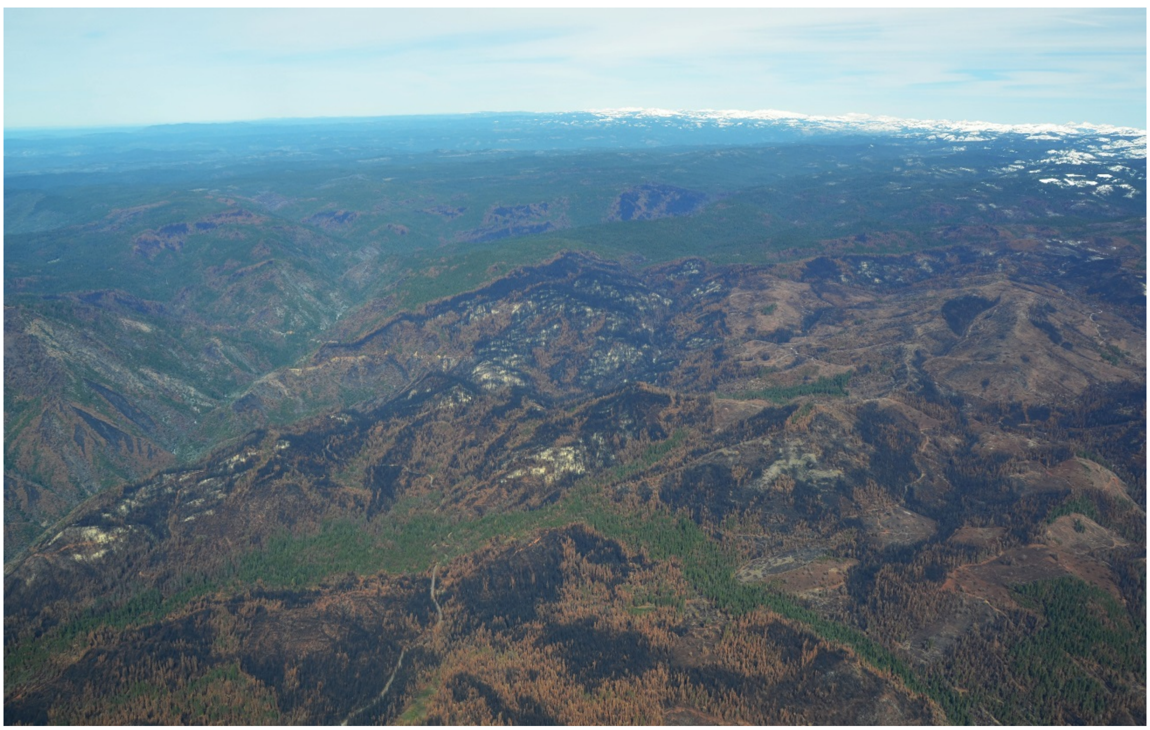
United States Department of Agriculture

Rim Fire Recovery (43033)

Environmental Impact Statement



Forest Service | Stanislaus National Forest | R5-MB-270 | August 2014

Rim Fire Recovery (43033)

Environmental Impact Statement

Stanislaus National Forest

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Cooperating Agencies: None

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Abstract: This Environmental Impact Statement (EIS) describes a proposal by the Stanislaus National Forest which would include: salvage of dead trees; hazard tree removal along low standard roads; fuel reduction for future forest resiliency to fire; road improvements to enhance hydrologic function; and, enhancement of wildlife habitat. The EIS discloses the direct, indirect and cumulative environmental effects that would result from the proposed action, a no action alternative and two additional action alternatives. The Responsible Official has not identified a preferred alternative at this stage.

Cover Photo: view north from over Corral Creek at the heart of the Rim Fire Recovery project area shows a mosaic of vegetation burn severities. The Clavey River drainage is on the left, Reed Creek is in the middle-ground and Hull Creek is in the background. EIS Appendix P (Photos), which is available in the project record, contains a wide-range of other photos related to this project.

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Summary

The Forest Service prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EIS discloses the environmental impacts that would result from the proposed action, a no action alternative and 2 additional action alternatives developed in response to issues raised by the public. The Responsible Official has not identified a preferred alternative at this stage.

Background

The Rim Fire started on August 17, 2013 in a remote area of the Stanislaus National Forest near the confluence of the Clavey and Tuolumne Rivers about 20 miles east of Sonora, CA. Over several weeks it burned 257,314 acres, or 400 square miles including 154,530 acres of National Forest System (NFS) lands. The fire also burned within Yosemite National Park (78,895 acres), Sierra Pacific Industries private timberland (16,035 acres), other private land (7,725 acres) and Bureau of Land Management (BLM) land (129 acres).

The Rim Fire Recovery (Rim Recovery) project is located within the Rim Fire perimeter in the Stanislaus National Forest on portions of the Mi-Wok and Groveland Ranger Districts. The project boundary includes all NFS lands within the fire plus a few locations where road and roadside improvements extend slightly outside the perimeter.

Purpose and Need

The Forest Service identified the following needs for this project.

1. ***Capture Economic Value through Salvage Logging***

   The tremendous number of dead trees across this large landscape creates the need for the removal of this perishable commodity in a timely manner. If removed within the next 2 years, the value of the dead trees would pay for their removal from the forest and potentially for other future restoration treatments. Leaving the dead trees on site would create a large and dangerous fuel load in this vast area, and future removal of the down material if desired, would be very difficult, costly, and time consuming.

2. ***Provide Worker and Public Safety***

   The Rim Fire significantly increased the risk to human life, safety and property. Providing a safe environment for both public use and the administration of affected roads and facilities is critical.

3. ***Reduce Fuels for Future Forest Resiliency***

   Harvesting dead timber reduces the existing fuel load of standing dead trees to protect multiple resources including soils and watersheds from future high-intensity fires. In order to reintroduce fire into these areas as soon as possible, the current fuel load needs to be reduced.

4. ***Improve Road Infrastructure to Enhance Hydrologic Function***

   Road sediment increases are likely to occur in high soil burn severity areas and to a lesser extent in moderate soil burn severity areas. Ensuring that water is properly funneled through these systems to drainages that can move and utilize this resource is critical for protection of watersheds and soils, and also to provide the best aquatic habitat within these systems.

5. ***Enhance Wildlife Habitat***

   Because the fire burned through 46 California spotted owl PACs, as well as thousands of acres of other critical habitat, retaining old forest structures (large snags and downed logs) is important at this time since future recruitment of these old forest features is not expected to occur until decades to centuries into the future.

Proposed Action

The Forest Service proposed action, within the Rim Fire perimeter on NFS lands includes:

- Salvage of dead trees and fuel reduction (28,326 acres)
- Hazard tree removal and fuel reduction along low standard roads (341 miles or 16,315 acres)
- Road reconstruction (319.9 miles) and road maintenance (216.1 miles)
- New road construction (5.4 miles)
- Temporary road construction (13.2 miles)
- Rock quarry sites (7)
- Water sources (94 locations)

Significant Issues

Scoping identified issues which are a point of discussion, dispute, or debate with the Proposed Action. An issue is an effect on a physical, biological, social, or economic resource. An issue is not an activity; instead, the predicted effects of the activity create the issue. Significant Issues are used to formulate alternatives, prescribe mitigations measures, or analyze environmental effects. Issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflicts. Significant issues listed are based on public comments.

1. Health and Safety

a. Existing conditions do not provide a safe environment for administration and public use of roads because hazard trees pose a threat to health and safety.
b. Public conflicts with logging operations along roads and worker conflicts along power lines and Highway 120 pose threats to worker and public safety.

2. Snag Forest Habitat

a. Proposed activities may affect black-backed woodpecker (BBWO) populations because the woodpeckers may occur at higher densities in areas treated and the project does not include avoidance measures or limited operating periods for nesting BBWO.
b. Proposed activities may affect spotted owls because remapping of existing Protected Activity Centers (PACs) and Home Range Core Areas (HRCAs) burned in the fire would damage this still viable and important owl habitat.

3. New Road Construction

c. Proposed new road construction may affect roadless areas and destroy habitat because these areas are currently undisturbed and inaccessible to motor vehicles.

4. Wildlife Habitat

d. Proposed activities may affect critical deer winter range as well as oak and green island habitat because the project does not include specific protection or enhancement measures.
e. Proposed management requirements seem excessive (i.e., a one mile buffer for suitable frog habitat and 20 down logs within streams every mile) because these measures are not necessary and the cost of implementation is high.

5. Salvage Logging

f. Proposed activities may reduce biodiversity, threaten rare plants, and impact the outstandingly remarkable values and integrity of the Clavey River due to impacts from salvage logging.
g. Application of sporax may affect implementation of the logging because it is not necessary and adds costs.

6. Soil and Watershed Impacts

h. Proposed activities may affect streams by causing significant sedimentation and soil loss because of the already compromised condition of these areas and insufficient buffers.

Alternatives Considered in Detail

The action alternatives (Alternatives 1, 3 and 4) and the no action alternative (Alternative 2) are considered in detail. The no action alternative, as required by the implementing regulations of NEPA, serves as a baseline for comparison among the alternatives (73 Federal Register 143, July 24, 2008; p. 43084-43099). The following sections describe each of the alternatives considered in detail (see Map Package and project record for detailed maps of each alternative).

Table S.01-1 provides a summary of the proposed activities included in each alternative and Appendix E (Treatments) provides detailed information for each specific treatment unit.

Alternative 1 (Proposed Action)

Alternative 1 includes salvage logging on up to 28,326 acres including 24,127 acres of ground based, 16 acres of ground based/skyline swing, 2,930 acres of helicopter, and 1,253 acres of skyline treatments. Proposed fuel treatments include 7,626 acres of biomass removal, 24,143 acres of machine piling and burning and 4,199 acres of jackpot burning. Fell and remove hazard trees (green and dead) adjacent to 341 miles of forest roads outside of proposed salvage units, amounting to 16,315 acres. Some non-merchantable trees may be felled and left in place. Alternative 1 includes 5.4 miles of new road construction, 319.9 miles of route reconstruction and 216.1 miles of road maintenance along low standard roads. Within Critical Winter Deer Range and adjacent to Yosemite National Park, units (totaling 1,351 acres) were identified for salvage and/or biomass removal to achieve desired forage/cover ratios and to provide for deer passage and access.

Alternative 2 (No Action)

Alternative 2 (No Action) provides a baseline for comparison with the other alternatives (Table S.01-1). Under Alternative 2 (No Action), general salvage and hazard tree abatement and removal adjacent to lower standard roads would not occur. None of the viable timber would be removed from this area leaving tens to hundreds of tons of fuel per acre once these trees fall down and rendering access for firefighting virtually impossible. No hazard tree removal would occur adjacent to lower standard roads, leaving thousands of existing hazard trees to fall on their own as a result of natural forces.

Alternative 3

Alternative 3 responds to issues and concerns related to Snag Forest Habitat, New Road Construction, Wildlife Habitat, and Soil and Watershed Impacts (Chapter 1.08). Compared to Alternative 1, it addresses those issues by proposing additional wildlife habitat enhancement including biomass removal in Critical Deer Winter Range and the Forest Carnivore Connectivity Corridor (FCCC) Forest Plan Amendment, additional soil and watershed protection (mastication and drop and lop), and less new road construction. It also includes research related to wildlife, fuels, watershed, and soils questions.

Alternative 4

Alternative 4 is similar to Alternative 3 except that it replaces new road construction with temporary roads and drops 2,500 acres of salvage logging in highly suitable BBWO habitat. Alternative 4 responds to issues and concerns related to Snag Forest Habitat, New Road Construction, Wildlife Habitat, and Soil and Watershed Impacts (Chapter 1.08) by proposing the same action items as Alternative 3 for wildlife habitat enhancement (including biomass removal in Critical Deer Winter Range and the FCCC Forest Plan Amendment) and, soil and watershed protection (mastication and drop and lop). It also includes research related to wildlife, fuels, watershed, and soils questions. Compared to Alternative 3, Alternative 4 further addresses the Snag Forest Habitat issue with additional BBWO habitat retention and the New Road Construction issue with no new road construction.

Alternatives Considered but Eliminated from Detailed Study

NEPA requires that federal agencies rigorously explore and objectively evaluate all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments and internal scoping suggested the alternatives briefly described below. Chapter 2.04 provides the reasons for eliminating them from detailed study.

a. ***Remove the Maximum Amount of Timber Value***
Salvage all NFS lands; produce 5,000 board feet or more per acre; eliminate expensive logging systems to maximize returns; minimize snags retained; and, limit biomass removal costs.

b. ***Hazard Tree Removal Only***
Cut and remove only dead trees adjacent to low standard roads.

c. ***Retain 100 Percent Black-Backed Woodpecker Modeled Pairs***
Retain 100 percent of BBWO pairs on NFS lands; reduce salvage by 7,500 acres; and, reduce hazard tree removal by 1,000 acres.

d. ***Retain 75 Percent of the Black-Backed Woodpecker Modeled Pairs***
Retain 75 percent of BBWO pairs on NFS lands; and, reduce salvage by half.

e. ***Retain Pre-Fire Spotted Owl PAC Boundaries, No PAC Remapping or Retiring***
Retain the 46 burned spotted owl PACs in their original location.

f. ***Natural Succession***
Allow natural recovery; decommission roads; and, reduce erosion, sedimentation and grazing.

Comparison of Alternatives

Table S.01-1 compares the alternatives with a summary of proposed activities.

Table S.01-1 Comparison of Alternatives: Proposed Activities

Proposed Treatments[1]	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Salvage ground based (acres)	24,127	0	26,252	24,176
Salvage ground based/skyline swing (acres)	16	0	16	16
Salvage aerial based helicopter (acres)	2,930	0	3,035	2,568
Salvage skyline system (acres)	1,253	0	1,096	1,066
Subtotal Salvage (acres)	**28,326**	**0**	**30,399**	**27,826**
Hazard Tree Removal (miles)	341	0	314.8	324.6
Subtotal Hazard Tree Removal (acres)	**16,315**	**0**	**15,253**	**15,692**
Total Hazard Tree and Salvage (acres)	**44,641**[2]	**0**	**45,652**[2]	**43,518**[2]
Biomass Removal	7,626	0	8,379	7,975
Mastication	0	0	1,309	1,309
Drop and Lop	0	0	2,228	1,798
Machine Piling and Burning	24,143	0	22,036	20,320
Jackpot Burning	4,199	0	4,147	3,650
Total Fuels (acres)	**35,968**[2]	**0**	**38,099**[2]	**35,052**[2]
New Construction (miles)	5.4	0	1.0	0
Reconstruction (miles)	319.9	0	323.6	315.0
Maintenance (miles)	216.1	0	200.6	209.3
Subtotal Construction and Maintenance (miles)	541.4	0	525.2	524.3
Temporary Road (new miles)	3.9	0	9.5	8.4
Temporary Road (existing miles)	9.3	0	22.7	22.1
Temporary Use – Revert (miles)	8.4	0	3.3	3.3
Subtotal Temporary Roads (miles)	**21.6**	**0**	**35.5**	**33.8**
Total Roads (miles)	**563.0**	**0**	**560.7**	**558.1**
Private Roads Needing Right-of-Way (miles)	11.2	0	11.2	11.2
Rock Quarry Sites	7	0	7	7
Potential Water Sources	94	0	94	94

[1] Salvage includes removal of dead trees and fuel reduction; Hazard Tree includes removal of hazard trees and fuel reduction.
[2] Salvage and Hazard Tree acres overlap with Fuel Reduction acres and do not total.

Summary of Environmental Consequences

Table S.01-2 compares the alternatives with a summary of selected environmental effects.

Table S.01-2 Comparison of Alternatives: Summary of Effects

	Resource and Indicator	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Air Quality	Smoke Emissions from Machine Pile Burning	effects to local communities and Yosemite would be minimal due to controlled emissions	none from pile burning, but under uncontrolled circumstances this amount of material would cause issues for sensitive groups	same as alternative 1	same as alternative 1
Aquatics	Foothill yellow-legged frog, Western pond turtle, Hardhead	may affect individuals but is not likely to lead to a trend toward federal listing or loss of viability	no project related effects	same as alternative 1	same as alternative 1
	California red-legged frog, Sierra Nevada yellow-legged frog	may affect, likely to adversely affect	no project related effects	same as alternative 1	same as alternative 1
Cultural Resources	Cultural Resources	none	no direct effects, moderate indirect and cumulative effects; may affect fragile resources	same as alternative 1; however, watershed treatments will benefit cultural sites	same as alternative 3
	Cultural Resource Special Interest Area (SIA)	salvage removal will enhance or protect the cultural values of the SIA	none	same as alternative 1	same as alternative 1
Fire and Fuels	Fire Behavior	fire effects in treated units would be significantly reduced	future fires would burn with increasingly higher intensities	similar to alternative 1; treatments provide break in fuel profiles	same as alternative 3
	Fire Suppression Capability	high capability; reduced fuel continuities; increased safety; reduced potential for resource damage; potential for reduced suppression costs	capability dramatically declines over time; fire effects exceed firefighter capabilities; fireline production rates decline over time	same as alternative 1	same as alternative 3
	Fuel Loading	surface fuel loading reduced to 10 tons/acre; reduced risk of substantial erosion and sedimentation caused by future stand-replacing fire	Increased surface fuel loading estimated at 42 tons/acre in 10 years and 78 tons/acre in 30 years; future reburn likely to lead to erosion and sedimentation	surface fuel loading reduced to 10 to 20 tons/acre; reduced risk of substantial erosion and sedimentation caused by future stand-replacing fire	same as alternative 3
Invasive Species	Habitat Alteration and Vectors	high risk for habitat alteration; high risk of increased vectors	less risk of spreading weeds than alternatives 1, 3, or 4	moderate risk for habitat alteration and moderate to high risk of increased vectors	same as alternative 3
Range	Grazing Management	Improves safety, access, administration, and livestock movement	Safety risks to managers. Negatively affects access and livestock movement	same as alternative 1	same as alternative 1
	Rangeland Vegetation	no long term changes to vegetation types; beneficial effect on rangeland vegetation	no direct effects; potential for negative indirect effects from falling dead trees	same as alternative 1	same as alternative 1
Recreation	Recreation Access and Opportunity	negative effects on some developed recreation sites; short term negative impacts to dispersed recreation; positive effects to public safety and recreation access	negative long-term effects to recreation access and public safety; closure of some developed recreation sites is likely to result in over-use of open developed sites	same as alternative 1	same as alternative 1

	Resource and Indicator	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Sensitive Plants	Sensitive Plants	management requirements would protect sensitive plants	no direct effects; negative indirect effects might occur from falling dead trees	similar to alternative 1	same as alternative 1
Society	Social and Cultural Impacts	administrative access enhanced, dispersed recreation open, and public firewood gathering allowed	administrative access constrained, dispersed recreation closed, and public firewood gathering not allowed	same as alternative 1	same as alternative 1
	Temporary Employment Generation	6,659 annual jobs supported, based on 661 mmbf and other recovery activities	no increase in annual jobs	6,318 annual jobs supported based on 623 mmbf and other recovery activities	5,511annual jobs supported based on 541 mmbf and other recovery activities
Soils	Soil Stability and Effective Soil Cover	slight reduction in erosion	erosion rates remain high, slightly higher than alternative 1	improves cover, reduces erosion hazard ratings and erosion rates in WSAs compared with alternative 1	similar to alternative 3
	Porosity	improves porosity; limited porosity decreases in areas off skid trails; decreases effects of soil sealing	additional compaction will not occur; however, existing skid trails and temporary roads would not be subsoiled.	similar to alternative 1	similar to alternative 1
Transportation	Forest Transportation System Conditions	safer, well maintained system	access not improved, unsafe conditions along roads, system not as well maintained as in alternative 1	same as alternative 1	same as alternative 1
Watershed	Erosion and Sedimentation (Timber and Fuel Reduction Activities)	negligible change in erosion rates in most watersheds; one watershed with slightly elevated erosion and two watersheds with decreased erosion; highest potential for erosion and sedimentation related to fuel reduction	erosion rates similar to alternative 1 and higher than alternatives 3 and 4; sedimentation would not increase; existing skid trail sediment transport networks remain	negligible change or decrease in erosion rates in most watersheds; watershed treatments increase ground cover and reduce erosion in WSAs; less potential for erosion and sedimentation in WSAs than alternative 1	same as alternative 3
	Erosion and Sedimentation (Road Related Activities)	road treatments reduce erosion potential; reduced erosion potential on existing temporary roads; some erosion and sedimentation potential for new temporary roads, water sources and material sources	increased sedimentation from road-stream hydrologic connectivity; existing temporary roads not decommissioned; increased risk of excessive sedimentation from stream crossing failures	similar to alternative 1	similar to alternative 1
	Riparian Vegetation	slight beneficial effects to riparian obligate species recovery; management requirements protect existing obligate species, fens and meadows	no disturbance to riparian species	same as alternative 1	same as alternative 1

	Resource and Indicator	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Watershed	Stream Condition	no measurable changes in stream flow or channel incision; stream banks not degraded; increased LWD and sediment storage	no measurable changes in stream flow or channel incision; initially less ground cover along stream banks; large levels of LWD and sediment storage over time	no measurable changes in stream flow or channel incision; stream banks not degraded; increased LWD and sediment storage, but less than alternative 1	same as alternative 3
	Water Quality (Beneficial Uses of Water)	water temperature not affected; some sedimentation; limited potential for registered borate compound to contaminate surface waters; no effects to beneficial uses	beneficial uses would continue to be met	same as alternative 1	same as alternative 1
Wildlife	Valley elderberry longhorn beetle	may affect but is not likely to adversely affect the Valley elderberry longhorn beetle; will not affect Designated Critical Habitat	same as alternative 1	same as alternative 1	same as alternative 1
	Bald eagle, California spotted owl, Great gray owl, Northern goshawk, Pacific marten, Pallid bat and fringed myotis	may affect individuals but is not likely to result in a trend toward federal listing or loss of viability	same as alternative 1	same as alternative 1	same as alternative 1
	Fisher	may affect individuals, but is not likely to contribute to the need for federal listing or result in loss of viability for the fisher	same as alternative 1	same as alternative 1	same as alternative 1
	Black-backed woodpecker	lowest predicted pair density; retains 41 percent of modeled pairs	retains 100 percent of modeled pairs	second lowest predicted pair density; retains 46 percent of modeled pairs	highest predicted pair density of the action alternatives; retains 54 percent of modeled pairs
	Mule deer	improves 1,352 acres of critical winter deer range	improves 0 acres of critical winter deer range	improves 4,416 acres of critical winter deer range	same as alternative 3

LWD=Large Woody Debris; **WSA**= Watershed Sensitive Area

1. Purpose of and Need for Action

The Forest Service prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Draft EIS discloses the direct, indirect and cumulative environmental impacts that would result from the proposed action and alternatives.

1.01 Document Structure

The document is organized into the following chapters and sections:

- **Chapter 1** (Purpose of and Need for Action): briefly describes the proposed action, the need for that action, and other purposes to be achieved by the proposal. It also details how the Forest Service informed the public of the proposed action and how the public responded.
- **Chapter 2** (The Alternatives): provides a detailed description of the proposed action as well as alternatives developed in response to comments raised by the public during scoping and information gained after the formulation of the proposed action and public scoping period. It includes a summary comparison of the action and effects of the alternatives.
- **Chapter 3** (Affected Environment and Environmental Consequences): describes the environmental impacts of the proposed action and alternatives.
- **Chapter 4** (Consultation and Coordination): provides a list of preparers and others consulted during the development of the EIS.
- **Index**: provides page numbers by document topic.
- **References**: provides a list of references and literature cited in the EIS.
- **Appendices**: provide more detailed information to support the analyses presented in the EIS.
- **Map Package**: the separate map package includes large scale maps showing treatment units and other information included in each alternative.

Additional documentation, including detailed analyses of project area resources, may be found in the project record located at: Stanislaus National Forest, 19777 Greenley Road, Sonora, CA 95370.

1.02 Background

The Rim Fire started on August 17, 2013 in a remote area of the Stanislaus National Forest near the confluence of the Clavey and Tuolumne Rivers about 20 miles east of Sonora, CA. Exhibiting high to extreme fire behavior with multiple flaming fronts, the fire made runs of 30,000 to 50,000 acres on two consecutive days. It quickly spread up the Tuolumne River watershed and its main tributaries: Clavey River, North Fork Tuolumne, Middle Fork Tuolumne, South Fork Tuolumne and Cherry Creek. It also overlapped into the North Fork Merced River. Overall, 98% of the Rim Fire occurred in the Tuolumne River watershed. Over several weeks it burned 257,314 acres, or 400 square miles including 154,530 acres of National Forest System (NFS) lands. The fire also burned within Yosemite National Park (78,895 acres), Sierra Pacific Industries private timberland (16,035 acres), other private land (7,725 acres) and Bureau of Land Management (BLM) land (129 acres)[1].

The Rim Fire is the third largest wildfire in California history and the largest wildfire in the recorded history of the Sierra Nevada. It is also California's largest forest fire, burning across a largely conifer dominated forest landscape. The two larger fires were wind driven brush fires near San Diego in 2003

[1] All acreage figures are based on fire perimeter and land ownership information as of October 24, 2013.

and in Lassen County in 2012. Figure 1.02-1 shows the location of the Rim Fire within the boundaries of the Stanislaus National Forest, Yosemite National Park and the local counties (Mariposa and Tuolumne).

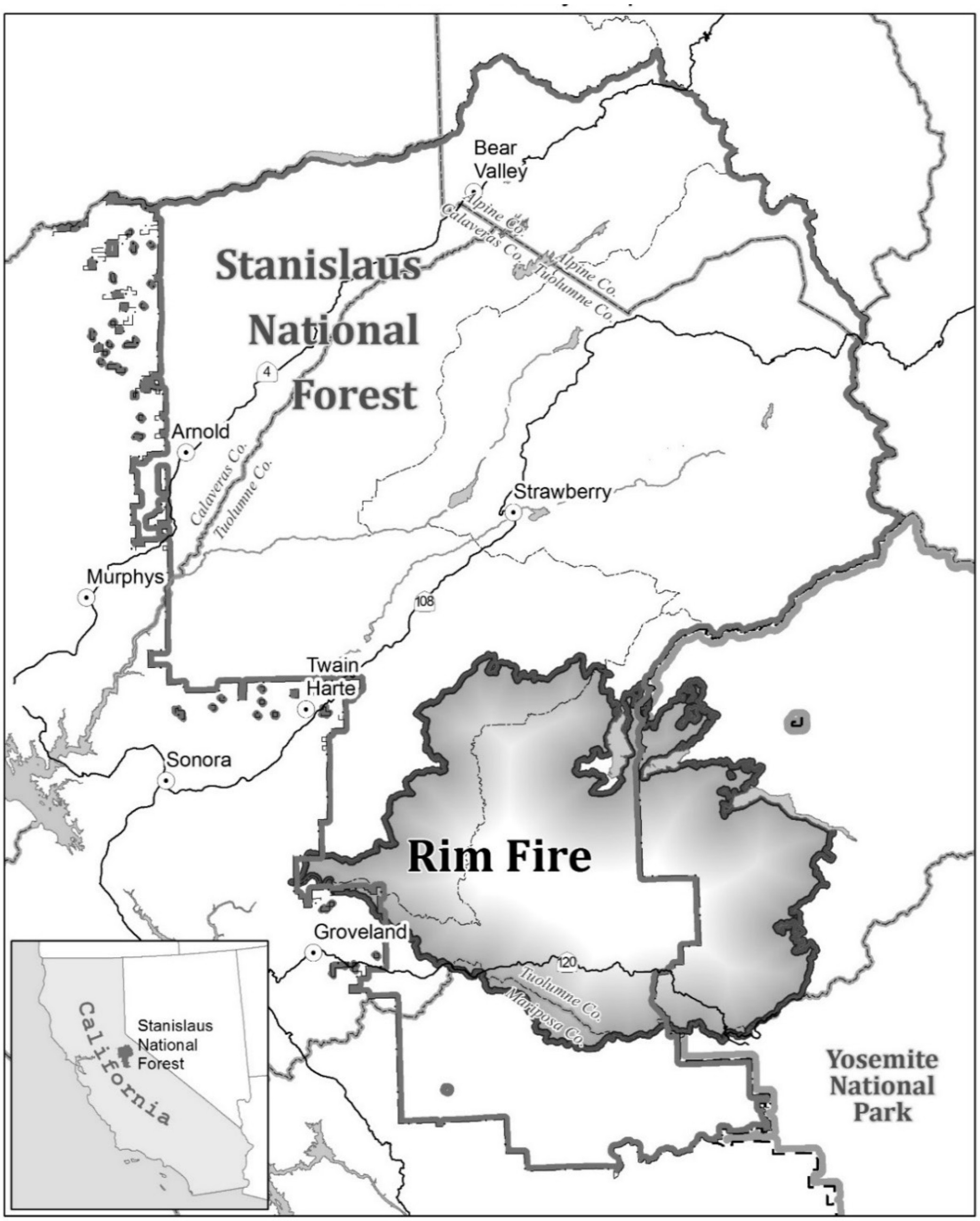

Figure 1.02-1   Rim Fire Vicinity Map

The Rim Fire burned between 1,000 to 7,000 feet in elevation in a mixed severity mosaic pattern through all the principal vegetative communities within it. The fire impacted a range of California Wildlife Habitat Relationships (CWHR) vegetation types including grass-oak woodlands, chaparral, lower westside ponderosa pine, mixed conifer forests and high elevation true fir and lodgepole pine. The fire resulted in areas of high, moderate and low vegetation burn severity. Figure 1.02-2 shows an example of high soil burn severity and high vegetation burn severity in the Rim Fire. Figure 1.02-3 shows moderate soil burn severity and high vegetation burn severity. Figure 1.02-4 shows low soil burn severity and low vegetation burn severity.

Figure 1.02-2 High Soil Burn Severity and High Vegetation Burn Severity Photo

Figure 1.02-3 Moderate Soil Burn Severity and High Vegetation Burn Severity Photo

Figure 1.02-4 Low Soil Burn Severity and Low Vegetation Burn Severity Photo

The mosaic pattern of the fire resulted in areas of high, moderate and low vegetation burn severity as shown on a map in Figure 1.04-2. Figure 1.04-3 displays a map of the soil burn severity. Weather and timing played key roles in vegetation and soil burn severity; where fire entered during the night or at a time when humidity was higher and the weather calmer, the fire behavior was much less volatile than during daytime plume-driven fire runs that sometimes continued for miles. In the high vegetation and soil burn severity areas, the fire engulfed nearly all of the conifer forests and plantations, and chaparral that previously covered the landscape. In these areas, the fire consumed the vegetation, which moderates erosion during winter rains and provides food or cover for wildlife, leaving behind bare ground and ash. All that remained were standing charred trees with few limbs or needles and severely damaged trees that were not expected to survive. In the moderate vegetation and soil burn severity areas much of the conifer canopy was killed, but some overstory trees survived. Many trees retained burned limbs and needles, and most of the needles fell before winter to provide the first post-fire ground cover. The low soil and vegetation burn severity areas resulted in an underburn that consumed a minor amount of the woody fuels on the forest floor leaving mostly green, lightly burned trees in its path and much of the pre-fire ground cover intact. In addition, small scattered areas within the fire perimeter were left unburned as fire went around some natural features and moist riparian areas.

Due to dangerous conditions from trees damaged or killed by the Rim Fire, access to the project is currently closed to the general public. After determining that circumstances within the burn area presented unsafe conditions for public travel, Stanislaus Forest Supervisor Susan Skalski issued a temporary Forest Order (STF 2013-08) prohibiting public use within the burn area on August 22, 2013. The Forest Supervisor issued several updates changing the closure area in response to current conditions for public safety (2013-09 on 8/23/2013; 2013-10 on 8/31/2013; 2013-11 on 9/12/2013; 2013-14 on 9/27/2013; 2013-15 on 11/18/13). On April 14, 2014, the Forest Supervisor issued the current temporary Forest Order (STF 2014-01), opening portions of the previous closure area and prohibiting public use within the remaining portions of the burn area until November 18, 2014.

Project Location

The Rim Fire Recovery (Rim Recovery) project boundary is located within the Rim Fire perimeter within portions of the Mi-Wok and Groveland Ranger Districts on the Stanislaus National Forest. The project area includes all NFS lands within the fire plus a few locations where road and roadside improvements extend slightly outside the perimeter. It does not include Wilderness or any private, state or other federal lands. Each alternative assumes that adjacent federal lands, such as those administered by Yosemite National Park, will be managed according to existing management plans and applicable federal laws. Each alternative also assumes that private lands will meet applicable state and federal land use regulations.

Project Development

An event as large as the Rim Fire provides an opportunity to consider restoration at a landscape scale, considering the many ecological structures, processes, and functions that are desirable and sustainable for future forested conditions. The Forest Plan (USDA 2010a, p. 5 through 15) includes goals to create a fire resilient forest where fire is an integral part of the ecosystem, not a landscape altering force. To sustain forests into the future, natural and prescribed fire will be an important tool to protect this area from another stand replacing event. To that end, Stanislaus National Forest Fire and Fuels managers together with Researchers from the Pacific Southwest Research Station (PSW) compiled a strategy for the Rim Fire area outlining conditions along with features on the landscape that could help reduce the size and severity of future fires. The goal is not to prevent fires within the forest, but to modify fire behavior to lower severity, and to bring these areas back to a more historic heterogeneous structure where fire complements and sustains the system instead of destroying it.

The proposed structures include shaded fuel breaks along roads, large blocks of forest with lower densities adjacent to critical areas (i.e., private property and wildlife emphasis areas), heterogeneous forest structure throughout the area (clumpy, variable spacing of trees), limited amounts of plantations on southern and southwestern slopes where natural fire return intervals are high and the tree growing ability is low, and prescribed and natural fire occurs within stands every 5 to 20 years. Such features located across the landscape provide safe locations for firefighters to work from during wildfires and to utilize during prescribed burning activities (Johnson et al. 2013). The fire and fuels strategy fits well with the overarching objective of sustainable old forests for wildlife and timber production. Several critical wildlife species lost habitat within the Rim Fire; therefore, providing opportunities to return forests to this area is critical for sustainable populations and connectivity of habitat for wildlife movement and expansion.


Large coarse woody debris

The activities proposed within the Rim Fire Recovery EIS take the first step toward meeting the goals stated above. Two critical parts are the removal of the heavy dead fuel load within areas being considered for long-term forest management and creating SPLATS along key ridges and most roads. Salvage logging beginning in late summer 2014 and finishing in late 2015, would reduce fuels which will aid in the re-introduction of fire back into these areas (natural or prescribed) as soon as possible. If all the current standing fuels were left in place across this landscape the fire intensity during the next event would destroy most if not all of the recovering vegetation and cause much greater soil damage than the Rim Fire. Identifying and treating the SPLATS (also occurring over the next year) would provide areas where fire can be slowed or stopped and back burns can be utilized for suppression which is another reason roadside hazard tree removal is a critical part of this project. Biomass is proposed in this project within all SPLATs, a critical piece to meet reduced fuels across this landscape. It would occur during the timber sales (late summer 2014 through 2015) or be completed separately and completed sometime in 2016 and 2017. Tractor piling or jackpot burning on steeper slopes of residual fuels would also occur as part of this project after the completion of the timber sales, likely beginning in 2015 and finishing in 2018. Activity generated fuel created during the timber sale operations would also be required to be treated prior to the sale terminating.

Following the strategy, future reforestation (either natural or planted) would be focused on areas that are best suited to support a forest and be more resilient when the next fire comes. If planting occurs, it would likely begin in spring 2016 and occur over several years, avoiding south facing slopes, lower quality sites, and steep areas that will likely receive a higher intensity fire when the next one occurs. One of the primary goals of the strategy is to reintroduce fire and/or to let natural fire back into these “plantations” as soon as possible in order to ensure the long-term existence and viability of this new forest. Follow-up fuel maintenance treatments would also occur to maintain the desired conditions over the long-term within SPLATs, every 10 years or so. The Forest recognizes that fire will occur here again and setting up a landscape that is resilient to it is critical. In addition to vegetation resiliency, several other restoration needs exist within this landscape and will be addressed by the Forest under future analysis. These include noxious weed treatments, gully rehabilitation, protection of springs and meadows, meadow enhancement and habitat improvement.

While the fire and fuels strategy was being written, Forest wildlife biologists and PSW subject matter scientists evaluated the post-fire Protected Activity Center (PAC) conditions to determine viability of each one and options for those no longer providing the desired habitat. In addition, foresters verified the vegetation burn severity and identified economically feasible timber harvest of dead trees estimated to be a minimum of 5,000 board feet (BF) per acre of trees 16 inches diameter at breast height (dbh) and greater. These three efforts, along with Interdisciplinary (ID) Team review of the area and identification of the potential issues, led to the formation of the Proposed Action and associated Management Requirements.

PSW researchers met with the Forest's Interdisciplinary Team (ID Team) several times during the fall and winter to identify research questions and opportunities across this landscape. This effort proposed several areas within burned spotted owl PACs to be left intact for long-term research on fire effects on spotted owls, black-backed woodpeckers, and other species. In addition, a multitude of other wildlife, watershed, and forestry studies are proposed within the burn area. Using satellite imagery, the ID Team conducted a unit by unit review of the proposed action in December and identified desired changes. The two additional action alternatives also incorporate public scoping comments, input from collaborative partners (Rim Fire Technical Team and Yosemite Stanislaus Solutions), Tuolumne County officials, and local California Fish and Wildlife Service biologists.

In March 2009, PSW released General Technical Report 220, "An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests" (GTR 220) (North et al. 2009a). GTR 220 emphasized the importance of learning from historic conditions to determine sustainable desired conditions. This report summarized recent scientific literature suggesting that land managers produce different stand structures and densities across the landscape using topography and historic fire behavior to guide treatments. Historically, both topography and fire influenced forest structure and composition in the Sierra Nevada. Management that creates and mimics those historic stand structures and fire-mediated processes will help restore the natural role of fire on the landscape, create structural heterogeneity at multiple scales, and improve habitat quality by providing multilayered canopies and other key structures associated with sensitive wildlife species, such as the Pacific fisher, California spotted owl, and northern goshawk. Although there are no known occurrences of the Pacific fisher on the Stanislaus National Forest, nor is there specific management direction on the Forest to manage for fishers, the fisher is imperiled. Because of this, the ID Team identified habitat connectivity for potential future expansion of forest carnivore populations for the purpose of restoring and enhancing their habitat. In addition, critical deer winter range exists within the Rim Fire area. Yosemite Deer Herd travel, into and through the area, is important for this species to access lower elevation forage, such as grass, oaks, and nutritious acorns, needed for winter survival.

Forest Service direction and intent, recent science summarized by GTR 220, and the Rim Fire Vegetation Resiliency Strategy (project record) provide an extensive foundation of information to draw from during the Rim Recovery planning effort. The analysis in this document focuses on restoring ecosystem function, process, and resiliency by addressing issues related to vegetative composition and structure, forest health, fuels, hardwood and wildlife habitat improvement, and socio-economic objectives. Although these are long-term goals, how and where salvage logging is conducted, if conducted at all, will set the stage for future activities in this area and provide some habitat components within the burn that will not be naturally available for decades to come (i.e., large down woody material).

The Rim Fire is not the first wildfire that occurred in this area. Since 1944, 20 large fires burned fully or partially within the Rim Fire area leaving portions of the area now burned up to four times over that period. Figure 1.02-5 shows the large fire history of this wildfire dominated landscape.

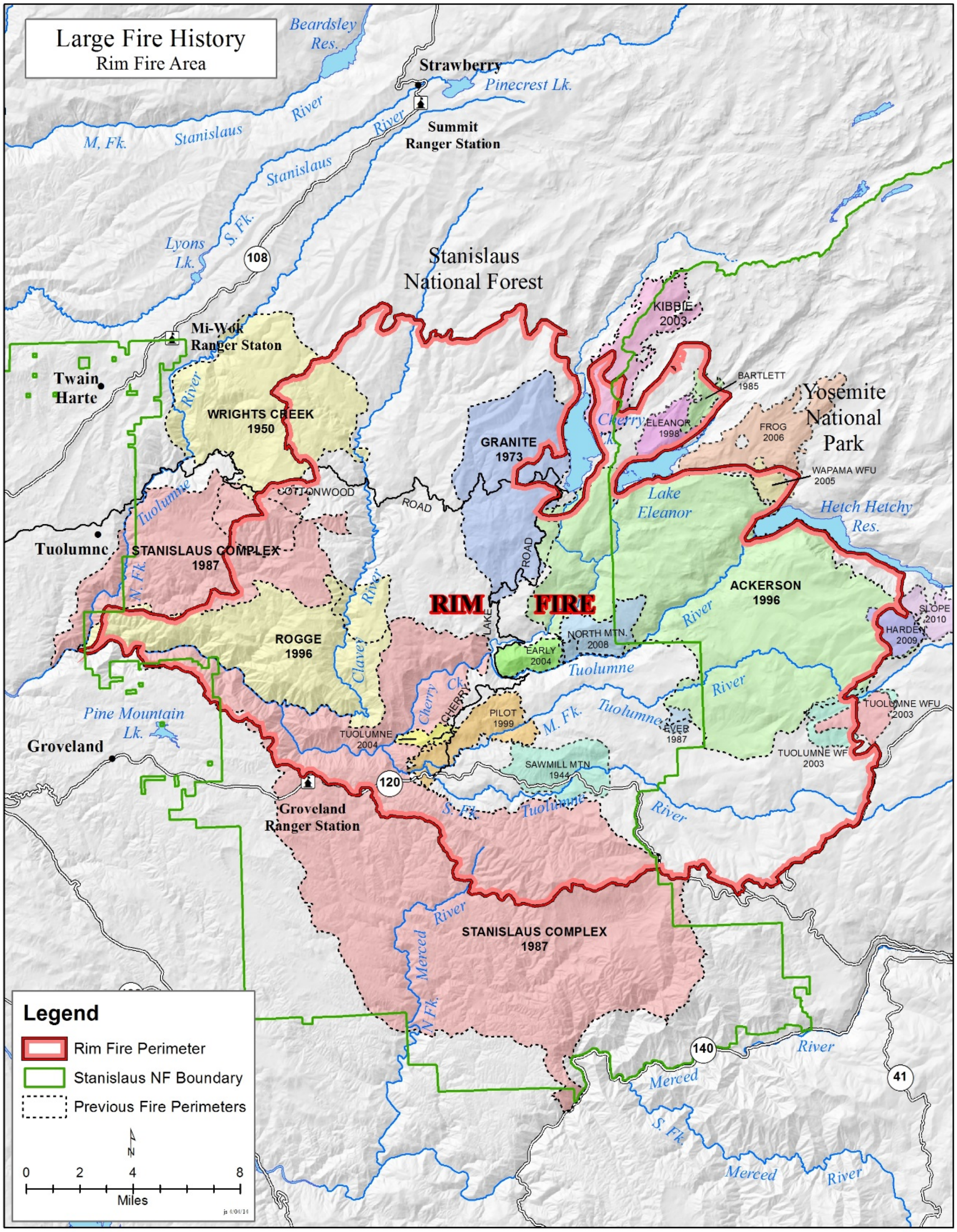

Figure 1.02-5   Large Fire History Map

Salvage logging of burned trees and roadside hazard trees is the first step in the process of long-term forest recovery. In order to provide critical structures within the recovering forests over time, retention of snags (dead standing trees) and down logs are necessary initial components for rebuilding wildlife habitat and healthy soils and watersheds. Snags provide short term benefits for many species of wildlife, and long-term down woody structure. Most of the burned forested stands were over-stocked due to decades of fire exclusion and now have far more dead trees within them than would have occurred naturally. In addition, the vast area of high severity burn is far larger than historic gap sizes would have been in the Sierra Nevada, setting up another severe fire scenario if not treated. In the short-term, while the dead trees are still standing and before the vegetation re-grows, the fire intensity would be low. Over time, if the dead trees and logs were left in place impacts to multiple resources including severe soil damage (hydrophobic soils) would result and be far more damaging than the Rim Fire (Monsanto and Agee 2008).

Forest Plan Direction

The Forest Service completed the Stanislaus National Forest Land and Resource Management Plan (Forest Plan) on October 28, 1991 (USDA 1991). The Stanislaus National Forest "Forest Plan Direction" presents the current Forest Plan management direction, based on the original Forest Plan, as amended (USDA 2010a). The Forest Plan Compliance Checklist (project record) provides additional details.

Relation to Other Rim Fire Projects

The Rim Fire Hazard Tree (Rim HT) Project was the first of multiple recovery and restoration projects that may be proposed over the next several years within the Rim Fire area. The April 25, 2014 decision approved removal of both hazard trees and trees felled during fire suppression and rehabilitation actions. The Rim HT Project is currently being implemented and will continue to be implemented regardless of the decision that is made for the Rim Fire Recovery Project. The Rim Fire Recovery Project treatment areas do not overlap with the Rim HT Project treatment areas; nor does the Rim Fire Recovery Project include any roads or facilities included under the Rim HT Project. Therefore, while this EIS considers the effects of the Rim HT Project as part of the cumulative effects analysis, the Rim HT Project and this project are not connected actions under CEQ's NEPA regulations (see 40 C.F.R. § 1508.25 (1)).

After the Rim Fire Recovery Project decision is made, the Forest Service expects to engage in further restoration and rehabilitation activities within the Rim Fire area. For example, the agency is contemplating future projects to address reforestation, ecosystem restoration, fuels treatments, and other forest restoration activities. Such future actions will help contribute to the recovery and restoration of the area burned by the Rim Fire, taking advantage of the work done through this project and building on it. However, it is still very early in the planning process for those future actions, and in many instances the planning process for such actions has not even begun. For those future actions where some planning has begun, such as for reforestation, the agency has not developed any specific proposals that can be meaningfully evaluated at this time. Much of what happens with future reforestation and other restoration actions will depend on information that is simply unavailable at this point, and may not be known for months, or even years. Identifying areas where reforestation would occur, for example, is dependent on many factors including the reduction of fuels within this project area along with older plantations where the trees are too small to salvage log. Early reintroduction of fire into the Rim landscape is desirable to keep fuel loading low within and outside of plantations. Careful planning needs to occur to devise a fuel break pattern and planting strategy that will be effective in the long-term establishment of a forest in the Rim Fire area. Locations where successful natural regeneration is successful and would ensure a future forest (plenty of trees per acre) is a factor that will help dictate where and how reforestation is done. The type of competing vegetation that returns to the site is the most important factor in planning future reforestation success and this will not be fully known until later this season at the earliest. The type, size and distribution of competing vegetation will dictate treatment types needed for control, i.e. vegetation germinated by seed can be treated mechanically while sprouting vegetation might be treated chemically.

Because the Rim Fire Recovery Project has independent utility and will proceed regardless of whether future agency actions occur within the Rim Fire area, the future actions and this project are not connected actions under CEQ's NEPA regulations. Furthermore, because none of the future actions have reached the stage of being "identified proposals" that can be meaningfully evaluated, those future actions do not meet the definition of "reasonably foreseeable future actions" in the Forest Service's NEPA regulations (36 C.F.R. § 220.3, 220.4(a)(1)). Therefore, future restoration and recovery actions are not included in the cumulative effects analysis for this project. If there are cumulative effects arising from future projects in combination with the residual effects this project, those cumulative effects will be considered as part of the environmental effects analysis for those future projects, to the extent required by NEPA.

1.03 Purpose And Need

As described in Chapter 1.02 in Project Development, the following goals and objectives helped to develop the purposes and needs of this project listed below.

- Restore the forest at a landscape scale;
- Conserve ecological structures, processes, and functions that are desirable and sustainable for future forested conditions;
- Bring areas back to a more historic heterogeneous structure where fire complements and sustains the system instead of destroying it;
- Restore ecosystem function, process, and resiliency by addressing issues related to vegetative composition and structure, forest health, fuels, hardwood and wildlife habitat improvement, and socio-economic objectives;
- Repair infrastructure to allow for administration and enhance hydrologic function; and,
- Provide safe access.

1. Capture Economic Value through Salvage Logging

The tremendous number of dead trees across this large landscape creates the need for the removal of this perishable commodity in a timely manner. If removed within the next 2 years, the value of the dead trees would pay for their removal from the forest and potentially for other future restoration treatments. Leaving the dead trees on site would create a large and dangerous fuel load in this vast area, and future removal of the down material if desired, would be very difficult, costly, and time consuming. The value of these trees is short lived, and will continue to decline over time. Even with implementation within the first year, it is estimated that trees below 16-inch diameter at breast height (dbh) would no longer have value. The diameter size of a tree with economic value will only increase over time as the trees deteriorate with time.

2. Provide Worker and Public Safety

Currently, the area contains excessive stretches of fire-killed and structurally compromised trees along low standard forest roads not included in the Rim HT project. The dramatic change in forest condition as a result of the Rim Fire significantly increased the risk to human life, safety and property. Miles of hazard trees now comprise much of the overall forest structure. Providing a safe environment for both public use and the administration of affected roads and facilities is critical, and the reason for the removal of dead and damaged trees that could fall onto roads. In addition, fighting future fires in these areas would be dangerous, due to the multiple dead trees and fuel loading. The Chief of the Forest Service and the Regional Forester stress that the safety of the public and our employees is our central concern. Within the transportation corridors, hazard tree management is vital to everyone’s safety (USDA 2012c).

3. Reduce Fuels for Future Forest Resiliency

Harvesting dead timber supports the objectives of the Rim Fire Vegetation Resiliency Strategy (project record) by reducing the existing fuel load of standing dead trees to protect multiple resources including soils and watersheds from future high-intensity fires. Key areas identified as treatments needed for resiliency may be less economical to log, but are critical for creating greater fire resiliency of future forests. Removing burned trees and fuels where tree mortality exceeds the needs for snag and log recruitment is the first step to meet desired fuels conditions. The goal is to leave no more than 20 tons per acre and 10 tons per acre in Strategically Placed Landscape Area Treatments (SPLATs) and Strategic Fire Management Features (SFMF) while working with other resources to ensure soil and hydrologic stability. Higher levels would make this area more prone to future high-intensity fires, burning through the recovering forest before it could mature. In order to reintroduce fire into these areas as soon as possible, the current fuel load needs to be reduced to a level where fire would burn in patchy mostly low, and some moderate, vegetative burn severities.

4. Improve Road Infrastructure to Enhance Hydrologic Function

One of the most potentially damaging factors for watershed and soils resources is the improper movement of water from the road system within the burn. Road sediment discharge increases are expected as a result of the Rim Fire. Most increases are likely to occur in high soil burn severity areas and to a lesser extent in moderate soil burn severity areas. Problems include areas where road drainage is not fully functional and culverts at road-stream crossings are undersized or damaged. The undersized culverts cannot handle post-fire flow volume and the additional woody debris and sediment it carries. Ensuring that water is properly funneled through these systems to drainages that can move and utilize this resource is critical for protection of watersheds and soils, and also to provide the best aquatic habitat within these systems.

5. Enhance Wildlife Habitat

Because the fire burned through 46 California spotted owl PACs, as well as thousands of acres of other critical habitat, retaining old forest structures (large snags and downed logs) is important at this time since future recruitment of these old forest features is not expected to occur until decades to centuries into the future. The fire also burned through critical deer winter range. Deer migration access to winter foraging areas is essential for a thriving deer herd. Downed trees and the potential for more dead trees to fall would continue to inhibit herd access to critical winter habitat and browse. Additional needs within the burn area to promote various species in the short and long-term include:

- Unlogged burned forest areas across the landscape to provide sufficient habitat for wildlife species dependent on post-fire environments (i.e. black-backed woodpecker).
- A forest carnivore connectivity corridor linking Yosemite National Park wildlife populations to future habitat providing opportunities for these species to move north into the Stanislaus National Forest.
- Areas within critical winter deer range for salvage and non-merchantable material removal to achieve desired forage and cover ratios and deer migration access to critical winter range.
- Enhancement of native vegetation cover, stabilization of channels by non-structural means, and minimization of adverse effects from existing roads and exposed bare soil within Riparian Conservation Areas (RCAs) and the Clavey River Critical Aquatic Refuge (CAR).

1.04 PROPOSED ACTION

This is the Proposed Action, as described in the Notice of Intent (78 Federal Register 235, December 6, 2013; p. 73498-73499), with corrections based on updated data and map information and completion of PAC remapping as stated in the scoping package. These corrections and refinements provide additional resource protection and a more accurate and informed proposed action.

The Forest Service proposed action, within the Rim Fire perimeter in the Stanislaus National Forest, includes: salvage of dead trees; removal of hazard trees along roads open to the public and roads used to access and implement proposed treatments; fuel reduction for future forest resiliency to fire; and, road improvements to enhance hydrologic function. Implementation is expected to begin summer 2014 and continue up to 5 years. Roadside hazard trees will be designated for removal using the Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region, April 2012 (Report RO-12-01). Dead trees in salvage units will be designated for removal based on “no green needles visible from the ground”. Proposed treatments in the project area include:

- Salvage of dead trees and fuel reduction (28,326 acres) including ground based mechanized equipment such as harvesters and rubber tired skidders (24,127 acres), ground based/skyline swing (16 acres) and aerial based helicopter (2,930 acres) or cable systems (1,253 acres).
- Removal of hazard trees and fuel reduction along existing low standard forest roads (341 miles or 16,315 acres).
- Reconstruction (319.9 miles) and maintenance (216.1 miles) to enhance hydrologic function and stream protection.
- New construction (5.4 miles) to allow for salvage removal and long-term access for future activities.
- Temporary road construction (13.2 miles). Temporary roads will be decommissioned following completion of project activities.
- Rock quarry sites (7 sites) identified to accommodate road needs.
- Water sources (94 potential locations) identified for road construction, reconstruction and maintenance as well as long-term resource needs.

No salvage treatments are proposed within Wilderness or Inventoried Roadless Areas. No salvage treatments are proposed within the wild classification segments of the Wild and Scenic Rivers. Hazard tree removal is considered within all river segment classifications. Project design will incorporate water quality Best Management Practices (BMPs) according to regional and national guidance.

Merchantable trees [likely those dead trees greater than 16 inches diameter at breast height (dbh) by the time of harvest] would be removed as sawlogs and non-merchantable trees of smaller diameters may be removed as biomass, masticated (shredded), felled and lopped, or machine piled and burned. Harvest would occur in a timely manner to minimize loss of value; dead trees lose their value within 2 years, or even less for smaller diameter material. It is anticipated salvage harvest operations would begin as soon as August 2014 and continue for up to 5 years. Figure 1.04-1 shows the treatment units included in the Proposed Action.

Chapter 2.02 includes a detailed description of this proposal under Alternative 1 (Proposed Action).

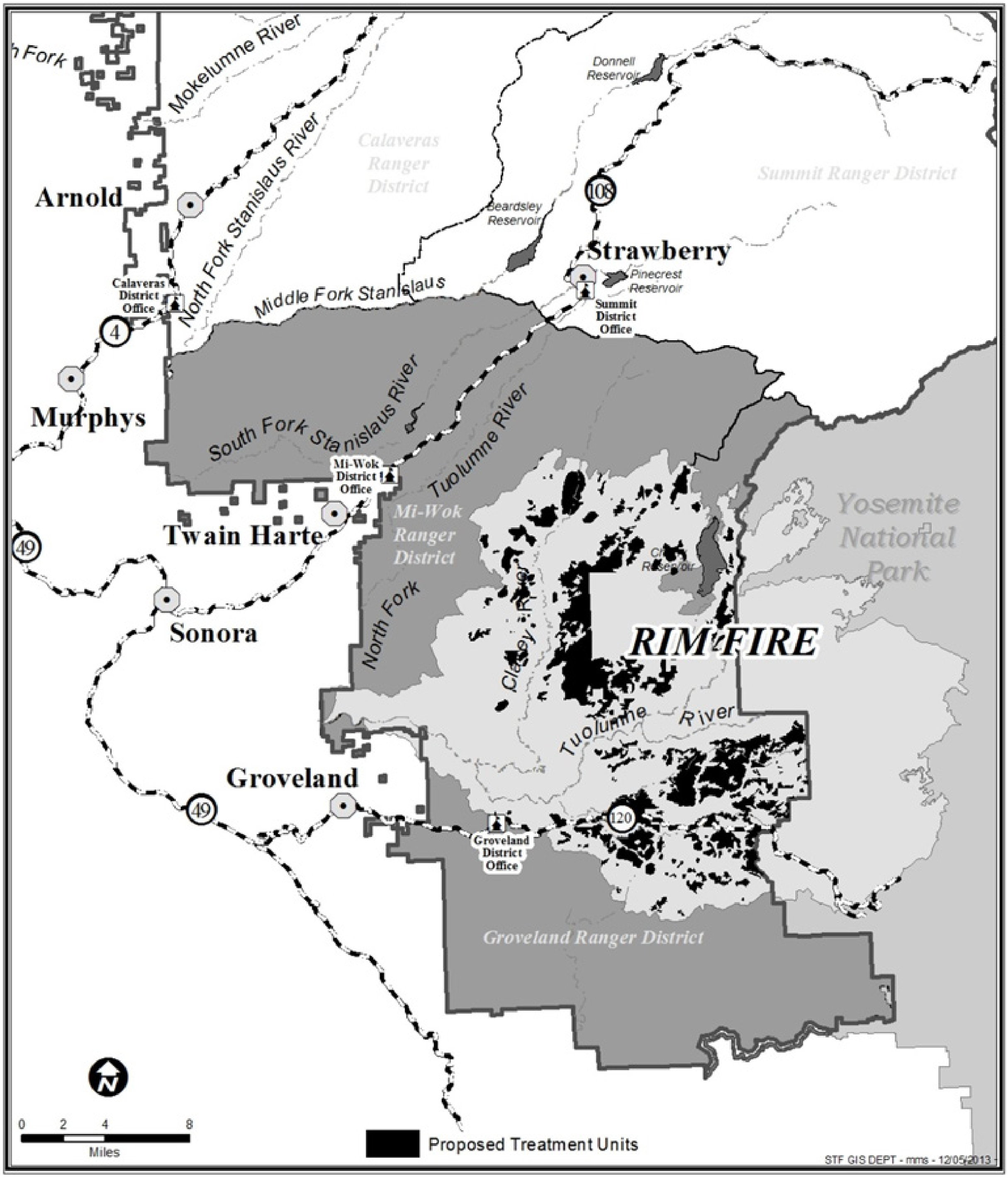

Figure 1.04-1 Rim Fire Recovery Proposed Action Treatment Units

Figure 1.04-2 shows vegetation burn severity mapped with the proposed action treatment units.

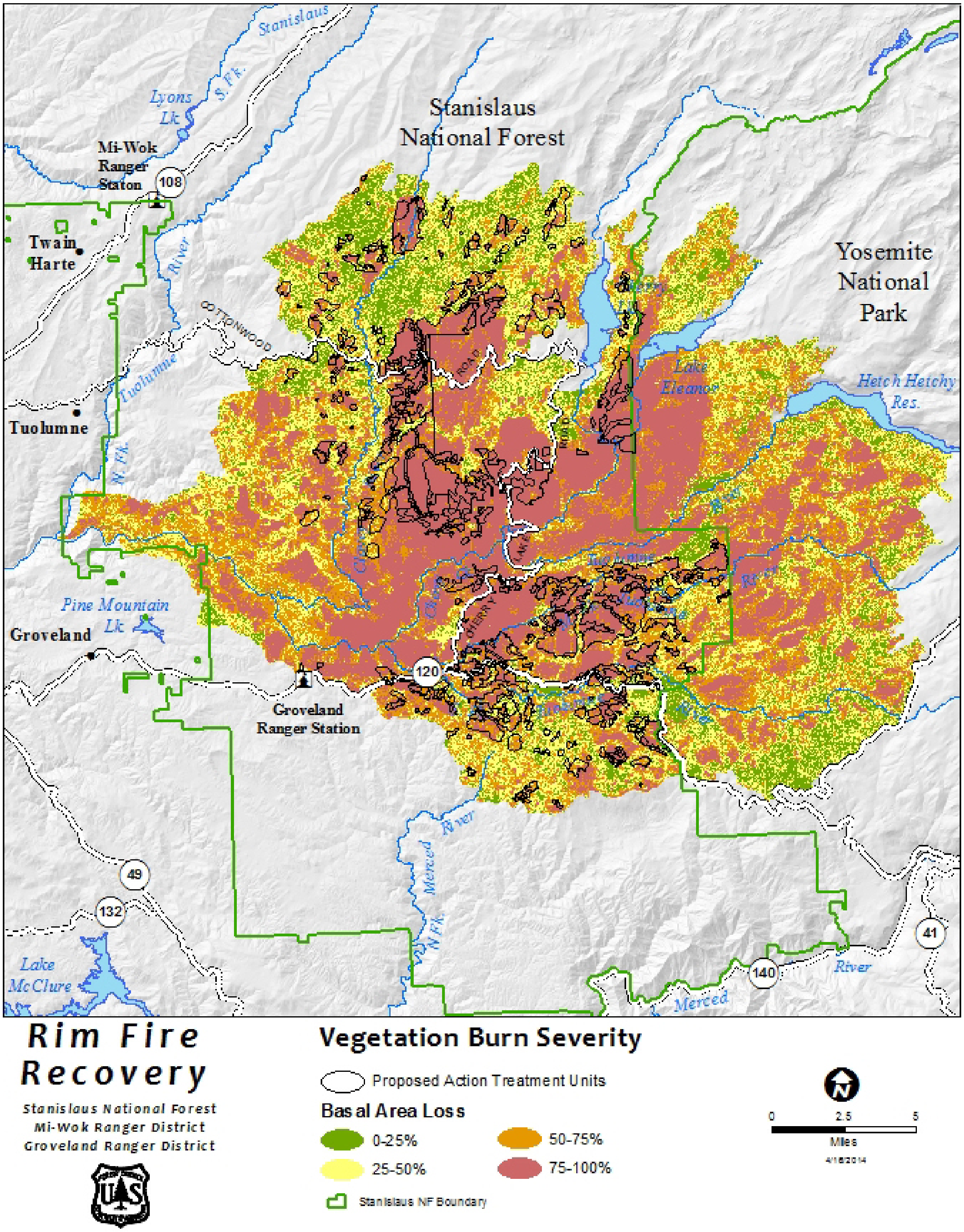

Figure 1.04-2 Vegetation Burn Severity Map

Figure 1.04-3 shows soil burn severity mapped with the proposed action treatment units.

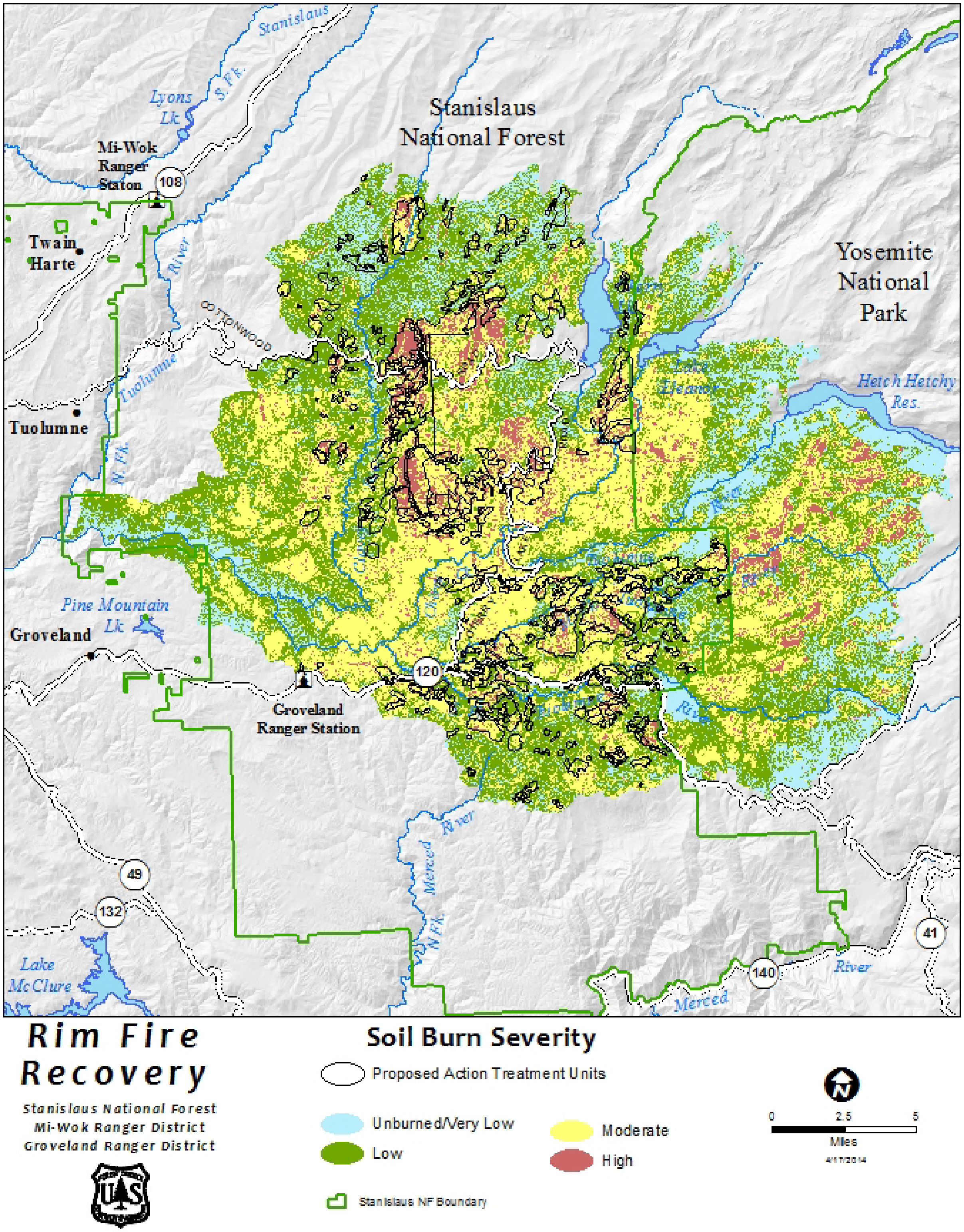

Figure 1.04-3 Soil Burn Severity Map

Updates to the Proposed Action

The Forest updated the proposed action based on subsequent field information and a unit-by-unit ID Team review. The updated proposed action differs from the original scoping package (Scoping) with over half the changes in relation to the remapping of the severely burned California spotted owl, great grey owl, and goshawk PACs as called for in the scoping package. Additional roads analysis led to additional categories of road actions. Temporary roads occur in two sub-categories (new and existing) to better capture impacts. In addition, the category "temporary use – revert" tracks non-system roads needed for project access and also anticipated as needed for future use separate from the Forest Transportation System (FTS).

Table 1.04-1 displays and compares the Proposed Action from Scoping with the updates identified for Alternative 1 (Proposed Action) in this draft EIS.

Table 1.04-1 Updates to the Proposed Action

Proposed Treatments[1]	Proposed Action (Scoping)	Alternative 1 (Proposed Action)
Salvage (ground based)	25,174 acres	24,127 acres
Salvage (ground based/skyline swing)	0 acres	16 acres
Salvage (aerial based helicopter)	3,147 acres	2,930 acres
Salvage (skyline system)	1,327 acres	1,253 acres
Subtotal Salvage	**29,648 acres**	**28,326 acres**
Hazard Tree Removal	369 miles	341 miles
Subtotal Hazard Tree Removal	**17,890 acres**	**16,315 acres**
Total Hazard Tree and Salvage	**47,538 acres**	**44,641 acres**
New Construction	6 miles	5.4 miles
Reconstruction	327 miles	319.9 miles
Maintenance	164 miles	216.1 miles
Subtotal Construction and Maintenance	**497 miles**	**540.6 miles**
Temporary Road Construction	14 miles	
Temporary Road Construction (new)		3.9 miles
Temporary Road Construction (existing)		9.3 miles
Subtotal Temporary Road Construction	**14 miles**	**13.2 miles**
Temporary Use - Revert	8 miles	8.4 miles
Total Road	**519 miles**	**562.2 miles**
Rock Quarry Sites	75	7
Potential Water Sources	95	94

[1] Salvage Treatments include removal of dead trees and fuel reduction; Hazard Tree Treatments include hazard tree removal and fuel reduction.

Changes to the Proposed Action between Draft and Final EIS

In response to public comments on the DEIS and other information, the proposed action now includes minor changes to: correct and clarify the management requirements as described in Chapter 2.

1.05 Principal Laws and Regulations

The National Environmental Policy Act of 1969 (NEPA) requires that all major federal actions significantly affecting the human environment be analyzed to determine the magnitude and intensity of those impacts and that the results be shared with the public and the public given opportunity to comment. The regulations implementing NEPA further require that to the fullest extent possible, agencies shall prepare EISs concurrently with and integrated with environmental analyses and related surveys and studies required by the Endangered Species Act of 1973, the National Historic Preservation Act of 1966, and other environmental review laws and executive orders. Other laws that apply to this project include: the Multiple Use and Sustained Yield Act of 1960; the National Forest Management Act of 1976; the Clean Air Act of 1990; the Clean Water Act of 1972; and, the Forest and Rangeland Renewable Resources Planning Act of 1974.

1.06 Decision Framework

As the Responsible Official, the Forest Supervisor may decide to: (1) select the proposed action; (2) select one of the alternatives; (3) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (4) select the no action alternative, choosing not to authorize the Rim Recovery project. In making this decision, the Forest Supervisor will consider such questions as:

- How well does the selected alternative meet the purpose and need described in this EIS?
- How well does the selected alternative move the project area toward the desired conditions established in the Forest Plan?
- Does the selected alternative mitigate potential adverse effects?

Project-Level Pre-decisional Administrative Review (Objection) Process

This project is subject to comment pursuant to 36 CFR 218, Subparts A and B. Only those who submit timely project specific written comments[2] during a public comment period are eligible to file an objection. Individuals or representatives of an entity submitting comments must sign the comments or verify identity upon request. Comments received, including the names and addresses of those who comment, will be considered part of the public record on this proposal and will be available for public inspection.

Emergency Situation Determination

In order to facilitate implementation of this project, the Forest Service Chief granted an Emergency Situation Determination (ESD) pursuant to 36 CFR 218.21 (78 Federal Register 59, March 27, 2013; p. 18481-18504) on April 23, 2014. An emergency situation is a situation on NFS lands for which immediate implementation of a decision is necessary to achieve one or more of the following: relief from hazards threatening human health and safety; mitigation of threats to natural resources on NFS or adjacent lands; avoiding a loss of commodity value sufficient to jeopardize the agency's ability to accomplish project objectives directly related to resource protection or restoration (36 CFR 218.21(b)). The determination that an emergency situation exists is not subject to administrative review (36 CFR 218.21(c)). With an ESD granted, the project is not subject to the pre-decisional objection process (36 CFR 218.21(d)).

Alternative Arrangements

In order to facilitate implementation of this project, the President's Council on Environmental Quality (CEQ) granted alternative arrangements in accordance with 40 CFR 1506.11 on December 9, 2013. With these alternative arrangements for the Rim Recovery project, CEQ specifically approved the following:

- Shortened the public comment period for the draft EIS from 45 to 30 days.

[2] **Specific written comments**. Written comments are those submitted to the responsible official or designee during a designated opportunity for public participation (§ 218.5(a)) provided for a proposed project. Written comments can include submission of transcriptions or other notes from oral statements or presentation. For the purposes of this rule, specific written comments should be within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the responsible official to consider.

- Eliminated the minimum 90-day requirement between the Notice of Availability of the draft EIS and the publication of the Record of Decision (ROD).
- Eliminated the 30-day waiting period between the publication of the final EIS and the ROD.

CEQ also included the following requirements for the Forest:

- Continue to enhance public and stakeholder engagement during the scoping initiated by the December 6, 2013 Notice of Intent to prepare the EIS.
- Continue active engagement of interested parties throughout the preparation of the EIS.
- Continue communication with the Yosemite Stanislaus Solutions collaborative group.
- Attend and continue communication with the Sierra Nevada Conservancy and parties participating in the Rim Fire Landscape Restoration Technical Workshop on December 18, 2013.
- Post the Final EIS and proposed ROD on the Forest Service website for public review 5 to 10 business days prior to publishing the official Notice of Availability in the Federal Register.

1.07 Public Involvement

Public participation is important at numerous points during the analysis. The Forest Service seeks information, comments and assistance from federal, state and local agencies and individuals or organizations that may be interested in or affected by the proposed action.

Because of the critical need to begin implementation as soon as possible, this project focused on unprecedented up front public involvement. The Forest engaged two large collaborative groups. One local group, Yosemite Stanislaus Solutions (YSS) includes a wide variety of local county stakeholders including the timber industry, environmental organizations and business leaders. YSS fosters partnerships among private, nonprofit, state and federal entities with a common interest in the health and well-being of the landscape and communities in the Tuolumne River Watershed. The group fosters an all-lands strategy to create a heightened degree of environmental stewardship, local jobs, greater local economic stability, and healthy forests and communities. The other group, known as the Rim Fire Technical Team consists of representatives from state and national environmental organizations, the timber industry and other government entities with a more national or statewide interest base. The Forest Service met with both of these groups on several occasions including field trips into the burn area and all day workshops identifying the long-term goals of this landscape and future desired conditions.

The Forest held its first field trip into the Rim Fire on October 16, 2013 with individuals from the Tuolumne Band of Me-Wuk Indians, Central Sierra Environmental Resource Center (CSERC), Sierra Club, Tuolumne County Alliance for Resources and Environment (TuCARE), California Fish and Wildlife Service, Audubon Society, Tuolumne County Supervisors, logging companies, sawmills, Sierra Nevada Conservancy and the local collaborative group YSS. On November 14, 2013 the Rim Fire Technical Team toured the burn area with several stops and discussions with Forest Service managers and researchers.

Public Scoping Period (30 days) for the Notice of Intent

The Forest Service conducts scoping according to the Council on Environmental Quality (CEQ) regulations (40 CFR 1501.7). In addition to other public involvement, scoping initiates an early and open process for determining the scope of issues to be addressed in the EIS and for identifying the significant issues related to a proposed action. This scoping process allows the Forest Service not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, narrowing the scope of the EIS process accordingly (40 CFR 1500.4(g)).

The Forest Service first listed the Rim Recovery project online in the Stanislaus National Forest Schedule of Proposed Actions (SOPA) on December 5, 2013. The project first appeared in the published quarterly SOPA in January 2014. The Forest distributes the SOPA to about 160 parties and it is available on the internet [http://www.fs.fed.us/sopa/forest-level.php?110516].

The Forest Supervisor sent a scoping letter and package to 131 individuals, permittees, organizations, agencies, and Tribes interested in this project on December 5, 2013. The letter requested specific written comments on the Proposed Action during the initial 30-day designated opportunity for public participation. The Forest Service published a Notice of Intent (NOI) that asked for public comment on the proposal between December 6, 2013 and January 6, 2013 (78 Federal Register 235, December 6, 2013; p. 73498-73499). Interested parties submitted 4,200 total letters during the comment period including 174 unique individual letters and 4,026 form letters. Other interested parties submitted 3,627 form letters (late) after the comment period closed. The Scoping Summary (project record) identifies specific comments and shows how the ID Team used them to identify issues (Chapter 1.08).

The Forest Service held public open houses at the Supervisor's Office on December 13 and 14, 2013. They were advertised on local radio stations, in the local newspaper, on the Stanislaus National Forest website, through a "tweet" to more than 68,000 followers, through direct mailings to those on the SOPA mailing list, and to those who showed interest in the project. Over 25 people attended the open houses where the Forest described the preliminary purpose and need for the project as well as proposed recovery treatments. ID Team members participated and answered questions regarding the project and proposed action.

Ongoing Public Involvement

After the initial 30-day scoping period, the Forest continued scoping with interested parties. The Forest hosted another Rim Fire Technical Workshop to share the development of alternatives status on January 31, 2014. The Forest described the alternatives developed since the initial scoping at a public open house on February 13, 2014 attended by over 50 people. The Forest organized field trips with the Tuolumne Band of Me-Wuks on March 13, 2014 and March 17, 2014 followed by a Tribal consultation day on May 9, 2014.

The Forest organized 24 tours into the Rim Fire area for congressional aides, local government, and other interested parties. The Forest also provided monthly updates to the Tuolumne Board of Supervisor's Natural Resources Committee. Forest Service representatives also spoke with many local and statewide businesses, interest groups and service clubs including Hetch Hetchy, TuCARE, Blue Ribbon Coalition, American Forest Resource Council, Range Permittees, Rotary Clubs, Stanislaus Wilderness Volunteers, Sierra Forest Legacy, timber operators and the Lions Club.

Public Comment Period (30 days) for the Draft EIS Notice of Availability

The 30-day comment period on the Rim Fire Recovery Draft Environmental Impact Statement (DEIS) began with publication of the Notice of Availability (NOA) in the Federal Register on May 16, 2014 (79 Federal Register 95, May 16, 2014; p. 28508). The Forest Service published a Notice of Availability (NOA) that asked for public comment on the DEIS The NOA did not accurately reflect the 30-day comment period alternative arrangements granted by CEQ. The Forest submitted an amended notice to EPA. The revision to the Federal Register (79 Federal Register 100, May 23, 2014; p. 29759-29760) made a correction to reduce the comment period from June 30, 2014 to June 16, 2014 reflecting the President's Council on Environmental Quality (CEQ) alternative arrangement granted in accordance with 40 CFR 1506.11 on December 9, 2013. Among these alternative arrangements, CEQ specifically approved shortening the public comment for this DEIS from 45 to 30 days. In addition, on May 20, 2014, the Forest Service submitted a legal notice showing the opportunity to comment during the 30-day comment period on the DEIS began with publication of the Notice of Availability in the Federal Register on May 16, 2014.

The Forest Supervisor sent a DEIS notification letter to the 174 interested parties who submitted unique comments during scoping along with other individuals, permittees, organizations, agencies, and Tribes interested in this project on May 16, 2014, requesting specific written comments by the filing deadline of June 16, 2014. The Forest Service also published the DEIS on the internet [http://www.fs.fed.us/nepa/nepa_project_exp.php?project=43033].

During this period, the Forest produced materials for social media outlets, including tweets, web features and photo pages; and, distributed some 60,000 newspaper inserts throughout the region explaining many of the proposed activities. The Forest hosted a public open house on May 22, 2014; and, a webinars on May 30, 2014 and June 25, 2014 for a variety of interested stakeholders including Tuolumne River Trust, Berkeley Camp, and industry representatives. The Forest organized 3 field trips with the Tuolumne Band of Me-Wuks on June 11, June 18 and June 25, 2014. The Forest hosted a field trip into the Rim Fire area on June 16, 2014 with over 40 attendees including a CEQ official and representatives from various environmental organizations, industry and local government.

Interested parties submitted 5,589 total comment letters on the DEIS including 154 unique individual letters and 5,435 form letters from 8 different organized groups. Out of the total letters, 385 were duplicates and 12 arrived after the comment period closed. The Response to Comments, Appendix F, identifies specific comments and the Forest Service responses to comments. Appendix L of the EIS includes letters from Federal, State, local agencies (no elected officials submitted comments) and the Tuolumne Me-Wuk Tribal Council. The project record contains the letters received commenting on the DEIS.

Responses to public comments were finalized during the development of the FEIS. Responses reflect work done after publication of the DEIS. Comments on the DEIS were used to modify Alternative 4.

1.08 ISSUES

The Forest reviewed the purpose and need, proposed action and scoping comments in order to identify issues (Scoping Summary, project record). An issue is a point of discussion, dispute, or debate with the Proposed Action; an issue is an effect on a physical, biological, social, or economic resource; an issue is not an activity; instead, the predicted effects of the activity create the issue. The Forest Service separated the issues into two groups: significant and non-significant. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..."

Significant issues are defined as those directly or indirectly caused by implementing the proposed action. Significant Issues are used to formulate alternatives, prescribe mitigation measures, or analyze environmental effects. Issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflicts.

Non-Significant Issues are those: 1) outside of the scope of the proposed action; 2) already determined through law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific fact; 5) a comment, opinion, or statement of position; or, 6) a question for clarification or information. Although non-significant issues are not used to formulate alternatives or prescribe management requirements, the EIS will disclose all significant environmental effects including any related to non-significant issues. The Scoping Summary (project record) identifies non-significant issues and reasons why they were found non-significant.

As described above, issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflicts. Based on public comments, the Forest developed significant issues to formulate and compare alternatives, prescribe management requirements, or analyze and compare the environmental effects of each alternative. Significant issues are listed below with issue statements based on public comments submitted during scoping.

Significant Issues

1. *Health and Safety*

a. Existing conditions do not provide a safe environment for administration and public use of roads because hazard trees pose a threat to health and safety.
b. Public conflicts with logging operations along roads and worker conflicts along power lines and Highway 120 pose threats to worker and public safety.

2. *Snag Forest Habitat*

a. Proposed activities may affect black-backed woodpecker (BBWO) populations because the woodpeckers may occur at higher densities in areas treated and the project does not include avoidance measures or limited operating periods for nesting BBWO.
b. Proposed activities may affect California spotted owls because re-mapping of existing PACs and Home Range Core Areas (HRCAs) burned in the fire would damage this still viable and important owl habitat.

3. *New Road Construction*

a. Proposed new road construction may affect roadless areas and destroy habitat because these areas are currently undisturbed and inaccessible to motor vehicles.

4. *Wildlife Habitat*

a. Proposed activities may affect critical deer winter range as well as oak and green island habitat because the project does not include specific protection or enhancement measures.
b. Proposed management requirements seem excessive (i.e., a one mile buffer for suitable frog habitat and 20 down logs within streams every mile) because these measures are not necessary and the cost of implementation is high.

5. *Salvage Logging*

a. Proposed activities may reduce biodiversity, threaten rare plants, and impact the outstanding remarkable values and integrity of the Clavey River due to impacts from salvage logging.
b. Application of sporax may affect implementation of the logging because it is not necessary and adds costs.

6. *Soil and Watershed Impacts*

a. Proposed activities may affect streams by causing significant sedimentation and soil loss because of the already compromised condition of these areas and insufficient buffers.

1.09 GIS DATA

The Forest Service uses the most current and complete data available. Geographic Information System (GIS) data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation and/or, incomplete while being created or revised. Using GIS products for purposes other than those intended may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. The information contained within Chapter 2 (The Alternatives) of this EIS takes precedence in case of disagreement with the GIS data (including maps created using that data).

2. The Alternatives

This Chapter describes and compares the alternatives considered for the Rim Fire Recovery project. It presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among the options for the Responsible Official and the public. It includes the action alternative or the proposed action (Alternative 1), the no action alternative (Alternative 2), and two additional action alternatives (3 and 4) that provide a comprehensive range for the decision maker. The no action alternative serves as a baseline for comparison purposes (73 Federal Register 143, July 24, 2008; p. 43084-43099). Based on the issues identified through public comment on the proposed action as well as the unique opportunities created by the Rim Fire, the Forest Service developed the other action alternatives that achieve the purpose and need through different combinations and types of activities than the proposed action. Some of the information used to compare the alternatives is based on the design of the alternative, and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

This chapter is divided into five sections:

- Chapter 2.01 describes how the alternatives were developed.
- Chapter 2.02 presents the alternatives considered in detail.
- Chapter 2.03 describes the management requirements common to all action alternatives.
- Chapter 2.04 presents the alternatives considered, but eliminated from detailed study, including the rationale for eliminating them.
- Chapter 2.05 compares the alternatives based on their environmental, social and economic consequences including a comparative display of the projected effects of the alternatives.

2.01 How the Alternatives Were Developed

The project area includes NFS lands, on the Stanislaus National Forest, outside of Wilderness. It does not include any private, state or other federal lands. Each alternative assumes that other adjacent federal lands, such as those administered by Yosemite National Park will be managed according to existing management plans and applicable federal laws. Each alternative also assumes that private lands will meet applicable state and federal land use regulations.

Chapter 2.02 displays the alternatives fully considered in detail including three action alternatives and the no action alternative, while Chapter 2.04 describes other alternatives considered, but eliminated from detailed study. Appendix D (Research) and Appendix E (Treatments) provide detailed information related to the alternatives. The separate map package includes large scale maps showing treatment units and other information included in each alternative.

Primary Objectives

The action alternatives developed by the ID team represent a wide range of perspectives designed to address the purpose and need (Chapter 1.03) and the issues identified through scoping (Chapter 1.08). The purpose and need includes five primary objectives (Chapter 1.03). In addition to those five objectives, the ID Team identified research as a sixth primary objective for developing Alternatives 3 and 4.

Table 2.01.1 displays the six primary objectives used to identify treatments and develop the action alternatives while Table 2.05-2 shows acres by primary objective and Appendix E (Treatments) shows primary objectives for each specific treatment unit.

Table 2.01-1 Primary Objectives

Primary Objective	Purpose
1. Economic Value	Capture the economic value of hazard trees and dead trees which pays for their removal from the forest and potentially for other future restoration treatments.
2. Public and Worker Safety	Remove dead and dying hazard trees adjacent to Forest Roads and project access areas. This primary objective also includes the health and safety of workers and permittees during range fence installation and maintenance.
3. Fuel Reduction	Reduce fuels to provide for future forest resiliency and firefighting safety and success. Additional treatments in SPLATs and Defense Zones.
4. Enhance Hydrologic Function	Improve road infrastructure to enhance hydrologic function of roads. This only applies to roads so it will not be displayed in table 2.05-2 which displays unit acres.
5. Enhance Wildlife Habitat	Retain specific old forest components (large snags and down logs) and/or remove material to improve wildlife habitat. a. Deer Habitat Improvement – Removal of merchantable and nonmerchantable material for movement and access, and to achieve desired forage/cover ratios b. Snag Retention
6. Research	Utilize the unique scale and intensity of the Rim Fire to answer questions and provide more information on a wide range of research topics.

The action alternatives were developed and described according to the following activity groups where applicable.

Salvage and Fuel Reduction

The action alternatives vary in the number of acres proposed for salvage harvest, the type of harvest, associated fuel reduction treatments (e.g. biomass or tractor piling).

Merchantable trees, likely those dead trees greater than 16 inches diameter at breast height (dbh) by the time of harvest, would be removed as sawlogs and non-merchantable trees of smaller diameters may be masticated (shredded), felled and lopped, machine piled and burned, or removed as biomass. Harvest would occur in a timely manner to minimize loss of value; dead trees lose their value within 2 years or even less for smaller diameter material. Salvage and hazard tree removal are expected to take place first in order to capture the highest economic value of the standing timber and to remove hazard trees for safety of operations. Biomass removal may be completed simultaneously with the salvage operation or occur as a second entry into the area. Post-harvest evaluation would determine the extent of treatments necessary to meet fuels, watershed, and wildlife objectives for ground cover and fuel loading. It is anticipated salvage harvest operations would begin as early as September 2014 and continue for up to 5 years. Fuels treatments are expected to begin as early as September 2014 and continue for up to 7 years. Actual timing may vary based on deterioration of material, weather and resource availability (personnel and budget). The action alternative maps in the map package show the unit locations.

Salvage

Dead conifer trees greater than 16 inches dbh (this diameter will vary based on tree merchantability at the time of harvest) would be removed utilizing ground based mechanized equipment where practical. Ground based equipment would include harvesters and rubber tired skidders. Helicopter logging or skyline systems would be utilized on steeper slopes and where necessary to meet resource objectives. Feller-bunchers may be utilized on skyline and helicopter units where slopes are less than 45 percent. Only trees with no green needles (as seen from the ground) would be removed. Residual live trees within salvage units would be protected during harvest operations and retained. Management Requirements identify the snag and down log retention guidelines. All activity generated fuels would be treated to meet the fuels desired conditions.

Biomass Removal

Biomass treatments would entail the mechanical removal of un-merchantable trees between 4 inches and 16 inches dbh (this varies depending on log merchantability and the desire for retaining material onsite for various resource needs). These trees would be removed as firewood, shavings logs, pulpwood, removed for biomass fuel for electric cogeneration plants, or decked and left on site for public firewood cutting. Biomass removal may be completed simultaneously with the salvage operation, but depending on availability of equipment and operators, this activity may occur as a second entry after the timber is removed.

Machine Piling and Burning

Machine piling and burning is the use of mechanical equipment to push brush skeletons, small dead trees and excess downed fuels into piles for burning. This method would be used in areas where high fuel loads remain post-harvest. In order to meet wildlife and soils objectives, piling would be conducted in a manner that would leave the down logs, greater than 20 inches diameter (large end) and 10 feet in length, out of the piles.

Jackpot Burning

Jackpot burning is the prescribed burning of heavy concentrations of down woody fuels. This type of burning would allow for the majority of the area to retain ground cover while reducing the heavy concentrations of fuels post-harvest. This treatment is proposed within the helicopter and skyline units where machine piling is not feasible.

Mastication

Alternatives 3 and 4 would include mastication treatments consisting of the shredding of brush skeletons and small dead trees (generally under 10 inches dbh). The shredded material generated would be left on site. This treatment would be conducted in areas that do not meet the minimum requirements for soil cover and/or are in watershed sensitive areas (WSAs). Criteria for evaluating the need for this action included: proposed recovery activities, soil burn severity, percent slope, slope shape, slope length, existing and potential soil cover, proximity to intermittent and perennial drainages, and proximity to high runoff response soils. This treatment would not be used where post treatment fuel levels exceed objectives. This treatment would also be used in predominantly brushy areas for deer habitat enhancement.

Drop and Lop

Alternatives 3 and 4 would include drop and lop proposed in portions of units identified as WSAs to increase ground cover. Criteria for evaluating the need for this action are the same as described above for mastication. This treatment would involve felling non-merchantable trees less than 10 inches dbh and lopping them into pieces small enough to ensure the material is not stacked and has as much ground contact as practical. A minimum 50 percent effective ground cover is desired but may be limited by fuel objectives.

Hazard Tree Removal and Fuel Reduction

Due to hazardous conditions created by the Rim Fire, all of the action alternatives propose hazard tree removal along low standard roads and trails used in the project as well as routes accessing salvage and fuels reduction units including those within all Wild and Scenic River segment classifications. Routes used in the project would be assessed for hazard trees and abated where they exist; however, it should be noted that many areas would receive no treatments because there is no hazard or threat to health and safety (i.e. low severity burn resulted in no tree mortality, forest structure is composed of small trees or shrub layer). Hazard trees would be designated for removal using the Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region, April 2012

(USDA 2012c). Only those green trees deemed to be imminent hazards (high certainty of mortality or failure within the next two years) would be removed and all green trees would be marked (not designated by description in the timber sale contract). These areas would also receive fuels reduction treatments.

Biomass Removal

Same as under salvage and fuel reduction.

Machine Piling and Burning

Same as under salvage and fuel reduction.

Roads

All of the action alternatives propose either maintenance or road reconstruction to support the removal of logs and biomass from treatment units as well as hazard trees adjacent to lower standard forest roads. In addition, Alternatives 1 and 3 propose new construction to access some salvage units in order to reduce log yarding distances. Each action alternative includes several miles of temporary roads to minimize skidding distances. Several areas identified as "skid zones" would be used to move dead trees from the unit to the designated landing outside the unit boundary. No changes in allowed public uses would occur on any existing National Forest System Road (NFSR) or National Forest System Trail (NFST) used for the project.

New Construction

Alternatives 1 and 3 would include new roads that designed to engineering standards according to assigned road management objectives. Expected actions include vegetation clearing, excavation and embankment, blading and shaping, installation of drainage structures, and importing of armoring and surfacing rock material as needed. All new roads would be added to the Forest Transportation System (FTS), gated and closed to public vehicular traffic, and would remain available for long-term administrative use for future access and management of NFS lands.

Reconstruction

Reconstruction generally includes work to improve and restore roads. This work would improve the road conditions as needed for safe and efficient haul of forest products as well as for enhancing hydrologic function and stream protection in accordance with applicable BMPs. Actions may include surface improvement; construction of drainage dips, culverts, riprap fills or other drainage or stabilization features with potential disturbance outside the established roadway (toe of fill to top of cut); realignment; and widening of curves as needed for log trucks and chip van passage. Reconstruction also includes the actions identified in the maintenance category, such as removal of roadside hazard trees.

Maintenance

Roads used for the project that are in functioning condition would be maintained. Maintenance preserves the function of the road but generally does not include improvements. Maintenance activities generally include: blading; brushing; removal of roadside hazard trees; repair and/or replacement of road surfaces; cleaning, repair, or installation of drainage structures such as culverts, ditches, and dips; dust abatement; removal and installation of closure barriers; and installation or repair of signs. Maintenance activities generally do not disturb ground outside the existing road prism (toe of fill to top of cut) other than removal of material around culvert inlets.

Stored Roads

Some Maintenance Level 1 roads (currently closed and stored) would be opened and receive the appropriate maintenance or reconstruction treatments as described above. By definition, these roads are expected to be used intermittently when needed for project access, but kept closed for periods of years between uses. Following the project, these roads would be physically closed to all motor vehicle travel by using native material barriers such as boulders, berms, cull logs and stumps. Beyond the closure, the integrity of Maintenance Level 1 roads would be preserved to the extent practicable, implementing measures as necessary to reduce sediment delivery from the road surface and fills and reduce the risk of crossing failure and stream diversion.

Temporary Roads

Temporary roads are not intended to be a permanent part of the road system and would be decommissioned after use. Temporary roads may overlay existing corridors or be newly constructed features. Some NFSTs currently managed for either motorized or non-motorized use, are proposed as temporary roads. These would be put back to their previous use after project completion.

Construction of temporary roads may include vegetation clearing, excavation, blading and shaping to provide for safe project access and removal of forest products. New and existing temporary roads would have improvements necessary to attain stabilization of the roadbed and fill slopes, including employing measures such as out-sloping, drainage dips, and water-spreading ditches. Unlike permanent roads, temporary roads would only have the minimal investment and drainage required to minimize resource impacts while providing for safe use and passage of haul vehicles during the short life of the route.

After a temporary road has served the project purpose, the Forest Service would decommission it. This involves one or more of the following activities: removing culverts, eliminating ditches, subsoiling and out-sloping the roadbed, removing ruts and berms, effectively blocking the road to vehicular traffic, and building cross ditches and water bars. When culverts are removed, associated fills would also be removed to the extent necessary to permit normal maximum flow of water.

Temporary Use - Revert

Some segments identified for temporary project use would revert to their existing use post-project. These routes are associated with authorized or other needed uses (for example, access to a water tank under special use permit), and are expected to still be utilized into the future. Temporary use routes would be improved to a minimal standard for haul, while also improved to minimize adverse environmental impacts, maintain stabilization, and ensure proper drainage. These routes would continue to exist after the project is completed.

Skid Zones

The term skid zone is being used to identify areas where landings for units harvested using ground based equipment are not located either within or adjacent to the units. The skid zones encompass an area that skidding equipment may traverse to take logs from the unit to the landing, using a specified skid trail pattern that would be determined during harvest operations by a Forest Service (FS) timber sale administrator. The intent is to identify areas outside units that need to be surveyed and assessed for potential impacts due to treatment activities.

Right-of-Way Acquisition

Some roads under private jurisdiction would provide more efficient access to the project. These roads would require a Forest Service right-of-way or access agreement to allow for access and haul of forest products. Where appropriate, public easements would be pursued; at a minimum administrative access would be needed for project use.

Water and Rock Sources

Available water and rock material sources within and adjacent to the project area would be utilized to support project road work. Roads providing access to and from these sites would also be maintained.

Wildlife Habitat Enhancement

The action alternatives vary by type and amount of wildlife habitat enhancement treatments for critical deer range and increased snag retention.

Research

Alternatives 3 and 4 include treatment areas that would be utilized for research projects. Research opportunities are abundant within the Rim Fire perimeter and scientists from PSW and managers from the Stanislaus National Forest are working together and collaborating with universities and others to take advantage of the unique opportunity a fire of this scale and intensity provides. One study design is to allocate California Spotted Owl (CSO) sites affected by the Rim Fire into treatment groups. Some treatment units were dropped from the project and some unit boundaries were modified based on the needs of the research proposals. Occupancy surveys would be conducted annually for 5 years beginning in 2014. Assuming a best case treatment schedule, salvage treatments would be initiated in late Fall 2014 and continue through at least 2016. Two years of post-treatment surveys are needed to assess the effects of both wildfire and salvage-logging. Occupancy surveys would assess reproduction. Researchers may also conduct radio-telemetry work to document habitat use and foraging behavior of CSOs during the five year period post-fire. The study would be adapted to utilize the specific timing and spatial implementation of treatments.

These, and other, sample units would also serve as footprints for a number of other research projects. The units can provide a canvas for strip transects to conduct small mammal trapping grids and avian monitoring using point count surveys. They would also be used for monitoring cavity use and foraging behavior of black-backed woodpeckers using standard nest searching protocols. These units would serve as sites to quantify effects of salvage on hillslope soil erosion. Silt fences would be installed to measure erosion rates in small (less than 0.5 acre) treated and untreated swales within areas of high soil burn severity. Also, water quality research would evaluate the effects of salvage logging on sediment yield and peak discharge at the small watershed scale. This study would use paired small catchment (10 to 20 acres) to measure total sediment yields, runoff and peak flow as well as small hillslope sediment fences to quantify hillslope contributions. Additional research is likely to occur within the Rim Fire, but would utilize the proposals and activities in this EIS as the basis for treatment and non-treatment pairings.

Forest Plan Amendments

Alternatives 3 and 4 include a Forest Plan Amendment designating a Forest Carnivore Connectivity Corridor (FCCC).

Management Requirements

The action alternatives include management requirements designed to implement the Forest Plan and to minimize or avoid potential adverse impacts. Each action alternative lists the management requirements specific to it and Chapter 2.03 identifies those common to all action alternatives. Management requirements are mandatory components of each alternative and will be implemented as part of the proposed activities. Most Management Requirements were utilized in other past projects and, through monitoring, were shown to be very effective in protecting or enhancing resources.

Changes to the Alternatives between Draft and Final EIS

In response to public comments on the DEIS and other information, the alternatives now include minor changes to: correct and clarify the management requirements; and, reflect a scaled-back Research component in Alternative 3 and Alternative 4.

2.02 Alternatives Considered In Detail

The action alternatives (Alternatives 1, 3 and 4) and the no action alternative (Alternative 2) are considered in detail. The no action alternative, as required by the implementing regulations of NEPA, serves as a baseline for comparison among the alternatives (73 Federal Register 143, July 24, 2008; p. 43084-43099). The following sections describe each of the alternatives considered in detail (see Map Package and project record for detailed maps of each action alternative).

Alternative 1 (Proposed Action)

This is the Proposed Action, as described in the Notice of Intent (78 Federal Register 235, December 6, 2013; p. 73498-73499), with corrections based on updated data and map information and completion of PAC re-maps as stated in the scoping package (Chapter 1.04). These corrections and refinements provide additional resource protection and a more accurate and informed proposed action. Alternative 1 (Proposed Action) includes the treatments and actions described below. Table 2.05-1 provides a summary of the proposed activities and Appendix E (Treatments) provides detailed information for each specific treatment unit.

Salvage and Fuel Reduction

Alternative 1 includes salvage logging on up to 28,326 acres including 24,127 acres of ground based, 16 acres of ground based/skyline swing, 2,930 acres of helicopter, and 1,253 acres of skyline treatments. Proposed fuel treatments include: 7,626 acres of biomass removal, 24,143 acres of machine piling and burning and 4,199 acres of jackpot burning.

Hazard Tree Removal and Fuel Reduction

Fell and remove hazard trees (green and dead) adjacent to 341 miles of forest roads outside of proposed salvage units, amounting to 16,315 acres. Some non-merchantable trees may be felled and left in place.

Roads

Alternative 1 includes 5.4 miles of new construction, 319.9 miles of reconstruction and 216.1 miles of maintenance. About 3.9 miles of temporary road construction (new), 9.3 miles of temporary road construction (existing), and 8.4 miles of existing temporary use routes tied to current and future uses would be used for the project and then reverted afterwards to their original use.

Wildlife Habitat Enhancement

Within Critical Winter Deer Range and adjacent to Yosemite National Park, units were identified for salvage and/or biomass removal to achieve desired forage/cover ratios and to provide for deer passage and access. These units encompass 1,351 acres and include: L03, L06, L07, L202, L203A, L203B, L204A, L204B, L205, L206, M201, O201, and P201.

Management Requirements

Alternative 1 includes the following management requirements in addition to the Management Requirements Common to All Action Alternatives (Chapter 2.03).

1. Yard whole merchantable trees within ground based salvage units where fuel levels exceed desired amounts. If breakage from trees occurs during logging operations and debris amount exceeds 10 tons per acre, piling and burning and/or jackpot burning may be utilized.
2. Where existing fuel loads are less than or equal to 5 tons per acre, some trees may be felled and left in place or masticated into pieces less than 2 feet in length to reduce potential soil erosion and maintain soil productivity. Total fuel loading for these units should not exceed 10 tons per acre

with a fuel bed depth less than or equal to 12 inches. Woody debris less than or equal to 8 inches in diameter will not exceed 3 tons per acre.

3. Piling and burning, and/or jackpot burning may be used to reduce fuel loading when dead and down woody fuels (3 inches and above) within salvage units exceed 10 tons per acre.
4. Meet habitat needs for Threatened, Endangered and Sensitive (TES) aquatic species:
   a. Maintain a 30-foot no cut and no equipment buffer around areas identified as suitable California red-legged frog aquatic habitat (breeding and non-breeding) including: 1) 0.16 miles of Middle Fork Tuolumne River located in unit V10; 2) 2.7 miles of unnamed stream (flowing out of Birch Lake) and tributary in unit U01; and, 3) Homestead pond located in unit Y02. This requirement does not apply to operations for hazard tree removal.
   b. In suitable Sierra Nevada yellow-legged frog (SNYLF) habitat within 75 feet of proposed activities where no surveys have been completed (Looney Creek) a qualified biologist will perform a visual encounter survey before project implementation. If SNYLF are detected, establish a 75-foot no equipment buffer from the high water mark.
   c. To provide key pieces of wood to the channel, retain a minimum of 20 pieces of large woody debris (LWD, trees of the largest diameters) per mile of perennial and intermittent channels in salvage units. These snags should be felled into the stream in an upstream direction (greater than 45 degrees from perpendicular) to the maximum extent possible in order to actively recruit large wood to the channel. If these trees pose an unacceptable fuels risk, retain the largest portion of the bole equivalent to three times the bankfull width of the stream.
   d. Adjacent to Abernathy Meadow (Unit U01), retain 12 down logs per acre around the perimeter of the meadow, extending 300 feet from the edge of the meadow to replace important elements for western pond turtle habitat. These trees shall be felled and left on the ground and be representative of the largest 50 percent of the trees in the retention zone.
   e. Do not allow new construction, including temporary roads, within 0.25 miles of Abernathy Meadow in Unit U01 or within 0.25 miles of "Big Kibbie Pond" in unit O02.
   f. To minimize direct impact to foothill yellow-legged frogs, do not allow skidding directly across the main stream channel in units H11, H13, K01, K02 and L03.
5. Forest Service Manual 2550-Soil Management-R5 Supplement (USDA 2012b) and Forest Plan Direction (USDA 2010a) provide standards and guidelines for soil management and are the basis for soil requirements to minimize potential impacts:
   a. Spread existing windrows within units following treatments. A soil scientist will evaluate spreading operations on slopes greater than 25 percent to ensure standards are met.
6. Provide for a forest carnivore connectivity corridor for fisher and Pacific marten, linking Yosemite National Park, the North Mountain Inventoried Roadless Area west to the Clavey River, including the following proposed salvage units: L02, L05, M1 through M10, M12, M13, M15, M16, M18, M19, and N1.
7. Within critical winter deer range and migration corridors, remove or pile and burn non-merchantable material to protect remnant oaks and achieve desired forage/cover ratios identified in consultation with the California Department of Fish and Wildlife. This includes proposed units L03, L06, L07, L202 through L206, M201, O201 and P201.
8. Prevent introduction and spread of noxious weeds:
   a. Where possible above 4,000 feet elevation, prior to use, manually treat dense infestations of weeds in areas utilized by project equipment/vehicles to prevent spread, if flowers or seeds are present on the plants.
   b. Flag and avoid infestations of high priority noxious weeds during project activities. Manual methods such as hand thinning may take place within noxious weed sites if timed for before seed set.

Alternative 2 (No Action)

Alternative 2 (No Action) provides a baseline for comparison with the other alternatives (Table 2.05-1). Under Alternative 2 (No Action), general salvage and hazard tree abatement and removal adjacent to lower standard roads would not occur. Current management plans would continue to guide management of the project area. None of the viable timber would be removed from this area leaving tens to hundreds of tons of fuel per acre once these trees fall down and greatly hindering access for firefighting. No hazard tree removal would occur adjacent to lower standard roads, leaving thousands of existing hazard trees to fall on their own as a result of natural forces. These roads would likely remain closed to public access. The cost of future activities where removal of this material is essential to implementation would be far more expensive and perhaps become cost prohibitive. The maintenance and reconstruction would not be implemented to accomplish the project goal of a properly functioning road infrastructure.

Alternative 3

Alternative 3 responds to the significant issues and concerns stated in Chapter 1.08. Compared to Alternative 1, it addresses those issues by proposing: additional wildlife habitat enhancement (including biomass removal in Critical Deer Winter Range and the FCCC Forest Plan Amendment); additional soil and watershed protection (mastication and drop and lop); and, less new construction. It also includes research related to wildlife, fuels, watershed, and soils questions. Alternative 3 includes the treatments and actions described below. Table 2.05-1 provides a summary of the proposed activities and Appendix E (Treatments) provides detailed information for each specific treatment unit.

Salvage and Fuel Reduction

Alternative 3 salvage and fuels treatments are similar to Alternative 1; however, it includes two additional fuel treatments (mastication and drop and lop) to mitigate impacts of the fire and logging on soil and water resources.

Alternative 3 includes salvage logging on up to 30,399 acres including 26,252 acres of ground based, 16 acres of ground based/skyline swing, 3,035 acres of helicopter, and 1,096 acres of skyline treatments. Proposed fuels treatments include: 8,379 acres of biomass removal, 22,036 acres of machine piling and burning and 4,147 acres of jackpot burning, 1,309 acres of mastication, and 2,228 acres of drop and lop.

Hazard Tree Removal and Fuel Reduction

Alternative 3 involves felling and removing of hazard trees (green and dead) adjacent to 314.8 miles of forest roads, amounting to 15,253 acres, outside of proposed salvage units. Some non-merchantable trees may be felled and left in place.

Roads

Alternative 3 includes 1.0 mile of new construction, 323.6 miles of reconstruction and 200.6 miles of maintenance. It also includes 9.5 miles of temporary road construction (new), 22.7 miles of temporary road construction (existing), and 3.3 miles of existing temporary roads tied to current and future uses would be used for the project and then reverted afterwards to their original use.

Wildlife Habitat Enhancement

Alternative 3 includes several additional treatment units to enhance the Critical Deer Winter Range (Appendix E). In addition, the FCCC Forest Plan Amendment provides for long-term movement of wildlife from Yosemite National Park through the Stanislaus National Forest.

Research

Alternative 3 includes the Research projects described in Chapter 2.01. Appendix D (Research) provides additional details for the individual research proposals.

Forest Plan Amendment

Alternative 3 includes a Forest Plan Amendment designating a 4 mile wide FCCC, as habitat for old-forest habitat associated species, particularly forest carnivores (portions of this corridor also overlap critical deer range). Figure 2.02-1 shows the corridor would lead from Yosemite National Park and North Mountain Inventoried Roadless Area (IRA) west to the Clavey River. The corridor includes the following proposed units that would be managed for Old Forest Emphasis: L02, L05, M1 through M10, M12, M13, M15, M16, M18, M19, and N1.

This Forest Plan Amendment changes the land allocation on 9,923 acres from General Forest to Old Forest Emphasis Area (OFEA) and includes the following desired condition. Other existing land allocations (Wild and Scenic River, PAC, HRCA, and OFEA) would remain unchanged (Table 3.01-1).

Desired Condition: the FCCC provides habitat connectivity for forest carnivores, linking Yosemite National Park and the North Mountain Inventoried Roadless Area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover; more than 10 tons per acre of coarse woody debris in decay classes 1 and 2; and, an average of 6 snags per acre. Habitat structures are important to retain that may constitute rest sites as described in Freel 1991 and Lofroth et al. 2010 (e.g. plate 7.7 and 7.8).

Management Requirements

Alternative 3 includes the following management requirements in addition to the Management Requirements Common to All Action Alternatives (Chapter 2.03).

1. Complete all burning under approved burn and smoke management plans. Acquire burn permits from the appropriate county Air Pollution Control District(s) which will determine when burning is allowed. The California Air Resources Board provides daily information on "burn" or "no burn" conditions. Design and implement burn plans to minimize particulate emissions.
2. Retain 10 to 20 tons per acre coarse woody debris greater than 3 inches. The goal is to maintain a total fuel load of 10 tons per acre, and not to exceed 20 tons per acre when it is needed to meet other resource requirements. Do not exceed 5 tons per acre woody debris less than 3 inches in diameter.
3. Do not exceed 12 inch fuel depth within SPLATs and 18 inch fuel depth outside SPLATs.
4. Meet habitat needs for Threatened, Endangered and Sensitive (TES) aquatic species:
    a. To avoid California red-legged frog take, fell trees away from 1) 0.16 miles of Middle Fork Tuolumne River located in unit V10; 2) 2.7 miles of unnamed stream (flowing out of Birch Lake) and tributary in unit U01D; and 3) Homestead pond located in unit Y02.
    b. Ensure California red-legged frog cover is provided in the upland habitat located within unit U01D. Consultation between the Sale Administrator and an aquatic biologist will occur during harvest. If the area is found to be deficient in downed material, drop and lop dead trees 8 to 16 inches dbh uniformly across the landscape at a rate of 3 to 5 tons per acre.
    c. Provide a minimum of 5 standing dead trees per acre within RCAs adjacent to all perennial channels that are within or bordering salvage units. These snags should have the largest diameters possible and be located within 100 feet of the edge of the active channel.

   d. To minimize direct impact to western pond turtle, limit the ground based equipment to the maximum extent possible in units S01, S04 (within 0.25 mile of the South Fork Tuolumne River), V10 and V14B between June 1 and July 15.

5. Forest Service Manual 2550-Soil Management-R5 Supplement (USDA 2012) and Forest Plan Direction (USDA 2010) provide standards and guidelines for soil management and are the basis for soil requirements to minimize potential impacts:
   a. In high burn severity areas, leave a 20 foot buffer of small trees (non-merchantable) adjacent to motorized trail segments, and 10 to 20 tons of surface material.
   b. Ground-based operations will occur when soil moisture is relatively dry in the 4 to 8 inch depth range. Consultation with a Soil Scientist will occur prior to start-up of operations. Suspend operations whenever soil moisture conditions are such that excessive damage would occur. In high burn severity areas, use the Very High Erosion Hazard Rating when considering application of erosion control measures.

6. Ensure consistency with Forest Plan and Regional Conservation strategies for terrestrial wildlife:
   a. Snag retention in OFEA, HRCA and FCCC units: the intent is to retain legacy structure where it exists for long-term resource recovery needs (i.e., the development of future old forest habitat with higher than average levels of large conifer snags and down woody material). Retain all hardwood snags greater than or equal to 12 inches diameter at breast height (dbh). Retain an average of 30 square feet of basal area of conifer snags across each unit by starting at the largest snag and working down, with a minimum of four and a maximum of 6 per acre.
   b. In OFEA, HRCA, FCCC, and in roadside hazard units within Protected Activity Centers (PACs), retain the largest size classes of down woody material at a rate of 15 to 20 tons per acre on a unit basis. In all units, emphasize down woody material retention greater than 100 feet from roadsides.
   c. Where roadside hazard treatments are within PACs and HRCAs, add acreage to the PAC and/or HRCA equivalent to the treated acres of the most suitable habitat available.
   d. Within viable post-fire PACs, flag and avoid current and historic nest trees and avoid altering screening vegetation within 500 feet; if hazard abatement is deemed immediately necessary, coordinate with a wildlife biologist and with other disciplines (e.g. recreation) as needed to identify options for the deciding official.
   e. Reduce LOPs in PACs to 0.25 mile area around a nest site if surveys are conducted.
   f. Within critical winter deer range and migration corridors, remove or pile and burn non-merchantable material to protect remnant oaks and achieve desired cover/forage ratios identified in collaboration with the California Department of Fish and Wildlife and partners. This includes proposed units L03, L04, L07, L201 through L206, M201 through M204, O201 and P201.
   g. Flag and avoid hardwood aggregations and meadows and seeps within units. Aggregations are 0.1 to 0.5 acre groups of sprouting hardwood or of meadow/seep vegetation. Groups or meadows/seeps may be linear along drainages. Reaching in and end lining allowed. Ground-based equipment prohibited. Exceptions should be limited but may be made for operability in consultation with the sale administrator and project biologist.

7. Ensure consistency with Forest Plan and other direction for sensitive and watch list plants.
   a. For roadside hazard tree abatement, where it is not possible to fully avoid a Sensitive Plant occurrence, a botanist will review the site with the Sale Administrator and advise on the least impactive method to use for the site, such as timing of impacts, directionally fall trees away from dense concentrations, full suspension removal of the log, partial suspension, or buck and leave the log.

b. Hide, obscure or block appearance of motorized access created by the project to “lava cap” habitats. Existing patches of live or dead brush or other vegetation on the edges of the “lava caps” can be utilized for this purpose.
c. In order to protect occurrences of *Peltigera gowardii*, conduct project activities in such a way that sediment is not added to or accumulates within occurrences, especially in Corral Creek at Sections 17 and 20, T1N, R18E, the unnamed tributary to Clavey River in Section 18, T1N, R18E; the unnamed tributary to Skunk Creek in Section 21, T1N, R18E; and, Twomile Creek in Section 36, T3N, 17E; and Section 1, T2N, R17E.
d. During helicopter salvage operations, avoid flying logs over cliff habitats in and adjacent to unit X23. Off-road equipment will not track within 25 feet of the bases or tops of cliffs and large rock outcrops, or through gravelly openings with shallow soils in units X18, X19 and X23 nor in the roadside hazard tree removal of Forest Roads 1S60Y, 1S79, 1S80, 2S65D, 2S66Y, and 2S66YA. Manual removal of fuels, directional felling and tree removal using an articulating arm or equipment which allows for full suspension may occur in these equipment exclusion areas during the dry, non-growing period for the rare plant species, approximately July 1 through November 30
e. Avoid adverse effects to Pacific Madrone (*Arbutus menziesi*i), Tanoak (*Notholithocarpus densiflorus*), California nutmeg (*Torreya californica*) and Sierra sweet bay (*Myrica hartwegii*) trees and saplings during all project activities. During reconstruction activities, avoid these species unless the trees or saplings create a safety hazard or interfere with the integrity of the road surface. Prune limbs to obtain sight distance rather than masticate the trees or saplings.

8. Conduct a pre-project implementation invasive plant inventory of all project areas subject to project associated ground disturbance. This inventory, along with previous survey information, will be utilized to implement the requirements below.
   a. Flag and avoid infestations of high and moderate priority weeds in all project locations subject to ground disturbance from either mechanical or foot traffic (e.g. project units, staging/landing areas, turnouts, roads). Units currently included are: B32, D04B, E01B, F11, F16, F23A, H11, H12X, K02, L04, L202, L202B, L203, L204, L205, L206, M202A, M203, N01, Q14A, R01A, R04A, R04B, R12X, R17X, R19A, R19B, R19D, S02, S03, V10, V13, V14B, V14C, X04, X06, X116, X118X and X119X (70 acres).
   b. In areas needed for implementation of the proposed activities, manually treat new or expanding portions of post-Rim Fire infestations before seed dispersal. Manual treatment will entail the cutting, digging, or pulling of all flower heads and/or vegetative reproductive parts (i.e. rhizomatous root parts). The Weed Risk Assessment (project record) describes species specific treatments.
   c. Where re-using landing and/or staging areas is necessary, the topsoil (top 6-8 inches) may be pushed into a wind-row and covered to prevent seed dispersal. Topsoil will be pushed back into place following project completion.
   d. Conduct maintenance activities in a manner which reduces the risk of weed spread, such as: avoiding soil movement out of weed sites; grading toward weed infestations, not away; or utilizing manual methods.
   e. Obtain construction materials, including crushed rock, drain rock, riprap and soil, from sources free of high and moderate priority weeds. If sources do contain these priority weeds, either flag and avoid or move topsoil to a nearby location that will not be disturbed and cover.

9. Protect and avoid all surviving proven and candidate rust resistant sugar pine trees during operations.

10. Place all fuel piles as far from wilderness and National Park boundaries as possible. Place piles behind remaining vegetation/topography and out of view.

11. Maintain existing cattleguards to Forest Service standards during post-harvest maintenance.
12. Protect recreation resources:
    a. No log truck hauling will occur on Evergreen Road or Cherry Lake Road: from July 3 through July 5; during Memorial Day and Labor Day weekends (3:00 p.m. Friday through Monday); or, on other weekends (3:00 p.m. Friday through Sunday) between Memorial Day and Labor Day.
    b. No operations on weekends beginning Memorial Day through Labor Day in areas adjacent to Lost Claim and Sweetwater Campgrounds (units Y01B, Y01D, V12A and V12B).
    c. Identify and protect National Forest System Trails (NFST) during operations. Trails, if damaged, will be restored in kind according to Forest Service standards including the placement of rolling dips.
    d. Close skid trails to motorized travel with earth berms, logs and/or rocks after operations are complete. Do not use stumps or root wads to close skid trails.
    e. Avoid using water sources in developed recreation sites while facilities are open to public use.

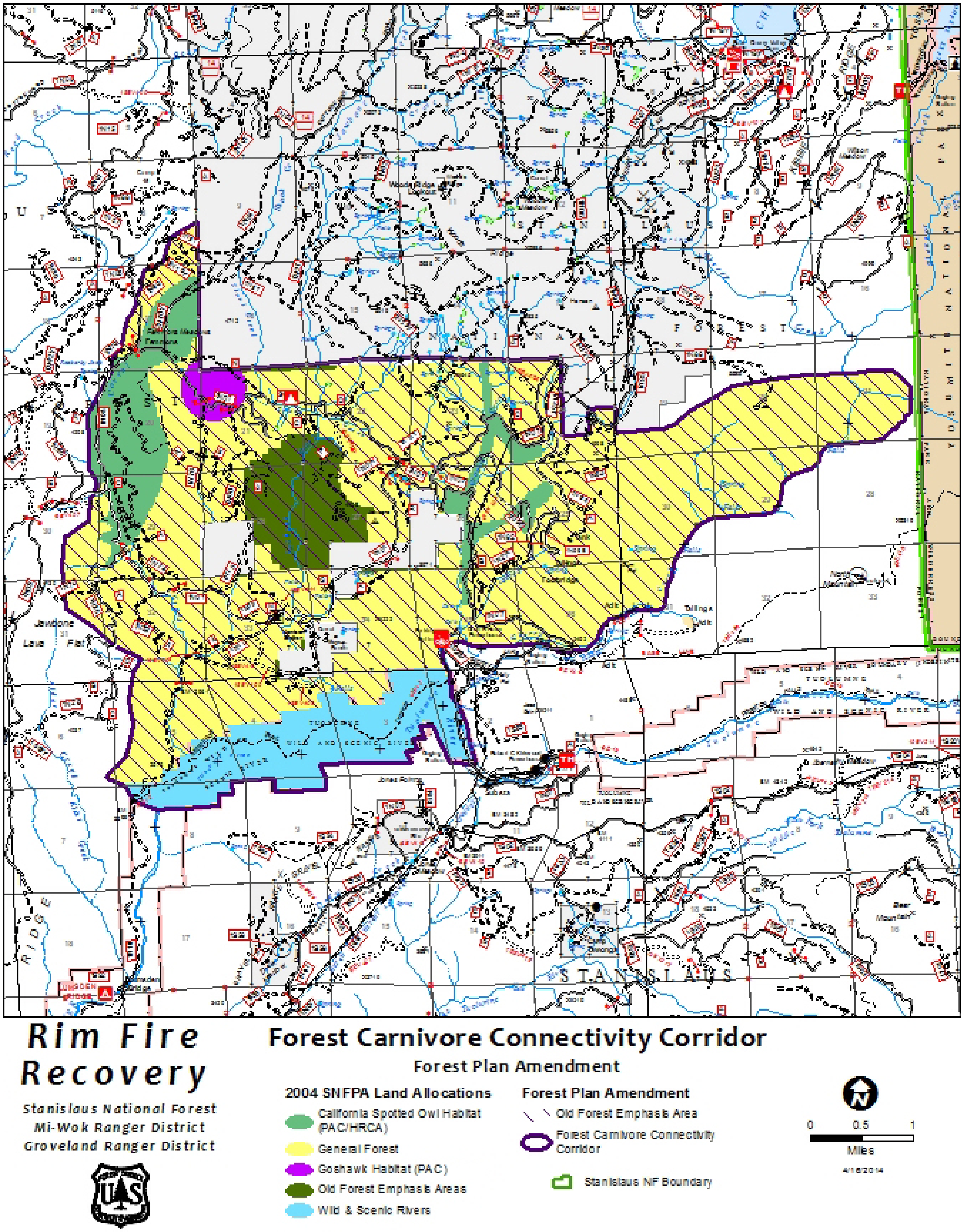

Figure 2.02-1 Forest Carnivore Connectivity Corridor Forest Plan Amendment

Alternative 4

Alternative 4 is similar to Alternative 3 except that it replaces new construction with temporary roads and drops 2,500 acres of salvage logging in highly suitable black-backed woodpecker habitat.

Alternative 4 differs from Alternative 3 by deleting 2,500 acres of salvage logging in highly suitable black-backed woodpecker habitat and replacing new road construction with temporary roads

Alternative 4 responds to the significant issues and concerns stated in Chapter 1.08 by proposing the same action items as Alternative 3 for wildlife habitat enhancement (including biomass removal in Critical Deer Winter Range and the FCCC Forest Plan Amendment) and, soil and watershed protection (mastication and drop and lop). It also includes research related to wildlife, fuels, watershed, and soils questions. Compared to Alternative 3, Alternative 4 further addresses the Snag Forest Habitat issue with additional black-backed woodpecker habitat retention and, the New Road Construction issue with no new construction. Alternative 4 includes the treatments and actions described below. Table 2.05-1 provides a summary of the proposed activities and Appendix E (Treatments) provides detailed information for each specific treatment unit.

Salvage and Fuel Reduction

Alternative 4 includes salvage logging on up to 27,826 acres including 24,176 acres of ground based, 16 acres of ground based/skyline swing, 2,568 acres of helicopter, and 1,066 acres of skyline treatments. Proposed fuels treatments include: 7,975 acres of biomass removal, 20,320 acres of machine piling and burning and 3,650 acres of jackpot burning, 1,309 acres of mastication, and 1,798 acres of drop and lop.

Hazard Tree Removal and Fuel Reduction

Alternative 4 involves felling and removing of hazard trees (green and dead) adjacent to 324.6 miles of forest roads, amounting to 15,692 acres, outside of proposed salvage units. Some non-merchantable trees may be felled and left in place.

Roads

Alternative 4 includes 315.0 miles of reconstruction and 209.3 miles of maintenance. Alternative 4 does not include new construction. It includes 8.4 miles of temporary road construction (new), 22.1 miles of temporary road construction (existing) and 3.3 miles of existing temporary use routes tied to current and future uses would be used for the project and then reverted afterwards to their original use.

Wildlife Habitat Enhancement

Alternative 4 includes the same wildlife enhancement treatments as Alternative 3.

Research

Alternative 4 includes the same research treatments as Alternative 3.

Forest Plan Amendment

Alternative 4 includes the same FCCC Forest Plan Amendment as Alternative 3.

Management Requirements

Alternative 4 includes the same management requirements as Alternative 3.

2.03 MANAGEMENT REQUIREMENTS COMMON TO ALL ACTION ALTERNATIVES

Based on a site specific review of each alternative, resource specialists identified the following management requirements that would be implemented under the action alternatives (1, 3 and 4).

1. Whole tree yard merchantable trees within ground based salvage units where fuel levels exceed desired amounts.
2. Meet habitat needs for Threatened, Endangered and Sensitive (TES) aquatic species:
   a. Prohibit mechanical operations within 1 mile of areas identified as suitable California red-legged frog breeding habitat during the wet season (the first rainfall event depositing more than 0.25 inches of rain on or after October 15 until April 15).
   b. To minimize direct impacts to California red-legged frogs, do not locate burn piles within 100 feet of Homestead Pond located in unit Y02 (suitable California red-legged frog breeding habitat), within 50 feet of the 0.16 miles of Middle Fork Tuolumne River located in harvest unit V10, or within 50 feet of the 2.7 miles of unnamed stream (flowing out of Birch Lake) and tributary in harvest unit U01 (suitable California red-legged frog aquatic non-breeding habitat).
   c. When igniting hand piles within 1 mile of suitable California red-legged frog breeding habitat, ignite only on one side, not to exceed half the circumference of the pile, on the side furthest from the nearest aquatic feature.
   d. Locate roads and landings at least 300 feet away from suitable California red-legged frog breeding and non-breeding aquatic habitat. Construction within 1 mile of suitable habitat must occur during the dry season (typically April 15 through October 15). Table 2.03-1 shows road treatments for the breeding habitat areas.
   e. Retain existing downed large woody debris 24 inches and greater in diameter at the small end that is either crossing a perennial channel or within 30 feet of the stream edge. Tops may be removed if fuel issues are a concern; however, 50 percent of the tree bole should remain in the RCA.
   f. To minimize direct impacts to foothill yellow-legged frogs, do not fall timber directly across the stream in units F11, F15, F17, F18, H13A, K01, K02, L01, L02B, L203 and L205. This requirement also applies to hazard tree removal along roads: 1N36, 1N41, 1N50, 1N50A, 1N50C and 1N79B.
   g. Prohibit equipment operations in units U01B and O02A, within 300 feet of Abernathy Meadow and Big and Little Kibbie Ponds from June 1 through July 15 and during periods when these features have no standing water.Use screening devices on water drafting pumps and use pumps with low entry velocity to minimize impacts to aquatic species. A drafting box measuring 2 feet on all sides covered in a maximum of 0.25 inch screening is required.
   h. Follow any additional site specific Management Requirements provided by the Fish and Wildlife Service within their Biological Opinion for this project.

Table 2.03-1 Units and roads associated with California red-legged frog breeding habitat

Breeding Habitat	Treatment Units	Hazard Tree Removal	Road Treatments
Drew Creek	W03, V06, V10	01N10, 01N10C, 01S30, 01S30B, 01S52, 01S58, 01S58A, 01S58B, 01S58E, 01S58F, 01S61, 01S99Y, 18E217, 18E219, 18EV420, 18EV421, 18EV422, 18EV424, FR14720, FR14722, FR1981, FR36710, FR4100, FR4875, FR7858, FR9139	Temporary Road: FR4100, 18EV420, 18EV422
Birch Lake and Mud Lake	U01, Q14A, Q14B, Q15, Q16	01S19, 01S19A, 01S20Y, 01S32, 01S68Y, 01S96, 19EV211, 19EV214, FR8799	Reconstruct: 01S18Y, 01S19, 01S19A, 01S20Y, 01S32, 01S68Y, 01S96, 19EV214
Homestead Pond	Y02, Y03	01N10, 01S08YA, 01S21Y, 01S23E, 01S48Y, FR9772, TR9835	Reconstruct: 01S08Y, 01S08YA, FR98671
Hunter Creek and ponds	NONE	01N01H, 01N01K, 01N02, 01N02B, 01N13, 01N13A, 01N13B, 01N17, 01N17A, 01N18, 01N18A, 01N19, 01N25, 01N25A, 01N25B, 01N27, 01N27A, 01N27B, 01N34Y, 01N35, 01N38, 01N38A, 01N39, 01N40, 01N43, 01N43B, 01N43C, 01N43D, 01N48, 01N48A, 01N48B, 01N54, 01N67, 01N78, 02N11D, 02N11F, 11624B, 11624C, 11708A, 11708B, 11717B, 11719C, 11721E, 11728B, 11728C, 11729A, 11730C, 11731A, 16E179, 18E317, FR7965	NONE
Harden Flat Ponds	R15, S11, V14B, X104, X109, X115, X116, X120, X25	01S03B, 01S62, 01S75, 01S75Y	01S03B, 01S09, 01S62, 01S64, 01S75Y, FR5310

3. Management requirements designed to protect water quality and watershed conditions are derived from Regional and National BMPs (USDA 2011a, USDA 2012a) and Riparian Conservation Objectives (RCOs) (USDA 2004). Riparian resources within Riparian Conservation Areas (RCAs) and the Critical Aquatic Refuge (CAR) will be protected through compliance with the RCOs outlined in the Forest Plan (USDA 2010a). BMPs protect beneficial uses of water by preventing or minimizing the threat of discharge of pollutants of concern. BMPs applicable to this project are listed below with site-specific requirements and comments. Project planners and administrators (e.g., layout, Sale Administrator, Contracting Officer Representative) are responsible for consulting with a hydrologist and/or soil scientist prior to or during project implementation for interpretation, clarification, or adjustment of watershed management requirements.
   a. **Mechanized Equipment Operations within RCAs/CAR**. On the Stanislaus National Forest, ground-based mechanized equipment operations in RCAs are divided into three zones. The exclusion zone, at the edge of streams or wetlands, prohibits mechanized equipment use. Next, the transition zone allows light mechanized activity. Last, the outer zone allows activity to increase to standard operations beyond the RCA. Together, these zones comprise a wide, graduated RCA buffer zone intended to achieve RCOs as well as vegetation management objectives. The purpose of mechanized RCA operations is to reduce fuel loading and improve riparian vegetation community condition close to streams and wetlands. These operations are carefully conducted to prevent detrimental soil impacts and retain a high percentage of ground cover in the RCA. Where ground cover is minimal in an RCA, such as following wildfire, specialized low ground pressure vehicles become the primary type of equipment used. They minimize disturbance during timber removal operations and can be used to increase ground cover by chipping and distributing woody debris. Forest guidance for Mechanized Equipment Operations in RCAs (Frazier 2006) as summarized above was developed for RCA vegetation management operations in unburned areas. It has since been

revised to include post-wildfire operations. Table 2.03-2 provides a summary of the operating requirements for mechanical operations in RCAs.

Table 2.03-2 Operating requirements for mechanized equipment operations in RCAs

Stream Type[1]	Zone	Width (feet)	Equipment Requirements	Element	Operating Requirements
Perennial/ Intermittent and Special Aquatic Features (SAFs)	Exclusion	0 - 15	Mechanical Harvesting/ Shredding[2]: Prohibited		
		0 - 50	Skidding[3]: Prohibited		
	Transition	15 - 100	Mechanical Harvesting/ Shredding: Allowed	Streamcourse Debris	Remove activity-created woody debris to above the high water line of stream channels
				Vegetation	Retain remaining post-fire obligate riparian shrubs and trees that have live crown foliage or are resprouting (e.g., willows, alder, dogwoods and big leaf maples)
				Streambanks	Do not damage streambanks with equipment.
		50 - 100	Skidding: Allowed	Skid Trails	Use existing skid trails except where unacceptable impact would result. Do not construct new primary skid trails within 100 feet of the stream
				Stream Crossings	The number of crossings should not exceed an average of 2 per mile
	Outer (Perennial/SAFs)	100 - 300	Mechanical Harvesting/ Shredding/ Skidding: Allowed	Skid Trails	Allow skid trail density and intensity to gradually increase with distance from the Transition Zone
	Outer (Intermittent)	100 - 150	Mechanical Harvesting/ Shredding/ Skidding: Allowed	Skid Trails	Allow skid trail density and intensity to gradually increase with distance from the Transition Zone
Ephemeral	Exclusion	0 - 15	Mechanical Harvesting/ Shredding: Prohibited		
		0 - 25	Skidding: Prohibited		
	Transition	15 - 50	Mechanical Harvesting/ Shredding: Allowed		
		25 - 50	Skidding: Allowed	Stream Crossings	The number of crossings should not exceed an average of 3 per mile

[1] Perennial streams flow year long. Intermittent streams flow during the wet season but dry by summer or fall. Ephemeral streams flow only during or shortly after rainfall or snowmelt. Special aquatic features (SAFs) include lakes, meadows, bogs, fens, wetlands, vernal pools and springs.
[2] Low ground pressure track-laying machines such as feller bunchers and masticators.
[3] Rubber-tired skidders and track-laying tractors.

b. **Management Requirements Incorporating BMPs and Forest Plan S&Gs**. Table 2.03-3 presents management requirements pertaining to: erosion control plans; operations in RCAs; road activities; stream crossings; log landings; skid trails; suspended log yarding; water sources, rock borrow pits/quarries, slope and soil moisture limitations, servicing and refueling of equipment; burn piles; application of registered borate compound; water quality monitoring; and, cumulative watershed effects

Table 2.03-3 Management requirements incorporating BMPs and Forest Plan S&Gs

Management Requirements	BMPs/Forest Plan[1]/Locations
Erosion Control Plan - Prepare a project area Erosion Control Plan (USDA 2011a) approved by the Forest Supervisor prior to the commencement of any ground-disturbing project activities. Prepare a BMP checklist before implementation.	**Regional BMPs** 2-13 Erosion Control Plans (roads and other activities) 1-13 Erosion Prevention and Control Measures During Operations 1-21 Acceptance of Timber Sale Erosion Control Measures before Sale Closure **National Core BMPs** Veg-2 Erosion Prevention and Control **Forest Plan S&Gs** 194 (RCO 4) **Locations**: all areas where ground-disturbing activities occur.

Operations in Riparian Conservation Areas
- Delineate riparian buffers along streams and around special aquatic features within project treatment units as described above in Table 2.03-2.
- Fell trees harvested within RCAs directionally away from stream channels and SAFs unless otherwise recommended by a hydrologist or biologist. Fall hazards trees that cannot be removed either parallel to the contour of the slope or into the channel, as recommended by a hydrologist or biologist.
- Maintain or provide ground cover (e.g., maintain post-fire conifer needle cast; provide logging slash, straw, wood chips, felled or masticated small burned trees) within 100 feet of perennial and intermittent streams and SAFs to the maximum extent practicable to minimize erosion and sedimentation. A minimum of 50% well distributed ground cover is desired.
- Minimize turning mechanical harvesters/shredders in the RCA Transition Zone to limit disturbance.
- Exclude mechanized equipment between the near-stream roads that closely parallel both sides of Corral Creek [1N01, 1N08 on the west and 1N74 (south of junction with 1N74C) and 1N74C on the east] unless otherwise recommended by a hydrologist or soil scientist. Smooth out all end lining ruts within this area. The maximum mechanized equipment exclusion width is the RCA width (300 feet).
- The Sale Administrator shall coordinate with a hydrologist prior to operating around Scout Spring Gully (Unit T22).
- The Sale Administrator shall coordinate with a hydrologist prior to operating in unit T27B to protect the Bear Gully restoration site, the stream channel downstream of the site, and the alluvial flat.
- In areas with less than 50% soil cover and slopes greater than 15%, the following requirements apply:
  - From 0-50 feet from perennial and intermittent stream banks, smooth out feller buncher or end lining ruts greater than 4 inches in depth.
  - From 50-100 feet from perennial and intermittent stream banks, smooth out feller buncher or end lining ruts greater than 4 inches in depth or waterbar these ruts following the waterbar spacing guidelines for a very high erosion hazard rating.
- Increase the ground-based equipment exclusion zone in RCAs to 100 feet on slopes greater than 25% with slope lengths greater than 100 feet, high burn severity, and immediately adjacent to perennial and intermittent channels within the following units: D04B, D12, E01B, E02, E03B, F11, G01, G03B, L02D, M01, M05A, M15, N01I, R16, S02, S04, T04B, T04C, T27B, U03, V13, V14B, V14C. Prior to implementation, these sites will be evaluated in the field by a hydrologist or soil scientist to identify on the ground areas where exclusion is required.
	Regional BMPs
	1-4 Using Sale Area Maps and/or Project Maps for Designating Water Quality Protection Needs
	1-8 Streamside Zone Designation
	1-10 Tractor Skidding Design
	1-18 Meadow Protection During Timber Harvesting
	1-19 Streamcourse and Aquatic Protection
	5-3 Tractor Operation Limitations in Wetlands and Meadows
	5-5 Disposal of Organic Debris
	7-3 Protection of Wetlands
	National Core BMPs
	Aq Eco-2 Operations in Aquatic Ecosystems
	Plan-3 Aquatic Management Zone Planning
	Veg-1 Vegetation Management Planning
	Veg-2 Erosion Prevention and Control
	Veg-3 Aquatic Management Zones
	Veg-4 Ground-Based Skidding and Yarding Operations
	Forest Plan S&Gs
	193 (RCO 2)
	194 (RCO 3)
	194 (RCO 4)
	195 (RCO 5)
	Locations: All units containing RCAs and SAFs, and specifically the portions of units mentioned in this section of Table 2.03-3.

Road Construction and Reconstruction - Maintain erosion-control measures to function effectively throughout the project area during road construction and reconstruction, and in accordance with the approved erosion control plan. - Stabilize disturbed areas with certified weed free mulch, erosion fabric, vegetation, rock, large organic materials, engineered structures, or other measures according to specification and the erosion control plan. - Set the minimum construction limits needed for the project and confine disturbance to that area. - Adjust surface drainage structures to minimize hydrologic connectivity by: discharging road runoff to areas of high infiltration and high surface roughness;	**Regional BMPs** 2-2 General Guidelines for the Location and Design of Roads 2-3 Road Construction and Reconstruction 2-8 Stream Crossings 2-13 Erosion Control Plans (roads and other activities) **National Core BMPs** Road-3 Road Construction and Reconstruction **Forest Plan S&Gs**

Management Requirements	BMPs/Forest Plan[1]/Locations
armoring drainage outlets to prevent gully initiation; and, increasing the number drainage facilities within RCAs. - Minimize diversion potential by installing diversion prevention dips that can accommodate overtopping runoff. Place diversion prevention dips downslope of crossing, rather than directly over the crossing fill, and in a location that minimizes fill loss in the event of overtopping. Armor diversion prevention dips when the expected volume of fill loss is significant. - Locate and designate waste areas before operations begin. Deposit and stabilize excess and unsuitable materials only in designated sites. Do not place such materials on slopes with a high risk of mass failure, in areas subject to overland flow (e.g., convergent areas subject to saturation overland flow), or within the RCA. Provide adequate surface drainage and erosion protection at disposal sites. - Do not permit side casting in RCAs. Prevent excavated materials from entering water or RCAs. - Schedule operations during dry periods when rain, runoff, wet soils, snowmelt or frost melt are less likely. Limit operation of equipment when ground conditions could result in excessive rutting, soil compaction (except on the road prism or other surface to be compacted), or runoff of sediments directly to streams. - Stabilize project area during normal operating season when the National Weather Service predicts a 50% or greater chance of precipitation. - Keep erosion-control measures sufficiently effective during ground disturbance to allow rapid closure when weather conditions deteriorate. - Complete all necessary stabilization prior to precipitation that could result in surface runoff. - Scatter construction-generated slash on disturbed areas. Ensure ground contact between slash and disturbed slopes. Windrow slash at the base of fills to reduce sedimentation. Ensure windrows are placed along contours with ground contact between slash and disturbed slope. - Monitor contractor's plans and operations to assure contractor does not open up more ground than can be substantially completed before expected winter shutdowns, unless erosion-control measures are implemented. - Install erosion-control measures on incomplete roads prior to precipitation or the start of winter (November 16 through March 31) and in accordance with the Erosion Control Plan. Remove ineffective temporary culverts, culvert plugs, diversion dams, or elevated stream crossings; leaving a channel at least as wide as before construction and as close to the original grade as possible. Install temporary culverts, side drains, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, dikes, debris racks, pipe risers, or other facilities needed to control erosion. Remove debris, obstructions, and spoil material from channels, floodplains, and riparian areas. Do not leave project areas for the winter with remedial measures incomplete. Provide protective cover for exposed soil surfaces.	62 193 (RCO 2) 194 (RCO 4) **Locations**: all new construction and reconstruction.
Road Maintenance and Operations - Clean ditches and drainage structure inlets only as often as needed to keep them functioning. Prevent unnecessary or excessive vegetation disturbance and removal on features such as swales, ditches, shoulders, and cut and fill slopes. - Maintain road surface drainage by removing berms, unless specifically designated otherwise. - Accompany grading of hydrologically connected road surfaces and inside ditches with erosion and sediment control installation. - Divert springs across roads to prevent them from pooling and diverting on or along the road. A layer of coarse rock with geotextile fabric or other treatments may be necessary. - Ensure that after maintenance activities (i.e., grading/earthwork activities) the final road surface drainage system will remove water from the road surface with the purpose to minimize concentrated runoff to an area. Ensure that existing metal/drain gutters are in working condition and /or install them as needed. - Conduct road watering for maintenance, dust abatement, and road surface protection using approved existing water sources locations. (See Water Sources Development and Use below)	**Regional BMPs** 2-4 Road Maintenance and Operations 2-13 Erosion Control Plans (roads and other activities) **National Core BMPs** Road-4 Road Operations and Maintenance Veg-2 Erosion Prevention and Control **Forest Plan S&Gs** 193 (RCO 2) 194 (RCO 4) **Locations**: all roads with maintenance or project use.

Management Requirements	BMPs/Forest Plan[1]/Locations
Stream Crossings **Design of New or Reconstructed Crossings** - Design permanent stream crossings (new construction and replacement culverts) to pass the 100-year flood flow plus associated sediment and debris; armor to withstand design flows and provide desired passage of fish and other aquatic organisms. - Locate and design crossings to minimize disturbance to the water body. Use structures appropriate to the site conditions and traffic. Favor armored fords for streams where vehicle traffic is seasonal or temporary, and where the ford design maintains the channel pattern, profile and dimension. - Install stream crossings according to project specifications and drawings. Design should sustain bankfull dimensions of width, depth and slope, and maintain streambed and bank resiliency. - Construct diversion prevention dips to accommodate overtopping of runoff if diversion potential exists. Locate diversion prevention dips downslope of the crossing rather than directly over crossing fill; armor diversion prevention dips based on soil characteristics and risk. Install cross drains (e.g., rolling dips; waterbars) to hydrologically disconnect the road above the crossing and to dissipate concentrated flows. **Construction, Reconstruction and Maintenance Operations** - Keep excavated materials out of channels, floodplains, wetlands and lakes. Install silt fences or other sediment- and debris-retention barriers between the water body and construction material stockpiles and wastes. Dispose unsuitable material in approved waste areas outside of the RCA. - Inspect and clean equipment; remove external oil, grease, dirt and mud and repair leaks prior to unloading at site. Inspect equipment daily and correct identified problems before entering streams or areas that drain directly to water bodies. Remove all dirt and plant parts to ensure that noxious weeds and aquatic invasive species are not brought to the site. - Remove all project debris from the stream in a manner that will cause the least disturbance. - Minimize streambank and riparian area excavation during construction. Stabilize adjacent disturbed areas using mulch, retaining structures, and or mechanical stabilization materials. - Ensure imported fill materials meet specifications, and are free of toxins and invasive species. - Divert or dewater stream flow for all live streams or standing water bodies during crossing installation and invasive maintenance.	**Regional BMPs** 2-8 Stream Crossings 2-13 Erosion Control Plans (roads and other activities) **National Core BMPs** AqEco-2 Operations in Aquatic Ecosystems Road-7 Stream Crossings Veg-2 Erosion Prevention and Control **Forest Plan S&Gs** 62 193 (RCO 2) 194 (RCO 4) **Locations**: all stream crossings on constructed, reconstructed and maintained roads.
Closure of Temporary and ML 1 Roads - Remove road stream crossings and other culverts identified at high risk of failure and posing a threat to water quality before a road is closed. - Block closed roads to prevent vehicle access. - Road-stream crossings deemed safe to leave in place will be treated to remove the potential for streamflow diversions in the event of a crossing failure or blockage, and, where needed, will have rock armor added to downstream crossing fill to prevent erosion. - Ensure that the road, culvert, and all hydrologically connected drainage structures are cleaned, and sediment and erosion controls are intact and functioning prior to closure. - Ensure road is effectively drained (e.g. waterbars, dips, outsloping) and treated to return the road prism to near natural hydrologic function. - Treat and stabilize road surfaces through subsoiling, scattering slash, and/or revegetation. Reshape and stabilize side slopes as needed.	**Regional BMPs** 2-6 Road Storage 2-7 Road Decommissioning 2-13 Erosion Control Plans (roads and other activities) **National Core BMPs** Road-6 Road Storage and Decommissioning Veg-2 Erosion Prevention and Control **Forest Plan S&Gs** 57 193 (RCO 2) **Locations**: all roads post-project closed or ML1 status.
Log Landings - Re-use log landings to the extent feasible. Existing landings within RCAs may be used when sedimentation effects can be mitigated by erosion prevention measures. - Do not construct new landings within 100 feet of perennial or intermittent streams and SAFs and 50 feet of ephemeral streams. - See the Soils Management Requirements for subsoiling requirements.	**Regional BMPs** 1-12 Log Landing Location 1-16 Log Landing Erosion **National Core BMPs** Veg-6 Landings Veg-2 Erosion Prevention and Control **Forest Plan S&Gs** 194 (RCO 4) **Locations**: all landings.

Management Requirements	BMPs/Forest Plan[1]/Locations
Skid Trails - Design and locate skid trails to best fit the terrain, volume, velocity, concentrations and direction of runoff water in a manner that would minimize erosion and sedimentation. - Locate new primary skid trails at least 100 feet from perennial and intermittent streams and SAFs and new secondary skid trails at least 50 feet from perennial and intermittent streams and SAFs. Locate all skid trails at least 25 feet from ephemeral streams. Primary skid trails typically have 20 or more passes and result in detrimental compaction or displacement of soils. Secondary skid trails have fewer passes and result in minor compaction or displacement. - Use existing skid trails wherever possible except where unacceptable resource damage may result. Existing skid trails <100 feet from streams may be used if they are rehabilitated following use to improve infiltration from their current state. - Skid trails within 100 feet of steams will be given priority for subsoiling. - See Soils Management Requirements for additional requirements on rehabilitating skid trails.	**Regional BMPs** 1-10 Tractor Skidding Design 1-17 Erosion Control on Skid Trails **National Core BMPs** Veg-2 Erosion Prevention and Control Veg-4 Ground-Based Skidding and Yarding Operations **Forest Plan S&Gs** 194 (RCO 4) **Locations**: all ground-based yarding system units.
Suspended Log Yarding - Fully suspend logs to the extent practicable when yarding over RCAs and streams. - Locate skyline corridors to minimize damage to live streamside trees or resprouting streamside burned trees and shrubs. - Install skyline corridor erosion control measures prior to each winter season to ensure runoff will be well dispersed and not concentrated down corridors. Measures may include water bars constructed in alternating directions, smoothing of ruts, and/or logging slash lopped to contract specifications.	**Regional BMPs** 1-11 Suspended Log Yarding in Timber Harvesting 2-13 Erosion Control Plans (roads and other activities) **National Core BMPs** Veg-2 Erosion Prevention and Control Veg-5 Skyline and Aerial Yarding Operations **Locations**: all units using skyline yarding systems.
Water Sources - For water drafting on fish-bearing streams: do not exceed 350 gallons per minute for streamflow greater than or equal to 4.0 cubic feet per second (cfs); do not exceed 20% of surface flows below 4.0 cfs; and, cease drafting when bypass surface flow drops below 1.5 cfs. - For water drafting on non-fish-bearing streams: do not exceed 350 gallons per minute for streamflow greater than or equal to 2.0 cfs; do not exceed 50% of surface flow; and, cease drafting when bypass surface flow drops below 10 gallons per minute. Water sources designed for permanent installation, such as piped diversions to off-site storage, are preferred over temporary, short-term-use developments. Locate water drafting sites to avoid adverse effects to in-stream flows and depletion of pool habitat. - Do not allow water drafting from streams by more than one truck at a time. - Do not construct basins at culvert inlets for the purpose of developing a waterhole, as these can exacerbate plugging of the culvert. - Gradually remove temporary dams when operations are complete so that released impoundments do not discharge sediment into the streamflow - When diverting water from streams, maintain bypass flows that ensure continuous surface flow in downstream reaches, and keep habitat in downstream reaches in good condition. - Locate approaches as close to perpendicular as possible to prevent stream bank excavation. - Treat road approaches and drafting pads to prevent sediment production and delivery to a watercourse or waterhole. Armor road approaches as necessary from the end of the approach nearest a stream for a minimum of 50 feet, or to the nearest drainage structure (e.g., waterbar or rolling dip) or point where road drainage does not drain toward the stream. - Armor areas subject to high floods to prevent erosion and sediment delivery to water courses. - Install effective erosion control devices (e.g., gravel berms or waterbars) where overflow runoff from water trucks or storage tanks may enter the stream, - Check all water-drafting vehicles daily and repair as necessary to prevent leaks of petroleum products from entering RCAs. Water-drafting vehicles shall contain petroleum-absorbent pads, which are placed under vehicles before drafting. Water-drafting vehicles shall contain petroleum spill kits. Dispose of absorbent pads according to the Hazardous Response Plan.	**Regional BMPs** 2-5 Water Source Development and Utilization 2-13 Erosion Control Plans (roads and other activities) **National Core BMPs** WatUses-3 Administrative Water Developments AqEco-2 Operations in Aquatic Ecosystems **Forest Plan S&Gs** 193 (RCO 2) 194 (RCO 4) **Locations**: all water drafting sites.

Management Requirements	BMPs/Forest Plan[1]/Locations
Rock Borrow Pits/Quarries - Limit the area of disturbance to the minimum necessary for efficient operations. - Rehabilitate and stabilize sites after operations are complete to minimize risk of off-site movement. - Where appropriate, install temporary barriers between the extraction area and surface waters to prevent sedimentation. - Obliterate or decommission temporary access roads unless other treatment is required. - Maintain system roads to quarries or borrow pits.	**Regional BMPs** 2-12 Aggregate Borrow Areas 2-13 Erosion Control Plans (roads and other activities) **National Core BMPs** Min-5 Mineral Materials Resource Sites **Locations**: all borrow pits.
Slope and Soil Moisture Limitations - See Soils report for specific slope limitations for operation of ground-based equipment. - See Soils report for wet weather operating restrictions.	**Regional BMPs** 5-2 Slope Limitations for Mechanical Equipment Operation 5-6 Soil Moisture Limitations for Mechanical Equipment Operations **National Core BMPs** Veg-2 Erosion Prevention and Control Veg-4 Ground-Based Skidding and Yarding Operations **Locations**: all ground-based equipment units.
Servicing, Refueling, and Cleaning Equipment and Parking/Staging Areas - Allow temporary refueling and servicing only at approved sites located outside of RCAs. - Rehabilitate temporary staging, parking, and refueling/servicing areas immediately following use. - A Spill Prevention and Containment and Counter Measures (SPCC) plan is required where total oil products on site in above-ground storage tanks exceed 1320 gallons or where a single container exceeds 660 gallons. Review and ensure spill plans are up-to-date. - Report spills and initiate appropriate clean-up action in accordance with applicable State and Federal laws, rules and regulations. The Forest hazardous materials coordinator's name and phone number shall be available to Forest Service personnel who administer or manage activities utilizing petroleum-powered equipment. - Remove contaminated soil and other material from NFS lands and dispose of this material in a manner according to controlling regulations. - Install temporary wash sites only in areas where the water and residue can be adequately collected and either filtered on site or conveyed to an appropriate wastewater treatment facility.	**Regional BMPs** 2-10 Parking and Staging Areas 2-11 Equipment Refueling and Servicing **National Core BMPs** Road-9 Parking and Staging Areas Road-10 Equipment Refueling and Servicing Fac-7 Vehicle and Equipment Wash Water **Forest Plan S&Gs** 193 (RCO 1) **Locations**: designated temporary refueling, servicing and cleaning sites and parking/staging areas.
Application of Registered Borate Compound - Do not apply fungicide within 10 feet of surface water, when rain is falling, or when rain is likely that day (i.e., National Weather Service forecasts 50% or greater chance). - Follow all State and Federal rules and regulations as they apply to pesticides.	**Regional BMPs** 5-7 Pesticide Use Planning Process 5-8 Pesticide Application According to Label Directions and Applicable Legal Requirements 5-11 Cleaning and Disposal of Pesticide Containers and Equipment 5-12 Streamside Wet Area Protection During Pesticide Spraying **National Core BMPs** Chem-1 Chemical Use Planning Chem-2 Follow Label Directions Chem-3 Chemical Use Near Waterbodies Chem-5 Chemical Handling and Disposal **Forest Plan S&Gs** 193 (RCO 1) **Locations**: portions of units with applications in RCAs.

Management Requirements	BMPs/Forest Plan[1]/Locations
Burn Piles - Place burn piles a minimum of 50 feet away from perennial and intermittent streams and SAFs and 25 feet from ephemeral streams. Locate piles outside areas that may receive runoff from roads. Avoid disturbance to obligate riparian vegetation. - Do not dozer pile in sensitive watershed areas (areas where mastication or drop and lop have been prescribed). Grapple piling is allowed in these areas, but is subject to the mechanized equipment restrictions for RCAs. When grapple piling in sensitive watershed areas, consult a hydrologist or soil scientist if less than 70% ground cover would be retained. - Minimize effects on soil, water quality, and riparian resources by appropriately planning pile size, fuel piece size limits, spacing, and burn prescriptions in compliance with state or local laws and regulations if no practical alternatives for slash disposal in the RCA are available.	**Regional BMPs** 6-2 Consideration of Water Quality in Formulating Fire Prescriptions 6-3 Protection of Water Quality from Prescribed Burning Effects **National Core BMPs** Fire-1 Wildland Fire Management Planning Fire-2 Use of Prescribed Fire **Forest Plan S&Gs** 194 (RCO 4) **Locations**: all pile burning areas, sensitive watershed areas.
Cumulative Watershed Effects (CWE) Analysis - CWE analysis will be conducted for the project.	**Regional BMPs** 7-8 Cumulative Off-Site Watershed Effects **Locations**: All activities within the project watersheds will be analyzed
Water Quality Monitoring - Conduct implementation and effectiveness monitoring using the Best Management Practices Evaluation Program (BMPEP) (USDA 2002) and the National Core Monitoring Protocols (FS-990b) (USDA 2012a). - Conduct project-level in-channel monitoring as required in the Water Quality Management Handbook (USDA 2011a).	**Regional BMPs** 7-6 Water Quality Monitoring **Locations**: Monitoring locations will be detailed in a project monitoring plan.

[1] Forest Plan Standards and Guidelines indicate page number from Forest Plan Direction (USDA 2010a).

4. Forest Service Manual 2550-Soil Management-R5 Supplement (USDA 2012) and Forest Plan Direction (USDA 2010) provide Standards and Guidelines for soil management and are the basis for soil requirements to minimize potential impacts.
   a. Where present, maintain soil cover, surface organic matter and soil organic matter consistent with the Forest Plan. If the existing condition is deficient, watershed specialists may prescribe activities to increase soil cover on sensitive soils or where accelerated runoff and erosion could pose unacceptable risk to resources as a result of the proposed action. These activities could include mastication or lop and scatter of trees less than 10 inches for mastication and up to 16 inches for drop and lop, a cut-to-length logging system, drop and leave, certified weed-free straw mulch applications or seeding with approved native seed. Generally, these treatments would only be considered in units with greater than 15 percent slopes, high Erosion Hazard Ratings and an existing or predicted deficiency in ground cover that would persist longer than one season.
   b. Use existing skid trails and landings except where unacceptable resource damage may result (i.e. skid trails running on 40 percent slope). Limit disturbed skid trail footprint (main and branching secondary trails) to less than 15 percent of the unit area or to the existing disturbed area.
   c. Subsoil main skid trails and waterbar remaining skid trails prior to each winter season and unit close out. Subsoiling will occur on all primary skid trails and on secondary skid trails found to be creating an unacceptable risk to soil or water resources. In addition, landings and temporary roads will be subsoiled and all erosion control measures applied after use is completed. Subsoiling may be excluded from areas of high soil sensitivity, such as shallow or rocky soils, when recommended by a soil scientist. Obliterate out-sloped berms. Outslope re-used skid trails where gullies formed from water concentration along insloped segments.
   d. Segments of pre-existing skid trails and landings causing watershed issues (i.e. concentrating water, gullying) will be subsoiled and waterbarred for resource protection, including those not used during implementation.
   e. Limit ground based equipment to less than 35 percent slopes unless a soil scientist evaluates operations on the steeper slopes. Feller bunchers may do short pitches up to 45 percent slope.

5. Ensure consistency with Forest Plan and Regional Conservation strategies for terrestrial wildlife. Protected Activity Centers (PACs) apply to spotted owls, goshawks, and great gray owls.
    a. In all units retain:
        1. All large hardwood snags greater than or equal to 12 inches dbh.
        2. A minimum of 4 snags (in the largest size class available) per acre averaged across ten acres in mixed conifer forest type.
        3. A minimum of six snags per acre in red fir forest type.
        4. The largest size classes of dead and downed logs greater than or equal to 12 inches in diameter at the midpoint at a rate of 10 to 20 tons per acre.
    b. Maintain a LOP prohibiting vegetation treatments, new construction, blasting, landing construction, and helicopter flight paths within 0.25 mile of a PAC during the breeding season for California spotted owls (March 1 through August 31), northern goshawks (February 15 through September 15), great gray owls (March 1 through August 15) and within 0.5 miles of the known bald eagle nest (January 1 through August 31) unless surveys conducted by a Forest Service biologist confirm non-nesting status.
    c. Conduct surveys in compliance with the Pacific Southwest Region's survey protocols to establish or confirm the location of the nest activity center for spotted owl, great gray owl and goshawk.
    d. For any new permanent road construction within PACs, HRCAs, forest carnivore connectivity corridors or winter deer range, designate the route as blocked Level 1 or Level 2 gated year round. This management requirement does not apply to Alternative 4.
    e. Flag and avoid elderberry plants greater than one inch stem diameter that occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14B, X15, X16, X25, Y01A, Y01C, and Y01D and roads identified for hazard tree removal).
        1. Prohibit ground based mechanical operations and burning within 50 feet of elderberry plants.
        2. Pile burning and mechanical activities within 100 feet of flagged shrubs will be subject to an LOP from April 1 through June 30 of any given year to avoid fire and dust impacts to beetles.
        3. If additional elderberry shrubs with stems over 1 inch diameter are found prior to or during project implementation, they will be similarly avoided and the District wildlife biologist will be notified immediately and adequate mitigation measures will be taken.
    f. Notify the District Wildlife Biologist if any Federally Threatened, Endangered, Candidate species or any Region 5 Forest Service Sensitive species are discovered during project implementation so that LOPs or other protective measures can be applied, if needed.

6. Apply a registered borate compound to all freshly cut fir stumps 14 inches and greater in diameter (green trees only) to limit the spread and establishment of new centers of annosum root disease within harvest areas where live trees still exist. Do not apply fungicide within 10 feet of surface water, when rain is falling or when rain is likely that day (i.e. National Weather Service forecasts 50 percent or greater chance); follow all State and Federal rules and regulations as they apply to pesticides.

7. Ensure consistency with Forest Plan and other direction for sensitive plants.
    a. Flag and avoid known and new occurrences of Sensitive Plants except as allowed below:
        1. Manual fuel reduction may take place within *Clarkia australis*, *Clarkia biloba* ssp. *australis*, *Mimulus filicaulis* or *Mimulus pulchellus* occurrences only during the dry non-growing period (Table 2.03-4). Pile or scatter all material outside Sensitive Plant occurrences.
        2. Mastication and skid trail legacy compaction subsoiling may be conducted within *Clarkia australis* occurrences only during the dry non-growing period (Table 2.05-4). Do not track masticator through occurrences smaller than 0.25 acre. Minimize tracking in

occurrences larger than 0.25 acres. Wherever possible, reach into occurrences with masticator head to conduct the work instead of tracking through.

b. In order to protect the habitat for the Sensitive Plants which occupy "lava cap" soils all equipment and vehicles will remain on roads through this habitat type (i.e. no parking off road, landing construction or staging areas).

Table 2.03-4 Growing seasons and appropriate identification periods for select Sensitive Plants

Species	Growing Season	Identification Period	Dry, Non-growing Period[1]
Clarkia australis	December 1 - August 15	June 15 - August 15	August 15 - November 30
Clarkia biloba ssp. australis	December 1 - July 31	May 15 - July 15	August 1 - November 30
Mimulus filicaulis	March 15 - July 15	April 15 - June 30	July 15 - November 30
Mimulus pulchellus	March 1 - June 15	April1 - June 1	June 15 - November 30

[1] The actual dry, non-growing period will be determined by field observations year to year by a Botanist. The dry, non-growing period is the time when these species are most resistant to disturbance activities. All dates are approximate, varying with elevation, weather and site conditions.

8. Prevent introduction and spread of noxious weeds:
   a. Implement the equipment cleaning requirements in the standard contract provisions for all contract operations and activities.
   b. The Forest Service will designate the order, or progression, of unit completion to emphasize treating uninfested units before treating infested units to reduce the risk of weed spread from infested units into uninfested units. Clean equipment before moving from infested sites and prior to being transported from the project area.
   c. Use certified weed-free mulches (woodstraw and rice straw are preferred) where available. Stage these materials in weed-free sites only.

9. Protect range resources:
   a. Avoid damage to rangeland infrastructure (fences, water developments, cattleguards) during project implementation.
   b. Any serviceable or intact infrastructure that is damaged during implementation must be repaired to Forest Service standards.
   c. Avoid snag retention adjacent to critical range infrastructure.

10. Project implementation shall also comply with Programmatic Agreement Among the United States Forest Service, Stanislaus National Forest, The California State Historic Preservation Officer, and The Advisory Council on Historic Preservation Regarding the Program of Rim Fire Emergency Recovery Undertakings, Tuolumne County, California (RIM PA).
   a. All sites will be delineated on the ground prior to implementation to prevent impacts during proposed treatment activities.
   b. Any tree inadvertently felled into a cultural site boundary is to be left in place until the incident is evaluated by the Heritage Resource specialist and recommendations made to the deciding official.
   c. If a transportation corridor is found to contain an archaeological deposit, all efforts shall be made to avoid using that portion of the travel-way. Alternatively, two foot padding may be placed on the travel-way to protect the resource if the placement of the padding is determined sufficient for resource protection by the Forest Engineer. In addition, the pads should be easily distinguished from the underlying deposit.
   d. In the event that new cultural resources are discovered during project implementation, the district archaeologist must be notified and all activities in the vicinity (150 feet) of the resource shall cease until consultations are completed; in accordance with the PA.
   e. Heritage Resource Surveys: conduct surveys to determine presence of resources following Regional and Rim PA standards.

f. SHPO Consultation: Forest Service consultation with the State Historic Preservation Officer (SHPO) to comply with Section 106 of the National Historic Preservation Act (must be completed prior to implementation).

2.04 Alternatives Considered but Eliminated from Detailed Study

NEPA requires that federal agencies rigorously explore and objectively evaluate all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments and internal scoping suggested the alternatives briefly described below along with a brief response discussing the reasons for eliminating them from detailed study.

a. Remove the Maximum Amount of Timber Value

This alternative, based on scoping comments would salvage every acre within the NFS lands and produce 5,000 BF or more per acre and eliminate more expensive logging systems like helicopter and skyline to maximize returns. It would minimize the number of snags retained within treatment units and across the landscape, and limit the costs associated with biomass removal within each sale. Although it meets portions of the purpose and needs to capture economic value, promote public and worker safety, and improve the hydrologic function of roads, it was considered but eliminated from detailed study for the following reasons:

- Recent information indicates that local mill capacity cannot accommodate the timber volume that would be produced by this alternative.
- It does not meet the purpose and need of reducing fuels for future forest resiliency. Although most of the larger trees would be removed providing an initial fuel treatment, over 30,000 acres of needed fuel treatments would not occur with this alternative.
- It does not meet the purpose and need of wildlife habitat enhancement. Dead trees and smaller biomass material within Critical Deer Winter Range would remain on site since the amount of merchantable material is minimal with most of the area having less than 5,000 BF of timber per acre making it uneconomical to treat. No additional snags would be left for various wildlife species and those retained on site would be smaller in diameter.
- It is not consistent with agency policy and Forest Plan Direction, which require special considerations in Roadless and other land management areas.
- It does not provide opportunities for research scientists to investigate key questions related to fire management and landscape restoration after an extreme fire.

b. Hazard Tree Removal Only

This alternative, based on scoping comments, would only cut and remove dead trees adjacent to low standard NFSRs; all other dead trees would remain. It was considered but eliminated from detailed study for the following reasons:

- It does not meet the purpose and need to capture the economic value since many large burned dead trees in dense stands would be left within the burn.
- It does not fully meet the purpose and need to provide for worker and public safety. If not removed by salvage treatments, tens to hundreds of tons of fuel per acre would accumulate on the ground. The complex of downed trees and subsequent shrub growth will greatly increase the probability of another extreme wildfire. Firefighter access will be difficult and in some cases impossible, resulting in less direct attack options and wider containment lines resulting in a larger wildfire. More importantly, firefighter safety will be compromised by the hazards left in this untreated landscape.

- It does not meet the purpose and need to reduce fuels for future forest resiliency. If only roadside hazard trees are removed, over 30,000 acres of needed fuel treatments would not occur with this alternative. No biomass would be treated and only minimal fuels reduction would occur across this large landscape, making future fires difficult to manage and contain.
- The maintenance and reconstruction of roads would not be implemented to accomplish the project goal of a properly functioning road infrastructure.
- It does not meet the purpose and need of wildlife habitat enhancement. Under this alternative, long-term impacts to critical wildlife habitat would not be addressed, in particular for the California spotted owl, great gray owl, northern goshawks, and mule deer herds in need of winter range land for foraging.
- It does not provide opportunities for research scientists to investigate key questions related to fire management and landscape restoration after an extreme fire.

c. Retain 100 Percent Black-Backed Woodpecker Modeled Pairs

This alternative, based on scoping comments raised during collaborative meetings, would retain 100 percent of black-backed woodpecker pairs on the Stanislaus National Forest as modeled by Tingley et al. 2014. This alternative would need to retain about 21,000 more acres than Alternative 4. Compared to Alternative 4, this alternative would reduce salvage treatments to 7,500 acres and hazard tree removal to 14,500 acres. It was considered but eliminated from detailed study for the following reasons:

- It does not meet the purpose and need to provide for worker and public safety. Roadside hazard trees would be left standing making roads unsafe for the public and field workers. This is estimated to be over 85 miles of Level 2 roads. In addition, because hazard trees could be removed from only some road segments, certain roads may remain closed to public access because the risk of hazard tree failure threatens public and worker safety.
- It does not fully meet the purpose and need for reducing fuels for future forest resiliency. If not removed by salvage treatments, tens to hundreds of tons of fuel per acre would accumulate on the ground, increasing the probability of another large wildfire. Firefighter access would be difficult in future fires and their safety compromised by the hazards left in this untreated landscape.
- The maintenance and reconstruction of roads would not be implemented to accomplish the project goal of a properly functioning road infrastructure.
- It may not fully provide opportunities for research scientists to investigate key questions related to fire management and landscape restoration after an extreme fire.

d. Retain 75 Percent of the Black-Backed Woodpecker Modeled Pairs

This alternative, based on scoping comments raised during collaborative meetings, would retain 75 percent of black-backed woodpecker pairs on the Stanislaus National Forest as modeled by Tingley et al. 2014. This alternative would need to retain about 14,000 acres more than Alternative 4. Compared to Alternative 4, this alternative would reduce salvage treatments by half. It was considered but eliminated from detailed study for the following reasons:

- It does not meet the purpose and need to provide for worker and public safety. Roadside hazard trees on 65 miles of Level 2 roads in the best habitat would be left standing making roads unsafe for the public, field workers, and firefighters.
- It does not fully meet the purpose and need of reducing fuels for future forest resiliency. Some of the best Black-Backed Woodpecker habitat is located in areas that were identified as strategic fuel treatment areas to prevent a large complex of downed wood accumulation.
- It would not meet the purpose and need of improving the hydrologic function of the road system. Because timber sales are used to fund road treatments, some road reconstruction and maintenance would not occur under this alternative.

- It may not fully provide opportunities for research scientists to investigate key questions related to fire management and landscape restoration after an extreme fire.

e. Retain Pre-Fire Spotted Owl PAC Boundaries, No PAC Remapping or Retiring

This alternative, based on scoping comments, would retain the 46 spotted owl PACs burned within the Rim Fire in their original location. PACs are remapped following fire to encompass the best available habitat, generally the areas with the most remaining large live trees. No remapping of boundaries into adjacent green habitat would occur and none that were completely consumed by the fire would be retired. These would be kept as suitable habitat for the owls. It was considered but eliminated from detailed study for the following reasons:

- It is not consistent with Forest Plan Direction, which requires that habitat conditions be evaluated after a stand-replacing event and opportunities for remapping of PACs be identified. PACs are delineated to encompass the best available 300 acres of habitat.
- It does not fully meet the purpose and need to provide worker and public safety since hazard trees would not be removed in retained PACs.
- It does not fully meet the purpose and need of reducing fuels for future forest resiliency. In retained PACs, hazard trees would be felled and left in place and strategic fuel treatments would not occur. The large amount of fuel in these areas would make future fires difficult to manage and contain, jeopardizing future fire resiliency.
- It may not fully provide opportunities for research scientists to investigate key questions related to fire management and landscape restoration after an extreme fire.

f. Natural Succession

This alternative, based on scoping comments, would allow the forest to recover naturally. This differs from "No Action" by including measures to reduce erosion and sedimentation, decommissioning roads, and curtailing cattle grazing in recovering areas. Salvage logging would be reduced or eliminated in sensitive areas. Impacted fisheries would recruit new populations from endemic stock migration rather than hatchery augmentation. It was considered but eliminated from detailed study for the following reasons:

- Road decommissioning, cattle grazing, and fisheries recruitment are outside the scope of this project.
- It does not meet the purpose and need to capture the economic value since many large burned dead trees in dense stands would be left within the burn.
- It does not meet the purpose and need of reducing fuels for future forest resiliency. No biomass would be treated and over 30,000 acres of needed fuel treatments would not occur with this alternative. The large amount of fuel in these areas would make future fires difficult to manage and contain, jeopardizing future fire resiliency.
- It does not provide opportunities for research scientists to investigate key questions related to fire management and landscape restoration after an extreme fire.

g. Central Sierra Environmental Resource Center

This alternative, based on DEIS comments, is similar to Alternative 4 but would incorporate selected aspects of Alternative 2 (No Action). This Alternative would increase snag retention levels in General Forest units, remove selected skyline and helicopter units, and remove units bordering private lands west of Cherry Lake while emphasizing treatments near residential areas or family camps. It was considered but eliminated from detailed study for the following reasons:

- It is similar to an alternative already considered in detail (Alternative 4) with effects within the range of the alternatives already considered in detail.

h. Sierra Forest Legacy

This alternative, based on DEIS comments, would reduce the area affected by salvage logging in order to minimize watershed impacts, eliminate skyline and cable logging in order to avoid high fuel loading in these units, retain old forest structure in old forest emphasis areas, implement landscape goals and landscape themes, and considers bioclimatic envelope mapping. This suggested alternative drops units from Alternative 4 in order to improve conservation of sensitive resources. It was considered but eliminated from detailed study for the following reasons:

- It is similar to an alternative already considered in detail (Alternative 4) with effects within the range of the alternatives already considered in detail.

2.05 COMPARISON OF THE ALTERNATIVES

Chapter 3 describes the environmental consequences of the alternatives. This section compares the alternatives by providing summary tables showing the key differences between alternatives. The Alternative Comparison Map (project record) displays the locations of treatments considered in all action alternatives. Table 2.05-1 compares the alternatives with a summary of proposed activities.

Table 2.05-1 Comparison of Alternatives: Proposed Activities

Proposed Treatments[1]	**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3**	**Alternative 4**
Salvage ground based (acres)	24,127	0	26,252	24,176
Salvage ground based/skyline swing (acres)	16	0	16	16
Salvage aerial based helicopter (acres)	2,930	0	3,035	2,568
Salvage skyline system (acres)	1,253	0	1,096	1,066
Subtotal Salvage (acres)	**28,326**	**0**	**30,399**	**27,826**
Hazard Tree Removal (miles)	341	0	314.8	324.6
Subtotal Hazard Tree Removal (acres)	**16,315**	**0**	**15,253**	**15,692**
Total Hazard Tree and Salvage (acres)	**44,641**[2]	**0**	**45,652**[2]	**43,518**[2]
Biomass Removal	7,626	0	8,379	7,975
Mastication	0	0	1,309	1,309
Drop and Lop	0	0	2,228	1,798
Machine Piling and Burning	24,143	0	22,036	20,320
Jackpot Burning	4,199	0	4,147	3,650
Total Fuels (acres)	**35,968**[2]	**0**	**38,099**[2]	**35,052**[2]
New Construction (miles)	5.4	0	1.0	0
Reconstruction (miles)	319.9	0	323.6	315.0
Maintenance (miles)	216.1	0	200.6	209.3
Subtotal Construction and Maintenance (miles)	**541.4**	**0**	**525.2**	**524.3**
Temporary Road (new miles)	3.9	0	9.5	8.4
Temporary Road (existing miles)	9.3	0	22.7	22.1
Temporary Use – Revert (miles)	8.4	0	3.3	3.3
Subtotal Temporary Roads (miles)	**21.6**	**0**	**35.5**	**33.8**
Total Roads (miles)	**563.0**	**0**	**560.7**	**558.1**
Private Roads Needing Right-of-Way (miles)	11.2	0	11.2	11.2
Rock Quarry Sites	7	0	7	7
Potential Water Sources	94	0	94	94

[1] Salvage includes removal of dead trees and fuel reduction; Hazard Tree includes removal of hazard trees and fuel reduction.
[2] Salvage and Hazard Tree acres overlap with Fuel Reduction acres and do not total.

Table 2.05-2 compares the alternatives with a summary of salvage and fuel reduction treatment acres by primary objective(s). Table 2.01.1 displays the six primary objectives used to identify treatments and develop the action alternatives and Appendix E (Treatments) shows primary objectives for each specific treatment unit.

Table 2.05-2 Comparison of Alternatives: Treatment Acres by Primary Objective(s)

Primary Objectives	Alternative 1 (acres)	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)
1. Economic Value	2,564	0	406	331
1. Economic Value 2. Public and Worker Safety	24,410	0	1,886	1,774
1. Economic Value 2. Public and Worker Safety 3. Fuel Reduction	0	0	4,499	3,750
1. Economic Value 2. Public and Worker Safety 3. Fuel Reduction 5. Enhance Wildlife Habitat b. Snag Retention	0	0	4,304	3,928
1. Economic Value 2. Public and Worker Safety 3. Fuel Reduction 6. Research	0	0	360	360
1. Economic Value 2. Public and Worker Safety 3. Fuel Reduction 5. Enhance Wildlife Habitat b. Snag Retention 6. Research	0	0	1,519	1,519
1. Economic Value 2. Public and Worker Safety 5. Enhance Wildlife Habitat a. Deer Habitat Improvement	36	0	0	0
1. Economic Value 2. Public and Worker Safety 5. Enhance Wildlife Habitat a. Deer Habitat Improvement b. Snag Retention	0	0	519	519
1. Economic Value 2. Public and Worker Safety 5. Enhance Wildlife Habitat b. Snag Retention	0	0	6,342	5,255
1. Economic Value 2. Public and Worker Safety 5. Enhance Wildlife Habitat b. Snag Retention 6. Research	0	0	3,369	3,369
1. Economic Value 2. Public and Worker Safety 6. Research	0	0	31	31
1. Economic Value 3. Fuel Reduction	0	0	269	269
1. Economic Value 3. Fuel Reduction 5. Enhance Wildlife Habitat b. Snag Retention	0	0	446	350
1. Economic Value 3. Fuel Reduction 5. Enhance Wildlife Habitat b. Snag Retention 6. Research	0	0	76	76

Primary Objectives	Alternative 1 (acres)	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)
1. Economic Value 5. Enhance Wildlife Habitat a. Deer Habitat Improvement	195	0	0	0
1. Economic Value 5. Enhance Wildlife Habitat a. Deer Habitat Improvement b. Snag Retention	0	0	185	185
1. Economic Value 5. Enhance Wildlife Habitat b. Snag Retention	0	0	1,043	965
1. Economic Value 5. Enhance Wildlife Habitat b. Snag Retention 6. Research	0	0	685	685
2. Public and Worker Safety 3. Fuel Reduction	0	0	150	150
2. Public and Worker Safety 3. Fuel Reduction 5. Enhance Wildlife Habitat a. Deer Habitat Improvement b. Snag Retention	0	0	756	756
2. Public and Worker Safety 3. Fuel Reduction 5. Enhance Wildlife Habitat b. Snag Retention	0	0	659	659
2. Public and Worker Safety 5. Enhance Wildlife Habitat a. Deer Habitat Improvement	1,121	0	0	0
2. Public and Worker Safety 5. Enhance Wildlife Habitat a. Deer Habitat Improvement b. Snag Retention	0	0	2,788	2,788
2. Public and Worker Safety 5. Enhance Wildlife Habitat b. Snag Retention	0	0	15	15
5. Enhance Wildlife Habitat a. Deer Habitat Improvement b. Snag Retention	0	0	92	92
totals	**28,326**	**0**	**30,399**	**27,826**

Table 2.05-3 compares the alternatives with a summary of effects.

Table 2.05-3 Comparison of Alternatives: Summary of Effects

	Resource and Indicator	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Air Quality	Smoke Emissions from Machine Pile Burning	effects to local communities and Yosemite would be minimal due to controlled emissions	none from pile burning, but under uncontrolled circumstances this amount of material would cause issues for sensitive groups	same as alternative 1	same as alternative 1
Aquatics	Foothill yellow-legged frog	may affect individuals but is not likely to lead to a trend toward federal listing or loss of viability	no project related effects	same as alternative 1	same as alternative 1
	Western pond turtle	may affect individuals but is not likely to lead to a trend toward federal listing or loss of viability	no project related effects	same as alternative 1	same as alternative 1
	Hardhead	may affect individuals but is not likely to lead to a trend toward federal listing or loss of viability	no project related effects	same as alternative 1	same as alternative 1
	California red-legged frog	may affect, likely to adversely affect	no project related effects	same as alternative 1	same as alternative 1
	Sierra Nevada yellow-legged frog	may affect, likely to adversely affect	no project related effects	same as alternative 1	same as alternative 1
Cultural Resources	Cultural Resources	none	no direct effects, moderate indirect and cumulative effects; may affect fragile resources	same as alternative 1; however, watershed treatments will benefit cultural sites	same as alternative 3
	Cultural Resource Special Interest Area (SIA)	salvage removal will enhance or protect the cultural values of the SIA	none	same as alternative 1	same as alternative 1
Fire and Fuels	Fire Behavior	fire effects in treated units would be significantly reduced	future fires would burn with increasingly higher intensities	similar to alternative 1; treatments provide break in fuel profiles across the project area	same as alternative 3
	Fire Suppression Capability	high capability; reduced fuel continuities; increased safety; reduced potential for resource damage; potential for reduced suppression costs	capability dramatically declines over time; fire effects exceed firefighter capabilities; fireline production rates decline over time	same as alternative 1	same as alternative 3
	Fuel Loading	surface fuel loading reduced to 10 tons/acre; reduced risk of substantial erosion and sedimentation caused by future stand-replacing fire	Increased surface fuel loading estimated at 42 tons/acre in 10 years and 78 tons/acre in 30 years; future reburn likely to lead to substantial erosion and sedimentation	surface fuel loading reduced to 10 to 20 tons/acre; reduced risk of substantial erosion and sedimentation caused by future stand-replacing fire	same as alternative 3

	Resource and Indicator	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Invasive Species	Habitat Alteration and Vectors	high risk for habitat alteration; high risk of increased vectors	less risk of spreading weeds than alternatives 1, 3, or 4	moderate risk for habitat alteration and moderate to high risk of increased vectors because of additional management requirements	same as alternative 3
Range	Grazing Management	Improves safety, access, administration, and livestock movement	Safety risks to managers. Negatively affects access and livestock movement	same as alternative 1	same as alternative 1
	Rangeland Vegetation	no long term changes to vegetation types; beneficial effect on rangeland vegetation condition	no direct effects; potential for negative indirect effects from falling dead trees	same as alternative 1	same as alternative 1
Recreation	Recreation Access and Opportunity	negative effects on some developed recreation sites; short term negative impacts to dispersed recreation; positive effects to public safety and recreation access	negative long-term effects to recreation access and public safety; closure of some developed recreation sites is likely to result in over-use of open developed sites	same as alternative 1	same as alternative 1
Sensitive Plants	Sensitive Plants	management requirements would protect sensitive plants	no direct effects; negative indirect effects might occur from falling dead trees	similar to alternative 1	same as alternative 1
Society	Social and Cultural Impacts	administrative access enhanced, dispersed recreation open, and public firewood gathering allowed	administrative access constrained, dispersed recreation closed, and public firewood gathering not allowed	same as alternative 1	same as alternative 1
	Temporary Employment Generation	6,659 annual jobs supported, based on 661 mmbf and other recovery activities	no increase in annual jobs	6,318 annual jobs supported based on 623 mmbf and other recovery activities	5,511annual jobs supported based on 541 mmbf and other recovery activities
Soils	Soil Stability and Effective Soil Cover	slight reduction in erosion	erosion rates remain high, slightly higher than alternative 1	improves cover, reduces erosion hazard ratings and erosion rates in WSAs compared with alternative 1	similar to alternative 3
	Porosity	improves porosity; limited porosity decreases in areas off skid trails; decreases effects of soil sealing	additional compaction will not occur; however, existing skid trails and temporary roads would not be subsoiled.	similar to alternative 1	similar to alternative 1
Transportation	Forest Transportation System Conditions	safer, well maintained system	access not improved, unsafe conditions along roads, system not as well maintained as in alternative 1	same as alternative 1	same as alternative 1

	Resource and Indicator	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Watershed	Erosion and Sedimentation (Timber and Fuel Reduction Activities)	negligible change in erosion rates in most watersheds; one watershed with slightly elevated erosion and two watersheds with decreased erosion; highest potential for erosion and sedimentation related to fuel reduction	erosion rates similar to alternative 1 and higher than alternatives 3 and 4; sedimentation would not increase; existing skid trail sediment transport networks remain;	negligible change or decrease in erosion rates in most watersheds; watershed treatments increase ground cover and reduce erosion in WSAs; less potential for erosion and sedimentation in WSAs than alternative 1	same as alternative 3
	Erosion and Sedimentation (Road Related Activities)	road treatments reduce erosion potential; reduced erosion potential on existing temporary roads; some erosion and sedimentation potential for new temporary roads, water sources and material sources	increased sedimentation from road-stream hydrologic connectivity; existing temporary roads not decommissioned; increased risk of excessive sedimentation from stream crossing failures	similar to alternative 1	similar to alternative 1
	Riparian Vegetation	slight beneficial effects to riparian obligate species recovery; management requirements protect existing obligate species, fens and meadows	no disturbance to riparian species	same as alternative 1	same as alternative 1
	Stream Condition	no measurable changes in stream flow or channel incision; stream banks not degraded; increased LWD and sediment storage	no measurable changes in stream flow or channel incision; initially less ground cover along stream banks; large levels of LWD and sediment storage over time	no measurable changes in stream flow or channel incision; stream banks not degraded; increased LWD and sediment storage, but less than alternative 1	same as alternative 3
	Water Quality (Beneficial Uses of Water)	water temperature not affected; some sedimentation; limited potential for registered borate compound to contaminate surface waters; no effects to beneficial uses	beneficial uses would continue to be met	same as alternative 1	same as alternative 1
Wildlife	Valley elderberry longhorn beetle	may affect but is not likely to adversely affect the Valley elderberry longhorn beetle; will not affect Designated Critical Habitat	same as alternative 1	same as alternative 1	same as alternative 1
	Bald eagle	may affect individuals but is not likely to result in a trend toward federal listing or loss of viability for the bald eagle	same as alternative 1	same as alternative 1	same as alternative 1
	California spotted owl	may affect individuals but is not likely to result in a trend toward federal listing or loss of viability for the California spotted owl	same as alternative 1	same as alternative 1	same as alternative 1

	Resource and Indicator	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Wildlife	Great gray owl	may affect individuals but is not likely to result in a trend toward federal listing or loss of viability for the great gray owl	same as alternative 1	same as alternative 1	same as alternative 1
	Northern goshawk	may affect individuals but is not likely to result in a trend toward federal listing or loss of viability for the northern goshawk	same as alternative 1	same as alternative 1	same as alternative 1
	Pacific marten	may affect individuals but is not likely to result in a trend toward federal listing or loss of viability for the Pacific marten	same as alternative 1	same as alternative 1	same as alternative 1
	Fisher	may affect individuals, but is not likely to contribute to the need for federal listing or result in loss of viability for the fisher	same as alternative 1	same as alternative 1	same as alternative 1
	Pallid bat and fringed myotis	may affect individuals but is not likely to result in a trend toward federal listing or loss of viability for the pallid bat or fringed myotis	same as alternative 1	same as alternative 1	same as alternative 1
	Black-backed woodpecker	lowest predicted pair density; retains 41 percent of modeled pairs	retains 100 percent of modeled pairs	second lowest predicted pair density; retains 46 percent of modeled pairs	highest predicted pair density of the action alternatives; retains 54 percent of modeled pairs
	Mule deer	improves 1,352 acres of critical winter deer range	improves 0 acres of critical winter deer range	improves 4,416 acres of critical winter deer range	same as alternative 3

3. Affected Environment and Environmental Consequences

3.01 Introduction

Chapter 3 summarizes the physical, biological, social, and economic environments that are affected by the proposed action and alternatives and the effects on that environment that would result from implementation of any of the alternatives. This chapter also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

The “Affected Environment” section under each resource topic describes the existing condition against which environmental effects were evaluated and from which progress toward the desired condition can be measured. Environmental consequences form the scientific and analytical basis for comparison of alternatives, including the proposed action, through compliance with standards set forth in the Stanislaus National Forest Land and Resource Management Plan, as amended (Forest Plan). The environmental consequences discussion centers on direct, indirect and cumulative effects, along with applicable mitigation measures. Effects can be neutral, beneficial or adverse. The “Irreversible and Irretrievable Commitments of Resources” section is located at the end of this chapter. These terms are defined as follows:

- Direct effects are caused by the action and occur at the same place and time as the action.
- Indirect effects are caused by the action and are later in time, or further removed in distance, but are still reasonably foreseeable.
- Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Analysis Process

The environmental consequences presented in Chapter 3 address the impacts of the actions proposed under each alternative. This effects analysis was done at the project scale (the scale of the proposed action as discussed in Chapter 1). However, the effects findings in this chapter are based on site-specific analyses. Each resource specialist assessed every alternative at a level sufficient to support their effects analysis and identify any necessary site-specific mitigation. Most resources considered the short-term temporal analysis bounds to generally be the life of the active projects, about five to ten years. Beyond this time frame are the long-term effects. The resource reports (project record) contain additional details about the analysis process.

Cumulative Effects

According to the CEQ NEPA regulations, “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7). The cumulative effects analysis area is described under each resource, but in most cases includes all NFS, private and other public lands that lie within the Rim Fire perimeter. Past activities are considered part of the existing condition and are discussed in the “Affected Environment (Existing Conditions)” and “Environmental Consequences” sections under each resource.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects. This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis for three reasons.

First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Innumerable actions over the last century (and beyond) impacted current conditions and trying to isolate the individual actions with residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because information on the environmental impacts of individual past actions is limited, and one cannot reasonably identify each and every action over the last century that contributed to current conditions. Focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Finally, the Council on Environmental Quality (CEQ) issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ 2005).

The cumulative effects analysis is consistent with Forest Service NEPA regulations (73 Federal Register 143, July 24, 2008; p. 43084-43099), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)"

For these reasons, the analysis of past actions in Chapter 3 is based on current environmental conditions. Appendix B (Cumulative Effects Analysis) lists present and reasonably foreseeable future actions potentially contributing to cumulative effects.

Forest Plan Amendments

Alternative 3 and Alternative 4 include a Forest Plan Amendment designating a 4-mile wide FCCC, as habitat for old-forest habitat associated species, particularly forest carnivores (portions of this corridor also overlap critical deer range). Figure 2.02-1 shows the corridor would lead from Yosemite National Park and North Mountain IRA west to the Clavey River. The corridor includes the following proposed units that would be managed for Old Forest Emphasis: L02, L05, M1 through M10, M12, M13, M15, M16, M18, M19, and N1. This Forest Plan Amendment changes the land allocation on 9,923 acres from General Forest to OFEA and includes the desired condition described in Chapter 2. Table 3.01-1 shows that other existing land allocations (Wild and Scenic River, PAC, HRCA, and OFEA) allocations would remain unchanged.

The effects analysis in Chapter 3 does not specifically identify effects directly related to the FCCC Forest Plan Amendment; however, the analysis discloses effects for Alternative 3 and Alternative 4 assuming implementation of this Forest Plan Amendment. Since the Forest Plan Standards and Guidelines for General Forest and OFEA are the same (USDA 2010a, p. 190-191), this Forest Plan Amendment is not expected to cause any direct, indirect or cumulative effects.

Table 3.01-1 Forest Carnivore Connectivity Corridor Forest Plan Amendment Land Allocations

Land Allocation	Existing	Proposed
California Spotted Owl Habitat (PACs and HRCAs)	1,197	1,197
General Forest	9,923	0
Goshawk Habitat (PACs)	176	176
Old Forest Emphasis Areas	794	10,717
Wild and Scenic Rivers	1,213	1,213
Total	**13,303**	**13,303**

HRCA=Home Range Core Area; **PAC**=Protected Activity Center

Forest Plan Direction

The Forest Service completed the Stanislaus National Forest Land and Resource Management Plan (Forest Plan) on October 28, 1991. The "Forest Plan Direction" (USDA 2010a) presents the current Forest Plan management direction, based on the original Forest Plan, as amended. The Forest Plan identifies land allocations and management areas within the project area including: Wild and Scenic Rivers, Proposed Wild and Scenic Rivers, Critical Aquatic Refuge (CAR), Riparian Conservation Areas (RCAs), Near Natural, Scenic Corridor, Special Interest Areas, Wildland Urban Intermix, Protected Activity Centers (PACs), Old Forest Emphasis Areas, and Developed Recreation Sites. The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Incomplete or Unavailable Information

CEQ regulations for implementing NEPA describe how Federal agencies must handle instances where information relevant to evaluating "reasonably foreseeable" [3] adverse impacts of the alternatives is incomplete or unavailable. According to 40 CFR 1502.22:

> When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.
>
> a. If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the EIS.
> b. If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the EIS:
>   1. A statement that such information is incomplete or unavailable;
>   2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
>   3. A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and,
>   4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

[3] For the purposes of this rule, CEQ states: "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason (40 CFR 1502.22).

Chapter 3 identifies incomplete or unavailable information so the reader understands how they are addressed. The EIS summarizes existing credible scientific evidence relative to environmental effects and makes estimates of effects on theoretical approaches or research methods generally accepted in the scientific community.

Resource Reports

The resource sections in this chapter provide a summary of these project-specific reports and other documents (project record); they are available by request and are incorporated by reference.

- **Aquatic Species:** Biological Assessment for Threatened and Endangered Species for Aquatic Species and Terrestrial Wildlife for US Fish and Wildlife Service review of proposed action (see wildlife); combined Aquatic Biological Assessment and Biological Evaluation (Aquatic BA and BE); Aquatic Management Indicator Species Report (Aquatic MIS Report); and Fisheries Report.
- **Cultural Resources:** Cultural Resources Report
- **Fire and Fuels:** Fuels Report
- **Invasive Species:** Noxious Weed Risk Assessment (NWRA)
- **Range**: Rangeland Specialist Report (Range Report)
- **Recreation**: Recreation Report
- **Sensitive Plants:** Botanical Resources Report (Botany Report); and Biological Evaluation for Sensitive Plants (Sensitive Plants BE)
- **Soils**: Soils Report
- **Transportation**: Transportation Report
- **Vegetation**: Forest Vegetation Report
- **Watershed**: Watershed Management Report including the appendices for cumulative watershed effects and management requirements (Watershed Report); Watershed Monitoring Plan; and Erosion Control Plan
- **Wildlife**: Biological Assessment for Threatened and Endangered Species for Aquatic Species and Terrestrial Wildlife for US Fish and Wildlife Service review of proposed action (see aquatic species); combined Terrestrial Biological Assessment, Biological Evaluation, and Wildlife Report (Terrestrial BE); Terrestrial Wildlife Management Indicator Species Report (Wildlife MIS Report); and Migratory Landbird Conservation Report

Affected Environment Overview

All resources share many aspects of the affected environment. To avoid repetition in each resource section, the following general elements of the affected environment are provided. The 400-square-mile Rim Fire encompasses a diverse and complex landscape. Landforms within the Rim Fire area are dramatic, punctuated by river canyons, glaciation, a lava cap and large expanses of gentle to moderately steep slopes. Geology is varied and includes all three of the principal geologic types in the Sierra Nevada mountain range. Metamorphic rock occupies much of the lower elevations and the Sierra granitic batholith and relic volcanic flows generally occur at higher elevations. The watersheds, rising in elevation from about 2,000 to 7,000 feet, include rock-rimmed river canyons, mountain meadows, major rivers and small secluded streams. Oak grasslands occur at the lowest elevations, with large expanses of mixed conifer forests at mid-elevation and even some red fir-lodgepole pine stands growing at the highest elevations. Cottonwoods and quaking aspens occupy occasional streamside and meadow sites at mid-to-high elevations. As in many areas of the Sierra Nevada, the landscape has been heavily influenced over the last 150 years by past management activities including; mining, grazing, fire exclusion, large high-severity fires and drought. Railroad logging also occurred throughout the area and almost all of the burned forest consists of second growth trees.

The Rim Fire area lies within a Mediterranean climate zone consisting of warm, mostly dry summers and cool, wet winters. Average summer high temperatures are about 95 degrees Fahrenheit at the lowest elevations and 75 degrees Fahrenheit at higher elevations. Average low winter temperatures are about 30 to 20 degrees Fahrenheit at the lowest and highest elevations respectively. Extreme high and low temperatures vary about 10 to 15 degrees from average. Precipitation increases in elevation, with a range of about 30 to 50 inches per year across the fire area.

The Rim Fire, like almost all wildfires, burned in a mosaic pattern of high, moderate and low soil burn severity with some unburned areas within its perimeter. While the Rim Fire is the largest fire to ever occur on the Stanislaus National Forest, the soil burn severity was relatively low. The high soil burn severity is the second lowest of the principal fires within its perimeter that have occurred since 1973.

Of the 154,530 acres burned on NFS land, 7 percent, or 10,000 acres, resulted in high soil burn severity leaving very little ground cover (0 to 20 percent) distributed in various sized patches. Ground cover in the moderate soil burn severity areas was also substantially reduced as nearly all trees were killed by the fire. Post fire, cover exists on about 56 percent of the area (the total of the low soil burn severity and the unburned portion within the fire perimeter). This cover consists of living vegetation which primarily includes conifer trees with forest floor litter and duff, plus brush and smaller woody shrubs

The Rim Fire burned through numerous watersheds which are an important component of the water supply, fish and wildlife habitat, recreation, timber production and other values of the Sierra Nevada mountain range. Portions of the watersheds within the Rim Fire perimeter previously burned in several fires during the last century, while some areas have not burned in over 100 years. About 98 percent of the Rim Fire burned within the Tuolumne River watershed. The remaining 2 percent burned in the North Fork Merced River watershed along the southern edge of the fire.

The Rim Fire burned less severely near streams than in the uplands in almost all watersheds, and substantially less in many. And though it burned less in these locations there was still a notable loss of the stream shade capacity of conifers and riparian obligate trees and shrubs in many watersheds. While it may take conifers decades to return and once again provide shade, the riparian trees will fill the void in the short-term and also provide biodiversity along stream reaches burned in the Rim Fire.

Road density in the Rim Fire area ranges from one to six miles of road per square mile, with an average of about 4 miles. This is similar to other roaded multiple-use areas within the forest. Road sediment discharge increases are expected as a result of the Rim Fire. Most increases are likely to occur in high soil burn severity areas, and to a lesser extent in moderate soil burn severity areas. Problems include locations of improper road drainage function and culvert issues at road-stream crossings. The undersized culverts cannot handle post-fire flow volume and the additional woody debris and sediment it carries.

Information on Other Resource Issues

The alternatives considered in detail do not affect the following resources or localized effects are disclosed under other resources; they are not further discussed in Chapter 3.

Climate Change

The following elements of climate change are known with near certainty (IPCC 2007):

1. Human activities are changing the composition of Earth's atmosphere. Increasing levels of greenhouse gases, like carbon dioxide (CO_2) in the atmosphere since pre-industrial times, are well-documented and understood.
2. The atmospheric buildup of CO_2 and other greenhouse gases is largely the result of human activities such as the burning of fossil fuels.
3. An "unequivocal" warming trend of about 1.0 degrees to 1.7 degrees Fahrenheit occurred from 1906-2005. Warming occurred in both the Northern and Southern Hemispheres and over the oceans.

4. The major greenhouse gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries. It is virtually certain that atmospheric concentrations of greenhouse gases will continue to rise over the next few decades.
5. Increasing greenhouse gas concentrations tend to warm the planet.

According to IPCC (2007), however, it is uncertain how much warming will occur, how fast that warming will occur, and how the warming will affect the rest of the climate system including precipitation patterns. Given what is known and what is not known about global climate change, the following discussion outlines the cumulative effects of this project on greenhouse gas emissions and the effects of climate change on forest resources.

Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_20) emissions generated by project activities are expected to contribute to the global concentration of greenhouse gases that affect climate change. Projected climate change impacts include air temperature increases, sea level rise, changes in the timing, location, and quantity of precipitation, and increased frequency of extreme weather events such as heat waves, droughts, and floods. The intensity and severity of these effects are expected to vary regionally and even locally, making any discussion of potential site-specific effects of global climate change on forest resources speculative.

Because greenhouse gases from project activities mix readily into the global pool of greenhouse gases, it is not currently possible to discern the effects of this project from the effects of all other greenhouse gas sources worldwide, nor is it expected that attempting to do so would provide a practical or meaningful analysis of project effects. Potential regional and local variability in climate change effects add to the uncertainty regarding the actual intensity of this project's effects on global climate change. Further, emissions associated with this project are extremely small in the global atmospheric CO_2 context, making it impossible to measure the incremental cumulative impact on global climate from emissions associated with this project.

In summary, the potential for cumulative effects is considered negligible for all alternatives because none of the alternatives would result in measurable direct and indirect effects on air quality or global climatic patterns.

Inventoried Roadless Areas

All or portions of three Inventoried Roadless Areas (IRAs) are located on NFS lands within the Rim Fire perimeter: 1) the Cherry Lake IRA (1,000 acres) is located in the east-central portion of the Forest adjacent to the Emigrant Wilderness and Yosemite National Park; 2) the North Mountain IRA (8,100 acres) is located in the southeast part of the Forest adjacent to Yosemite National Park; and, 3) the Tuolumne River IRA (17,300 acres) is located in the southwest part of the Forest. It contains the lower Clavey River and about 18 miles of the Tuolumne Wild and Scenic River.

The alternatives do not include any activities within or adjacent to these IRAs. Nearby short-term road maintenance and other project induced noise is consistent with the Roadless Area Characteristics[4] identified in the 2001 Roadless Rule. Therefore, the alternatives are not likely to result in direct, indirect or cumulative effects on those characteristics.

Vegetation

The Stanislaus National Forest contains a mosaic of vegetation distributed and controlled primarily by climate and soils. The dominant vegetation types occur as broad bands oriented northwest-southeast

[4] Roadless Area Characteristics are: high quality or undisturbed soil, water, and air; sources of public drinking water; diversity of plant and animal communities; habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; primitive, semi-primitive non- motorized, and semi-primitive motorized recreation opportunities; reference landscapes; natural appearing landscapes with high scenic quality; traditional cultural properties and sacred sites; and, other locally identified unique characteristics. (66 Federal Register 9, January 12, 2001; p. 3245)

across the Forest occupying general elevation zones. Conifer forests are the predominant vegetation type where proposed activities would occur.

The fire severity within the Rim Fire occurred in a mosaic of low, moderate and high vegetation burn severity. Areas that burned at higher fire severity show a much larger reduction in the number of live trees per acre overall. Moderately high to high severity areas have an almost 100 percent reduction in live trees. Approximately 47 percent of the dense (greater than 60 percent canopy cover) conifer, hardwood, and mixed-conifer forest types burned almost completely, with total mortality. An additional 12 percent of the forest, with 40 to 59 percent canopy cover, was killed by the fire. Accounting for all tree size density classes, only 41 percent of the forest remained below 25 percent mortality levels.

The ability of forests to regenerate after stand replacing fire is highly dependent on seed sources. Larger patches of burn areas (such as those in the high severity areas) can result in openings in the forest that are larger than the reach of surviving neighboring conifers, whose seeds cannot cover the open area (Bonnet 2005). Based on the current scientific information regeneration of conifers, especially of pine in high severity areas, will be limited compared to other areas of the fire that burned at lower intensity.

Because of the fire severity and the high percentage of mortality in many areas, changes to size and density classes of vegetation types are expected. It is anticipated that mixed conifer and pine areas, with greater than 75 percent mortality, will give way to chaparral-dominated vegetation. In mixed conifer and pine areas of 25 to 75 percent mortality, canopy cover densities will decrease from above 40 percent to less than 25 percent. Decreases in canopy cover density for hardwood vegetation types are also expected.

Action alternatives would remove primarily dead vegetation and may damage live trees or plants during harvest operations, but the extent of damage would be localized and long term effects to vegetation would be negligible. The range, sensitive plants, soils, watershed and wildlife sections disclose any localized effects on specific vegetation.

Visual Resources

In moderate and high severity burn areas, the dramatically altered landscape does not meet Forest Plan Standards and Guidelines for Visual Quality Objectives (USDA 2010a, p. 63). Most of the effects that are initially perceived as negative (flush cut stumps, hand or machine piles, treatment edges, ground disturbance, and untreated slash) occur during implementation. This initial phase is short term and does not represent the completed treatment. At the conclusion of treatment, visual signs of activity (i.e., cut stumps or track and tire marks) may still be evident in the immediate foreground view but would dissipate over time. Since the majority of the forest is viewed as a middle-ground or background view the appearance of a naturally evolving landscape setting will dominate in most instances. Evidence of burned trees and ground features naturally occur in forests with wildfire regimes.

Overall the proposed treatments would improve visual quality by reducing the visual evidence of fire over time. By treating slash and activity fuels through piling and burning, vegetation would regrow providing visually pleasing contrast to surrounding features and landforms. With growth of shrubs, grasses, and forbs, the majority of evidence of management activities would not be evident to the casual forest visitor. These improvements in how the landscape is viewed will begin to show up within one year of treatments being completed. Where project activities are proposed within sight distance (middle-ground and background) of Wild and Scenic Rivers, Wilderness or Yosemite National Park, distance and geographic features would obscure most treatments from the casual observer or users of those areas. As such, the alternatives are not likely to result in direct, indirect or cumulative effects on visual resources.

Yosemite National Park

The Stanislaus National Forest shares a common boundary, much of which is Wilderness, with Yosemite National Park to the east. The National Park Service manages park resources and values to leave them unimpaired for the enjoyment of future generations. The alternatives considered in detail will not directly affect park resources. Action alternatives will increase worker and public safety and improve Forest Service ability to manage future fires, which may indirectly benefit park resources and values. Wildlife habitat improvement activities may benefit Yosemite National Park wildlife populations by providing corridors for wildlife movement on the Stanislaus National Forest.

Analysis Framework

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders." The following resource sections list the applicable laws, regulations, policies and Executive Orders relevant to that resource. The resource reports (project record) include the surveys, analyses and findings required by those laws.

CEQA and NEPA Compliance

NEPA requires agencies to assess the environmental effects of a proposed agency action and any reasonable alternatives before making a decision on whether, and if so, how to proceed. The California Environmental Quality Act (CEQA) applies to projects of all California state, regional or local agencies, but not to Federal agencies. Its purposes are similar to NEPA. They include ensuring informed governmental decisions, identifying ways to avoid or reduce environmental damage through feasible mitigation or project alternatives, and providing for public disclosure (CEQA Guidelines, 15002, subd. (a)(1)-(4)).

The CEQ regulations for implementing NEPA encourage cooperation with state and local agencies in an effort to reduce duplication in the NEPA process (40 CFR 1506.2). The CEQ regulations further provide agencies with the ability to combine documents, by stating that "any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork" (40 CFR 1506.4). Furthermore, if an existing document cannot be utilized, portions may be incorporated by reference. Like NEPA, CEQA encourages cooperation with Federal agencies to reduce duplication in the CEQA process. In fact, CEQA recommends that lead agencies rely on a Federal EIS "whenever possible," so long as the EIS satisfies the requirements of CEQA (Cal. Pub. Resources Code, 21083.7). Overall, the resource analysis contained in this EIS meets CEQA requirements; however, the following information is provided since this document uses terminology not commonly used in CEQA and vice versa:

- **Management Requirements**: Chapter 2 lists management requirements. The action alternatives include management requirements designed to implement the Forest Plan and to minimize or avoid potential adverse impacts. Each action alternative lists the management requirements specific to it and Chapter 2.03 identifies those common to all action alternatives. Management requirements are mandatory components of each alternative and will be implemented as part of the proposed activities.
- **Green House Gas Emissions**: Chapter 3.01 (Climate Change) and Chapter 3.02 (Air Quality) describe and evaluate greenhouse gas emissions.
- **Growth Inducing Impacts and Energy Impacts**: Chapter 3.10 (Society, Culture and Economy) describes population growth and evaluates economic growth inducing impacts. No population growth inducing impacts are expected since NFS lands are not available for urbanization. Chapter 3.10 also describes energy impacts related to haul distance and biomass use for electrical power.

3.02 AIR QUALITY

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Air Quality Management Practices

Smoke from prescribed fire is managed so that emissions meet applicable state and federal standards. Prescribed fires are regulated and authorized by the local Air Pollution Control District (APCD) and the California Air Resources Board under the process established by the California Smoke Management Program (Title 17). The legal basis of the program is found in the Smoke Management Guidelines for Agricultural and Prescribed Burning adopted by the California Air Resources Board (ARB) on March 23, 2001 (CARB 2001). The Guidelines provide the framework for State and local air district regulators to conduct the program. Elements of the program include:

- Registering and Permitting of Agricultural and Prescribed Burns
- Meteorological and Smoke Management Forecasting
- Daily Burn Authorization
- Enforcement

The 1990 Clean Air Act (CAA) amendments and the 1998 EPA Interim Policy on Wildland and Prescribed Fire form the federal requirements and guidance behind the California program (Ahuja et al. 2006). Burn days are allocated by the responsible air quality regulatory agency when dispersion conditions are most likely to prevent exposure to unhealthy smoke concentrations. Allocations are considered on a cumulative potential for the air basin by regulatory review of a unified reporting system, the Prescribed Fire Information Reporting System (PFIRS), maintained by the California Air Resources Board (CARB 2012). The reporting system and a daily conference call between regulatory meteorologists, resource agency meteorologists, and resource agency fire managers allow for a daily discussion of ongoing events, smoke dispersion, allocations, and burn approval outlook. The objective of this system is to facilitate fuel treatment and minimize smoke exposure to the public.

In the spring of 2011, staff of the ARB, Federal and State Land Management Agencies, and Air Districts in California worked together to revise the policy that governs the management of naturally ignited fires. The protocol, entitled “Coordination and Communication Protocol for Naturally Ignited Fires” (CARB 2011), establishes a framework from which smoke and emission impacts from wildfires would be minimized through fire suppression techniques and improved public awareness.

- The Forest Service utilizes Best Available Control Measures (BACMs) and Best Smoke Management Practices (BSMPS)(NRCS 2011) to reduce particulate emissions. BACMs are a combination of practices intended to reduce emissions to the lowest practicable amount. BACMs are accomplished by diluting or dispersing emissions, or by preventing potential emission sources whenever possible. Examples of BACMs include: Reducing pollutants by limiting the mass of material burned, burning under moist fuel conditions when broadcast burning, shortening the smoldering combustion period, and increasing combustion efficiency by encouraging the flaming stage of fire when burning piles.
- Diluting pollutant concentrations over time by reducing the rate of release of emissions per unit area, burning during optimum conditions, and coordinating daily and seasonally with other burning permittees in the area to prevent standard exceedances.

Effects Analysis Methodology

Smoke emissions were calculated for machine pile burning, jackpot burning and for wildfires. Greenhouse gas emissions were calculated. The emissions for biomass removed for wood products and/or utilized for bioenergy production were also estimated. Tons per acre of non-merchantable timber were calculated from post fire plot sampling. These data were then used, along with treatment acres, to derive the average biomass emissions for each alternative.

Assumptions Specific to Air Quality

The emissions were calculated using the following formula;

> E_i (tons) equals (A multiplied by FL multiplied by percent C multiplied by EF) all divided by 2000 to convert pounds to tons

Where:

> E_i equals Emissions in tons for ith emission type (e.g. $PM_{2.5}$ or NOx or CH_4)
> A equals Area in acres
> FL equals Fuel Loading in tons per acre
> Percent C equals Percent fuel consumed
> EFi equals Emission factor for ith type (in pounds per ton of dry fuel consumed)

- Average Fuel loading assumed under different treatments is 20 tons per acre (per field surveys) per message from Scott Cones, Mi-Wok District Fuels Officer
- Percent combustion under pile burning is 100 percent
- Percent combustion under jackpot burning is 50 percent
- Jackpot burns are similar to broadcast or underburns
- EFs for pile and jackpot burns were derived from Hardy et al. 2001: PM_{10} equals (12.4, 25), $PM_{2.5}$ equals (10.8, 22), CH_4 equals (11.4, 8.2), NMHC equals (8, 6.4), CO equals(153, 178), CO_2 equals (3271, 3202), NO_x equals(6, 6), SO_x equals (2.4, .2.4)
- EFs for biomass utilized for bioenergy production were by from Placer County and TSS Consultants 2008: PM_{10} equals 0.319, $PM_{2.5}$ equals 0.28072, CH_4 equals 0.214, NMHC equals 0.071, CO equals 0.018, CO_2 equals 3271, NO_x equals 3.041, SO_x equals 2.129, and N_20 equals 0.45
- GWP (Global Warming Potential) factor for greenhouse gas conversion to CO_2 equivalent metric tons from IPCC 2007
- Wildfire emissions were based on a wildfire burning under 90th percentile weather conditions at year 20 for all scenarios.
- Road construction, reconstruction, logging, haul traffic, and rock quarry blasting would have a minor effect on air quality due to the project's management requirements and implementation of standard dust abatement requirements within all Forest Service timber sale contracts. Therefore, these emissions are not calculated.

Data Sources

- First Order Fire Effects Monitoring Program
- CARB (2010)
- EPA (2012)
- Inciweb (2013)
- IPCC (2007)
- Placer County Air Pollution Control District (2008)
- Placer County Executive Office et al. (2008)
- Springsteen et al. (2011)
- Tarnay, L. (2014)

Air Quality Indicators

The Clean Air Act lists 189 hazardous air pollutants to be regulated. Some components of smoke, such as polycyclic aromatic hydrocarbons (PAH) are known to be carcinogenic. Probably the most carcinogenic component is benzo(a)pyrene (BaP). Other components, such as aldehydes, are acute irritants. In 1994 and 1997, 18 air toxins were assessed relative to the exposure of humans to smoke from prescribed and wildfires.

The following seven pollutants are most commonly found in smoke from fire:

- **Particulate Matter** ($PM_{2.5}$ and PM_{10} a criteria pollutant): Particulates are the most prevalent air pollutant from fires and are of the most concern to regulators. Research indicates a correlation between hospitalizations for respiratory problems and high concentrations of fine particulates. $PM_{2.5}$ are fine particles that are 2.5 microns in diameter or less in size. PM_{10} are fine particles that are between 10 and 2.5 microns in diameter or less in size. Particulates can include carcinogens and other toxic compounds. Overexposure to particulates can cause irritation of mucous membranes, decreased lung capacity and impaired lung function.
- **Methane** (CH_4): Methane is an odorless, colorless flammable gas. Short-term exposure to methane may result in feeling tired, dizziness and headache. There is no long-term health effects currently associated with exposure to methane. Methane is a greenhouse gas (GHG) and contributes to global climate warming (IPCC 2007).
- **Carbon Monoxide** (CO a criteria pollutant): Carbon monoxide reduces the oxygen carrying capacity of the blood, a reversible effect. Low exposures can cause loss of time awareness, motor skills and mental acuity. Also, exposure can lead to heart attacks, especially for persons with heart disease. High exposures can lead to death due to lack of oxygen.
- **Carbon Dioxide** (CO_2): Carbon dioxide is a colorless, odorless and non-poisonous gas formed by combustion of carbon and in the respiration of living organisms. Carbon dioxide is the primary GHG emitted through human activities. Greenhouse gases act like a blanket around the Earth, trapping energy in the atmosphere and causing it to warm. The buildup of GHGs can change the Earth's climate and result in dangerous effects to human health and welfare and to ecosystems (IPCC 2007).
- **Nitrogen Oxide** (NO_x a precursor to O_3): Nitrogen oxide is a group of different gases made up of different levels of oxygen and nitrogen. Nitrogen dioxide (NO_2 a criteria pollutant) is a reddish-brown gas. Small levels can cause nausea, irritated eyes and/or nose, fluid forming in lungs and shortness of breath. Breathing in high levels can lead to rapid, burning spasms, swelling of throat, reduced oxygen intake, a larger buildup of fluids in lungs and/or death. N_2O is a GHG and contributes to global warming.
- **Ozone** (O_3 a criteria pollutant) is the most widespread air quality problem in the state according to the CARB (2010). It is not emitted directly but is formed from reactions of hydrocarbons and NO_x in the presence of sunlight. It can cause reduced lung function and irritated eyes, nose and throat. It is known to cause damage to some vegetation, including ponderosa pine and Jeffrey pine trees (Procter et al. 2003).
- **Sulfur Oxide** (SO_x a criteria pollutant): Short-term exposure to high enough levels of sulfur dioxide (SO_2) can be life threatening. Generally, exposures to SO_2 cause a burning sensation in the nose and throat. SO_2 exposure can cause difficulty breathing, including changes in the body’s ability to take a breath or breathe deeply, or take in as much air per breath. Long-term exposure to sulfur dioxide can cause changes in lung function and aggravate existing heart disease. Asthmatics may be sensitive to changes in respiratory effects due to SO_2 exposure at low concentrations. Sulfur dioxide is not classified as a human carcinogen (it has not been shown to cause cancer in humans). SO_x is not an issue in the state and has not been analyzed.

The Rim Fire Recovery project area is located in Tuolumne County and Mariposa County, California. The direct, indirect and cumulative effects analysis area for the air quality section of this report is the Tuolumne and Mariposa Air Pollution Control Districts located in the Mountain Counties Air Basin.

Affected Environment

Existing Conditions

According to the Environmental Protection Agency (EPA) Green Book, updated July 2, 2014, Tuolumne and Mariposa counties are Designated Non-Attainment Areas for ozone; the project area falls within these two counties. The Emigrant Wilderness is a Class 1 Federal area. Yosemite National Park is a Class 1 Federal area adjacent to the project area. The San Joaquin Valley, a non-attainment area, runs along the western boundary of the project area. The Forest Service follows the guidelines assigned by the California Air Resource Board [ozone State Implementation Plan (SIP), visibility SIPs, and Title 17] to limit state-wide exposure on a cumulative basis, in compliance with the Clean Air Act (CARB 2001) (CARB 2008).

Air quality from the Rim Fire reached unhealthy levels from Yosemite to the San Joaquin Valley, according to an alert from the National Weather Service. People were advised to avoid strenuous outdoor activity or to remain indoors because fine particles in smoke can irritate the eyes and respiratory system and aggravate chronic heart and lung disease. Figure 3.02-1 shows the smoke from the Rim Fire in the Groveland area and how people responded by wearing filtering devices.

Figure 3.02-1 Smoke from the Rim Fire billlows over Groveland and affects air quality

Environmental Consequences

Effects Common to all Alternatives

Emissions for all the Alternatives including Alternative 2 (the no action alternative serves as the control) are shown in Table 3.02-01 through Table 3.02-13. The tables are grouped by treatments: Prescribed Fires: Table 3.01-1 to Table 3.02-3; Wildfires: Table 3.02-4; Biomass Removal: Table 3.02-5 to Table 3.02-7; Green House Gases are under Prescribed Fires, Table 3.02-8 to Table 3.02-10; and Green House Gases are under different biomass removal types (i.e. biomass for wood products or prescribed burning or for bioenergy), Table 3.02-11 to Table 3.02-13.

Direct and Indirect Effects

Prescribed Fires

Table 3.02-1 displays emissions under pile burning. Table 3.02-2 shows emissions under jackpot burning. Table 3.02-3 displays the expected combined emissions for all alternatives under machine pile and jackpot burning. Burning would be completed under approved burn and smoke management plans. Given the ability to control ignition times to favor good smoke dispersion, it is not anticipated that prescribed burning would impact the local communities. Smoke would be transported to the northeast by typically southwest winds during the day. At night, some smoke from smoldering burns in the project area may move down drainages. Piles would be burned under weather conditions that would allow efficient combustion.

Table 3.02-1 Emissions under pile burning (tons)

Alternative	Acres Treated	PM_{10}	$PM_{2.5}$	CH_4	NMHC	CO	CO_2	NO_x
1	16,366	2,029	1,768	1,866	1,309	25,040	16,399	982
2	0	0	0	0	0	0	0	0
3	16,564	2,054	1,789	1,888	1,325	25,343	541,808	994
4	14,892	1,847	1,608	14,892	1,191	22,785	487,117	894

Table 3.02-2 Emissions under jackpot burning (tons)

Alternative	Acres Treated	PM_{10}	$PM_{2.5}$	CH_4	NMHC	CO	CO_2	NO_x
1	4,199	524	462	172	134	3,737	67,226	126
2	0	0	0	0	0	0	0	0
3	4,147	518	456	170	133	3,691	66,393	124
4	3,650	456	402	150	117	3,249	58,437	110

Table 3.02-3 Emissions from the sum of pile and jackpot burns (tons)

Alternative	Acres Treated	PM_{10}	$PM_{2.5}$	CH_4	NMHC	CO	CO_2	NO_x
1	20,565	2,554	2,229	2,038	1,444	26,678	535,332	1,108
2	0	0	0	0	0	0	0	0
3	20,711	2,572	2,245	2,058	1,458	26,960	608,202	1,118
4	18,542	2,303	2,010	15,042	1,308	24,208	545,554	1,003

Generally, $PM_{2.5}$ emissions are the dominant public health risk and can be viewed as the primary indicator. The total treatment acres and emissions displayed have value as a relative comparison of alternatives but not as an assessment of public exposure since the fuel treatments will take place over multiple years and multiple times during each year. Public exposure of smoke emissions will be mitigated by the daily burn day permission and allocation from the California Air Resources Board and the local air pollution control districts. The objective of this program is to mitigate public exposure below health risk thresholds. Most likely the total emissions occurring on any particular burn day may not be allowed to exceed 100 to 200 tons of $PM_{2.5}$ irrespective of the action alternative.

Wildfires

Emissions from wildfires within the project area were modeled. Table 3.02-4 is based on the First Order Fire Effects Model (FOFEM 6.0), the 90th percentile weather for the project area and the estimated fuel loading under each Alternative at year 20 (Boutcher 2014). For Alternative 2, the 30,399 acres identified in Alternative 3 were used for the smoke emission analysis. Alternative 2 generates the maximum emissions compared to all other alternatives. This demonstrates the emissions savings that can be generated from prescribed burn treatments as opposed to wildfire scenarios.

Table 3.02-4 Smoke emissions at year 20 under wildfire conditions (tons)

Alternative	Acres Treated	PM_{10}	$PM_{2.5}$	CH_4	NMHC	CO	CO_2	NO_x
1	28,326	3,285	2,775	1,600	1,133	34,005	330,012	354
2	30,399	20,476	17,360	10,352	7,334	224,632	1,319,961	744
3	30,399	3,526	2,979	1,717	1,216	36,498	354,210	380
4	27,826	3,228	2,727	1,572	1,113	33,412	324,256	347

Biomass Removal

Biomass removed for wood products keep the carbon and other GHG emissions locked up until the end of the product life through combustion or decomposition. The process removes the location of emission generation from forest site to the new location and has a diluting effect depending on where the forest products go and when they start decomposing.

Table 3.02-5 shows the emissions that would be saved from release to the atmosphere from the forest site due to biomass removal. Table 3.02-6 lists the emissions produced when the removed biomass is used for bioenergy production. A savings of 97 percent occurs in PM2.5 emissions alone, when biomass is used for bioenergy, whereas CH4 emissions savings amount to 98 percent. Table 3.02-7 demonstrates the difference in emissions production under biomass removed for wood products or through open burning and biomass utilized for bioenergy production.

Table 3.02-5 Emission savings (compared to open burning) under biomass removal (tons)

Alternative	Acres Treated	PM_{10}	$PM_{2.5}$	CH_4	NMHC	CO	CO_2	NO_x
1	7,620	945	823	869	610	11,659	249,250	457
2	0	0	0	0	0	0	0	0
3	8,379	1,039	905	955	670	12,820	274,077	503
4	7,975	989	861	909	638	12,202	260,862	479

Table 3.02-6 Emissions under biomass used for bioenergy generation (tons)

Alternative	Acres Treated	PM_{10}	$PM_{2.5}$	CH_4	NMHC	CO	CO_2	NO_x
1	7,620	24	21	16	5	1	249,250	232
2	0	0	0	0	0	0	0	0
3	8,379	27	24	18	6	2	274,077	255
4	7,975	25	22	17	6	1	260,862	243

Table 3.02-7 Emission difference between biomass removal and biomass used for bioenergy (tons)

Alternative	Acres Treated	PM_{10}	$PM_{2.5}$	CH_4	NMHC	CO	CO_2	NO_x
1	7,620	921	802	852	604	11,657	0	225
2	0	0	0	0	0	0	0	0
3	8,379	1,012	881	937	664	12,818	0	248
4	7,975	963	839	892	632	12,200	0	236

Greenhouse Gases

Table 3.02-8 displays the GHG from pile burning. Table 3.02-9 shows the GHGs produced from jackpot burning. Table 3.02-10 sums up the number under those two treatments. There are no GHGs generated under Alternative 2 because no jackpot or pile burning occurs.

Table 3.02-11 displays the amounts of GHG savings when biomass is removed. Table 3.02-12 shows the amounts of GHGs produced when biomass is utilized for wood products or for bioenergy. No difference occurs for CO2 under either scenario for any alternative. Less CH4 and N2O are produced under bioenergy production. Table 3.02-13 shows the emission reduction that occurs in GHGs by utilizing the biomass for bioenergy instead of biomass for wood products or open burning.

Table 3.02-8 Greenhouse gas emissions under pile burning

Alternative	CO_2 Equivalent metric tons			
	CH_4	CO_2	N_2O	Total
1	35,536	485,546	14,817	535,900
2	0	0	0	0
3	35,966	491,420	14,997	542,383
4	32,336	441,815	13,483	487,634

Table 3.02-9 Greenhouse gas emissions under jackpot burning

Alternative	CO_2 Equivalent metric tons			
	CH_4	CO_2	N_2O	Total
1	3,279	60,974	1,901	66,154
2	0	0	0	0
3	3,239	60,219	1,877	65,335
4	2,850	60,219	1,652	64,722

Table 3.02-10 Total greenhouse gas emissions under pile and jackpot burning

Alternative	CO_2 Equivalent metric tons			
	CH_4	CO_2	N_2O	Total
1	38,816	546,520	16,718	602,054
2	0	0	0	0
3	39,205	551,639	16,874	607,718
4	35,186	502,034	15,135	552,356

Table 3.02-11 Greenhouse gas emissions savings (compared to open burning) under biomass removal

Alternative	CO_2 Equivalent metric tons			
	CH_4	CO_2	N_2O	Total
1	16,546	226,070	6,899	249,515
2	0	0	0	0
3	18,194	248,588	7,586	274,368
4	17,317	236,602	7,220	261,139

Table 3.02-12 Greenhouse gas emissions under biomass used for bioenergy

Alternative	CO_2 Equivalent metric tons			
	CH_4	CO_2	N_2O	Total
1	311	226,070	9,641	236,022
2	0	0	0	0
3	342	248,588	10,602	259,531
4	325	236,602	10,090	247,018

Table 3.02-13 Greenhouse gas emissions saved using biomass for bioenergy as compared to open burning

Alternative	CO_2 Equivalent metric tons			
	CH_4	CO_2	N_2O	Total
1	16,235	0	3,355	19,590
2	0	0	0	0
3	17,852	0	3,689	21,541
4	16,992	0	3,511	20,502

CUMULATIVE EFFECTS

Additional projects within and adjacent to the project area will utilize prescribed burning: Two-mile Ecological Restoration: Vegetation Management, Soldier Creek Timber Sale, Reynolds Creek Ecological Restoration and several thousand acres of pile burning on private land. California's Smoke Management Program (Title 17) is designed to prevent cumulative effects from prescribed fire operations. The program provides allocations of emissions based on an airshed's capacity and forecasted dispersal characteristics. The allocation process considers all burn requests, meteorological conditions, forecasted air pollution levels (similar to the BSMPs described by the NRCS 2011) and uncontrollable events like wildfire. Wildfire emissions can overwhelm air basins and most prescribed burn requests are denied during wildfire events. As a result of the California Smoke Management Program and agency oversight, none of the action alternatives are expected to contribute toward air quality cumulative effects.

Alternative 1

DIRECT AND INDIRECT EFFECTS

A lower number of acres are treated under jackpot as compared to pile burning. The $PM_{2.5}$ and other emissions produced under prescribed burning are less under jackpot.

The wildfire emissions for $PM_{2.5}$ and other pollutants are lower under Alternative 1 as compared to Alternative 2, but higher than Alternative 4.

The number of acres treated for biomass removal under Alternative 1 are the lowest (i.e. 7,620 acres as compared to 8,379 acres and 7,975 acres for Alternatives 3 and 4 respectively). The $PM_{2.5}$ emissions are reduced to 21 tons under biomass for bioenergy from 823 tons under open burning.

The total GHGs produced are 602,054 CO_2 equivalent metric tons from prescribed fire treatments.

CUMULATIVE EFFECTS

Cumulative Effects would be similar as described under Effects Common to all Alternatives

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

No acres are being treated under Alternative 2 and therefore no emissions are displayed under pile and jackpot burning.

Under Alternative 2, no pile burning and no jackpot burning occur; therefore, there would be no smoke directly generated from management activities. It is expected that there will continue to be lightning and human caused ignitions within the perimeter of the Rim Fire. The emissions in tons per acre would be similar to Alternative 1 for the first five years; however, potential emissions would be much higher after year 5 when the standing dead trees start to fall and contribute to the ground fuel available for burning in a wildfire. Table 3.02-4 shows that under a wildfire scenario during 90th percentile weather conditions at year 20, $PM_{2.5}$ emissions for Alternative 2 would be 17,360 tons as compared to 2,775 under Alternative 1.

Although Alternative 2 would not produce GHGs tied to the management actions defined in the other alternatives it would likely produce the highest level of GHGs since it is anticipated to have the highest level of wildfire. The Rim Fire in 2013 consumed approximately 257,000 acres and produced 11 million tons of GHGs as CO_2 equivalent metric tons (Tarnay 2014). Table 3.02-4 shows about 1.6 million tons of GHG would be produced from 30,399 wildfire acres under Alternative 2.

Where wildfires cannot be contained and they burn into heavy fuels, it is expected that heavy smoke from fire burning or smoldering in downed logs would result. This smoke would be blown to the northeast towards Yosemite National Park, a federal Class 1 area, by typical southwest winds during the day. At night, smoke from a fire in this area would move down the drainages and likely cause impacts to the San Joaquin Valley.

CUMULATIVE EFFECTS

The cumulative effects from other projects would be the same as described under Effects Common to all Alternatives. However, when the effects from Alternative 2 are added, the cumulative effects are also much higher than the action alternatives. Potential wildfire emissions would overwhelm air basins.

Alternative 3

DIRECT AND INDIRECT EFFECTS

The highest number of acres being treated for prescribed burning are under Alternative 3 and it produces the highest emissions followed by Alternatives 1 and 4 respectively. The highest benefit in emission reduction would occur under Alternative 3 because maximum biomass would be removed. The maximum GHGs emission savings occur under this alternative when biomass is utilized for bioenergy.

CUMULATIVE EFFECTS

Cumulative effects would be similar as described under Effects Common to all Alternatives.

Alternative 4

DIRECT AND INDIRECT EFFECTS

The number of acres treated under Alternative 4 fall between Alternatives 1 and 3, and the emissions produced and saved are also between those two action alternatives.

CUMULATIVE EFFECTS

Cumulative Effects would be similar as described under Effects Common to all Alternatives.

Summary of Effects Analysis across All Alternatives

Table 3.02-3 displays total emissions for machine pile and jackpot burning for each alternative. Total emissions from wildfires were generated using the 90th percentile weather, fuel loading at year 20 and multiplied by the number of acres treated for each alternative except Alternative 2. For Alternative 2, the 30,399 acres identified in Alternative 3 were used for the smoke emission analysis.

Areas outside treatment units would experience similar fire behavior, which would result in similar emissions. Table 3.02-4 compares smoke emissions under wildfire conditions by alternative. The expected amount of smoke emissions for Alternative 2 under wildfire conditions and inside treatment units at year 20 would be 6 to 8 times more for all types of emissions except NO_x which is about 2 times.

The project is located in an area designated as non-attainment for ozone. Ozone is known to impact human respiratory function and the health and vigor of some vegetation including ponderosa and Jeffry pine (Procter et al, 2003). The burn treatments under Alternatives 1, 3 and 4 will be conducted under an EPA approved California Smoke Management Program (SMP). Under the revised Conformity Rules the EPA has included a Presumption of Conformity for prescribed fires that are conducted in compliance with a SMP; therefore, the federal actions will be presumed to conform and no separate conformity determination will be made. The California Smoke Management Program provides for the allocation of emissions from biomass burning with respect to cumulative effects. Biomass burning projects are regulated and coordinated by air quality regulatory jurisdictions and all entities submitting burns for approval. In making those decisions, air quality regulators consider forecasts, dispersion conditions, locations of proposed projects and background air quality by air basin. These considerations have historical success in preventing cumulative effects of smoke.

3.03 Aquatic Species

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The Forest Plan includes goals and strategy applicable to aquatic species and the Rim Recovery project (USDA 2010a):

- Fish and Wildlife Goal: Provide habitat for viable populations of all native and desired non-native wildlife, fish and plants. Maintain and improve habitat for Threatened and Endangered species and give special attention to sensitive species to see that they do not become Federally listed as Threatened or Endangered.
- Aquatic Management Strategy: Identifies endpoints (desired conditions) toward which management moves watershed processes and functions, habitats, attributes, and populations. Goals of the Aquatic Management Strategy (AMS) include direction to (1) maintain viable populations of native and desired non-native species, (2) maintain habitat connectivity for aquatic and riparian species, and (3) maintain streamflow patterns and sediment regimes in accordance with evolutionary processes. The AMS has six RCOs that include the following element: (RCO 3) Ensure a renewable supply of large down logs that can reach the stream channel and provide suitable habitat within and adjacent to the Riparian Conservation Area.

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

Project effects analyses covered threatened, endangered, and proposed species where their geographic and elevation range and suitable habitat occurred within the Rim Recovery project area. An official list of federal threatened, endangered, and proposed species covering the project area was obtained from the Sacramento U.S. Fish and Wildlife Office website on December 5, 2013, and updated on April 17, 2014 (Document 140417112513). The treatment in this analysis includes recent taxonomic changes and proposed listings for Sierra Nevada yellow-legged frog that were not reflected in the official list. Scientific literature, state and federal databases (CNDDB, Aquasurv) were also examined to determine if species may occur in the project area.

Assumptions Specific to Aquatic Species

- The range map developed by Dr. Roland Knapp provides the best available estimate of the former range of the Sierra Nevada yellow-legged frog (SNYLF). The map was developed using a Maxent model using every verified historical and current SNYLF locality. This model was also used by the U. S. Fish and Wildlife Service to refine the boundaries of proposed critical habitat for the frog (Federal Register 2013a).
- For the foothill yellow-legged frog (FYLF) and western pond turtle (WPT), all intermittent and perennial streams below 4,200 feet in elevation provided suitable habitat for the species. This is considered a conservative approach because some intermittent streams do not provide any perennial water, making occupancy by either species unlikely. If these small, intermittent tributaries have very steep pitches (e.g., 20-foot high waterfall), they are also unlikely to be used by the turtle (Holland 1994). Also, the WPT may also occupy streams above the 4,200 foot elevation because one known occupied site above this elevation, but almost all occupied sites are lower than 3,000 feet in elevation. Two occupied sites (ponds) are at 5,400 feet within this project area with no clear indication of how they became occupied by the species. It is possible that they occur at these sites naturally or are an artefact of introduction by humans.

- All suitable habitats are assumed to be occupied by the species because of the limitations inherent in visual encounter surveys. Since the FYLF can remain hidden in streamside vegetation, roots, or cracks in rocks and WPT detect and hide quickly from surveyors (at long distances), the lack of detection during a single survey does not indicate unoccupied habitat. Also, some surveys only cover portions of a stream which limits an assumption of occupancy for an entire stream.
- A 300-meter (984 feet) buffer was used for the WPT around suitable aquatic habitats to account for upland habitat use. This buffer is assumed to include a large majority of the upland habitat use, but acknowledges that turtles sometimes move distances greater than 300 meters from the water.
- In the post-fire environment, most of the sediment from hillslope erosion is assumed to end up in a stream. This assumption is more valid for high soil burn severity areas on steep slopes that are close to streams. High-severity areas typically have no beneficial ground cover and have water-repellent layers that allow sediment to be eroded. Roughness in topography, downed wood, rocks, and stump holes all have the potential to trap sediment being transported downslope and the assumption of 100 percent sediment routing to stream channels is an overestimation. However, using this assumption allows for the comparison of erosion rates and sedimentation across all alternatives.
- Regardless of the level of project-related activity, changes in sediment from project-related activity at the 5th Level Hydrologic Unit Code (HUC) watershed scale are assumed to be relatively minor when compared to post-fire sedimentation. For example, the amount of post-fire sediment delivered to the Clavey River may have small, localized consequences, but at the point of confluence with the Tuolumne, there would be too little sediment to significantly impair biological functions. Further, there would be very little detectable change in suitability for most aquatic habitats when the total amount of project-related sediment is added to the post-fire sediment. This is because large bedrock rivers are very effective at storing and transporting fine sediments.
- Species are not present where suitable habitat is not present.
- Proposed water quality BMPs and management requirements would function as designed and reduce the risk of both direct and indirect effects to aquatic species.

Data Sources

- Stanislaus National Forest basemap, watersheds delineated at multiple scales (Hydrologic Unit Codes 5-8), stream gradient layer.
- Stanislaus National Forest aquatic survey database (Aquasurv).
- Stanislaus Streamscape Survey Inventory (SSI) database.
- California Wildlife Habitat Relationships System (CWHR) and the California Natural Diversity Database.
- Erosion and sediment modeling (3.09 Soils and 3.14 Watershed.
- Hydrology, soils and geology BAER reports.

Aquatic Species Indicators

THREATENED AND ENDANGERED SPECIES

The Aquatic BA and BE evaluated two federally listed species: the threatened California red-legged frog (CRLF) and endangered Sierra Nevada yellow-legged frog (SNYLF). The indicators used for the analysis of potential impacts to these aquatic species are related to habitat suitability, breeding habitat, and upland habitat.

Breeding and Non-breeding Aquatic Habitat

- Amount of breeding habitat affected by project activities (CRLF and SNYLF)
- Amount of non-breeding habitat affected by project activities (CRLF)
- predicted increases in erosion levels from activities

Habitat Suitability (CRLF)

- Estimated post-fire and post-implementation sediment depths (inches) potentially added to suitable habitat based on the Disturbed Watershed Erosion Prediction Project (WEPP) modeling.

Breeding or Non-breeding Habitat (CRLF)

- Miles of breeding and non-breeding streams or acres of pond with occupied habitat
- Miles of breeding and non-breeding streams or acres of pond with suitable habitat
- Miles of breeding and non-breeding streams or acres of pond within units and/or hazard tree treatments

Number of road treatment intersections with breeding and non-breeding streams in analysis area Upland Habitat

- Acres of upland habitat within units and/or hazard tree treatments (CRLF and SNYLF)
- Miles of road treatments within upland habitat (CRLF and SNYLF)

SENSITIVE SPECIES

The Aquatic BE evaluated 3 Forest Service sensitive species: foothill yellow-legged frog (FYLF), western pond turtle (WPT), and hardhead. The indicators used for the analysis of potential impacts to these aquatic species include indicators common to all three species and indicators specific to each species.

Common Indicators

- Amount of species-specific buffer affected by the activities in each alternative
- Proportion of watershed affected by project activities

Species Specific Indicators

- Percentage of foothill yellow-legged frog buffer (in acres) affected by project activities
- Percentage of western pond turtle buffer (in acres) affected by project activities
- Percentage of watershed affected by project activities

Aquatic Species Methodology by Action

THREATENED AND ENDANGERED SPECIES

The methodology used in the analysis for the CLRF and the SNYLF were similar. Within the project area, occupancy and habitat suitability assessments identified localized analysis areas for each species. These analysis areas were defined by suitable breeding habitats and the non-breeding, upland and dispersal habitats associated with them. Within each discrete analysis area, effects to individuals and effects to habitats were analyzed for each alternative.

California Red-legged Frog

Perennial and intermittent aquatic habitats at elevations of 4,000 feet or less (except at historic localities above this elevation) were assessed for CRLF breeding and non-breeding suitability based on the primary constituent elements (PCEs) as defined by the USFWS (Federal Register 2010). The direct, indirect and cumulative effects for CRLF were based on suitable breeding habitats within one mile of the project area boundaries. The remaining habitat components (non-breeding aquatic, upland and dispersal) were then identified within one mile of the breeding habitats.

Sierra Nevada Yellow-legged Frog

A range map developed by Dr. Roland Knapp using historically and currently occupied sites was used as the basis for identifying suitable habitat for the SNYLF. Streams and ponds within the area covered by the range map were considered for analysis for the project. The direct, indirect, and cumulative effects were conducted for SNLYF suitable breeding, non-breeding and upland habitats where project activities were proposed within 984 feet of ponds and within 82 feet of any portion of a stream habitat as determined by the defined extent of the upland area for each of these habitats (Federal Register 2013b).

Existing Condition

Known pre-fire habitat characteristics were gathered and summarized to establish a baseline to compare how the estimated effects of the Rim Fire could affect each habitat. Most of the suitable breeding habitats included in this analysis had some level of pre-fire existing condition information.

Pre-fire existing condition assessments utilized a variety of factors. For the CRLF, the primary factors considered included, bullfrog presence, depth, and other human caused disturbances (recreation, roads, and urban areas). The primary factors contributing to SNYLF pre-fire existing condition assessments included fish presence, depth, and gradient and pool presence. These pre-fire existing condition factors were used in addition to the PCEs as defined by the USFWS (2010 and 2013b).

Sediment Analysis

The estimated tons of soil that could be eroded within each breeding watershed post-fire and post-implementation were used for determining the potential post-fire condition of each breeding habitat. Post-fire sedimentation analysis used outputs from modeling completed by the project soils scientist and included important factors like vegetation burn severity and stream gradient. Reports from the Burned Area Emergency Response team were also reviewed and incorporated as appropriate.

Vegetation Burn Severity

Vegetation that burned at moderate to high severities will provide the least amount of soil cover in the three years following the fire. Since the ground cover was essentially eliminated where vegetation burned at moderate to high severity, there is a high risk that eroded soils will be transported to aquatic habitats in these areas. Low burn severity areas and unburned vegetation within a fire area maintain levels of soil cover capable of withstanding erosion. Sediment transport on moderately steep to very steep hillsides is greater than in areas with gently sloping terrain. Therefore, hillside slope was considered when assessing the most likely sediment transport scenario for each habitat. The existing condition and subsequent post-implementation qualities reflect this inclusion.

Stream Gradient

Streams with steeper gradients will typically store less sediment because flow velocity and the force of gravity are greater in stream systems with steeper gradients. Lower gradient streams (less than 4 percent) have a tendency to store sediment in low velocity habitats (pools and slow runs) and impacts in these habitats would be more likely to be observable in the post-fire and post-project environment. Therefore, this analysis adjusted the sediment storage rate in streams in accordance with the associated average stream gradient.

Cumulative Effects

The spatial boundary for analyzing cumulative effects occurred at two different scales: (1) direct overlap with suitable CRLF and SNYLF habitats, and (2) within the breeding watershed scale (Table 3.03-8). This was done to provide a detailed look at the activities that could affect each suitable habitat and subsequently any individual CRLF or SNYLF inhabiting them. Because each of the habitats are fairly isolated with little likelihood of dispersal between them (except SNYLF between Little Kibbie and Big Kibbie Ponds), populations or individuals inhabiting these habitats are expected to remain within the habitats associated with each identified suitable breeding habitat.

The temporal boundary established for cumulative effects analysis was ten years from present, a timeline commensurate with the Cumulative Watershed Effects (CWE) modeling and related to using a threshold of concern (TOC). When the TOC is exceeded there is the risk of increased sedimentation in the channel, reduction in deep water habitat volume, reduction in interstitial spaces in the streambed, higher turbidity during high stream flow, and reduced primary and secondary productivity.

These changes in the aquatic system can affect reproduction, ability to avoid predation, and the availability of food resources. The CWE modeling indicated all streams would recover to near pre-fire levels within this time frame.

SENSITIVE SPECIES

For the FYLF and WPT, all streams below 4,200 feet were identified as suitable for the species. For the FYLF, all of these stream miles were buffered by 100 feet on both sides to provide an upland area for the frog. These two steps identified the number of stream miles to be calculated in the project area and amount of upland habitat associated with the streams. For the WPT, the same streams used for the FYLF analysis were buffered by a distance of 300 meters (984 feet) on each side of the stream to derive an upland habitat area. Both buffer areas (FYLF and WPT) are considered to contain the majority of upland habitat used by the species.

With these upland areas established, the activities proposed in each of the action alternatives were placed over the upland areas, or an intersection was created, to estimate the amount of area impacted by each activity for each species. Once this intersection of project activities and habitat buffer was established, the type of logging system used, volume estimates for "recovered" trees, road action types, and water use from designated sources were evaluated to conceptualize an intensity of activity occurring within each occupied or suitable watershed. This estimate was used to provide a point of reference for the amount of project-related activity occurring close to streams and provide a basis for assigning risk of direct and indirect effects to the species and their habitats. Since the types of actions in each action alternative were not different (only the amount of each activity differed), this approach was considered to be applicable to all of the alternatives.

For cumulative effects analysis, an internal planning effort identified all ongoing and planned activities on public and private lands (Appendix B). For public lands, ongoing actions (e.g., livestock grazing) and planned activities (e.g., Rim HT project) were identified on NFS and National Park Service (Yosemite NP) lands. For private lands, emergency timber plans were retrieved from CalFire to identify the areas where salvage logging occurred or is proposed to occur.

The spatial boundary for analyzing cumulative effects occurred at several different scales. For some small watersheds (7th and 8th level HUC and smaller) that are occupied or provide suitable habitat, cumulative effects were narrowed to the scale of the watershed. The reason this was done is to provide a detailed look at the activities that could affect small, isolated populations. Populations and individuals inhabiting these smaller streams are expected to remain within the watershed and complete all life stages in the watershed. Therefore, actions occurring outside of the small watershed, but within the larger 5th or 6th level HUC, may have no cumulative bearing on the isolated populations. Examples of smaller watersheds include Grapevine (7th level HUC) and Drew (8th level HUC) Creeks and the small, unnamed Clavey River tributaries (sub-8th level HUC). The spatial scale was also expanded out to larger watershed scales to address populations occurring in larger habitats, like the Clavey River. The downstream extent of the analysis area is Don Pedro Reservoir for the Tuolumne River watershed and the upper North Fork Merced River 5th level HUC.

The temporal boundary established for cumulative effects analysis was ten years from present, a date commensurate with the Cumulative Watershed Effects (CWE) modeling completed for the project (see Watershed Chapter). The reason this time frame was chosen is related to the modeling approach using a threshold of concern (TOC) for watersheds. When a watershed exceeds the TOC, there is an increased risk that a variety of watershed processes may not occur as they would when a watershed functions below the threshold. An example of a watershed process that may not function normally when the TOC is exceeded is the stability of the stream within its channel. When the TOC is exceeded there is the risk that the streambanks will become unstable and bank erosion can occur. This can lead to increased sedimentation in the channel, reduction in deep water habitat volume, reduction in interstitial spaces in the streambed, higher turbidity during high stream flow, and reduced primary and secondary productivity. These changes in the aquatic system can affect reproduction, ability to avoid predation, and the availability of food resources. The CWE model includes recovery times for certain actions, like logging, or events, like wildfire, whose effects diminish over time. When a watershed returns to below a TOC, natural processes in the stream system are expected to dominate and the stream should regain a high degree of stability over time. The CWE modeling indicated all streams (at 6th and 7th level HUC scale) would recover to near pre-fire levels within this time frame. It should be noted that some elements of the cumulative effects analysis, such as the long term recruitment of large woody debris (LWD), may extend 100 or more years into the future, but this timeframe could not be applied in the context of reasonably foreseeable future.

Affected Environment

The Rim Fire affected a variety of aquatic habitats including wetlands, ponds, natural and man-made lakes, streams, and rivers. The aquatic features at lower elevations, less than 2,500 feet, are primarily influenced by rainfall during the wet season (November through April), while aquatic features above this elevation are influenced by rainfall, snowpack, or a combination of both. Streams in the rainfall zone typically see peak flows following larger rain events and some intermittent streams may support surface water for several months. Streams in the rain and snow zones may see very high peak flows if rain falls on a snowpack, but streams typically show a period of peak flow as the snow melts in the late spring and early summer.

All of the larger stream systems affected by the Rim Fire are bedrock rivers (versus alluvial rivers) shaped by snowmelt runoff during the late spring (mid-May) to middle summer (mid-July). Geomorphic complexity in bedrock rivers in the Sierra Nevada requires variable annual flow (winter floods, snowmelt peak flows, winter and summer baseflow), periodic inputs of large volumes of sediments (landslides, hillslope mass wasting), and multiple flow thresholds (variable levels of flooding) (McBain and Trush 2004). Most of these rivers have steep canyons, and steep tributary streams, ascending to more gentle terrain above the canyon rim.

A very large proportion of the fire area occurred in the Tuolumne River watershed. The Tuolumne River originates in Yosemite National Park and has several large tributaries originating in the Park or on the Stanislaus National Forest. Five primary tributaries join the Tuolumne within the fire area: the Clavey and Middle, North, and South Fork Tuolumne Rivers, and Cherry Creek. The Middle and South Fork Tuolumne Rivers originate in Yosemite then flow in a westerly direction to join each other and then the main Tuolumne. Cherry Creek and the North Fork Tuolumne and Clavey Rivers originate from the Stanislaus and primarily flow in a southerly direction into the Tuolumne. There are many minor tributaries to the Tuolumne River and its principal tributaries including: Alder, Big, Corral, Drew, Grapevine, Indian, and Jawbone Creeks (Tuolumne River); Basin and Hunter Creeks (North Fork Tuolumne River); Big Creek (South Fork Tuolumne River); Eleanor Creek and Granite Creek (Cherry Creek); and Hull, Reed (including Bourland, Reynolds, and Little Reynolds Creeks), and Twomile Creeks (Clavey River). Additionally, there are numerous very small, typically unnamed tributaries to each of these listed streams and rivers.

Obligate riparian vegetation (e.g., willow and alder) along most streams in the affected area is typically restricted to a narrow (less than 50 feet) band adjacent to the edge of the water. There are some wetlands in fire perimeter that support obligate herbaceous riparian species as dominant plant community types.

The known distribution of all analyzed aquatic species follows and a description of suitable habitat for these species is also provided.

THREATENED AND ENDANGERED SPECIES

California Red-legged Frog

The CRLF is now likely extirpated from 70 percent of its former range (USFWS 2002). Rangewide, the CRLF occurred at elevations from sea level to 5,200 feet, although the highest known extant population occurs at 3,346 feet in Placer County (Barry and Fellers 2013). The historic localities in the Sierra Nevada over 3,600 feet were possibly introduced (USFWS 2002; Barry and Fellers 2013). The Fish and Wildlife Service has concurred that occurrences above 4,000 feet in the Sierra Nevada are atypical and has used this elevation as a threshold for critical habitat designation (Federal Register 2006).

California red-legged frogs inhabit various aquatic habitats including ponds, marshes, streams, and lagoons (Fellers 2005). The timing of breeding varies geographically, but typically occurs from November through April (USFWS 2002), which coincides with what will be referred to as the wet-season throughout this section. Females lay from 2,000-6,000 eggs (in masses) that are usually attached to vegetation near the water's surface. Eggs hatch in about 3 weeks. Tadpoles typically metamorphose within 11 to 20 weeks, from July to September, but overwinter aquatically at some sites (Fellers 2005; Bobzien and DiDonato 2007). Adult movements to terrestrial habitat or between aquatic habitats typically commence with the first fall rain (greater than 0.25 inches) and continue until April (Fellers and Kleeman 2007; Tatarian 2008). Adults may also disperse when aquatic habitats dry out (Fellers and Kleeman 2007). Individual movements of up to 2 miles have been reported (Fellers 2005), but 1 mile represents a more average dispersal distance (Federal Register 2010).

The CRLF recovery plan (USFWS 2002) identifies introduced species and habitat degradation and loss as primary drivers of CRLF population declines. Introduced bullfrogs, crayfish, fish, and plants which have become established throughout much of the historic CRLF range, detrimentally affect the CRLF through predation, competition, and reduced habitat quality. Agricultural and urban development have destroyed and fragmented much of the historic CRLF habitat. Other factors that may have particularly impacted Sierra Nevada populations include dams and impoundments, mining, livestock overgrazing, recreation, and timber harvesting.

Timber operations and other related actions conducted within watersheds inhabited by, or containing suitable CRLF habitat, may contribute to the degradation of instream and riparian habitat. Possible effects of timber operations leading to degraded habitat include, increased sedimentation, removal of trees providing bank stability and structure, and altered runoff patterns (USFWS 2002).

Access roads, haul roads, skid trails, and ground-based tractor yarding systems have great impacts related to sedimentation and compaction. Wet weather operations also have more potential for impacts. Timber harvesting in upland habitat can also impact CRLFs by causing direct harm or injury to frogs that may be dispersing or sheltering. Indirectly, upland timber harvesting may impact CRLFs by making them more susceptible to predation by compacting or removing the CRLFs cover or refugia (USFWS 2002).

The CRLF has not been detected on the Stanislaus National Forest since 1967 and is considered extirpated from the Tuolumne River watershed (USFWS 2002) included in the project area.

A total of 9.7 miles of potentially suitable breeding stream habitat, 11.1 acres of potentially suitable breeding pond habitat, 55.7 miles of non-breeding stream habitat, and 21,593 acres of upland habitat was identified within the project and analysis area. All other habitats were ruled out because they did not meet the suitability criteria. Within the Rim Recovery project area, five habitat units (Mather Vicinity, Drew Creek, Homestead Pond, Harden Flat, and Hunter Creek) were identified that have suitable breeding habitat in streams (Drew Creek, Hunter Creek) and ponds (Birch Lake, Mud Lake, Homestead Pond, and 7 unnamed ponds). Habitat characteristics including size (acres), length (miles), average depth (feet), and pre- and post-fire habitat quality determinations are summarized in Table 3.03-1. The percent of the landscape within each breeding habitat's watershed where vegetation remained unburned (UB) or burned at high (H), moderate (M), and low (L) severities is also displayed in Table 3.03-1. These values were used in determining the potential post-fire watershed response for the analysis.

Table 3.03-1 Existing condition summary for suitable CRLF breeding habitats

Habitat	Acres	Miles[3]	Avg. Depth[4] (feet)	Elevation (feet)	Vegetation Burn Severity (percent)				Pre-fire Habitat Quality	Post-fire Habitat Quality
					H	M	L	UB		
California red-legged frog										
Birch Lake[1]	4.0	0.28	No data	4,500	31	14	18	37	Low	No Change
Mud Lake[1]	2.2	0.31	No data	4,500	0	55	22	23	Low	No Change
Drew Creek		1.3	1.75	2,960 to 3,300	50	23	21	5	Moderate-High	Low
Harden Flat Pond 1	0.6	0.12	No data	3,500	11	40	34	16	Moderate	Moderate-Low
Harden Flat Pond 2	0.4	0.12	No data	3,500	0	11	3	86	Moderate	No Change
Homestead Pond[1]	0.2	0.06	> 6.5	3,100	86	14	0	0	Moderate	Moderate
Hunter Creek[2]		8.4	1.6	1,600 to 4,000	13	18	18	51	Moderate	Moderate-Low
Hunter Creek Pond 1	0.4	0.10	No data	3,880	10	32	44	15	Unknown	Unknown
Hunter Creek Pond 2	0.2	0.07	No data	3,760	9	32	46	13	Unknown	Unknown
Hunter Creek Pond 3	0.2	0.08	No data	3,880	9	17	59	14	Unknown	Unknown
Hunter Creek Pond 4	0.4	0.10	No data	3,760	14	41	39	6	Unknown	Unknown
Hunter Creek Pond 5	0.4	0.10	No data	3,360	13	35	47	5	Unknown	Unknown

H=High; M=Moderate; L=Low; UB=Unburned
[1] Bullfrogs present
[2] Trout present
[3] Miles of stream or shoreline of ponds
[4] Depths for creeks are average pool depths.

Sierra Nevada Yellow-legged Frog

Prior to 2007, *Rana muscosa* and *Rana sierrae* were considered a single species referred to as mountain yellow-legged frogs (Vredenburg et al. 2007). Genetic work however, confirmed morphological and acoustic dissimilarities between the northern and southern populations of mountain yellow-legged frogs, and accordingly, the frogs were reclassified as two species. Mitochondrial DNA indicates that the contact zone between the two species is between the middle and south forks of the Kings River. Frogs north of this point are now classified as Sierra Nevada yellow-legged frogs (SNYLF, *Rana sierrae*), and those south, remain mountain yellow-legged frogs (MYLF, *Rana muscosa*). Consequently, the analysis summarized here will address the effects of project actions on the SNYLF. Where information applies to both species, the two species will be referred to collectively as the MYLF-complex.

Although frogs of the MYLF- complex were historically abundant throughout the Sierra Nevada, current research has reported declines over large expanses of their range and as much as 97 percent on Forest Service lands. Where frogs are present, their numbers are relatively low in comparison to historical estimates (Brown et al. 2014). The current remaining populations are restricted primarily to publicly managed lands within National Forests and National Parks at elevations ranging from 4,500 to 12,000 feet (CDFG 2011).

Frogs of the MYLF-complex inhabit high mountain lakes, ponds, marshes, meadows, tarns, and streams. They are highly aquatic at all life stages and extensively use deep water ponds deeper than 6.5 feet that lack introduced fish. Despite their positive correlation with deep water habitats (Knapp 2005), both tadpoles and adults are most commonly found along open gently sloping shorelines that provide shallow waters of only 2 to 3 inches in depth (Mullally and Cunningham 1956; Jennings and Hayes 1994; Federal Register 2013a).

At lower elevations, the species is associated with rocky streambeds and wet meadows surrounded by coniferous forests (Zweifel 1955; Zeiner et al. 1988). Streams utilized by adults vary from high gradients and numerous pools, rapids, and small waterfalls to streams with low gradients and slow flows, marshy edges, and sod banks (Zweifel 1955). These frogs are rarely found in small or ephemeral streams which frequently have insufficient depth and hydroperiods for adequate refuge and overwintering habitat (Jennings and Hayes 1994).

The timing of breeding varies annually, but occurs shortly after snowmelt, typically between May and July (the dry season). Females lay clutches varying from 15 to 350 eggs (Vredenburg et al. 2005) attached to rocks, gravel, and vegetation or under banks (Wright and Wright 1949, Pope 1999). Eggs hatch in about 2.5 to 3 weeks (Pope 1999). Tadpoles may take more than 1 year (Wright and Wright 1949), and often require 2 to 4 years, to reach metamorphosis (Bradford et al. 1993; Knapp and Matthews 2000) depending on local climate conditions and site-specific variables. In aquatic habitats of high mountain lakes, the adult frogs typically move only a few hundred meters (Matthews and Pope 1999; Pope 1999), but single-season distances of up to 2.05 miles have been recorded along streams (Wengert 2008). Adults may move between selected breeding, feeding, and overwintering habitats during the course of the year. Though typically found near water, overland movements by adults of over 217 feet have been routinely recorded (Pope 1999). The farthest reported distance from water is 1,300 feet (Federal Register 2013a).

Some factors that may impact the MYLF-complex include recreation activities, dams and water diversions, livestock grazing, timber management, road construction and maintenance, and fire management activities. Timber harvest activities can remove vegetation and cause ground disturbance and compaction, leading to erosion (Helms and Tappeniner 1996; Federal Register 2013a). A large increase in sedimentation could potentially damage breeding habitat. Timber harvest may also alter the annual hydrograph, possibly lowering the water table in riparian habitat. Roads, including those associated with timber harvests, may contribute to habitat fragmentation and species disturbance, but have not been implicated as primary factors in this species' decline.

In some areas, long-term fire suppression has created conditions vulnerable to increased fire severity and intensity (McKelvey et al. 1996; Federal Register 2013a). Excessive erosion and siltation of habitats following wildfire is a concern in shallow, lower elevation areas below forested stands. Severe and intense wildfires may reduce amphibian survival (Russell et al. 1999). Amphibians may avoid direct mortality from fire by retreating to wet habitats or sheltering in subterranean burrows (Federal Register 2013a). Because these species generally occupy high-elevation habitats, where fire is less likely to occur, this is likely a low threat.

The SNYLF has been found throughout the Stanislaus National Forest in streams, meadows and lakes at elevations between 5,400 feet and 9,700 feet, most commonly in high alpine lake habitats. No SNYLF (extant or historic) have been found within the Rim Fire perimeter according to Forest and CNDDB records. With few exceptions, the stream occurrences associated with wet meadow systems are in streams adjacent to or connected to lakes and ponds. The majority of habitats within the project area are atypical of habitats where SNYLF are known to occur on the forest.

Within the Rim Recovery project area there are 2.6 miles of potentially suitable breeding habitat, 5.6 miles of suitable non-breeding stream habitat, 1.3 acres of breeding habitat in ponds, and 170 acres of upland habitat. Suitable habitats included in the analysis include sections of three different streams (Eleanor Creek, Reynolds Creek, and the Middle Fork Tuolumne River) and two ponds (Little Kibbie Pond and Big Kibbie Pond).

SENSITIVE SPECIES

Foothill yellow-legged frog

The FYLF is a stream breeding frog that spends essentially all of its time in or in very close proximity to water. Breeding occurs in late spring (small streams) or early summer (larger streams) when predictable or receding flows occur and water temperatures warm. Breeding females typically attach egg masses to stable substrates (rocks) in shallow, slow water. Tadpoles emerge in a few weeks and begin feeding on algae and diatoms attached to streambed substrates. As tadpoles develop, they become wary of potential predators and seek refuge around and under streambed substrates. Tadpoles metamorphose into "froglets" by early fall and probably stay near the breeding area for the first winter. Adult and sub-adult frogs adopt one of a couple of dispersal strategies outside of the breeding season. One strategy involves moving up or downstream of the breeding area and the frogs remain on the same stream. Another strategy involves dispersal into small tributary streams near the breeding site. They may remain in these smaller streams associated with very small pools for most of the year. Sunny areas for basking and shady areas for refuge are likely important attributes in allowing the frog to regulate its body temperature. With the onset of spring, males will move to the breeding areas to establish territories and females follow several weeks to months after the males. Females probably leave the breeding site immediately following breeding. The FYLF has a known local elevation range of 900 to 4,000 feet. On the forest, the highest elevation recorded for breeding on a large river is 3,000 feet (North Fork Tuolumne River) and 3,600 feet in a small stream (Bull Meadow Creek).

The FYLF is known to occur in the following streams: Drew Creek, Grapevine Creek, and Tuolumne River (Tuolumne River watershed); Basin Creek, Hunter Creek, North Fork Tuolumne River (North Fork Tuolumne River watershed); Bull Meadow Creek, Indian Springs Creek, unnamed tributary, and Clavey River (Clavey River watershed); and Bull Creek, Moore Creek, and North Fork Merced River (North Fork Merced River watershed). Many other streams in the fire area provide suitable habitat for the FYLF, but occupancy is unknown. Below the confluence of Cherry Creek, the Tuolumne River does not provide suitable breeding habitat for the frog. This is because there are drastic fluctuations in water associated with releases from Dion Holm Powerhouse on Cherry Creek. These fluctuations occur rapidly and daily during the breeding period, and are probably large enough to either scour or strand egg masses, both mortality events. Also, the cold water temperatures associated with the discharges may be enough to slow development and prevent metamorphosis in a timely manner. The Tuolumne River likely played an important role in supporting a number of interconnected sub-populations along the river prior to the construction of upstream dams. This assertion is supported by the presence of FYLF populations in most of the main tributaries and in the Tuolumne itself upstream of Early Intake which suggests an earlier, extensive distribution pattern of the frog.

Most of these populations, especially in small streams (e.g., Basin Creek) are believed to be small and consist of less than 20 adults. In the small tributaries that offer dispersal habitat, there could be very few individuals occupying the stream. The Clavey River is probably the largest remaining population of FYLF in the southern Sierra Nevada. Frogs are known to breed at the confluence with the Tuolumne River and above the 1N01 bridge crossing (9 miles) and this analysis assumes multiple breeding locations between these two points. Also, the river provides many more miles upstream of the bridge that are suitable for breeding. For the primary streams providing suitable habitat for the FYLF, Table 3.03-2 shows miles of suitable and occupied FYLF habitat, occupancy status, and whether surveys were conducted on the streams.

The analysis area for the FYLF includes the Tuolumne River watershed from Hetch Hetchy in Yosemite National Park to the backwaters of Lake Don Pedro. For this portion of the Tuolumne River watershed, the analysis area extends upstream each tributary stream to the fire boundary. In many instances, the entire watershed area of the smaller tributaries is within the fire area (e.g., Grapevine, Corral, and Alder Creeks). For other tributary watersheds, the fire only burned a portion of the total watershed area (e.g., Clavey and the Middle, North, and South Forks of the Tuolumne). For the North

Fork Merced River (about 100,000 acres), the Rim Fire only affected a small portion of several headwater tributaries to the river. In this instance, the analysis boundary only includes the upper portion of the North Fork Merced watershed, or the 37,000 acres in the 6th level HUC.

Table 3.03-2 Occupied and suitable habitat for FYLF in the Rim Fire area

Watershed (5th level HUC)	Stream	Watershed (acres)	Occupancy	Survey	Suitable (miles)	Upland Habitat Acres (30-meter buffer)
Tuolumne River	Tuolumne River	819,000	Yes	Yes	36.5	870
	Alder Cr.	1,525	Unknown	Yes	5.5	132
	Corral Cr.	4,570	Unknown	Yes	9.6	230
	Drew Cr.	1,697	Yes	Yes	4.6	110
	Grapevine Cr.	4,488	Yes	Yes	10.8	260
	Indian Cr.	2,344	Unknown	No	2.7	64
	Jawbone Cr.	13,136	Unknown	Yes	14.3	343
Middle Fork Tuolumne River	Middle Fork Tuolumne River	46,635	Unknown	Yes	25.5	612
North Fork Tuolumne River	North Fork Tuolumne River	63,849	Yes	Yes	75	1,796
	Basin Cr.	9,030	Yes	Yes	17.8	427
	Hunter Cr.	9,482	Yes	Yes	21.5	515
South Fork Tuolumne River	South Fork Tuolumne River	57,855	Unknown	Yes	29.4	704
Cherry Creek	Cherry Cr.	90,892	Unknown	No	17.8	428
	Eleanor Cr.	59,906	Unknown	No	2.3	55
	Granite Cr.	4,110	Unknown	Yes	6.0	144
Clavey River	Clavey River	100,645	Yes	Yes	29	696
	Reed Cr.	24,527	Unknown	Yes	4.2	101
	Adams Gulch	815	Unknown	No	0.8	18
	Bear Springs Cr.	2,403	Unknown	Yes	1.9	45
	Bull Meadow Cr.	1,430	Yes	Yes	3.0	71
	Indian Springs Cr.	356	Yes	Yes	0.8	20
	Quilty Cr.	1,089	Unknown	Yes	1.8	44
	Unnamed Tributary 1	773	Unknown	No	1.5	36
	Unnamed Tributary 2	373	Unknown	No	1.0	25
	Unnamed Tributary 3	1,343	Unknown	Yes	2.3	56
	Unnamed Tributary 4	490	Unknown	Yes	1.0	24
	Unnamed Tributary 5	688	Yes	Yes	1.7	41
	Cottonwood Cr.	5,307	Unknown	Yes	2.3	56
	Russell Cr.	560	Unknown	No	0.8	20
North Fork Merced River	North Fork Merced River	79,110	Yes	Yes	74.4	1,784
	Bull Cr.	21,064	Yes	Yes	44.7	1,072
	Deer Lick Cr.	3,981	Unknown	Yes	9.7	233
	Moore Cr.	5,896	Yes	Yes	11.9	286
	Scott Cr.	1,627	Unknown	Yes	1.9	46

Western Pond Turtle

The WPT is a species that requires aquatic and terrestrial habitats to meet its life history needs. Aquatic habitats are needed for breeding, eating, overwintering, regulating body temperature, refuge, and rearing hatchlings. Terrestrial habitats are needed for nesting, aestivation, overwintering, and regulating body temperature. The WPT mates under water and the females excavate a nest adjacent to aquatic habitat. Nests are typically constructed in open areas (little or no canopy cover) with well-drained soil and on gentle slopes with good solar aspect (south to west facing). The nests are typically found within 300 feet of the aquatic feature used by adults, but can be found almost a quarter of a mile away from the water. The eggs hatch in several months, but the hatchling turtles remain in the nest until the following spring or early summer. The hatchlings seek slow, shallow, and warm water where they can forage and grow. Adult and sub-adult turtles can spend much of their year within a small geographic area; however, they sometimes make long overland or upstream-downstream movements (Reese 1996). Like the FYLF, the turtle prefers a variety of microhabitats for regulating body temperature, but basking sites are particularly needed in the early season when air and water temperatures are relatively low. Basking also plays an important role for females in that elevated body temperature contributes to the development of the eggs.

While water is required for some life history aspects, the WPT can use seasonally wet habitats. During periods when the aquatic feature is dry, turtles can depart the feature for another nearby aquatic habitat or can venture into the terrestrial environment to aestivate. Aestivation is a seasonal reduction in activity and body function similar to hibernation. The turtles will locate a site where they can dig into the leaf duff, preferably with some overhead cover (shade), and wait until the rain replenishes the aquatic habitat. Turtles can also use the terrestrial environment during the winter. The behavior, overwintering, is similar to aestivation because they leave the water (around October), bury themselves into the leaf litter under trees or shrubs, and wait until spring. During this time, they may move about on the landscape or move to water then back to land.

The WPT is found frequently in habitats also occupied by the FYLF because they share many of the same habitat needs. On the Forest, almost all occurrences of turtles in streams are at elevations less than 3,500 feet, but several populations are in ponds at elevations up to 5,400 feet. Table 3.03-3 shows the streams, ponds, and meadow with known WPT populations and lists the primary streams that provide suitable habitat for the turtle.

Table 3.03-3 Occupied and suitable habitat for WPT in the Rim Fire area

Watershed (5th level HUC)	**Stream**	**Occupancy**	**Survey**	**Suitable** (miles)	**Upland Habitat Acres** (30-meter buffer)
Tuolumne River	Tuolumne River	Yes	Yes	36.5	8,711
	Drew Cr.	Yes	Yes	4.6	1,011
	Grapevine Cr.	Yes	Yes	10.8	2,565
	Jawbone Cr.	Unknown	Yes	14.3	3,411
	Three unnamed ponds	Unknown	No	10 acres	277
Middle Fork Tuolumne River	Middle Fork Tuolumne River	Yes	Yes	25.5	5,365
	Abernathy Meadow	Yes	Yes	7.5	132
	Grandfather Pond	Yes	Yes	0.2 acre	82
	Mud Lake	Yes	Yes	3 acres	115
North Fork Tuolumne River	North Fork Tuolumne River	Yes	Yes	75	16,718
	Basin Cr.	Unknown	Yes	17.8	3,902
	Hunter Cr.	Yes	Yes	21.5	4,912
South Fork Tuolumne River	South Fork Tuolumne River	Yes	Yes	29.4	6,411
Cherry Creek	Cherry Cr.	Unknown	No	17.8	3,737
	Eleanor Cr.	Unknown	No	2.3	599
	Big Kibbie Pond	Yes	Yes	1 acre	98
	Little Kibbie Pond	Yes	Yes	0.5 acre	86
Clavey River	Clavey River	Yes	Yes	29	3,460
	Reed Cr.	Unknown	Yes	4.2	904
North Fork Merced River	North Fork Merced River	Yes	Yes	74.4	16,908
	Bull Cr.	Yes	Yes	44.7	9,879
	Deer Lick Cr.	Unknown	Yes	9.7	2,234
	Moore Cr.	Yes	Yes	11.9	2,767
	Scott Cr.	Unknown	Yes	1.9	453

Hardhead

The hardhead is a large species of minnow that historically occurred in a narrow low-elevation zone, approximately 100 to 1,500 feet in elevation, in the foothills of the Sierra Nevada (Moyle 2002). Moyle (2002) included the hardhead as one component of an assemblage of native warm water species called the pikeminnow-hardhead-sucker assemblage. On the Stanislaus National Forest, California roach (a minnow), riffle sculpin, and rainbow trout could also occur with the hardhead in rivers with unregulated flows (no dams). The species description given in Moyle (2002) is the basis for the species and habitat description that follows.

Hardhead can be found in a variety of flowing water habitats from large intermittent foothill streams to large rivers. Larger individuals are typically associated with deep pools while smaller individuals are associated with shallow waters along the edge of the stream. For most of the year, the fish does not move extensively up- and downstream, opting to remain in a pool or series of pools linked by deep run habitat. Hardhead spawn in the spring (April and May) and may migrate upstream long distances in larger streams, especially those impacted by reservoirs. Like other minnows, hardhead likely spawn in gravel substrates in run habitat or at the tail out of pool habitat. Older fish are omnivorous, feeding on a mix of filamentous algae (where present) and invertebrates (e.g., crayfish, aquatic insects). Smaller fish tend to feed more on aquatic insects or other small invertebrates (e.g., snails). Hardhead appear to prefer warm (greater than 20 degrees Centigrade (68 degrees Fahrenheit)) water, but like to have access to deeper, cool water as water temperatures increase throughout the summer. Alteration of habitat and streamflow by dams and the introduction of predatory fish (mainly bass) have had major impacts on the distribution and abundance of the hardhead.

The status of hardhead in the Tuolumne River is unclear. There are no records of hardhead from above Don Pedro Reservoir, but Moyle (2002) indicates a dramatic population decline following impoundment of the Tuolumne River. This indicates the fish was present in the river previously. However, streamflow is regulated in the Tuolumne all of the way up to O'Shaughnessy Dam, Dion Holm Powerhouse on Cherry Creek, a main tributary to the Tuolumne. Forest Service personnel have conducted snorkel surveys of the lower Clavey River and observed schools of large minnows; but, hardhead are difficult to differentiate from Sacramento pikeminnow when observed from a distance. There is a possibility that hardhead continue to persist in the lower Clavey River, North Fork Tuolumne River, and possibly Cherry Creek upstream of Holm Powerhouse. Fish surveys conducted on the Tuolumne River upstream of Early Intake have not determined the presence of hardhead in that stream reach (personal communication with Mike Horvath, San Francisco Public Utilities Commission (Hetch Hetchy Regional Water System, Natural Resources Division).

Expected Post-Fire Watershed Response

Since the Rim Fire affected a large portion of the Tuolumne River watershed, including many of the smaller watersheds listed above, the previously forested landscape has been altered sufficiently that many of the "normal" watershed processes have been altered, sometimes dramatically. These processes include erosion of soil from hillslopes and stream channels, storage and transport of sediment in stream channels, stream flow, LWD recruitment, and maintenance of cool or cold water temperatures.

Hillslope erosion is a natural process that typically occurs at very low rates (0.1 to 0.5 tons per acre (USDA 2013)) in forested conditions. This rate can increase tremendously in landscapes affected by wildfire, sometimes greater than four orders of magnitude (10 to greater than 100 tons per acre). Under high soil and vegetation burn severity conditions, very little ground cover is left, soil structure is highly altered, and water repellent (hydrophobic) conditions exist in the upper soil layers. Rainfall on these high severity conditions can detach individual soil particles and the water repellent conditions allow the water to flow across the soil surface rather than soak into the soil. As the water moves across the soil, it can erode the soil surface (as sheet, rill, and gully erosion) and transport the sediment downslope to streams. Factors that contribute to the extent to which the soil erodes include, but are not limited to, soil texture, steepness of hillslope, amount of ground cover, and rainfall intensity.

Given large increases in erosion in the fire area, there will be areas with large volumes of sediment delivered to stream channels. Many of the small streams will be drastically altered by this sediment with the most obvious change being the streambed covered with fine sediment (the stream is "silted in”). Using the recent Bagley Fire on the Shasta-Trinity National Forest as an example, Forest Service employees measured sediment depths in excess of one meter (3.3 feet) in some stream channels (USDA 2013). While this example is a “worst case scenario” (caused by two uncommonly large storm events separated by a short period of time), our observations at one stream in the fire area, Skunk Creek, indicated the sediment was 1 to 2 inches deep following a below average precipitation year with relatively low intensity precipitation (to date). When large volumes of sediment are delivered to a stream channel, habitat complexity is reduced as pool and run habitats fill in and the stream bottom becomes relatively uniform. In larger streams like the Clavey River, extensive sedimentation could occur, but major reductions in pool volume are not likely because the energy of the streamflow is enough to keep the sediment moving downstream. Post-fire erosion rates can return to pre-fire rates within five to ten years.

With the loss of vegetation and leaf duff layer on the ground, the amount of flow in the streams, both base flow and peak flow, is generally expected to increase. This is because the trees are no longer taking up water through their roots and transpiring that water through their leaves (base flow) and the water repellent layers will cause the water to run off of the soil surface without being absorbed into the leaf duff layer and soil (peak flow). Peak flows can increase many times over in watersheds with extensive high severity burn conditions, especially following periods of high intensity rainfall, or rainfall of long duration and large amounts. As the streamflow begins to peak after a heavy rainfall in a burned watershed, the channel and streambanks are scoured by the water and the banks are eroded away. This is called channel erosion and it can be a significant source of sediment after a fire. With the loss of trees and other vegetation transpiring water, base flows can increase several fold throughout the year. Exaggerated peak flows (compared to pre-fire) should continue for three to five years after the fire, and increased base flows could continue for many decades.

The amount of sediment in the channel that is moved downstream or stored in the channel (and floodplains) depends on several factors, primarily streamflow and the gradient, or steepness, of the stream. In general, the steeper the stream is, the easier it is to transport the fine sediment downstream. Large streamflows have more energy than lesser flows and are capable of moving large quantities of sediment. In the five to ten years after the fire, channel conditions should be close to pre-fire conditions.

LWD recruitment generally increases after a fire because fire-killed trees eventually fall. Some of the trees fall into streams where they can influence stream morphology by catching sediment upstream of the tree and creating pool habitat downstream of the tree. Log jams can effectively trap and store large volumes of sediment for very long periods of time (greater than 50 years). The sediment stored behind the LWD can become important habitat for many aquatic species. The recruitment of LWD in streams is highest in the 10-20 years following a fire.

Water temperatures generally increase in the post-fire environment. This is largely due to the loss of vegetation providing shade to the surface of the water. In heavily forested conditions, very little direct sunlight hits the water and cool or cold water temperatures are maintained. When canopy cover is lost, stream temperatures can increase five degrees Fahrenheit or more for several years following the fire. Obligate riparian vegetation (examples, willow and alders) typically re-grows quickly and provides enough shading to be beneficial for maintaining cool and cold water.

For the FYLF, the impact to aquatic habitat is based on expected post-fire watershed response at various watershed scales. The estimates rely on (1) the extent to which a watershed was affected by fire, (2) the extent of high and moderate severity fire in a watershed, (3) stream gradient, and (4) sediment yield calculations when compared to pre-fire conditions. The Watershed Report (project record) provides a general narrative for how the primary watersheds (fifth and sixth level HUC) are expected to respond in the post-fire environment, and those evaluations were used to put the FYLF watersheds into categories of watershed response.

Three general categories were used for these watersheds: low, moderate, and high post-fire response. For the low category, the post-fire watershed responses may not be readily observable at suitable breeding sites. The ability to reproduce is considered to be a key factor in maintaining recruitment as the watersheds recover, because most populations are small and the loss of a recruitment class could have a population-level consequence. In high concern watersheds, major impacts are expected to all habitat types, especially significant reduction of pool and other deep water habitat. Deep water habitats are refuges and critical to overwintering success and escape from perceived predation attempts. In moderate concern habitats, extensive sedimentation of all habitats is expected, but deep water habitats should be maintained by the scouring action of water. Table 3.03-4 lists the watersheds suitable for FYLF and expected level of watershed response.

Table 3.03-4 Watersheds and streams with suitable habitat for FYLF with watershed response

HUC Level and Name	Stream	Watershed Response
5 – Big Creek-Tuolumne River	Big Creek	Low
6 – Grapevine Creek-Tuolumne River	Tuolumne River, Indian	Low
	Grapevine	Moderate
6 – Jawbone Creek-Tuolumne River	Tuolumne River	Low
	Drew	Moderate
	Alder, Corral, Jawbone	High
5 – North Fork Tuolumne River	North Fork Tuolumne River, Basin	Low
	Hunter	Moderate
5 – Clavey River	Clavey River	Low
6 – Lower Clavey River	Clavey River	Low
	Unnamed Tributaries 1-5, Adams Gulch, Bear Springs, Bull Meadow, Indian Springs, Quilty	High
6 – Middle Clavey River	Clavey River, Cottonwood	Low
	Russell	Moderate
6 – Reed Creek	Reed Creek	Low
7 –Lower Reed Creek	Reed Creek	Moderate
5 – Cherry Creek	Cherry	Moderate
6 – Lower Cherry Creek	Granite	High
5 – Eleanor Creek	Eleanor Creek	Moderate
5 – Falls Creek-Tuolumne River	Tuolumne River	Low
5 – Middle Fork Tuolumne River	Middle Fork Tuolumne River	Moderate
5 – South Fork Tuolumne River	South Fork Tuolumne River	Moderate
5 – North Fork Merced River	North Fork Merced, Bull, Deer Lick, Moore Creek, Scott	Low

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

General Effects Common to all Species

Mortality and Injury

The operation of equipment and the falling of trees and removal of trees have the potential to injure or kill aquatic organisms, particularly those occupying upland habitats. While most organisms close to water would be expected to escape into the water, a typical behavioral response by the FYLF and WPT, equipment can run over individuals that fail to flee or are unable to move.

The application of a registered borate compound to freshly cut stumps is proposed under this alternative. The risk assessment prepared for the project indicated only one scenario where a threshold would be exceeded and that was for an accidental spill of 25 pounds of the compound into a small pond (1,000 cubic meters or 324,000 gallons). Under this condition, the concentration of borate compound in the water (1.27 milligrams per liter) would barely exceed the "no observable effects concentration" (or NOEC) threshold for amphibians. A similar threshold has not been calculated for reptiles (like the WPT) and the NOEC for amphibians was applied to the turtle. As the name implies, below this threshold, no observable effects to health or reproduction would occur. If the organism is exposed to the spill scenario, the animal could become sick, immobile, or even die. This type of exposure scenario is unlikely because workers typically carry five or less pounds of the borate compound at a time. However, these species can occupy small pools with less volume than the pond modeled, and individuals could have their health compromised or die. If only one or very few individuals are affected, this is not expected to have an effect on the persistence of any of the populations in the project area. This is the extent of discussion of borax application for this analysis.

Physical Disturbance

When equipment is operated or forest workers are close to a stream, it could affect the behavior of aquatic organisms that are in the terrestrial environment. The typical response is for the individual to flee from the disturbance which would typically involve retreating into the water. The individuals typically hide under the streambank, rocks, or logs for up to 30 minutes and then return to the edge of the stream. They seek refuge if disturbed again and typically stay submerged longer or move away from the disturbance. Physical disturbance may interrupt basking, sleeping, or foraging, thereby creating the potential to affect physical well-being. A single instance of disturbance may have negligible or no effect on the physiology of an individual, but repeated disturbance has the potential to affect the physiological fitness of individuals (Rodriguez-Prieto and Fernandez-Juricic 2005).

Modification of Habitat

The primary impact to habitat expected from tree removal and road actions is an increase in sediment delivery caused by equipment operations on fire-affected soils. The operation of rubber-tired skidders, feller-bunchers, and harvesters on fire-impacted soils and in near stream environments can result in ground disturbance and soil compaction. Most of the timber harvest units coincide with areas of moderate and high burn severity, conditions that are more sensitive to disturbance. These areas typically have alterations in soil structure that make them more vulnerable to erosion and lack beneficial ground cover which can reduce erosion rates. Robichaud, et al. (2011) found a significant increase in sediment production originating from the skid trail network in salvage logged units. Increased erosion from the skid trails was attributable to increased compaction from repeated passes by equipment and the lack of ground cover on the trails (Robichaud et al. 2011). In general, the compaction caused by rubber tired skidders is greater than feller-bunchers or forwarders (Robichaud et al. 2011). (Further discussion of erosion is in the 3.14 Watershed and 3.11 Soils sections of this EIS.)

Habitat modifications caused by excess sediment generally include the reduction of deep water habitats (pools and runs), loss of microhabitat complexity, and filling the streambed with fine sediment. Pool and run habitats can be filled by excess sediment, especially in low gradient (less than 2 percent) stream reaches. The energy of water in higher gradient reaches (greater than 5 percent) tends to have enough erosive force to keep pools scoured and deep water maintained, but the overall pool volume may be reduced in low energy sites as sediment accumulates at the edges and tail of the pool. Excess sediment also reduces microhabitat complexity and the spaces between streambed substrates by filling the streambed with finer sized sediments (silts and sands). In lower gradient streams, the overall depth of the stream is typically reduced as the streambed fills with sediment and the water spreads out in a thin layer across this sediment. The loss of the small changes in streambed depth reduce microhabitat elements by eliminating velocity refuges and filling the spaces between larger substrates (gravel, cobble, and boulder) that are used by some species for breeding, foraging, and hiding. The change in streambed also influences the production of aquatic insects that use, including very specialized use, microhabitats in otherwise unimpaired streams. Aquatic insects play key roles in the breakdown of organic matter entering streams, nutrient cycling, and as sources of food for many aquatic and terrestrial species.

The recovery of fire-killed timber near streams would reduce the amount of LWD falling into the stream or onto the floodplain. LWD plays very important roles in the development of habitat complexity and sediment retention in a stream (USDA 1988; Montgomery et al. 1996; May and Gresswell 2003). Salvage logging tends to remove the largest trees because they have higher value, but the large pieces tend to decay slower and be retained longer. It may take several centuries (greater than 300 years) for some portions of the forest to regrow large trees.

California Red-legged Frog

Direct and indirect effects to individual California red-legged frog individuals include disturbance, injury or mortality, and reduced fitness as a result of repeated disturbance or a reduced food supply. Because California red-legged frog is considered to be extirpated from the Tuolumne River basin (USFWS 2003) these effects are discountable. However, because extensive surveys to confirm this have not been completed for the frog within the project area, these potential effects will be discussed.

Direct and indirect effects to habitat include a reduction in shade that can result in increased water temperatures; reduction in large downed wood recruitment that can alter stream form and limit creation of downstream habitat (pools) and reduce cover in upland areas; streambank damage from operation of equipment; a risk of chemical contamination from accidental spill of Sporax®; and increased sedimentation as a result of mechanical operations and soil compaction.

Effects to Individuals

Tree Felling and Removal

Effects to individuals are mainly associated with the operation of equipment, presence of forest workers in suitable habitats for the frog, and water drafting. If equipment operates in suitable habitat, there is the risk of injury or mortality if an individual frog does not escape the area when the disturbance is initiated. As activities become further from aquatic habitat the risk is reduced, although California red-legged frogs can be found in the upland habitat for extended periods in rodent burrows or under available cover (moist vegetation and downed wood). Any frogs in the upland habitat could be vulnerable to crushing if the equipment hits or runs over the cover object. As the amount of activity in the upland habitat increases, so does the risk. Because red-legged frog are considered extirpated from the Tuolumne River basin, this risk is expected to be very small. The amount of proposed operation within upland habitat is used as an indicator of risk.

Physical disturbance is also a direct impact to individuals and is associated with equipment operation and forest workers in close proximity to suitable habitats. Repeated disturbances can alter the fitness of individuals as it can interrupt typical feeding and resting patterns. If an individual is repeatedly disturbed in an area, they may avoid the area, essentially being temporarily displaced from their preferred habitat. Prolonged changes to behavior or displacement from its habitat may detrimentally impact an individual’s fitness (Rodriguez-Prieto and Fernandez-Juricic 2005). As described above, red-legged frog are generally associated with aquatic habitats but can be found in upland habitats for extended times. Many overland movements of red-legged frogs are associated with the wet season when implementation activities are stopped. Because the risk of direct impact is highest when equipment works in close operation to the stream, the amount potential aquatic habitat within project activities is used as an indicator of risk.

Indirect impacts to individuals can occur as a result of habitat modification associated with excessive sedimentation of habitat. As sediment is supplied in excess to a stream, deep water habitat can be reduced, the spaces between and under stream substrates (interstitial spaces) are filled in, and sediment covers suitable foraging substrates. Depth reduction of deep water habitats (pools and runs) can affect availability of breeding habitat. If the reduction of depth persists over many years, there could be population level impacts because reproductive success would be periodically reduced or eliminated. Excessive sedimentation also can fill in interstitial spaces and reduce the instream overhead cover available to all life stages. Red-legged frog tadpoles typically retreat to deep water and have also been observed burrowing in to sediment to escape (Bobzein and Didonato 2007). If these refuge habitats are limited, there could be an increase in predation. California red-legged frog tadpoles feed on algae and adult frogs feed on macroinvertebrates (Federal Register 1996). In stream habitats the larger substrates provide the algal resources. As excessive sedimentation begins to cover the streambed, the substrates used for foraging can also be covered, thereby resulting in decreased opportunities for feeding. The consequences of reduced food supply for tadpoles means slightly longer developmental time to metamorphosis and reduced size at metamorphosis. Longer developmental times could increase predation risk as metamorphosis occurs and tadpoles are less mobile due to presence of legs and the physiological cost of transforming the body. Smaller size at metamorphosis could affect individual survivorship over winter.

Effects to Habitats

Effects to habitat include reduction in shading, damage to riparian cover and streambanks, chemical contamination, increases sedimentation of aquatic habitats and reduction in large woody debris (LWD) from streams and upland habitats. Salvage logging would remove trees from riparian areas within the project area. The consequent impact to habitat is not known, but it could have positive or neutral benefit to the riparian habitat. Removal of stream shade can increase water temperature which can increase growth of emergent and aquatic vegetation, or can raise temperatures to the point frogs do not use the habitat. However, the net effect of salvaging dead trees may not be very big because the dead trees do not provide much shade, thereby making the effect somewhat neutral. The operation of equipment can potentially damage cover in upland riparian habitats as vehicles crush vegetation and displace large woody debris. The loss of cover could negatively impact the ability of red-legged frogs to forage or hide from predators. Equipment could also crush partially decayed logs and reduce potential refuge habitat under the log. The consequences of the loss of cover provided by riparian vegetation would be minor, because the extent of habitat loss would be limited to the few areas where equipment operation would occur in suitable habitat and temporary because the vegetation would likely regrow within a year.

The proposed action includes the use of a registered borate compound (example, Sporax® and hereafter referred to as Sporax®) to limit the spread of fungal disease to recently cut trees/stumps. Stump treatments are unlikely to harm aquatic animals because the method of application and project design measures would limit the potential for adverse acute and chronic exposures. A risk assessment was prepared for the project to address potential exposure scenarios (acute accidental, acute non-accidental, and chronic) for the application of the borate compound. The risk is more fully described under SNYLF. The MRs proposed for the project would effectively mitigate the direct effects to habitat. These MRs include limiting the distance to stream and timing of Sporax application.

There could be an increased rate of sediment delivery to the streams following roadside hazard abatement, salvage logging, machine piling, and pile burning. These activities create soil disturbance and compaction that leads to increase erosion and sedimentation. The roadside hazard tree removal has a potential for increasing sediment delivery to aquatic systems because ground based equipment is used and the logs are dragged along the ground, both creating soil disturbance. However, the potential for biologically important levels of sedimentation is low because the area affected is limited (200 feet on either side of the road), there is no skid trail network, and the trees are felled away from the stream so that they can be endlined (pulled by then end of the log furthest away from the stream) by the skidder which limits operation close to the stream. Pile burning also creates the potential for slight increases in sediment because the burn piles can cause localized soil hydrophobicity under the fire due to high temperatures and relatively long residence time. The potential for extensive off site soil movement is low because the piles tend to be small (20 to 50 square feet), but machine piles can have a much larger footprint (1,000 to 5,000 square feet).

Salvage logging (including hazard tree removal) would reduce the supply of large woody debris (LWD) in units that encompass or lie immediately adjacent to a stream. The removal of dead trees in riparian areas has the potential to reduce the availability of LWD that falls into the stream or riparian area. LWD creates habitat complexity in a stream by trapping sediment upstream and creating pools downstream of the LWD obstruction. LWD in uplands habitats provide cover and refugia for adult frogs. A management requirement is in place for recruiting the largest trees along perennial streams in salvage units that would potentially mitigate the overall reduction in LWD recruitment. However, this is considered to be a minimal amount of retention (5 trees per acre) and there would be a very long term (greater than 150 years and up to 300 years for very large trees) reduction in LWD recruitment rate in streamside salvage units.

Road Treatments

All road actions that improve or create a new road surface have the potential to increase erosion from the road surface and result in sedimentation of aquatic habitats if there is hydrologic connectivity between the road and a stream. Roads that are connected hydrologically to the stream have a higher potential to increase sediment delivery. Reconstruction and maintenance actions are primarily intended to facilitate vehicle use, but limiting hydrologic connectivity to streams is another important aspect of these treatments. Outsloping roads and installing effective water diversion structures can have long term benefits to aquatic systems by reducing the amount of sediment delivered from the road. So, there is a tradeoff for streams with road treatments with increased sediment delivery in the short term (1 to 2 years) and decreased delivery in the long term (greater than 2 years). Temporary roads would be vulnerable to erosion as described above, but these roads are not expected to have long-term effects to aquatic habitats because they would be fully decommissioned after use, meaning any culverts or culvert fills would be removed and the road surface would be subsoiled to break up compaction. New roads would require the development of the road prism and installation of culverts and other drainage structures (rolling dips). These roads would remain available to use for a long period and have the potential to generate sediment that could be delivered to streams. Management requirements and BMPs are included as part of the implementation of the proposed road actions and are designed to minimize the erosion of the road surface and delivery of sediment to streams.

Water Sources and Rock Quarries

Water drafting is required by the project for dust abatement on roads. Eighty one potential drafting sites were identified for use project-wide during implementation of the project. Drafting has the potential to suck in tadpoles (entrainment) or other small life stages as the pump pulls water from a stream. Entrainment and passage through the pump could be fatal to individuals or if the water is dispensed on a road or during fuels management activities (pile burning) in an upland area, mortality would likely result. The operation of the drafting pumps generate noise and workers attending to the pumps also create a source of physical disturbance. Five drafting locations were identified for Hunter Creek, one at the 1N01 crossing and four sites in headwater tributaries. To mitigate the potential for entrainment, the management requirement applied to drafting operations includes use of low intake velocity pumps and a screening device placed around the pump intake. These requirements would be effective at minimizing effects to the frog at the 1N01 crossing. At the four smaller drafting sites, a temporary holding tank would be used to accumulate water for drafting, not drafting directly from the stream.

Habitat Areas

Specific effects by habitat area are described below. Table 3.03-5 displays the acres and miles of proposed treatments in each habitat area. There is no California red-legged frog breeding stream habitat within proposed treatments.

Table 3.03-5 CRLF and SNYLF direct and indirect effect indicators for each alternative

Indicator	Alt 1	Alt 2	Alt 3	Alt 4
California red-legged frog				
Miles of suitable breeding stream within units/hazard tree	0(0)	0(0)	0(0)	0(0)
Acres of breeding ponds within units/ hazard tree	0.2 (1.9)	0(0)	0.1 (1.4)	0.1 (1.4)
Miles of perennial and intermittent non-breeding aquatic habitat within units/hazard tree				
Perennial and Intermittent	7.0 (2.1)	0(0)	5.8 (1.7)	5.8 (1.7)
Acres of upland habitat within units/hazard tree treatments	2,686 (12.4)	0.0(0)	2,467 (11.4)	2,467 (11.4)
Miles of road treatment within upland habitat buffer	49.8	0.0(0)	46.6	46.6
Maintenance	40.6	0.0(0)	36.8	36.8
Reconstruction	8.2	0.0(0)	8.3	8.3
Temporary	1.0	0.0(0)	1.6	1.6
Sierra Nevada yellow-legged frog				
Miles of suitable breeding /non-breeding stream within units/hazard tree	1.0 (38)	0 (0)	1.0 (38)	1.0 (38)
Acres of breeding/non-breeding pond within units/hazard tree	1.3 (100)	0 (0)	1.3 (100)	0.7 (53.8)
Acre of upland habitat within units/hazard tree treatments	14.3(8.4)	0 (0)	14.3 (8.4)	12.7 (7.4)
Miles of road treatment within upland habitat buffer				
Maintenance or Reconstruction	0.2	0.0(0)	0.2	0.2

Percent values are included in parentheses and represent the percent of the total in the Rim Fire perimeter.

Birch and Mud Lakes

There are no activities proposed in the immediate vicinity of Mud Lake and all proposed activities occur downstream and/or downslope of the breeding habitat. There is no risk of injury or disturbance at the breeding habitat. There is no risk of increased sediment reaching the ponds due to project activities, or in reduced shading and an associated increase in temperature. The habitat suitability of the ponds will remain low post-implementation.

There are 2.2 miles of non-breeding habitat within proposed salvage units out of 7.4 miles in the habitat area (30 percent). The non-breeding habitat in the Tuolumne River – Poopenaut Valley watershed (north half of habitat area) only has proposed treatment at the headwaters of the stream. Most of the non-breeding aquatic habitat in the Lower Middle Fork Tuolumne River and Upper Middle Fork Tuolumne River watershed is within proposed salvage harvest. WEPP modeling does not show a change in post-implementation erosion in the Tuolumne River – Poopenaut Valley or Upper Middle Fork Tuolumne River watersheds. Although no change is shown it is likely that implementation activities will result in some erosion and there will be some sediment delivery to the stream. The amount is not detectable above the background of the predicted fire erosion. The Lower Middle Fork Tuolumne watershed modelling indicates erosion will be reduced from 2.9 tons per acre post fire to 2.8 tons per acre post-implementation. Despite the predicted decrease in erosion, some sediment is still likely to enter the non-breeding aquatic habitat due to salvage, hazard tree and fuel reduction treatments.

Removal of salvage will not affect stream shading in this area as dead trees provide little shade. LWD recruitment will be reduced along the non-breeding habitat in the Lower Middle Fork Tuolumne River and Upper Middle Fork Tuolumne River. The management requirement maintains 5 standing trees per acre within the Riparian Conservation Areas (RCAs) of perennial streams as recruitment for downed wood. Existing downed wood crossing or within 30 feet of a stream will be retained. There are no planned water sources within this habitat area. Roadside Hazard Tree Removal and road treatments in this area do not occur near aquatic habitat.

Twenty-eight percent of the upland habitat is proposed for harvest and roadside salvage treatment, and 12 percent of the upland habitat with salvage treatment will also have fuels treatment. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. There are no activities proposed within the dispersal habitat between Birch and Mud Lakes.

Drew Creek

The breeding habitat along Drew Creek is not included within any proposed salvage units, or within hazard tree removal areas. There is no risk of disturbance or injury at the breeding habitat. Adjacent to the breeding habitat there is planned roadside hazard tree removal that comes close to the breeding habitat in two locations along 1S58. Reduction in stream shading below that caused by the fire is not anticipated, and therefore no increase in temperature is expected.

A total of 10.3 miles of non-breeding stream habitat is within the Drew Creek habitat area. There are 0.16 miles of non-breeding habitat in the Lower Middle Fork Tuolumne River watershed within proposed salvage units and 0.81 miles within roadside hazard tree removal units (total of 10 percent) in the Tuolumne River – Jawbone Creek watershed. WEPP modeling indicates erosion will be reduced from 2.9 tons per acre post fire to 2.8 tons per acre post-implementation in Lower Middle Fork Tuolumne River watershed and will remain at 3.6 tons per acre in the Tuolumne River – Jawbone Creek watershed. It is likely that implementation activities will result in some erosion and there will be some sediment delivery to the streams. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams and in many areas LWD will not be altered. The area along Lumsden Road where roadside hazard trees will be removed will have LWD maintained as described above. There is one proposed water source in the Drew Creek habitat area. It is a water trough/tank located in Section 21 south of Drew Creek and south of the proposed roadside hazard tree removal. This trough does not currently have any red-legged frog populations in it. Lumsden Road crosses the Tuolumne River within this habitat area at Lumsden Bridge. Road treatments are planned across this non-breeding habitat. Some sediment may enter the stream from the road treatments and may continue for one to two years. However, road treatments are designed to reduce hydrologically connected roads segments and any increased sediment will decrease after two years.

Ten percent of the upland habitat is proposed for harvest and roadside salvage treatment, with 1 percent of the upland habitat also receiving fuels treatments. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. Dispersal in the habitat occurs along Drew Creek and proposed activities will have no effect on the existing habitat.

Harden Flat Ponds

The breeding habitat within this habitat area is on private property and is not included within any proposed salvage units, or within hazard tree removal areas. There is no risk of disturbance or injury at the breeding habitat. Breeding habitat will maintain low suitability for red-legged frogs in this area.

There are 0.36 miles of non-breeding habitat in the Lower South Fork Tuolumne River watershed and in the Lower Middle Fork Tuolumne River watershed within salvage and roadside hazard tree treatment units. WEPP modeling indicates erosion will be slightly reduced in the Lower Middle Fork Tuolumne River watershed post-implementation, but will be unchanged in the Lower South Fork Tuolumne River watershed. Even with the predicted decrease post implementation it is likely that implementation activities will result in some erosion and there will be some sediment delivery to the streams. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams. Of the 6.4 miles of non-breeding habitat, only 0.36 miles (6 percent) will have trees removed. Management requirements maintaining some standing trees provide for

LWD recruitment. There are no proposed water sources in this area. None of the proposed road treatments cross stream habitat (they are not hydrologically connected) and it is unlikely sediment from road treatments will reach the streams.

Fourteen percent of the upland habitat is proposed for harvest and roadside salvage treatment with 10 percent also proposed for fuel treatment. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. Dispersal habitat is on the private property and will not be impacted by this action.

Homestead Pond

Homestead Pond is surrounded by a nineteen acre proposed salvage harvest unit. There would be a high risk of direct impact to red-legged frogs in this pond during project activities, mainly from physical disturbance. A 30 foot no cut and no equipment buffer would be applied adjacent to Homestead Pond and mechanical operations would be prohibited within 1 mile of breeding habitat during the wet season when frogs would be most likely to be present in the upland habitats, further reducing the potential for impacts. Reduction in stream shading below that caused by the fire is not anticipated, and therefore no increase in temperature is expected. The pond and salvage unit are on flat ground, therefore sediment is not expected to move into the pond in great quantities. However, some sedimentation is anticipated and would slightly reduce the depth of the pond.

There are 4.8 miles of non-breeding stream habitat within the Homestead Pond habitat area. There are 0.3 miles (7 percent) of non-breeding habitat in the Tuolumne River – Grapevine Creek watershed within proposed roadside hazard tree removal units. WEPP modeling indicates erosion will not be reduced from 2.0 tons per acre post fire. It is likely that implementation activities will result in some erosion and there will be some sediment delivery to the non-breeding habitat. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams and in most of the area LWD will not be altered. There are no proposed water sources in the Homestead Pond habitat area. One road in the project area crosses the non-breeding habitat provided by the Hetch Hetchy ditch feature. Because the road may be hydrologically connected to the non-breeding habitat, some sediment may enter the stream from the road treatments and may continue for one to two years. These road treatments are designed to reduce hydrologically connected roads segments and any increased sediment will decrease after two years.

Nine percent of the upland habitat is proposed for harvest and roadside salvage treatment with two percent of the habitat proposed for fuels treatment in the harvested units. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. There is no dispersal habitat in this habitat area.

Hunter Creek and Ponds

There are no salvage activities proposed within the Hunter Creek and Ponds habitat area. Hazard Tree Removal is proposed near the Hunter Creek breeding habitat in Section 17 (near Skidmore Pit). There is a slight risk of injury or mortality at this location; however this is mitigated by the management requirement to fell trees away from the stream. There will be no reduction in shading at breeding habitats (stream or pond) below that caused by the fire; therefore temperature will not be altered by this project. The proposed hazard tree removal and road treatments in Section 17 may result in a minor amount of additional sediment input into Hunter Creek due to the proximity to the creek. This additional input may last one to two years, and then will be reduced.

There are 26.8 miles of non-breeding stream habitat within this habitat area. There are 3.1 miles (12 percent) of non-breeding habitat within proposed roadside hazard tree removal units. The majority of non-breeding habitat consists of tributaries to Hunter Creek in the Lower North Fork Tuolumne River watershed and most was not burned in the Rim Fire. The non-breeding habitat within the Tuolumne River – Grapevine Creek watershed was burned. WEPP modeling indicates erosion will remain at 2.0 tons per acre post fire and post-implementation in this watershed. It is likely that implementation activities will result in some erosion and there will be some sediment delivery to the non-breeding habitat. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams and in most of the area LWD will not be altered. There are five proposed water sources in the Hunter Creek and Ponds habitat area; one water trough/tank that is not known to contain red-legged frogs, one site at the junction of Hunter Creek and Buchanan Road in breeding habitat, and three sites in non-breeding habitat along Forest Service roads 1N01, 1N27 and 1N35. Drafting in the latter four locations has the potential to entrain tadpole or smaller California red-legged frogs if they are present during activities, and can also result in disturbance in the area. There are several roads in the area that cross non-breeding habitat that provide some hydrologic connectivity. Some sediment may enter the streams from the road treatments and may continue for one to two years. These road treatments are designed to reduce hydrologically connected roads segments and any increased sediment will decrease after two years. Long term reduction in sediment delivery from the roads would be expected following road improvement actions.

Ten percent of the upland habitat is proposed for roadside salvage and fuel treatment. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. However, only a little more than half of the upland habitat was within the fire and experienced changes. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. The dispersal habitat along Hunter Creek would not be altered by the proposed activities.

Sierra Nevada Yellow-legged Frog

Effects to Individuals

Despite extensive surveys of suitable habitats no SNYLF have been found within the Rim Fire perimeter. Also, all analyzed areas provide low suitability habitat for the frog and survey efforts have determined the Kibbie ponds to be unoccupied. Overall, there is a very low risk of injury, mortality, or behavioral disturbance to individual SNYLF from the proposed actions. Because occupancy is not definitively known, effects to individuals are considered. A more comprehensive, detailed description of effects is available in the Biological Assessment and Biological Evaluation prepared for the project and part of the project record.

Tree Felling and Removal

Breeding and Non-breeding Aquatic Habitat: Proposed activities overlap 1.0 mile of stream and 1.3 acres of pond habitat (Table 3.03-5). Survey efforts at the Kibbie Ponds have been adequate to determine the ponds are unoccupied. There would be no impacts to individuals at this location. At Reynolds Creek, tree felling and removal would not occur within 500 feet of suitable breeding habitat. There would be hazard tree removal at one crossing of an intermittent tributary to the creek and there is a slight risk of direct impact to individuals at this location. At Eleanor Creek and the Middle Fork Tuolumne River, treatment units are adjacent to suitable breeding habitat and there is a risk of direct impact to individuals at this location. Injury, mortality, or physical disturbance could occur, though the likelihood is low because these large streams are atypical of SNYLF habitats on the forest and have self-sustaining populations of fish. In combination, occupancy is very unlikely at these sites and the risk to individuals is very low.

Upland Habitat: Project activities would affect approximately 14 acres or 8 percent of the total upland habitat available in the project area (Table 3.03-5). There is a risk of direct impact to individuals during salvage actions including injury, mortality, and physical disturbance. The SNYLF is typically found close to water and most long distance movements appear to be between suitable aquatic habitats in close proximity. The sites with the most activity, Big and Little Kibbie Ponds, are unoccupied based on survey results and direct impacts to individuals in upland habitat would not occur. Salvage and roadside hazard tree removal would not occur within 200 feet of Reynolds Creek where the best available aquatic habitat is located. Roadside hazard tree removal would affect a small amount of upland habitat near an intermittent tributary. The risk of directly impacting an individual is expected to be low because this small stream typically does not support water during the dry season, and the highly aquatic frog would be expected to move to permanent water found outside of this stream. Activities would occur in close proximity to Eleanor Creek and the Middle Fork Tuolumne River and could affect individuals in upland habitat. Physical disturbance is the anticipated direct effect whereby a frog would retreat into the water upon disturbance. Short term indirect impacts to individuals is expected during this disturbance, affecting some physiological aspects (examples, lack of feeding and stress from disturbance)

Burn Piles

SNYLF hiding in burn piles could be killed, injured, or disturbed if they are present when piles are ignited. Requiring burn piles to be located a minimum of 50 feet from perennial and intermittent streams and other special aquatic features would mitigate this risk. The risk is discountable at the Kibbie Ponds due to lack of occupancy, negligible at Reynolds Creek where piles would not be burned within 200 feet of aquatic habitat, and highest along Eleanor Creek and the Middle Fork Tuolumne River. The risk is higher at these two locations due to the level of fuel reduction activities adjacent to the streams.

Road Treatments

Road reconstruction and maintenance treatments (1.2 miles) are proposed in Alternative 1 within the SNYLF upland habitat buffers (i.e., 82 feet from stream banks and 984 feet between ponds). Impacts to individuals are not anticipated because most activity would occur in small, intermittent tributary streams that provide very low habitat suitability due to lack of water during the dry season. Most of the road maintenance and reconstruction activities would occur on or immediately adjacent (within 10 feet) to the existing road prism which limits the spatial extent of impact. Only one suitable breeding habitat, Reynolds Creek at 3N01, would be affected by road improvement actions. The most likely impact to individuals at this location would be physical disturbance associated with the operation of equipment and the presence of workers at the road crossing. Within 200 feet of any crossing, the duration of work is expected to be less than one day. This limited duration would not be sufficient to significantly impact physiological well-being of any individual.

Water Drafting

There is one drafting site within a SNYLF habitat area located at the 3N01 crossing of Reynolds Creek. Drafting has the potential to impact individuals through entrainment into the pump or by physical disturbance. Individuals could be sucked into the pump during drafting from the pool downstream of the road crossing. This would likely be a mortality event because of high pressures created by the pump. When the pump is being operated, physical disturbance could occur because the workers and operation of the pump would create noise that could affect individuals. The level of disturbance could be high enough that individuals would eventually move away from the drafting site to an area with lower levels of disturbance. This movement could have no measurable effect if a suitable replacement site is found or individuals could be faced with less optimal habitat and competition for available resources. There could be a slight reduction in individual physical fitness associated with reduced resources and competition, but this should not be a consequence that includes mortality from poor physical health. Management requirements, including the use of low velocity intake hoses and placing the intake into a drafting box to physically exclude individuals, minimize the potential that individuals could be sucked into the pump. Placing the intake into the drafting box would further decrease the intake velocity by increasing the distance an individual could come from the intake.

Effects to Habitats

SNYLF habitats have a moderate risk of being directly impacted by project activities because there is overlap of project activities with both suitable breeding and non-breeding aquatic and upland habitats (Table 3.03-5 and Table 3.03-15). The following management requirements would successfully mitigate the potential for project activities to directly impact SNLYF habitats: (1) directional felling of trees within RCAs away from stream channels and other special aquatic features, (2) excluding ground based mechanical equipment within 15 feet of water bodies, (3) prohibiting skidding within 50 feet of perennial and intermittent aquatic features, (4) increasing the ground based mechanical exclusion zone to 100 feet along portions of Bear Creek and Jawbone Creek that burned at high severity with slopes between 25 and 35 percent and lengths greater than 100 feet, and (5) the mechanical exclusion zone around Big and Little Kibbie Ponds.

Increases in Sediment

Breeding and Non-breeding Aquatic Habitat: Sediment levels at two SNYLF aquatic habitats, Eleanor Creek and Middle Fork Tuolumne River, are expected to increase with the implementation of Alternative 1. Salvage harvest, roadside hazard tree removal, and road improvement actions have the potential to disturb the soil surface and create conditions conducive to erosion. Bare soil attributable to equipment operation and the dragging of logs in near stream environments are the activities most likely to result in soil disturbance. The operation of harvesters and skidders in close proximity to streams can disturb the soil surface and cause compaction, respectively. At Reynolds Creek, the risk of sediment increases is low because the main salvage unit close to suitable habitat (D04B) is more than 500 feet from the stream and much of the area between the unit and the stream had lower burn severity. The low burn severities in this area provide adequate soil cover that would assimilate sediment coming off of unit D04B and prevent the sediment from reaching the stream. There would be a limited amount of roadside hazard activity at the point where 3N01M crosses an intermittent tributary, but the area is relatively unburned and the number of trees removed from the roadside would be low. Very small amounts of sediment could be routed to the intermittent channel, but the consequences would be a localized area of sediment deposition in the first couple of pools downstream of the crossing that would remain for less than two years. This amount of sediment would not impair the stream and would not affect the suitability of SNYLF habitat in Reynolds Creek. Small amounts of sediment could be delivered to the Kibbie ponds because salvage operations could occur all around both ponds. The amount is expected to be low because the terrain surrounding the ponds is relatively flat (less than 5 percent) which limits the potential for overland movement of water and delivery of sediment.

There is a salvage unit directly adjacent to 0.3 mile of Eleanor Creek. Approximately 0.15 mile of harvest could have mechanical equipment within 15 feet of the stream, with equipment staying 100 feet or more from the remaining 0.15 mile of stream. The equipment operation in very close proximity to the creek could cause areas of bare soil from which sediment could be transported to the stream. There would be short term (less than 2 years) consequences to pool and other slow water habitats from this sediment including very minor reduction in pool volume and refuge habitat under streambed substrates. The high stream gradient and snowmelt stream flows would be sufficient to mobilize these sediments in the first year following the two entries (salvage and fuel reduction) into the unit. There are two salvage units (Q08, Q09) adjacent to 0.7 mile of suitable habitat provided by the Middle Fork Tuolumne River. The sediment discussion for Eleanor Creek applies to this location including the potential for impacts, the consequences to habitat, and the duration of impact. The minor exception is that more sediment delivery is possible at the Middle Fork because 0.7 mile of habitat would be affected by project activities in close proximity to the river instead of 0.15 mile of Eleanor Creek.

Roadside hazard tree removal would occur at two road-stream intersections, one at Reynolds Creek and one at the Middle Fork Tuolumne River. At Reynolds Creek, the burn severity was low at the 3N01M crossing of an intermittent tributary and very few trees would be removed from this location. The burn severity was higher at the 1S25A crossing of the intermittent stream that is a tributary to the Middle Fork and up to 30 trees could be removed from the immediate riparian area of the stream. These trees would need to be extracted by a skidder equipped with an endline because the hillslope is steep. Pulling the logs out would create small areas of soil disturbance and some sediment could be directed to the channel. The sediment would cause a very minor reduction in pool volume that would last for one year at which point the seasonal streamflow would transport the sediment from this steep tributary to the Middle Fork. The transported sediment would likely not be detectable in the Middle Fork.

Road maintenance and reconstruction actions would make the roads more vulnerable to erosion for up to two years following the activity. Small amounts of sediment would be expected to enter streams that are hydrologically connected to the roads. The Kibbie Ponds are not hydrologically connected to the nearby road system and impacts to the habitat would not occur. The road (1S97) near Eleanor Creek is far enough away from the stream and is only connected to seasonal drainages and ephemeral swales. The likely fate of the sediment at this location would be storage in the drainages/swales and delivery to Eleanor Creek would not occur under typical circumstances. Road improvement activities would be most likely to affect Reynolds Creek and Middle Fork Tuolumne River because there would be activities at the road crossings of Reynolds Creek (3N01) and one of its tributaries (3N01M) and a tributary to the Middle Fork (1S25A). As with the sediment from the roadside hazard, there would be very minor impairment of slow water habitats lasting for a year after the road improvement action. For all sources of sediment combined, there would be minor and temporary impairment of some slow water habitats, but there would be no reduction in suitability for use by SNYLF.

Large Woody Debris

Salvage logging and roadside hazard tree removal would decrease the long term supply of LWD available for aquatic and upland habitats. The importance of LWD to SNYLF is not well documented, but woody debris may provide cover from predators (Federal Register 2013a) and promotes the formation of habitat complexity within a stream. Within the range of the frog, salvage logging and roadside hazard tree removal would not impact the mainstem of Reynolds Creek. Salvage logging alone would greatly reduce LWD around the Kibbie Ponds because the ponds lie entirely within salvage units. There would be a major reduction in LWD available to the frog in upland habitat at the ponds. Salvage logging would affect the LWD supply along 0.3 mile of Eleanor Creek and 0.7 mile of the Middle Fork Tuolumne River. The units would affect one side of each stream leaving the opposite side unharvested. Also, there would be no additional harvest of trees upstream of either location because they lie within Yosemite National Park. The effect would be a localized reduction of LWD available to the two streams and upland habitat on one side of each stream. This effect is expected to be very minor because there would be ample long term supply of LWD available to the streams from upstream sources. Salvage logging would reduce LWD in upland habitats, but the extent of deficient conditions would be present in less than 0.1 percent of the upland habitat available to the frogs in these streams. Very small reductions in LWD would occur at the two tributary streams mentioned under road improvement actions.

Water Drafting

Water drafting has the potential to impact the availability and supply of water to downstream habitats. During drafting, there is a temporary decrease in streamflow because water is being diverted to a portable tank or directly to a water truck. During this activity, there would be a temporary decrease in the wetted area of the stream and reduction in depths of pool habitats. The impacts of these effects would be most noticeable within 300 feet of the drafting site. At larger streams, drafting would likely occur directly from the stream in a pool or deep run type habitat, but in smaller streams a portable holding tank would most likely be used instead of drafting directly from the stream. There is only one proposed drafting site within breeding habitat for the SNYLF at the 3N01 crossing of Reynolds Creek. Management requirements would prevent the dewatering of any aquatic habitat and adequate habitat would be maintained to support all needs of the species. No detrimental impacts to any life stage of the frog are anticipated due to water drafting from Reynolds Creek. Management requirements include reduced rate of drafting when Reynolds Creek streamflow is between 1.5 cubic feet per second and 4.0 cubic feet per second. Because this stream has a resident trout population, there would be no drafting when streamflow drops below 1.5 cubic feet per second.

Foothill Yellow-legged Frog

Salvage and Roadside Hazard Tree Removal

There is no potential for direct effects to the FYLF in the following occupied locations: Basin, Drew, Grapevine, and Hunter Creeks, and North Fork Tuolumne and main Tuolumne Rivers. Proposed activity location relative to the potential habitat in the creek channel and Table 3.03-6 show no project related activity (hazard tree removal, salvage, or road treatments) is in close proximity to any of these six streams occupied by the frog. There is no potential for direct effect at the following streams providing suitable habitat for the FYLF: Adams, Alder, Bear Springs, Quilty and Russell Creeks, and Unnamed Clavey Tributary 2. No project activities would occur in close proximity to the streams which negates the potential for direct effect.

Table 3.03-6 shows that based on the limited amount of habitat affected by project activities, there is a very low risk of direct effect to occupied sites because there is very little project activity within the 30-meter buffers. These occupied sites include Bull, Bull Meadow, Drew, Grapevine, and Moore Creeks, and the Clavey and North Fork Merced Rivers. The hazard tree areas and roads are at the upper headwaters of Bull, Drew, Grapevine, and Moore Creeks and the North Fork Merced River. Even though these streams were buffered as suitable habitat, there is a negligible chance of occupancy. Within Bull Meadow Creek watershed, salvage unit L206, a plantation from the 1987 fire, is a proposed deer forage unit. A review of the post-fire aerial imagery indicates low mortality of trees along the stream. A road on the east side of the stream would have hazard trees removed, but imagery indicates limited mortality between the stream and road. Only roadside hazard tree removal would occur along 1N01 at the bridge crossing of the Clavey River. This is outside of the merchantable conifer elevation and the hazard trees are likely to be oaks. If the oaks are cut down the steep bank, there is a very low chance that they could fall to the river over 100 feet away and directly affect an individual frog. Furthermore, this is considered to be an unlikely occurrence as the fallers would likely leave the tree close to the road for firewood. The river is far below the road and there is a negligible chance for physical disturbance unless the tree falls down to the river.

A low risk of direct effects would occur at the following streams (occupancy unknown) because of the limited amount of activity within the buffer as shown in Table 3.03-6 or the hazard tree and salvage actions would occur along stream segments with very low habitat suitability. These streams include Cottonwood, Deer Lick, Eleanor, and Indian Creeks, and Clavey River Tributaries 1, 4, and 5. At Deer Lick Creek and Clavey River Tributaries 1 and 5, the roadside hazard tree and salvage units are at the upper headwaters of the streams and habitat suitability is very low if at all suitable. For Clavey River Tributary 4 and Indian Creek, aerial imagery shows very little mortality to conifers at the road crossing. Independently, the very low suitability habitat and low number of dead trees make the risk of a direct effect occurring very low.

Table 3.03-6 Watershed area, buffers and road treatments in FYLF suitable habitat in Alternative 1

Watershed (5th level HUC)	Stream	Percent FYLF Watershed Treated	FYLF Buffer Affected (acres)			Road Treatments (miles)			
			Hazard Tree	Salvage	Percent of total	Reconstruct	Maintain	New	Temp
Tuolumne River	Tuolumne River								
	Alder Cr.	10	5	0	4	0.8	2.5	0	0
	Corral Cr.	58	2	81	35	14.8	5	0.5	0
	Drew Cr.	12	12	0.4	11	0.5	4.5	0.1	1.1
	Grapevine Cr.	18	29	0	11	0.7	17.4	0	0
	Indian Cr.	2	1	0	less than 1	0	2.2	0	0
	Jawbone Cr.	25	5	46	14	18.5	8.8	0.2	3.4
Middle Fork Tuolumne River	Middle Fork Tuolumne River	17	22	255	46	58.3	12.5	0	5.3
North Fork Tuolumne River	North Fork Tuolumne River	2	0	0	0	0.4	22.7	0	0
	Basin Cr.	1	0	0	0	0.4	2.1	0	0
	Hunter Cr.	9	0	0	0	0	19.9	0	0
South Fork Tuolumne River	South Fork Tuolumne River	38	30	140	24	76.6	26.8	1.6	2.7
Cherry Creek	Cherry Cr.	11	8	67	18	34.6	9.9	0	1.0
	Eleanor Cr.	1	0	12	22	2.5	0	0	0
	Granite Cr.	27	2	50	36	12.4	1.1	0	0.1
Clavey River	Clavey River								
	Reed Cr.	20	1	49	49	25.4	17.8	0.2	2.2
	Adams Gulch	18	0	0	0	1.6	1.4	0	0
	Bear Springs Cr.	18	9	0.1	20	10	0.7	0	0
	Bull Meadow Cr.	36	5	1	8	3.9	0.7	0	0.8
	Indian Springs Cr.	19	3	2	25	1.4	0.1	0	0
	Quilty Cr.	5	0	0	0	0.1	1.1	0	0
	Unnamed Trib 1	16	3	0	8	0	2.9	0	0
	Unnamed Trib 2	24	0	0	0	0	2.5	0	0
	Unnamed Trib 3	69	0	26	46	11	0	0	0
	Unnamed Trib 4	43	3	0	13	2	1.7	0	0
	Unnamed Trib 5	43	7	8	37	2.2	2.7	0	0
	Cottonwood Cr.	31	0	3	5	21.4	7.2	0	0
	Russell Cr.	30	0	0	0	2.2	1	0	0
North Fork Merced River	North Fork Merced River	2	22	18	less than 0.1	11.6	11.8	0	0.3
	Bull Cr.	2	5	0	less than 0.1	0.5	5.5	0	0
	Deer Lick Cr.	8	4	13	7	3.4	2.3	0	0.2
	Moore Cr.	4	5	5	3	1.6	4.1	0	1
	Scott Cr.	22	2	0	8	3.6	3.4	0	0

A moderate risk could occur to individuals at the following locations: Cherry and Indian Springs Creeks. Table 3.03-6 shows 75 acres of salvage actions in the Cherry Creek watershed, but 52 acres alone are in Granite Creek which is discussed immediately below. The 23 acres of buffer treated is at the upper elevation limit established for the frog; therefore, the potential for occupancy is very low, especially in a relatively large stream like Cherry Creek. The level of activity in the buffer does pose a risk for injury, disturbance or mortality in these helicopter salvage units (O3, O6, O7 and P201), but the risk may be slightly lower because ground-based equipment would not operate in the units. Within Indian Springs watershed, a salvage unit runs along the north side of the creek at a distance of 1,200 feet. This site has known occupancy by FYLF and low numbers of frogs disperse from the Clavey River breeding sites to this stream. Direct effects to individuals are plausible at Indian Springs. A management requirement mitigates some of the direct effects (injury and mortality) by having timber directionally felled away from the stream. Physical disturbance is probably the most likely effect to individuals and the disturbance could last up to three weeks at the 11-acre unit. Due to the almost complete tree mortality in this unit, it is likely that there would be only one salvage entry.

A high risk of direct effect to individual FYLF could occur for the following streams: Corral, Granite, Jawbone, Reed, Middle and South Fork Tuolumne Rivers. Table 3.03-6 shows the level of risk is simply associated with the amount of activity within FYLF buffers. Due to the high levels of activity close to streams, the risk of injury, mortality, and physical disturbance would increase. Although there is a management requirement to directionally fall trees away from the stream to limit injury/mortality, a considerable amount of machinery would operate in close proximity to the streams. The occupancy status of these six streams is unknown, but occupancy is assumed to occur in order to allow for disclosure of impact. If individuals are killed, a minor impact to population status could occur because all populations are assumed to be small. The number of reproducing individuals could be decreased for up to two years at the localized breeding site scale. The elevated risk of individual mortality would not be likely to result in a localized extinction of a population or subpopulation. The likely outcome of this extensive operation close to streams is increased physical disturbance associated with equipment and forest workers in close proximity to the streams. As with Indian Springs, the disturbance could last up to four weeks (likely 2 to 3). Repeated disturbance could affect basking or foraging and/or increased stress, with a low to moderate risk of temporarily reducing physiological fitness (body condition).

The primary anticipated indirect effect is the increase of sediment delivery to the streams following roadside hazard abatement and salvage logging. Of the two activities, salvaging is assumed to have the greater potential effect because it would generate a larger skid trail network than the area immediately within the 200-foot hazard tree buffer along roads. Skid trails tend to yield greater quantities of sediment than undisturbed areas and yield increased sediment for a longer period of time (Robichaud et al. 2011). The longer duration of erosion from skid trails is due to the machinery created disturbance negatively affecting the recovery of ground cover, especially vegetation, on the trails (Robichaud et al. 2011).

The extent of salvaging in a watershed was the basis for estimating the potential for increased sediment and is represented as proportion of watershed area treated in Table 3.03-6. Additional consideration was given to the amount of buffer treated. The closer the activity is to a stream, the shorter the distance for runoff to travel, and the greater the likelihood that sediment is delivered to the stream. The logging system proposed (tractor, skyline, or helicopter) in an affected watershed was also considered because helicopter logging results in much less ground disturbance than ground-based logging. The lower levels of ground disturbance translate into lower erosion rates and less sediment routed to streams. A longer discussion of anticipated erosion effects from salvage logging is provided in the 3.11 Soils and 3.14 Watershed Chapters. The risk categories follow those used for direct effects and are low, moderate, and high. It should be noted that erosion and sediment modeling was completed for post-fire and post-project implementation for each alternative and this modeling showed very little difference in erosion rates or sediment yield. The modeling indicated broad scale decreases in erosion rates that were attributable to increased ground cover from salvage logging in high soil burn severity units (nonmerchantable material is left behind).

For streams in the low category (less than 15 percent of watershed area affected), there would be negligible to very minor increases in fine sediments. These fine sediments would mainly affect slow water habitats found in low gradient reaches (less than 2 percent), along the margins of the stream, and in pools. In these watersheds, it may not be possible to differentiate between post-fire erosion and treatment related sediment. This type of habitat impact would not affect habitat suitability for any life stage or the ability of a FYLF population to persist. Streams in the low category include Alder, Basin, Cherry, Deer Lick, Eleanor, Hunter, Indian, Moore, and Quilty Creeks and the Clavey, Tuolumne, and North Fork Merced Rivers.

In the moderate category (15-25 percent of watershed area affected), there would be minor increases in sediment from treated areas. For some reaches in the affected watersheds, it would be possible to differentiate the project related sediment from the post-fire erosion and the spatial extent of the effect on habitat would be localized (up to several hundred square feet below the deposition point). At the smaller reach scale (small streams within a watershed), there could be moderate levels of sediment affecting pool volume or reducing other deeper water habitats (less than 50 percent reduction in volume), but adequate depth should be maintained for individuals needing refuge habitat. Breeding habitat in larger streams could have detectable increases in sediment, but there should be limited impairment of the capability of the habitat to allow for eggmass to tadpole to metamorphosis development. The primary observable change in habitat at breeding sites would be a reduction in the spaces between larger stream substrates which would reduce the abundance and availability of escape habitat. Also, the increase in fine sediments could partially cover large substrates (large gravel to cobble sized) and limit the amount of foraging habitat on the substrates (tadpoles scrape or suck algae from the surface of rocks). There would be a discountable to minor effect on adult and sub-adult habitat in general aquatic habitat because the small amounts of sediment would not substantially reduce habitat suitability. Adult and sub-adults would still have ample deep water habitat to escape a perceived predation attempt. Streams in the moderate category include Adams, Bear Springs, Clavey River Tributaries 1 and 2, Drew, Grapevine, Indian Springs, and Scott Creek, and the Middle and North Fork Tuolumne Rivers.

For the remaining streams (Bull Meadow, Clavey River Tributaries 3-5, Corral, Cottonwood, Granite, Jawbone, Reed, and Russell Creeks and the South Fork Tuolumne River) there would generally be minor sedimentation at the stream scale and moderate sedimentation of localized habitats. Moderate impact at the local scale would mean a less than 30 percent reduction in volume of deep water habitats, widespread streambed sedimentation (less than 1 inch deep), and temporary reduction of shallow water habitats. Small, low gradient streams would see the greatest level of impact, while higher gradient sections of larger streams would effectively transport this sediment. The effective transport of sediment from some stream reaches would insure the availability of patches of high suitability habitat.

For the moderate and high watershed response categories, the duration of increased project-related sediment would be one to two years, and it may be difficult to differentiate between the post-fire erosion and the treatment related sediment at a watershed scale in the second year. Any repeated entries to remove additional dead material would not be expected to generate detectable sediment because there would be a limited skid trail network and few equipment passes on the skid trails limiting the extent of compaction.

Road Treatments

The proposed action would include several types of road management activities including maintenance and reconstruction. All action alternatives would propose the construction of new and temporary roads to access salvage units. These actions and activities are further detailed in the Transportation Chapter of this document.

Table 3.03-6 shows the types and mileage of road system related actions proposed under this alternative. Several factors determine the extent to which the road actions could affect aquatic habitats, including, but not limited to, the degree of connectivity to a stream or drainage network, approach angle of the road near the stream, spacing of water diversion structures, level of outsloping of the road surface, erodibility of the road surface (soil type), and road surface type. Road-stream connectivity field reviews have not been done. As such, this analysis lacks site-specific data and instead relies on a generalized approach using the (1) amount of activity in close proximity to streams and (2) total number of miles of road treated in each watershed. A miles per acre calculation was considered for analysis, but this type of simple averaging was not considered to be an accurate indicator of potential effect because road density (and thus, treatment intensity) varied considerably in any given watershed. The FYLF buffer (30 meters) was used as an indicator of road activity close to streams which includes the road surface area most likely to deliver sediment directly to a stream. The exceptions to this rule were the new and temporary road construction actions.

Road maintenance and reconstruction are similar treatments, but reconstruction typically includes a major reworking of the road surface and can include actions outside of the existing road prism. Both activities include the reworking of the road surface, typically with a road grader or other machine with a blade. This action loosens the compaction of the road surface and makes more fine sediment available to erosion via dust and rain runoff (Coe 2006, Stafford 2011). Stafford (2011) indicated a fairly high rate of connectivity between roads and the stream network; 11-30 percent of roads were connected hydrologically to a stream. Reconstruction and maintenance actions are primarily intended to facilitate vehicle use, but limiting hydrologic connectivity to streams is another important aspect of these treatments. Outsloping roads and installing effective water diversion structures can have long term benefits to aquatic systems by reducing the amount of sediment delivered from the road. So, there is a tradeoff for streams with road treatments with increased sediment delivery in the short term (1-2 years) and decreased delivery in the long term (greater than 2 years). Since the road treatments would occur prior to or during salvage operations in a unit, the sediment from the roads would be expected to combine with sediment generated from salvaging for up to two years.

Relatively little to no road-related sediment would be expected in the following FYLF watersheds: Adams, Alder, Basin, Bull, Clavey Tributaries 1, 2, and 4, Deer Lick, Eleanor, Indian, Indian Springs, Moore, Quilty, Russell, and Scott Creeks, and the North Fork Merced and Tuolumne Rivers. Sediment from maintenance and reconstruction should have no detectable effect on any habitat required by the FYLF. Minor amounts of road treatment related sediment would be expected in Bear Springs, Bull Meadow, Clavey Tributary 3, Cottonwood, Granite, Grapevine, Hunter, and Jawbone Creeks. Effects would be primarily localized and noticeable downstream of road crossings, and, depending on stream size and gradient at the crossing, could affect and area of less than 10 square feet to 100 square feet. In the remaining streams (Cherry, Clavey Tributary 5, Drew, and Reed Creeks and Middle and South Fork Tuolumne Rivers), there would be more areas with localized effects, especially in smaller tributaries. In all the rivers (Clavey, Tuolumne, Middle, North and South Fork Tuolumne Rivers, and Cherry Creek), sediment from the roads may not be detectable after the first year following road improvement and is unlikely to impair any biological function at these large watershed scales.

Corral Creek and the South Fork Tuolumne River have the most new road construction. The segment of new road in the Corral Creek watershed would cross the creek in the uppermost portion of the watershed and would require the installation of a culvert. Sediment would be anticipated from this crossing and persist for two years as the fill compacts and vegetation grows on the bare ground. Also, excavating the channel to place the culvert would generate sediment. The sediment from the fill and channel disturbance would be detectable for about 100 feet downstream. This section of stream does not provide suitable habitat for the FYLF, and the overall gradient of the channel indicates a high potential for this sediment to be transported out of the system within two or three years. The new road construction in the South Fork watershed would occur in upper watershed of Rush Creek. The road does not appear to cross any perennial or intermittent streams and could have very limited impact on Rush Creek. Because this stream is above the elevation range of the species on the Stanislaus, it is unlikely that habitat for FYLF downstream in the South Fork would have a measurable impact on suitability.

Water Sources and Rock Quarries

Water sources used for the road management activities and logging have management requirements that would result in minimal adverse direct and indirect effects to the FYLF. Rock pits are not located in or in close proximity to FYLF habitat, so no direct or indirect effects to the FYLF are expected to occur.

Fuels Treatments

Fuels treatments are proposed for the roadside and salvage units to reduce fuel loading created by nonmerchantable tree material. This post-salvage material would be piled by hand or machine (bulldozer or grapple). Hand piling does not create any ground disturbance and erosion would not be expected in areas treated in this manner. Dozer piling has the potential for the greatest amount of ground disturbance and erosion. Since the extent of this activity would only occur in the salvage and hazard tree units, the categories of watershed concern relate directly to erosion related to dozer piling. Erosion from the machine treated units would be detectable primarily in the moderate and high response watersheds, with slight impairment of FYLF habitat in the moderate response watersheds and minor, localized impairment of habitat in the high response watersheds.

The proposed treatments (salvage, roadside hazard, road improvement and construction) would have little impact on stream shading or the recovery of obligate riparian vegetation. The trees that would be removed are dead and no longer provide much shade to the stream surface. The actions to remove the dead trees would have little or no reduction in shading. The relative importance of shading to the frog is largely unknown, but as discussed earlier, a mix of shaded conditions is likely optimal for thermoregulation. The recovery of obligate woody riparian vegetation is unlikely to be significantly hindered by salvage and hazard tree removal because equipment would not be operating within the typically narrow riparian zone. The resprouting riparian vegetation may be damaged by falling trees, but further resprouting would limit the duration of this impact to less than a year.

The removal of dead trees in riparian areas has the potential to reduce the availability of LWD that falls into the stream or riparian area. While the importance of LWD to FYLF is unstudied, the general role and function of LWD in creating habitat complexity in a stream may be important to the frog. Therefore, this habitat element could be affected (reduced) by logging. There are requirements for recruiting the largest trees in salvage units that would potentially mitigate the overall reduction in recruitment. However, this is considered to be a minimal amount of retention (5 trees per acre) and there would be a very long term (greater than 150 years and up to 300 years for very large trees) reduction in LWD recruitment rate in streamside salvage units.

Western pond turtle

The risk of detrimental direct effects to the WPT is higher than for the FYLF because the turtle uses the uplands more extensively during different times of the year. As discussed earlier, the WPT can use upland habitats up to 400 meters away from an aquatic habitat and can occur in upland habitats for overwintering, nesting, and aestivation. In general, turtles remain close to water from early spring through early fall, but in habitats with seasonal water, they can move into upland habitat when the seasonal feature is dry. Table 3.03-7 provides a description of the amount of area treated by hazard tree and salvage logging activities for this alternative.

Salvage and Roadside Hazard Tree Removal

There is very low to no risk of direct effect to turtles in the following locations: Basin, Bull, Deer Lick, Hunter, Moore Creeks and the North Fork Merced and Tuolumne Rivers. In these watersheds, salvage and hazard tree treatment areas are located on headwater reaches where habitat suitability is very low or unsuitable. The WPT needs fairly big pools which these habitats lack.

There is a low risk of adverse direct effect to turtles in the following locations: Cherry, Cottonwood, Drew, Eleanor, and Reed Creeks, and the three unnamed ponds at Yosemite Lakes and Grandfather Pond. At Drew Creek, all of the salvage and roadside treatments are in the upper half of the watershed where the stream only has water during the winter months. During the time when salvage activities would occur, this stream is dry and turtles would be expected to occur in the lower section of stream that retains perennial water. Cherry, Cottonwood, Eleanor, and Reed Creeks are at the upper elevation limit of the WPT in streams on the Forest, and potential for occupancy is low. These sites also retain perennial water and turtles would be expected to be streamside when salvage activities would occur. A review of the aerial imagery for Homestead Pond indicates a limited amount of dead timber to the north, west, and south of the pond and a limited amount of equipment operation would likely occur in these areas (greater than 70 percent of available habitat). There is a higher level of activity to the east of the pond, but the estimated volume of timber is relatively low (less than 15,000 board feet) which suggests a fairly low level of logging activity. The most likely type of direct effect to WPT in these watersheds when water is present would be physical disturbance and the duration would be relatively short (less than 4 weeks) at any given location. This limited amount of disturbance would not have an appreciable effect on physical well-being, and the highly mobile turtle can move up- or downstream to avoid the disturbance.

Table 3.03-7 WPT buffer affected in salvage and roadside hazard tree units in Alternative 1

Watershed (5th level HUC)	Stream	WPT Buffer (percent total buffer treated)	
		Salvage Units	Hazard Tree Units
Tuolumne River	Drew Cr.	30 (3%)	89 (9%)
	Jawbone Cr.	701 (22%)	102 (3%)
	Homestead Pond	18 (20%)	0 (0%)
	Three unnamed ponds	27 (10%)	4 (1%)
Middle Fork Tuolumne River	Middle Fork Tuolumne River	2077 (39%)	304 (6%)
	Abernathy Meadow	66 (50%)	6 (5%)
	Grandfather Pond	11 (13%)	2 2%)
	Mud Lake	21 (18%)	0 (0%)
North Fork Tuolumne River	North Fork Tuolumne River	0 (0%)	411 (2%)
	Basin Cr.	0 (0%)	0 (0%)
	Hunter Cr.	0 (0%)	407 (2%)
South Fork Tuolumne River	South Fork Tuolumne River	1373 (21%)	534 (8%)
Cherry Creek	Cherry Cr.	424 (11%)	61 (2%)
	Eleanor Cr.	97 (16%)	0.1 (less than 1%)
	Big Kibbie Pond	86 (88%)	0 (0%)
	Little Kibbie Pond	54 (60%)	2 (2%)
Clavey River	Reed Cr.	443 (49%)	11 (1%)
	Cottonwood Cr.	29 (5%)	24 (5%)
North Fork Merced River	North Fork Merced River	176 (1%)	491 (3%)
	Bull Cr.	35 (less than 1%)	106 (1%)
	Deer Lick Cr.	42 (2%)	109 (5%)
	Moore Cr.	56 (2%)	60 (2%)

For WPT habitat in and along Jawbone Creek and the Middle and South Fork Tuolumne Rivers, salvage operations present a moderate risk of direct effect to the WPT, mainly due to the amount of activity that would occur in the 300-meter buffer. At these locations, turtles may overwinter in the upland from October through April, but logging activity would be unlikely at this time of year due to machinery operational constraints associated with soil compaction risk. During June and July, the WPT could use the uplands for nesting, but the availability of nesting habitat is very limited and restricted to relatively open, herbaceous dominated slopes. These open areas lack salvageable trees and the risk of direct effect is self-mitigating. In the Middle and South Fork Tuolumne Rivers, a majority of the salvage activity would occur in headwater tributaries and along low order streams (first and second order) with heavy pre-fire forest that typically provide low to very low suitable aquatic WPT habitat. The risk is decreased simply based on this low habitat suitability. However, for the main stems of the rivers, salvage logging would occur close to the channel and the potential for physical disturbance is moderate. This disturbance could last up to four weeks at any given salvage unit, but long-term impacts to physical well-being are not expected. For all four locations, the potential for injury or mortality of individuals is low because of the year-long availability of water means the turtle would likely be streamside during operations. The risk increases to moderate in October if logging activities continue late into the year because the turtles move into the upland habitat as the weather gets colder. The level of potential impact at these locations would not be sufficient to affect the long term viability of any existing population.

Abernathy Meadow, Mud Lake, and Grandfather, Big, and Little Kibbie Ponds have the highest potential for direct impact to individuals. At Abernathy Meadow, the turtles move into upland habitats during the summer when the seasonal pond goes dry. Previous radio telemetry tracking of individuals at this location confirms the turtles move into the upland and aestivate until the rainy season fills the pond. Because the turtles could be in the upland during salvage operations, there is a high risk of injury or mortality. The same conditions apply to Big and Little Kibbie Ponds, because these wetlands occasionally go dry (as they were during the Rim Fire) and the WPT would be expected to move into the uplands to aestivate. Because of this consideration, a management requirement was imposed for all action alternatives to prohibit the operation of equipment within a quarter-mile of the ponds and meadow if the features are lacking water. This management requirement helps to limit risk of injury and mortality. Also, equipment operation is prohibited within a quarter-mile from June through July would help to prevent disturbance to nesting turtles.

Grandfather Pond and Mud Lake tend to retain perennial water and the turtles are expected to remain close to the aquatic habitat during the period when salvage operations would occur close to the ponds. Still, some individuals could make overland journeys to and from Birch Lake at Camp Mather or move into the uplands to aestivate. This would pose a risk of injury or mortality during salvage operations. The overall risk to any one individual is considered to be low, but there would be a moderate to high risk of physical disturbance during salvage operations. The consequence would be a short duration (less than 4 weeks) change in behavior where terrestrial basking would be reduced. This would have a minor impact on physiological fitness, but would not be enough to alter a function like reproductive or overwintering fitness. This means a female would produce eggs as in a typical year and the bodily energy reserves entering winter would be sufficient to get individuals through to spring. No long-term consequences to these populations would be expected.

The primary adverse indirect impact to individuals would be sedimentation of stream habitats. As with the FYLF, the degree of impact is related to the extent of activity, particularly activity in close proximity to the aquatic features. The same categorization used for the FYLF applies to the WPT because the deep water features are important elements for both species. The description of impacts to deep water habitat described for the FYLF applies to the WPT and the reader is encouraged to read the FYLF description. Deep water habitats are important to all life stages of the WPT (except hatchlings) for escaping from disturbance (a perceived predation attempt), foraging, and thermal retreat. Sediment that reduces the volume of a deep water habitat by more than 50 percent is considered excessive and degrades habitat suitability from high to low. In larger streams and rivers (examples, Cherry Creek and Middle Fork Tuolumne River), the energy of the water during annual peak flows is enough to maintain extensive areas of high quality, deep water habitat. For hatchling turtles, excess sediment could fill backwater areas that provide high quality suitable habitat for this life stage. If this occurs, some hatchlings may not find sufficient food resources to keep the hatchling alive during the summer or following winter. This impact to habitat could last for 2 to 3 years, a low level impact to a population, because population growth could be decreased for several years. This should not affect the persistence of any population, however.

A secondary indirect effect that could affect the WPT is that salvage operations would remove standing dead trees from around the aquatic feature. This impact could be beneficial and detrimental to the WPT. The detriment is that these trees provide good overwintering and aestivation habitat when they fall. Turtles will dig themselves under the logs, which provide protection from predators and a moister microclimate during aestivation. Salvage logging would reduce the short- and long-term recruitment of LWD and reduce habitat suitability from high to moderate or low. Salvage logging would also potentially provide a benefit to the WPT because the removal of the trees would provide open, sunny habitat conducive to nesting. Pre-fire areas with dense overstory reduced the quality and quantity of nesting habitat, but areas with high vegetation mortality now give the WPT ample nesting habitat. Salvaging the dead material would provide a more open ground surface which would allow nestlings to easily navigate to the water.

Another secondary indirect effect associated with salvage operations is the reduction of LWD in aquatic systems (as noted previously for the FYLF). The habitat associations between LWD and the WPT are clearer because LWD provides high quality basking habitat when accessible from the water. Jennings and Hayes (1994) indicate the amount of basking habitat improves over-all habitat quality; therefore, abundant LWD in a stream would enhance habitat quality. The rate of recruitment of LWD from salvaged areas would be greatly reduced in localized areas. However, recruitment from upstream areas that were burned and unsalvaged should maintain relatively high LWD recruitment rates, and a management requirement is in place to retain five pieces of LWD (the largest trees) per acre for riparian areas in salvage units. The retention of this minimum amount of LWD would be beneficial for streamside habitat. The expected reduction in LWD recruitment rate is expected to have a very long term effect (greater than 150 years) and is related to the time when mature forests are re-established on the landscape.

Road Treatments

Same as FYLF.

Water Sources and Rock Quarries

Water sources used for the road management activities and logging have management requirements that would result in minimal adverse direct and indirect effects to the WPT. Rock pits are not located in WPT habitat, so no direct or indirect effects to the WPT would occur.

Fuels Reduction

The effects of fuels treatments on the WPT aquatic habitats would be the same as for the FYLF. As with the salvage logging, treatments occurring within the buffer established for the WPT would increase the risk of directly impacting individuals occurring in upland habitats. There is a very low risk of injury and mortality in units using hand piling to treat surface fuels. Physical disturbance is the most likely direct impact and there would little to no adverse impact to an individual's well-being. Units with machine piling would increase the risk of direct impact to relatively high levels because the intensity of operations would likely be high, especially in areas with high levels of mortality in small diameter (nonmerchantable) stands. Machine piling would likely occur only in one year and could occur one to five years following the salvage activities. As with the salvaging, low levels of mortality could affect population size for several years and until new individuals enter the population.

Hardhead

As noted earlier, suitable habitat is restricted to the lower reaches of the North Fork Tuolumne and Clavey Rivers and the Tuolumne River to approximately Lumsden Bridge. Because there are very few harvest or roadside units in close proximity to these river sections, there would be no direct effect to hardhead. There is a hazard tree unit along Lumsden Road, but trees would not be felled into the Tuolumne, thereby eliminating the risk of direct effect to any individual.

The indirect effect to hardhead is only related to sediment. Because a very small portion (less than 3 percent) of the North Fork Tuolumne River watershed burned at moderate severity (no high severity soil burn conditions), there would be no observable change to habitat conditions in the lower river. The fine sediment generated in the Hunter Creek watershed would be assimilated by the mainstem of Hunter Creek and then the North Fork Tuolumne above the reach suitable for hardhead. Because the Tuolumne River does not provide suitable breeding habitat for the hardhead (due to regulated streamflow), there would be no indirect impact on spawning habitat suitability. There would be no detectable effect to deep water habitats used by sub-adult and adult fish because the annual peak and base flows in the river are enough to mobilize and redistribute this sediment. There could be localized accumulations of sediment near the mouths of tributary streams that had a high proportion of high and moderate severity fire, but the sediment from all watershed sources would not be sufficient to have much of an effect on pool and deep run habitats.

CUMULATIVE EFFECTS

The primary pathways considered for cumulative effects to the CRLF and SNYLF are (1) the potential risk of directly impacting individuals or their habitats, (2) the risk of increased sedimentation in the habitats, and (3) the reduction of LWD in both aquatic and upland habitats.

Salvage harvest on private lands and livestock grazing were the two types of cumulative effect stressors evaluated for the FYLF, WPT, and hardhead. These two types of actions are considered to have the most detectable influence on aquatic systems, especially in the post-fire environment. The impact of post-fire logging has been discussed earlier in this document and this activity has the highest potential to increase erosion and sedimentation rates in a watershed. Livestock grazing is also discussed because the impact of concentrated livestock use in riparian areas (made more sensitive by moderate and high soil burn severity conditions) may have localized impacts to streambanks and the reestablishment of riparian vegetation.

Livestock grazing as a cumulative stressor will be discussed at a general level, because there is uncertainty regarding Forest Service administration of permits for allotments affected by the fire. Livestock may be excluded, partially or fully, from some allotments within the Rim Fire perimeter in 2014. Assuming the Forest Service allows light levels of grazing in portions of the allotments in 2014, livestock could impact sensitive streambanks through trampling. Streambanks are more sensitive post-fire than in unburned conditions because much of the vegetation has been burned and there is little root holding capacity to resist shearing by hooves. This is especially true in low gradient reaches (less than 2 percent) where alluvial (or depositional) banks dominate. In steeper gradient reaches, the streambanks tend to be more armored by larger diameter substrates (rocks like cobble and boulder) and resistant to bank shear. These localized areas of streambank disturbance may not have much of an effect at larger watershed scales, but they can influence sedimentation at locally important scales. If livestock are allowed to graze portions of the allotments, a small increase in sedimentation would be expected along low gradient reaches with no discernible increase along higher gradient sections. Table 3.03-9 shows the cumulative impact would be unnoticeable for watersheds with limited salvage activity. However, any impact in watersheds with high levels of salvage (greater than 50 percent of watershed or FYLF and WPT buffer, Table 3.03-9) could cumulatively contribute to extensive degradation of aquatic habitat. The duration of this combined reduction in habitat suitability would be two to three years. After this period, hillslope erosion rates would quickly decrease and habitat suitability would increase to moderate levels.

Another impact associated with livestock is the potential impaired recovery of riparian vegetation because poorly managed livestock can severely affect the recovery of obligate woody and herbaceous riparian species. The rapidly regrowing riparian vegetation is always a good food source, but especially late in the season when other forage options may have decreased in palatability. The proximity of this forage to water, another critical resource need for livestock, suggests livestock may congregate in sensitive post-fire riparian areas. Salvage logging does not generally impair riparian recovery if adequate equipment exclusion zones are maintained, so there may be very little cumulative effect to riparian recovery.

California Red-legged Frog

Cumulative actions would affect an additional 7.0 percent of available non-breeding habitat and 8.3 percent of upland habitat. The cumulative actions include emergency fire salvage on private lands and the Rim HT project. Table 3.03-8 depicts additional area of impact these would have to the different habitat types.

As Table 3.03-8 shows, the non-breeding stream habitat associated with four of the breeding habitat areas (Birch and Mud Lakes, Drew Creek, Harden Flat, and Hunter Creek) would have increases in the percentage of disturbance as a result of the cumulative actions. In these four areas, the amount of activity proposed in Alternative 1 is low and cumulatively no substantial increase in the potential effects to the non-breeding habitat is expected. Because of the low likelihood of occupancy, disturbance to individuals from other projects would be unlikely and not cause a measurable effect to individual CRLF. The amount of CRLF upland habitat would increase as a result of the cumulative actions.

Table 3.03-8 CRLF habitat effects including Cumulative Effects

Habitat	Percent of Habitat Affected					
	Alt 1	Alt 1 + CE	Alt 3	Alt 3 + CE	Alt 4	Alt 4 + CE
California red-legged frog						
Birch Lake / Mud Lake (breeding)	0/0	0	0/0	0	0/0	0
Non-Breeding (Per and Int.)	30	35	29	34	29	34
Upland	28	36	28	36	28	36
Drew Creek (breeding)	0	0	0	0	0	0
Miles of Non-Breeding (Per and Int.)	11	25	2	16	2	16
Acres of Upland	10	19	7	17	7	17
Harden Flat (breeding)	0	0	0	0	0	0
Miles of Non-Breeding (Per and Int.)	6	11	6	11	6	11
Acres of Upland	14	32	14	32	14	32
Homestead Pond (breeding)	100	0	71	97	71	97
Miles of Non-Breeding (Per and Int.)	0	5	0	5	0	5
Acres of Upland	9	21	3	15	3	15
Hunter Creek and Ponds (breeding)	0/0	0/5	0/0	0/5	0/0	0/5
Miles of Non-Breeding (Per and Int.)	9	15	9	15	9	15
Acres of Upland	10	16	10	16	10	16

Recruitment of LWD in CRLF upland habitats may be cumulatively affected by salvage and hazard tree reduction actions. Thirty-seven percent of the habitats affected by cumulative actions have proposed plans for salvage operations. The remaining 63 percent of the habitats affected would receive the hazard tree treatments proposed by the Rim HT project. This project proposes to only remove trees deemed hazardous to facilities (i.e., roads, structures, and developed sites). Therefore, potential sources of LWD would be retained at variable densities throughout the Rim HT project area. Despite the potential likelihood for a marked reduction in LWD in the habitats potentially affected by cumulative salvage operations, reductions of LWD within the Rim HT project area would be minor.

Birch and Mud Lakes

The Rim Fire Hazard Tree project would affect approximately 254 acres of upland habitat along two roads (Evergreen Road and 1S02) and the Peach Growers recreational residence tract. Actions along these roads would not additionally impact suitable breeding and non-breeding aquatic habitat or dispersal habitat between the lakes, but hazard tree reduction along these roads would affect an additional 6 percent of the available upland habitat at this location. Cumulatively, 36 percent of the upland habitat would be impacted by salvage or roadside hazard tree harvest. The increase in activity increases the risk of direct impact to individuals because mechanized equipment would be working in more habitat frogs could be in, increases the risk of sedimentation of non-breeding aquatic habitat, and reduces the amount of LWD available for use by the frog. The removal of hazard trees as described in the Rim Fire Hazard Tree EA would contribute to a long-term decrease in LWD on the landscape and would cause a slight decrease in the suitability of the upland habitat relative to cover.

The location of the cumulative actions indicates there is no likelihood that sediment would increase in Mud Lake, and the extensive meadow and lack of defined drainage network suggests that increased sediment delivery would not occur in Birch Lake.

Drew Creek

Within the Drew Creek habitat area there are 11 acres of private land within the Spinning Wheel Emergency Salvage Sale and 369 acres of hazard tree removal from National Forest System lands. None of these actions would directly affect suitable breeding habitat or dispersal habitat, but would affect non-breeding and upland habitats. For the Spinning Wheel sale, this activity is within the Middle Fork Tuolumne River watershed and non-breeding habitat crosses the parcel. This sale would not affect individuals in breeding habitat because it is more than 0.75 mile from Drew Creek. An increase in sediment delivery to the Middle Fork is not likely because the area of the sale is relatively flat (less than 5 percent slope) and sediment transport to the stream should not occur.

Hazard tree removal would occur adjacent to the intermittent section of Drew Creek above the area with suitable breeding habitat and increases in sediment are possible from this activity. This sediment would be additive to the proposed action in this part of the watershed and contribute to impacts to downstream breeding habitat. This sediment should be delivered to the breeding habitat either in the same year as the proposed action or the year before the proposed action. If it occurs with the same year as the proposed action, the expected outcome is a slight reduction in pool volume and fine sediment deposition in other slow water habitats. There would be a slight reduction in tadpole foraging habitat and temporary reduction in refuge habitat found between the streambed substrates. The consequences would be a slight increase in time to metamorphosis for tadpoles and slight increase in predation risk. If the sediment is delivered prior to the actions in Alternative 1, the sediment would have very little impact on habitats within the creek. The sediment would likely be stored in the very low gradient section of stream that traverses the private property at Drew Meadow, making detection of the sediment downstream very difficult. This level of sedimentation would not constitute any level of biological impairment and the habitat suitability would remain unchanged.

Drew Creek is within the Gravel Range livestock allotment. Livestock did not graze in 2014 and it is uncertain whether they will graze the allotment in 2015. Cumulative effects from this activity are uncertain, but could result in slight additions of sediment due to runoff from the extensive network of cattle trailing paths in close proximity to breeding habitat and trampling and chiseling of streambanks as the livestock forage on riparian vegetation and access water.

Harden Flat Ponds

There are no proposed activities on the private land immediately surrounding the ponds. Within the upland area around the ponds, other actions would impact approximately 306 acres of upland habitat. The Manly Emergency Salvage Sale includes 137 acres on the parcel northwest of the breeding habitats, the Sawmill Emergency Salvage Sale includes 29 acres in the northwest corner of the habitat area, and the Rim Fire Hazard Tree action would affect approximately 140 acres of upland habitat. Proposed activities on the Manly parcel is within the watershed of one of the ponds and could contribute sediment to the pond and cause a reduction in pond volume. This sediment would not be cumulative from actions proposed under Alternative 1 because there are no treatment units within this watershed. Sediment from the portion of the Rim Fire Hazard Tree project along Highway 120 would add to sediment in the pond, but is independent of the effects of the actions proposed in Alternative 1. The salvage harvest in the Manly parcel would not reach the Middle Fork Tuolumne River and would not cumulatively add to sediment in the river. The Sawmill Sale could affect a small non-breeding stream, but there would be no cumulative addition of sediment to this habitat because the actions in Alternative 1 would not occur within this watershed. A portion of the Rim Fire Hazard Tree project would occur along the Harden Flat road and is adjacent to the Middle Fork Tuolumne River. Small amounts of sediment could enter the stream from this activity in addition to the actions proposed in

Alternative 1. Cumulatively, there would be some deposition of sediment in slow water habitats, but this amount of sediment would not effectively impair any biological function of the river. The river has deep water habitat the frog needs for refuge.

All three cumulative actions and the actions in Alternative 1 would cumulatively affect 32 percent of the upland habitat available to the frog. This is a relatively high percentage of the upland area and the risk of direct impacts to individual CRLF would be moderate based on this percentage of habitat disturbed. There would also be a long-term reduction in LWD in these areas and upland habitat suitability would have a minor reduction in suitability based solely on the cover provided by the dead logs.

This area is within the Curtin livestock grazing allotment. Most of this analysis area is not grazed by livestock due to the private property and lack of forage along the Middle Fork. The streambanks are well armored by rock and other trampling resistant vegetation (trees). Grazing in close proximity to the Middle Fork may contribute some sediment to the Middle Fork, but the impacts are very minor and do not significantly add to cumulative effects in the river.

Homestead Pond

The Rim Fire Hazard Tree project and livestock grazing on the Meyer-Ferretti allotment were the two cumulative actions affecting aquatic habitat in this analysis area. Livestock did not graze the allotment in 2014 and it is uncertain whether grazing will occur in 2015. In this vicinity, livestock use the pond for watering and the meadow area surrounding the pond provides forage for the cows. There is moderate annual trampling of the shoreline of the pond and some increase in sediment occurs as a result of this action. This action has the potential to impact the volume of the pond over a long period of time (greater than 50 years). Livestock grazing does not occur in the non-breeding aquatic habitat in the Tuolumne River but does affect the headwaters of Moore Creek. The impacts to this tributary would not combine with effects from the proposed action because there would be no activity in this watershed.

The roadside hazard tree removal proposed in the Rim Fire Hazard Tree EA would affect approximately 244 acres of upland habitat in the analysis area. Hazard tree removal would occur in close proximity to the pond under the Hetch Hetchy powerlines and would reduce the availability of LWD in upland habitat near the pond. This action would affect approximately 12 percent of the upland area around the pond and would combine with the actions proposed under this alternative to affect approximately 21 percent of the upland habitat. This level of impact would have very minor impact to upland habitat relative to LWD, and the overall suitability of the habitat to support the frog in upland habitat would not be affected.

Hunter Creek and Ponds

Three actions would occur in this analysis area that have the potential to cumulatively affect the CRLF or its habitats and include the Duckwall Emergency Salvage Sale, the Rim Fire Hazard Tree EA, and livestock grazing on the Hunter Creek Allotment. The Duckwall Emergency Salvage Sale includes 480 private acres (4 percent of upland habitat area) and includes 0.4 miles of breeding stream habitat in section 16, Pond 1, and 1.6 miles of non-breeding habitat. The Rim Fire Hazard Tree EA actions would affect an additional 189 acres of upland habitat and includes 0.1 mile of potential non-breeding aquatic habitat. Salvage activities around Pond 1, the breeding habitat in Hunter Creek, and the non-breeding habitat have the potential to injure or kill any red-legged frogs in the area, and would add cumulatively to the slight possibility of the same effect due to the proposed action within the Hunter Creek watershed.

The salvage and roadside hazard tree removal actions would affect approximately 6 percent of the upland habitat in this analysis area and would combine with the actions proposed under Alternative 1 to affect 15 percent of the upland habitat. The primary anticipated impact is the reduction of LWD which would affect both aquatic and upland habitats. Loss of LWD would occur on 5.1 miles of stream habitat, or 14 percent of the total stream habitat in the area. Salvage operations, and to a lesser degree roadside hazard tree removal, would result in an increased rate of sediment delivery to breeding and non-breeding aquatic habitats. Most of the activity is in the intermittent headwater tributaries and the impacts would be localized, affecting small portions of the tributaries. This sediment would likely not be sufficient to impact the breeding habitat after it has been flushed from the tributaries because it would be well distributed and probably not readily measurable. Sediment would be expected to increase slightly for one to two years, and then be flushed from the system in two to five years.

This analysis area lies entirely within the Hunter Creek grazing allotment. Livestock did graze this allotment in 2014. There are no primary foraging areas adjacent to the stream which effectively limits the extent to which livestock are close to the stream. The livestock do use the breeding and non-breeding aquatic habitats for accessing water and there are localized impacts to streambanks at these access points. Grazing is probably a very minor source of sediment in this stream as determined by stream surveys conducted in the recent past (pre-fire). These surveys indicated very low prevalence of fine sediments in pool and pool tail (slow water) habitats from all sources combined, including livestock grazing and the road system. If patterns of grazing are maintained post-fire, the grazing will continue to contribute very small amounts of sediment to the streams which would combine with other cumulative sources. This sediment should not impair the biological functioning of the creek and suitable habitat for the frog is expected to continue to be available for frogs.

Sierra Nevada Yellow-legged Frog

There would be no cumulative effects to individuals or habitat at the Kibbie Ridge ponds or for Eleanor Creek. These areas are not within an authorized allotment for grazing and there would be no hazard tree reduction as described in the Rim Fire Hazard Tree Project Environmental Assessment. No other actions were identified within these areas that could contribute to cumulative effects.

Implementation of the Rim Fire Hazard Tree Environmental Assessment (Rim Hazard Tree EA) would affect an additional 7.5 acres of SNYLF upland habitat in the Reynolds Creek vicinity. The actions proposed in the Rim Hazard Tree EA would not affect the Middle Fork Tuolumne River area that is suitable for the SNYLF. The anticipated effect would be an additional, very minor increase in sediment delivery to Reynolds Creek and its tributaries near the 3N01 crossing associated with pulling cut logs from near stream habitats. When combined with the sediment expected from project activities, there would be slightly more sediment present in pool and slow water habitats in the intermittent tributaries, but there would be no biological impairment of the habitat. The duration of the combined sediment is expected to be one year following the treatment, acknowledging that activities could occur several years apart. In this case, the sediment would not be additive but would affect aquatic habitat to a lesser degree when compared to the additive condition.

There would also be a localized reduction in LWD supply at the road-stream intersections. The Rim Hazard Tree EA actions would only affect upland habitat in the Reynolds Creek analysis area, affecting an additional four intersections, including 3N01, within the suitable habitat for the frog. The cumulative number of crossings affected by roadside hazard tree removal would be five and would occur in areas with relatively low burn severity. The extent of tree removal is expected to be low and have a minor impact on the supply of trees that could become LWD in upland habitats. These five crossings would affect less than 5 percent of the total upland habitat available in the analysis area. There would be a minor, long term reduction in LWD in upland habitats at road crossings in the vicinity of 3N01.

Reynolds Creek is within two grazing allotments, Rosasco and Upper Hull, and cows were present during 2014. The Middle Fork Tuolumne River SNYLF area is within the Middle Fork grazing allotment. Cows were not turned onto the Middle Fork allotment in 2014. Livestock impacts are expected to occur at Reynolds Creek, but not at the Middle Fork Tuolumne River during 2014. Impacts could occur at both locations in 2015 pending a decision by the forest supervisor.

Livestock grazing in close proximity to streams has the potential to impact streambank stability through trampling and chiseling of the banks by cow hooves. The amount of disturbance to streambanks is generally related to the Availability of forage immediately adjacent to the stream. The elevation range of the Reynolds Creek area indicates the primary forage producing areas are meadows and seeps and springs. A query of the forest's livestock capability spatial layer indicates a very limited occurrence of areas capable of supporting livestock grazing. Further, most of this capable area is shrub dominated and not meadows. Shrub land would be more resistant to the trampling impact from cattle due to the extensive root system that resists erosion. Meadows are much more vulnerable to damage (and subsequent erosion and sedimentation) because the soil particles are much finer and livestock graze there more compared to other capable areas. Meadows only occur adjacent to less than 1 percent of any stream providing suitable habitat in the project area. Overall, the effect of livestock grazing relative to sedimentation is considered to be very minor and is expected to recur on an annual basis.

The minor amount of sediment attributable to grazing would potentially combine with sediment associated with implementation of Alternative 1 and the Rim Fire Hazard Tree EA actions. Combined, the sediment delivered to Reynolds Creek and its tributaries would impact slow water habitats and may be observable as a light dusting of silt in slow water habitats or small pockets of fine sands accruing behind larger stream substrates (cobbles and boulders) and in the slowest velocity areas of pools. This type of sediment impact would not be expected to significantly reduce pool volume or the spaces between streambed substrates where individuals could seek refuge from predation. This type of sedimentation pattern would not impair foraging habitat for tadpoles to the extent that growth and development are impacted.

Livestock grazing could also limit the regrowth of obligate riparian species (e.g., willows, alders, aspen) that were impacted by the fire. If the fire effectively killed the above ground portions of these types of riparian vegetation, the plant responds by sending up new growth from the roots or root crown. These new shoots capitalize on the extensive root system that was developed by the plant by growing rapidly and re-establishing riparian cover in the long term. Cattle do browse this new growth because it is very nutritive, but they tend to preferentially graze these plants late in the season when other upland forage (especially sedges) has lost its nutritional value. If the livestock greatly reduce the amount of regrowing vegetation, the shading and leaf fall provided by these plants would be reduced. The SNYLF can be found in full sun habitats, but a mix of shaded conditions allows the animal to effectively control body temperature while not moving great distances to find a satisfactory resting place. The annual leaf fall by obligate riparian plants also provides a beneficial resource to streams through nutrients dissolved in the water and organic matter added to the stream. Primary productivity, the growth of algae and other biological films forming on streambed substrates, is greatly influenced by the nutrients dissolved from the leaves. These biological films are very important food sources for the frog at the tadpole stage since they are algal grazers. The organic material provided by the leaves is also used by many species of aquatic insects that either ingest portions of the leaves or use the leaves in other ways (for example, caddisfly cases). The adult forms of these aquatic insects are seasonally important food sources for post-metamorphic frogs. Excessive impacts to regrowing riparian vegetation would have moderate impacts on stream shading in the short- to mid-term (3-10 years) and a very minor impact on aquatic insect and primary productivity.

Foothill Yellow-legged Frog

The following cumulative effects discussion is focused on salvage logging (hazard tree and salvaging) on public and private lands. Table 3.03-9 indicates 16 streams would not have cumulative effects attributable to salvage logging or hazard tree removal on public or private lands.

Table 3.03-9 Watershed area and buffers in FYLF and WPT suitable habitat in Alternative 1

Watershed and Stream	Percent FYLF Buffer Affected		Percent Watershed Treated		Percent WPT Buffer Affected	
	Alt1	Alt 1+CE	Alt 1	Alt 1+CE	Alt 1	Alt 1+CE
Tuolumne River Watershed HUC 5						
Alder Cr.	4	4	10	10	--	--
Corral Cr.	36	78	58	72	--	--
Drew Cr.	17	28	12	29	12	27
Grapevine Cr.	11	18	18	23	--	--
Indian Cr.	1	6	2	4	--	--
Jawbone Cr.	15	43	25	75	25	53
Homestead Pond	--	--	--	--	20	49
Middle Fork Tuolumne River Watershed HUC 5						
Middle Fork Tuolumne River[1]	45	57	48	61	44	57
Abernathy Meadow	--	--	--	--	55	55
Grandfather Pond	--	--	--	--	16	35
Mud Lake	--	--	--	--	18	73
North Fork Tuolumne River HUC 5						
North Fork Tuolumne River	0	2	1	6	2	6
Basin Cr.	0	0	1	5	0	less than 0.1
Hunter Cr.	6	14	9	23	8	19
South Fork Tuolumne River HUC 5						
South Fork Tuolumne River[2]	10	34	36	46	30	39
Unnamed ponds near Yosemite Lakes	--	--	--	--	5	8
Cherry Creek HUC 5						
Cherry Creek	18	34	13	35	13	29
Eleanor Cr.	22	22	1	1	16	16
Big Kibbie Pond	--	--	--	--	88	88
Little Kibbie Pond	--	--	--	--	63	63
Granite Cr.	36	78	27	85	--	--
Clavey River HUC 5						
Reed Cr.	50	54	20	34	50	62
Adams Gulch	0	0	18	36	--	--
Bear Springs Cr.	20	31	18	78	--	--
Bull Meadow Cr.	8	21	36	47	--	--
Indian Springs Cr.	25	25	19	29	--	--
Quilty Cr.	0	0	5	73	--	--
Unnamed Tributary 1	8	8	16	16	--	--
Unnamed Tributary 2	0	0	24	24	--	--
Unnamed Tributary 3	46	50	69	78	--	--
Unnamed Tributary 4	13	13	43	43	--	--
Unnamed Tributary 5	37	37	43	45	--	--
Cottonwood Cr.	5	18	31	43	--	--
Russell Cr.	0	0	30	30	--	--
North Fork Merced River HUC 5						
North Fork Merced River	2	2	10	10	4	4
Bull Cr.	less than 0.1	less than 0.1	2	2	1	1
Deer Lick Cr.	7	7	8	8	7	7
Moore Cr.	3	3	4	6	6	7
Scott Cr.	4	4	22	22	--	--

[1] Percentages calculated for the 6th level HUC Lower Middle Fork Tuolumne and not for the 5th level HUC
[2] Percentages calculated for the 6th level Lower South Fork Tuolumne River HUC

Four streams (Grapevine, Hunter, and Indian Creeks and the North Fork Tuolumne River) would have small increases in percentage of buffer treated and percentage of watershed area treated, but the amount would be less than 20 percent and 25 percent, respectively. In these four streams the amount of activity in the FYLF buffers and watershed is considered to be relatively low, and there would be no substantial increase in potential for direct and indirect effect. The primary direct effect would be increased disturbance, but the extent of this effect would not have an observable impact to overall well-being of any individual. Also, a very slight, if discernible, increase in sediment delivery to these streams is expected, but the increase would be very small and would not further impair the suitability of habitat for the frog.

The amount of cumulative disturbance within FYLF buffers at Bull Meadow, Drew and Cherry Creeks would be moderate and not exceed 35 percent of the total buffer in the watershed. At Drew Creek, most of the cumulative increase in disturbance would be in the upper watershed where habitat suitability for the FYLF is very low. There would be no increase in direct effect to the FYLF, but the increased activity in the watershed could deliver additional sediment to the stream. The increased buffer affected for Cherry Creek actually reflects the amount of activity in the Granite Creek subwatershed (discussed later). For Cherry Creek, there would be no discernible increase in direct effect to FYLF from cumulative salvage actions.

Four streams, Cottonwood and Reed Creeks and the Middle and South Fork Tuolumne Rivers, would see moderate to large amounts of FYLF buffer or total watershed area treated. Cottonwood and Reed Creeks are at the upper elevation range of the FYLF on the forest, and the risk of direct effect may be mitigated by their location. The cumulative amount of watershed area treated in both of these watersheds is between 34 and 43 percent. This extent is considered to be enough to potentially increase sedimentation to the point where habitat suitability begins to be impaired. The suitable habitat in both streams is near the confluence with the Clavey and the “pour point” of all disturbances in the watershed. Impacts to habitat would include decreased depth in slow water habitats, extensive sedimentation along the margins of the streams, and reduced availability of hiding refuges. Habitat suitability would be reduced from moderate-high to low-moderate. The increased sediment would be expected to last up to three years. This amount and duration of sediment would not be expected to affect the persistence of a FYLF population. Using the CWE modeling from the Watershed Chapter, the Reed Creek watershed (sixth level HUC) would exceed the TOC from 2014 through 2017, indicating watershed processes could become increasingly unstable during this period. Lesser, lingering watershed effects could continue for up to two years (through 2019) after receding below the TOC.

Cumulative actions in the watersheds of five streams would potentially have significant impacts on habitat suitability. These streams, as shown in Table 3.03-9, are Bear Springs, Clavey Tributary 3, Corral, Granite, and Jawbone Creeks. In these streams, 31 to 78 percent of the FYLF buffer and 72 to 85 percent of the watershed area would be affected by cumulative actions. In these streams, there would be a high risk of direct impacts to individuals and high to very high risk of indirect effects to individuals, populations, and habitat. The amount of buffer treated in these watersheds means extensive equipment operation in close proximity to the streams. While the risk of mortality and injury should remain low due to the flight response of the frog, the potential for physical disturbance is high. Duration of disturbance should be limited to 4 weeks in most locations, but the extent of operations suggests more individuals may be subjected to disturbance. The stress of disturbance may combine with the expected reduction in habitat suitability (less deep water habitat in small streams) and impair individual well-being. The added stress could indirectly lead to increased mortality rates over the first winter, effectively lowering population size.

Habitat suitability would also be significantly reduced from excess sediment and some small stream habitats may be unsuitable for the first year post-logging. Suitability would slowly improve over the next two to three years as the sediment is scoured and transported downstream. The sediment increases may make breeding and tadpole rearing habitats unsuitable in Corral and Jawbone Creeks for up to two years. A loss in reproduction in two or more years would decrease populations and potentially affect the long-term viability of some populations. The two most at-risk populations are in

Corral and Jawbone Creeks because the Tuolumne River likely effectively prevents the travel of individuals between watersheds. Isolated populations have a greater risk of extirpation than well-connected populations (Dunham et al. 2003). Therefore, if one of these isolated populations is extirpated, there is a very low likelihood that it would be recolonized within the next 20 to 50 years. For Bear Springs and Clavey Tributary 3, the potential for re-colonization would have a moderate to high likelihood because the FYLF is well distributed along the Clavey. It should be noted that surveys have not detected FYLF at any of these locations, but occupancy is assumed in these streams.

In support of the indirect effects to these streams, the CWE modeling was used and indicated the Corral and Granite Creek watersheds would exceed the TOC from 2014 to 2018, indicating watershed processes could become increasingly unstable during this period. Lesser, lingering watershed effects could continue for two to three years after receding below the TOC (through 2021). CWE modeling was also completed for the Bear Springs and Jawbone Creek watersheds and the TOC would be exceeded for two years, and relatively high equivalent roaded area (ERA) impacts would continue for three additional years.

Western Pond Turtle

The discussion of cumulative effects to stream habitat for the FYLF applies to the WPT because they use similar habitats. The main difference is that the WPT is less likely to utilize the very small, intermittent streams where sedimentation effects would be the highest. The discussion of direct effects for the FYLF applies to the WPT because actions within the FYLF buffer reflect the amount of activity in close proximity to the streams.

As with the FYLF, there would be very little to no cumulative effect to individuals or habitats for Basin, Bull, Deer Lick, Eleanor, Hunter, and Moore Creeks; the North Fork Merced and Tuolumne Rivers; and the unnamed ponds near Yosemite Lakes. This assessment of potential effect is based on the small (or no) change in amount of buffer affected in Alternative 1 and cumulative actions as shown in Table 3.03-9 and the location of the actions adding cumulatively to the alternative.

Moderate detrimental cumulative impacts would be expected at Cherry and Drew Creeks and the South Fork Tuolumne River and the magnitude of indirect effect (sedimentation) would impact WPT habitat in the following ways. Moderate sedimentation of deep water habitats would be expected in Drew Creek. If the 2005 Tuolumne Fire is used as a comparative example, high levels of sediment would fill small, shallow pools while the larger, deeper pools found in higher gradient areas would maintain most of their volume. Sediment “lenses” would be evident at the lower end of these larger pools, but the deepest part of the pool would be maintained for escape habitat. The shallow edge water required by hatchlings would be maintained in these larger pools, and the intermittent nature of the stream (in sections) would provide this necessary slow water habitat. The cumulative salvage actions would not occur in the reach occupied by the WPT and no cumulative impact to nesting or overwintering habitat would be expected. The South Fork Tuolumne River and Cherry Creek have sections with high gradient and pool abundance. The water energy in annual peak flows and high gradient sections should maintain more than 50 percent of pool habitat at high suitability levels. The remaining pool habitats would have moderate to high suitability for the WPT.

Moderate to high levels of cumulative impact would be expected at the Middle Fork Tuolumne River, Jawbone Creek, and Reed Creek, similar to that described previously for FYLF. The high overall level of activity in WPT buffers (53 to 62 percent of the buffers affected) suggests a moderate to high likelihood that physical disturbance would occur during salvage activities. The risk is greatest during June and July when females move upland to nest. It is possible that females could abandon nesting in the year salvaging would occur, but a long-term impact to population levels is not expected if only one year of recruitment is missed. The risk of injury or mortality is considered to be low at these locations because they maintain water during the period of time when salvage operations would occur (April through October). The risk of injury or mortality becomes moderate in October when night temperatures approach freezing and turtles move into the uplands to overwinter. Equipment operation in the uplands following nesting has a very low chance of impacting nests because the nests are typically located in areas with sparse overhead vegetation. These are areas that would typically not be harvested, but patches of open areas could occur in areas with merchantable timber.

The discussion of sediment related impacts to WPT habitat in these three locations is similar to what is described for the FYLF. Most deep water habitats would see moderate impacts (reduced pool volume), while patches of high suitability habitat would be found in the largest pools and in areas with higher stream gradient.

Table 3.03-9 shows high levels of cumulative disturbance would occur in the WPT buffer areas at Abernathy Meadow (55 percent of buffer affected), Mud Lake (73 percent), Homestead Pond (49 percent), and Big Kibbie (88 percent) and Little Kibbie (63 percent) Ponds. The potential for adverse direct effects, mainly physical disturbance, to occur are high during the period when operations occur in these areas and should last for three weeks, but multiple entries into the buffer would be likely for hazard tree removal and salvage logging. This means two periods of disturbance would likely occur during the first year (2014 to 2015), but the intensity and duration of disturbance should not be enough to affect the long-term well-being of individuals. The risk of injury and mortality would also increase at these locations during the summer when the volume of the ponds decreases by greater than 50 percent. The decreased pond volume could trigger an aestivation response and include the departure from the water to the upland habitats or movement between nearby aquatic habitats. If the timing of salvage operations coincides with this movement period, the risk of injury or mortality would increase to moderate levels. Any further loss of individuals from these four locations could effectively suppress population size for 15 years or more. The presence of mostly adult turtles at these locations suggests the recruitment rate of young turtles is very low.

The extent of salvage logging around these four ponds would also reduce the recruitment of LWD and upland habitat suitability would be reduced. In this case, the temporal bounding for analyzing the cumulative effects of LWD recruitment would extend upwards of 150 years (or more), which is commensurate with the re-establishment of trees with a large diameter.

Minor behavioral changes caused by physical disturbance would be the primary effect to WPT at Grandfather Pond. The moderate level of cumulative action within the buffers at this site (35 percent) suggests a relatively short duration of activities for the 29 acres affected. There is a low potential for increased mortality or injury during late summer, as described above, as the pond size decreases. There would be a low to moderate reduction in habitat suitability in the treated area associated with the reduced LWD recruitment potential.

Hardhead

There should be very little cumulative effect on hardhead habitat in the North Fork Tuolumne, Clavey, and Tuolumne Rivers. Very little watershed area would be affected by cumulative actions and the sediment generated from those actions would not be readily detectable in suitable hardhead habitat. The Clavey and Tuolumne Rivers are so large and have such high capacity to transport and store fine sediment that the deep water habitats would be minimally impacted and deep water refuge would be maintained. The sediments that could accumulate in spawning habitats would not be likely to impair spawning success in the Clavey River. The Tuolumne River is unsuitable for breeding, but offers high suitability habitat for adults and sub-adults, especially in late summer.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

General Effects Common to All Species

Mortality and Injury

No direct effect would be expected under Alternative 2. There would be no potential for mortality, injury, or physical disturbance of any of the three Forest Service Sensitive species created by salvage logging, abating the hazard of dead trees along forest roads, or restoring the road infrastructure.

Physical Disturbance and Modification of Habitat

Because the Forest Service would take no action under this alternative, natural watershed recovery processes would occur. Over time, there would be a gradual reduction in the delivery of sediment to stream channels as fire-resilient plant species recolonize burned areas and the soil-repellent layers break up. Erosion rates for most of the burned area would approach pre-fire rates within 5 or 6 years, but some areas could have elevated rates for up to 10 years. Streamflows would continue to be higher than in the pre-fire condition and some of the mapped intermittent streams could support perennial flow or maintain perennial water in pool habitats for 20 years or more. With the increased streamflow and decreased erosion (and sediment delivery to streams) rates, the silt and sand deposited and stored in the stream channels would be largely scoured from the channels within 5 to 7 years and pre-fire streambed condition would be evident in 10 years.

The recruitment of LWD to the stream would occur at high rates over the next 10 to 20 years and then slowly taper off as the rot-resistant trees (incense cedar and Douglas-fir) gradually fall. The LWD that lands on the floodplain and not in the channel would continue to be available for many decades. The LWD that falls into the streams should eventually benefit the stream by storing sediment generated by the fire and other events for long periods of time (greater than 20 years). Large debris dams store sediment and create pool habitats for many decades (Montgomery et al. 1996). The benefits of LWD will be most important in smaller streams (first to fourth order) and very important in lower gradient sections of streams (Ruediger and Ward 1996). Under this alternative, all sections of stream in the mixed conifer elevations have an unimpaired ability to receive large volumes of LWD. Lower elevation streams (less than 3,000 feet) will primarily recruit LWD from obligate riparian species and oak species.

One important consideration for Alternative 2 regarding the large volumes of LWD potentially recruited to stream channels, is that the LWD could mobilize during very high flows and threaten the road infrastructure. When LWD mobilizes down the channel and encounters a road crossing, the LWD can entrain (capture) other woody debris and sediment, creating a dam and preventing drainage of water and sediment through the culvert. Water could then cross the road surface, be diverted by the road, or cause the crossing to fail. In all three instances, large volumes of road surface and fill could be delivered to the stream channel, with the largest volumes of sediment coming from the failure of the crossing and erosion of the fill.

Stream shading would quickly increase in riparian areas affected by moderate and high vegetation severity fire. The obligate woody riparian species would regrow from stems and root crowns and increase in density via dispersal of seeds along the streams. Over the next 20 years, shading would increase to the point where cool and cold water temperatures would be maintained.

Under Alternative 2, the road system would not receive any treatment to improve drivability and correct drainage problems. Roads can be a primary source of human-caused sediment in forested conditions because they modify drainage networks and accelerate erosional processes (Furniss, et al. 1991). Past surveys of hydrologically connected road segments (HCS) on the forest have indicated considerable connectivity between road runoff and streams. In many cases, relatively uncomplicated techniques can be employed to reduce this road-stream connectivity, including outsloping the road surface, creating water diversion structures (rolling dips), and placing rock on dirt road surfaces. HCSs that deliver large volumes of sediment to streams appear to be relatively uncommon given the very large number of road miles on the forest, but the smaller scale HCS can cumulatively deliver large volumes of sediment. Regular road maintenance can be very effective at reducing sediment from this infrastructure. Alternative 2 would not generate revenue from merchantable timber to improve road function and many years could pass before those funds are made available to implement corrective actions. During this time, road conditions would gradually decline and increasing amounts of sediment could be delivered to streams in the project area.

Roadside hazard trees would be allowed to fall under this alternative limiting ready access to many parts of the fire. Forest Service personnel would not be as capable of conducting storm patrols of the fire area to detect road-related problems such as plugged culverts and gully erosion on the road surface. These potentially undetected problems could increase road crossing failures and extensive erosion of road surfaces, leading to excessive sediment delivery to many stream systems.

California Red-legged Frog

Under this alternative no direct or indirect effects would occur to individuals as a result of project activities. There is a very slight risk of individual being injured or killed by snags (dead trees) falling naturally and directly into aquatic habitats or in suitable upland habitat. Trees falling across roadways, near culverts, or into stream channels causing unwanted sedimentation or undesirable changes in channel morphology could slightly reduce habitat quality. Sedimentation risk may be higher in aquatic habitats surrounded by areas that sustained high vegetation burn severity where ground cover capable of reducing soil run-off is lacking. LWD recruitment rates would be very high in areas that sustained high vegetation burn severity fire.

Sierra Nevada Yellow-legged Frog

Same as CRLF.

Foothill Yellow-legged Frog

The main impacts to FYLF habitat would come from increased sediment delivery to streams, increased streamflow, and reduced stream shading. For the streams shown in Table 3.03-4 categorized as “low watershed response”, very little change in habitat is expected, particularly at the location of breeding sites. Minor sedimentation will occur in the headwater tributaries affected by the fire, but that sediment will be dispersed downstream to the point where it will be undetectable at the breeding site. Some of the stream segments affected by fire provide suitable dispersal habitat for adult and sub-adult FYLF, but the volume of deep water habitats should be adequately maintained, and the reduction in stream shade should have little effect on frog.

Streams categorized as “moderate watershed response” will see moderate to major adverse impact to the small order streams (first and second order or headwaters) affected by fire. Deep water habitats may be extensively filled in dispersal habitats and there could be minor to moderate sedimentation in suitable breeding habitats. In some small tributaries affected by high severity fire, some deep water habitats may be unsuitable for individual frogs and they may have to move up- or downstream to suitable non-breeding aquatic habitat. The increase in sediment at breeding sites will likely have a minor impact to the suitability of the breeding habitat and reproduction should still occur. However, increased sediment in shallow water habitats used by tadpoles may see a reduction in suitability as the spaces between larger substrates are filled. The lack of hiding refuge may increase predation for the breeding season following the fire, but habitat suitability should be restored in the third or fourth breeding season post-fire. Stream shading was substantially reduced at a watershed scale (greater than 50 percent), though patches of shade remain. There could be slight increases in water temperatures, but these would be within the known tolerance range of the frog.

For streams and watersheds in the high watershed response category, major impacts to habitat have occurred or will occur this precipitation year. Excess sediment is likely to fill many of the deep water habitats to the point where they do not provide adequate refuge for frogs. This situation may not hold true for high gradient sections of stream where the water's energy has enough force to keep some deep pool habitat intact. There may be more individuals concentrated around the remaining pools, which would likely increase competition and territoriality between individuals. The increased interaction between individuals could increase stress levels and reduce physical well-being. In streams like Bull Meadow Creek, the sediment may be enough to inundate breeding habitat and preclude breeding in 2014. Streams in this category will also see extensive decreases in water depth in shallow water habitats, potentially enough to exclude extensive use of those habitats.

The environmental outcomes for this alternative range from major habitat alterations in very small streams to no discernible impact in the larger rivers. The biggest impacts to habitat would be expected to occur in the five Clavey River tributaries and Alder, Bear Springs, Bull Meadow, Corral, Drew, Granite, Indian, Indian Springs, Jawbone, and Quilty Creeks. Moderate localized to minor overall alterations in habitat would be expected to occur in Adams, Cherry, Grapevine, Hunter, Reed, and Russell Creeks, and the Middle and South Fork Tuolumne Rivers. Minimal impacts to habitat would be expected to occur in Basin, Bull, Cottonwood, Deer Lick, Eleanor, Hunter, Moore, and Scott Creeks, and the North Fork Tuolumne and Merced Rivers.

Western Pond Turtle

Much of the discussion for the FYLF applies to the WPT for post-fire watershed response. There would be no risk of direct effect to individuals under this alternative. The post-fire erosion and sediment outcomes discussed for the FYLF apply to the WPT in that small streams with a high post-fire watershed response would see major impacts to the deep water habitats preferred by the turtle. In larger streams, the period of annual peak streamflow would have sufficient energy to maintain high suitability deep water habitats created by scour.

The primary difference for Alternative 2 relates to recruitment rate of LWD into suitable aquatic habitats. The recruitment rate would not be decreased due to salvage harvest and trees would be left to fall naturally. As noted previously, habitat suitability may be positively influenced by the increased abundance of basking sites (Jennings and Hayes 1994). More LWD would be recruited to all channels. The biggest increase in habitat suitability would likely occur in the larger streams and rivers like the Middle and South Fork Tuolumne Rivers.

The discussion of LWD recruitment also needs to include seasonal and perennial ponds and lakes at Abernathy Meadow, Big and Little Kibbie Ponds, Grandfather Pond, and Mud Lake. No trees would be harvested adjacent to lower quality roads or from salvage units surrounding these aquatic features leaving trees available for WPT use as they fall. As noted previously, the turtle will burrow under these objects in the upland to protect themselves from predators and weather elements. The unimpaired rate of recruitment of LWD would improve habitat suitability in the uplands surrounding the aquatic features. The environmental outcomes under this alternative would follow natural post-fire processes and WPT populations would be maintained.

Hardhead

No direct or detectable indirect effect to hardhead individuals, populations, or habitat would result from Alternative 2. At the scale of the lower Clavey, Tuolumne, and lower North Fork Tuolumne Rivers, the amount of post-fire sediment would not be enough to impair the suitability of the important habitat elements (deep pool, shallow edge water, and spawning habitats) in any of these locations.

CUMULATIVE EFFECTS

No direct effects would result from the implementation of this alternative. The indirect effects described above focus on sedimentation of aquatic habitats and LWD recruitment. Increased sediment would be expected from the road system if maintenance and restoration actions are not taken and LWD recruitment rates would remain very high in areas that sustained moderate and high vegetation severity fire conditions.

California Red-legged Frog

Table 3.03-8 shows no cumulative effects to individuals or their habitats would be expected to occur in the breeding habitats at Birch Lake, Drew Creek, Harden Flat Ponds 1 and 2, Homestead Pond, Hunter Creek, or Hunter Creek Ponds 2 through 5, because no federal actions associated with this EIS or private actions would occur there. Very little or no cumulative impact to individuals or their habitats would be expected to occur at Mud Lake or Hunter Creek Pond 1 because no other federal or private actions would occur there.

Cumulative actions would affect only a small proportion (less than 14 percent) of the non-breeding aquatic habitats associated with each CRLF breeding habitat (Birch and Mud Lake, Drew Creek, Harden Flat Ponds 1 and 2, Hunter Creek, and Hunter Creek Ponds 1 through 5). In these habitats there could be localized impacts to the habitats including destruction, increases in sedimentation, and loss of LWD recruitment, but the small cumulative percentage of habitat affected would not affect the overall habitat suitability in these habitats.

Table 3.03-8 shows cumulative actions would affect only a small to moderate proportion (6 percent to 18 percent) of the upland habitat associated with each CRLF breeding habitats (Birch and Mud Lakes, Drew Creek, Harden Flat Ponds 1 and 2, Hunter Creek, and Hunter Creek Ponds 1 through 5). This amount of activity is considered to be so low there would be no increase in the potential for direct effects. The primary direct effects that could occur in the areas where treatments overlap with the upland habitat would include an increase in individual behavioral disturbance and a reduction in LWD. The extent of these effects, however, would not be expected to cause an impact to the overall well-being of any individual CRLF, and only a slight reduction in amount of cover opportunities for CLRF in the form of LWD in the areas affected. Habitat suitability would not be expected to be impacted by this level of disturbance.

There would be no cumulative disturbances leading to increased sedimentation in the watersheds associated with the suitable breeding habitats at Birch Lake, Mud Lake, Harden Flat Pond 2, or Hunter Creek Ponds 3 through 5. In the Drew Creek watershed this activity could cause additional sediment to be transported to the stream because a large majority of the vegetation in the watershed burned at moderate to high severity (i.e. 73 percent, Table 3.03-1). As discussed earlier, sediment transport is more likely in areas where vegetation burned at moderate to high severities. In the Harden Flat Pond 1 watershed, there would be a low risk of increased sedimentation in the pond, because the area surrounding the pond is relatively flat and remained primarily unburned. Despite a moderate level of disturbance in the Homestead Pond watershed, no additional sedimentation would be expected at this site, because the amount of sediment generated by the cumulative action occurring there (i.e. Rim Fire HT project) would be minimal there would be no cumulative impact. In the Hunter Creek Watershed, most of the cumulative actions associated with emergency fire salvage on private lands would occur outside of suitable habitat (i.e. at greater than 4,000 feet in elevation). The other cumulative actions in the watershed would occur as a result of the Rim Fire HT project. Although, these activities could cause increased sedimentation in the stream, because only 14 percent of the watershed would be affected, the amount of sedimentation generated would be expected to be low and would not result in a change in habitat suitability.

The amount of cumulative disturbance within the watersheds associated with the suitable breeding habitats at Hunter Creek Ponds 1 and 2 would be high, at 81 percent and 68 percent, respectively.

Since the watersheds of these two ponds overlap, the risk of that additional sediment would be delivered to the ponds as a result of the emergency fire salvage planned to occur there is similar for both ponds. It is possible these ponds habitat suitability would be affected by increases in sedimentation caused by the emergency fire salvage because the design criteria for this salvage are unknown at this location. Protective measures to mitigate the risk of runoff from ground disturbance may not exist. Therefore, these habitats may be at risk.

Sierra Nevada Yellow-legged Frog

If Alternative 2 is implemented, there would be no direct or indirect impacts to individuals or habitats at Reynolds Creek, Big and Little Kibbie Ponds, Eleanor Creek, or the Middle Fork Tuolumne River. As such, there would be no cumulative impacts when added to other actions potentially impacting the species at this location. As described in the cumulative effects section under Alternative 1, the Rim Hazard Tree EA would affect Reynolds Creek, but not the other three locations. Grazing would occur within the Reynolds Creek and Middle Fork Tuolumne River watersheds and would act as potential impact source at these locations.

Foothill Yellow-legged Frog

Using Table 3.03-9, the cumulative actions within each watershed can be derived for other actions on public and private lands. Very little or no cumulative effects would be expected in the following watersheds because there would be no other federal or private actions: Adams, Alder, Basin, Bull, Deer Lick, Eleanor, Indian Springs, Moore, and Russell Creeks, Clavey Tributaries 1, 2, 4, and 5, and the North Fork Merced River. Increased sedimentation from other salvage operations would not occur and LWD recruitment potential would coincide with the existing condition.

Minor to no discernible cumulative effect would be expected from the following watersheds because the other private or federal actions would only affect a very small percentage (less than 15 percent) of the FYLF buffer in the watershed or total watershed area: Bull Meadow, Cottonwood, Grapevine, Hunter, Indian, Indian Springs, and Reed Creeks, Clavey Tributary 3, and the Middle, North, and South Fork Tuolumne Rivers. In these streams, there would be localized increases in sedimentation, but the small cumulative percentage of FYLF buffer and watershed affected would not be sufficient to impair any biological function in the streams. FYLF habitat suitability would remain in the moderate suitability category until post-fire sediment is flushed from the systems (1 to 2 years) and relatively unimpaired habitat suitability would recover after 2 years.

There would be minor to moderate localized effects to aquatic habitats in the following locations: Bear Springs, Cherry, Corral, Drew, Jawbone, and Quilty Creeks. At these sites, the percentage of FYLF buffer affected ranges from 0 to 42 percent and the percentage of watershed area affected ranges from 14 to 60 percent. Relatively minor changes would be expected in Cherry and Drew Creeks, but the remaining streams could have moderate reductions in habitat suitability, compared to a pre-fire condition, in extensive areas of the watershed. The increases in sedimentation could affect breeding and rearing success in Jawbone and Corral Creeks for up to two years. Adult and sub-adult habitats should not be significantly compromised by sediment because high energy pools and sections of steep stream gradient should maintain good pool depth for refuge habitat. Bear Springs and Quilty Creeks likely serve as dispersal habitats for frogs breeding in the Clavey River. In these streams, slow water habitats, especially in low gradient headwater streams, could have low suitability for up to two years, but larger stream sections with higher gradient should maintain moderate to high suitability, deep water habitats.

Suitable habitats in the Clavey and Tuolumne River would not be measurably affected by cumulative impacts. These river systems are so large that the increases in sediment from all sources, including post-fire runoff, would not be sufficient to cause a reduction in suitability of habitat for any life stage or impair any biological function associated with the frog (e.g., algal growth (tadpole food) during the summer baseflow period).

Western Pond Turtle

The following locations would not have cumulative effects because there would be no risk of direct effect, a very low risk indirect effect (discountable effect on individuals and habitat), and no other federal or private action: Basin, Big Creek, Bull, Deer Lick, Eleanor, Moore, and the North Fork Merced and Tuolumne Rivers, Big Kibbie Pond, Little Kibbie Pond, and the three unnamed ponds near Yosemite Lakes Campground.

Very minor to no discernible effect to individuals would occur at the following locations: Cherry, Drew, and Hunter Creeks, and the Middle and South Fork Tuolumne Rivers. Other federal or private actions would affect up to 16 percent of the WPT buffer in these streams which would correlate to a low risk of direct impact, primarily physical disturbance. Localized areas of increased sedimentation would be apparent, but deep pool habitats would retain moderate to high suitability for the turtle. Shallow water habitats used by hatchlings should see minor reductions in suitability, but the habitat should meet the growth and development needs of the turtle.

Moderate levels of cumulative effect would be apparent at the following locations: Jawbone Creek, Grandfather and Homestead Ponds, Mud Lake, and Abernathy Meadow. For Jawbone Creek, the most apparent indirect impact would be increased sedimentation because 50 percent of the watershed would be treated and 27 percent of the buffer would be treated. Deep water habitats would have minor to moderate reductions in volume, but the gradient and stream flow increases should maintain high quality pool habitat along most of the stream. The risk of direct effect is relatively low because the majority of the WPT buffer affected is in small tributary streams that provide low suitability habitat for the turtle. As for the ponds and meadow, between 20 and 55 percent of the buffer area would be treated by other private and federal actions. Mud Lake would be affected the most with over half of the buffer treated. At this location, the risk of physical disturbance is moderate and the risk of injury or mortality is relatively low. Operations would likely occur over a three to four week period and could occur when turtles are moving into the upland if the lake volume is reduced by 50 percent or more or if salvage activities occur into October when the turtles move into the upland. The potential recruitment of LWD would be reduced on the 63 acres treated, resulting in a habitat suitability reduction from just above moderate to just below moderate. For Homestead Pond, Grandfather Pond and Abernathy Meadow, more than 68 percent of the upland habitat would be unaffected by any action. There would be a low risk of physical disturbance because operations would only last a week or two at each location (16 to 42 treatment acres). Habitat suitability relative to LWD recruitment would be maintained in most of the upland area around each habitat.

Hardhead

There would be no cumulative effects to hardhead and habitat suitability would be maintained at high levels for all streams providing suitable habitat.

Alternative 3

DIRECT AND INDIRECT EFFECTS

The direct and indirect effects of Alternative 3 are similar to those described in Alternative 1. Differences only exist in the quantity of breeding, non-breeding and upland habitats affected and the relative risk project activities may have on them. Those differences and how they may affect the relative risk to individual CRLF and their habitats are discussed further.

California Red-legged Frog

Birch and Mud Lakes

There are no activities proposed in the immediate vicinity (within 500 feet) of Birch or Mud Lake and all proposed activities occur downstream and/or downslope of the breeding habitat. There is no risk of injury or disturbance at the breeding habitat. There is no risk of increased sediment reaching the ponds due to project activities, or in reduced shading and an associated increase in temperature. The habitat suitability of the ponds will remain low post-implementation.

There are 2.1 miles of non-breeding habitat within proposed salvage and fuels treatment units out of 7.4 miles in the habitat area (29 percent). Of this, 0.6 miles of the non-breeding habitat also falls within a proposed watershed sensitive area treatment. The non-breeding habitat in the Tuolumne River – Poopenaut Valley watershed (north half of habitat area) only has proposed treatment at the headwaters of the stream. Proposed treatments immediately adjacent to the non-breeding habitat include drop and lop treatment in a watershed sensitive area (WSA) to increase ground cover and reduce erosion. Most of the non-breeding aquatic habitat in the Lower Middle Fork Tuolumne River and Upper Middle Fork Tuolumne River watershed is within proposed salvage harvest. There is a 72 acre drop and lop WSA treatment in the Lower Middle Fork Tuolumne River along the intermittent outlet stream from Birch Lake specifically delineated to increase coarse cover for California red-legged frog and reduce erosion. WEPP modeling does not show a change in post-implementation erosion in the Tuolumne River – Poopenaut Valley or Upper Middle Fork Tuolumne River watersheds. Although no change is shown it is likely that implementation activities will result in some erosion and there will be some sediment delivery to the stream. The amount is not detectable above the background of the predicted fire erosion. The Lower Middle Fork Tuolumne watershed modelling indicates erosion will be reduced from 2.8 tons per acre post fire to 2.4 tons per acre post-implementation. This is in large part due to the proposed WSA treatments within the greater watershed area. Despite the predicted decrease in erosion, some sediment is still likely to enter the non-breeding aquatic habitat due to salvage, hazard tree and fuel reduction treatments.

Removal of salvage will not affect stream shading in this area as dead trees provide little shade. LWD recruitment will be reduced along the non-breeding habitat in the Lower Middle Fork Tuolumne River and Upper Middle Fork Tuolumne River. The MRs maintain 5 standing trees per acre within the Riparian Conservation Areas (RCAs) of perennial streams as recruitment for downed wood. Existing downed wood crossing or within 30 feet of a stream will be retained. There are no planned water sources within this habitat area. Roadside Hazard Tree Removal and road treatments in this area do not occur near aquatic habitat.

Twenty-seven percent of the upland habitat is proposed for harvest and roadside salvage treatment, and 24 percent of the upland habitat with salvage treatment will also have fuels treatment. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. There are no activities proposed within the dispersal habitat between Birch and Mud Lakes.

Drew Creek

The breeding habitat along Drew Creek is not included within any proposed salvage units, or within hazard tree removal areas. There is no risk of disturbance or injury at the breeding habitat. Adjacent to the breeding habitat there is planned roadside hazard tree removal that comes close to the breeding habitat in two locations. Reduction in stream shading below that caused by the fire is not anticipated, and therefore no increase in temperature is expected.

A total of 10.3 miles of non-breeding stream habitat is within the Drew Creek habitat area. There are 0.16 miles of non-breeding habitat in the Lower Middle Fork Tuolumne River watershed within proposed salvage units and 0.05 miles within roadside hazard tree removal units (total of 2 percent) in the Tuolumne River – Jawbone Creek watershed. WEPP modeling indicates erosion will be reduced from 2.8 tons per acre post fire to 2.4 tons per acre post-implementation in Lower Middle Fork Tuolumne River watershed and from 3.6 to 3.3 tons per acre in the Tuolumne River – Jawbone Creek watershed. This is a decrease in sediment delivery from Alternative 1 and the no action alternative. Even with the predicted decreased due to project implementation it is likely that implementation activities will result in some erosion and there will be some sediment delivery to the streams. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams and in many areas LWD will not be altered. The area along Lumsden Road where roadside hazard trees will be removed will have LWD maintained as described above. There is one proposed water source in the Drew Creek habitat area. It is a water trough/tank located in Section 21 south of Drew Creek and south of the proposed roadside hazard tree removal. This trough does not currently have any red-legged frog populations in it. Lumsden Road crosses the Tuolumne River within this habitat area at Lumsden Bridge. Road treatments are planned across this non-breeding habitat. Some sediment may enter the stream from the road treatments and may continue for one to two years. However, road treatments are designed to reduce hydrologically connected roads segments and any increased sediment will decrease after two years.

Seven percent of the upland habitat is proposed for harvest and roadside salvage treatment, with 1 percent of the upland habitat also receiving fuels treatments. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. Dispersal in the habitat occurs along Drew Creek and proposed activities will have no effect on the existing habitat.

Harden Flat Ponds

The breeding habitat within this habitat area is on private property and is not included within any proposed salvage units, or within hazard tree removal areas. There is no risk of disturbance or injury at the breeding habitat. Breeding habitat will maintain low suitability for red-legged frogs in this area.

There are 0.36 miles of non-breeding habitat in the Lower South Fork Tuolumne River watershed and in the Lower Middle Fork Tuolumne River watershed within salvage and roadside hazard tree treatment units. WEPP modeling indicates erosion will be reduced from 2.8 to 2.4 tons per acre in the Lower Middle Fork Tuolumne River watershed post-implementation, and from 3.1 to 2.8 tons per acre in the Lower South Fork Tuolumne River watershed. Even with the predicted decrease post implementation it is likely that implementation activities will result in some erosion and there will be some sediment delivery to the streams. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams. Of the 6.4 miles of non-breeding habitat, only 0.36 miles (6 percent) will have trees removed. MRs will maintain some standing trees to provide for LWD recruitment. There are no proposed water sources in this area. None of the proposed road treatments cross stream habitat (they are not hydrologically connected) and it is unlikely sediment from road treatments will reach the streams.

Thirteen percent of the upland habitat is proposed for harvest and roadside salvage treatment, with 10 percent also proposed for fuel treatment. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. Dispersal habitat is on the private property and will not be impacted by this action.

Homestead Pond

Homestead Pond is within a proposed salvage harvest. The harvest unit is limited to the north and east sides of the pond and is reduced in size to 15.1 acres from Alternative 1. There would be a high risk of injury or mortality to breeding red-legged frogs in this pond during project activities. However, the pond does not currently support red-legged frogs. Reduction in stream shading below that caused by the fire is not anticipated, and therefore no increase in temperature is expected. The pond and salvage unit are on flat ground, therefore sediment is not expected to move into the pond in great quantities. However, some sedimentation is anticipated.

There are 4.8 miles of non-breeding stream habitat within the Homestead Pond habitat area. There is no proposed roadside hazard tree removal in this habitat area under Alternative 3. Only the north half of the habitat area is within the Rim Fire, in the Grapevine Creek-Tuolumne River watershed. WEPP modeling indicates erosion will be reduced from 2.0 tons per acre post fire to 1.9 tons per acre post-implementation. Even with the predicted decreased due to project implementation it is likely that implementation activities will result in some erosion and there will be some sediment delivery to the non-breeding habitat. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams and in most of the area LWD will not be altered. There are no proposed water sources in the Homestead Pond habitat area. One road in the project area crosses the non-breeding habitat provided by the Hetch Hetchy ditch feature. Because the road may be hydrologically connected to the non-breeding habitat, some sediment may enter the stream from the road treatments and may continue for one to two years. These road treatments are designed to reduce hydrologically connected roads segments and any increased sediment will decrease after two years.

Three percent of the upland habitat is proposed for harvest and roadside salvage treatment, with one percent of the habitat proposed for fuels treatment in the harvested units. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. There is no dispersal habitat in this habitat area.

Hunter Creek and Ponds

There are no salvage activities proposed within the Hunter Creek and Ponds habitat area. Hazard Tree Removal is proposed near the Hunter Creek breeding habitat in Section 17 (near Skidmore Pit). There is a slight risk of injury or mortality at this location; however this is mitigated by the management requirement to fell trees away from the stream. There will be no reduction in shading at breeding habitats (stream or pond) below that caused by the fire; therefore temperature will not be altered by this project. The proposed hazard tree removal and road treatments in Section 17 may result in a minor amount of additional sediment input into Hunter Creek due to the proximity to the creek. This additional input may last one to two years, and then will be reduced.

There are 26.8 miles of non-breeding stream habitat within this habitat area. There are 3.1 miles (12 percent) of non-breeding habitat within proposed roadside hazard tree removal units. The majority of non-breeding habitat consists of tributaries to Hunter Creek in the Lower North Fork Tuolumne River watershed and most was not burned in the Rim Fire. The non-breeding habitat within the Tuolumne River – Grapevine Creek watershed was burned. WEPP modeling indicates erosion will be slightly reduced from 2.0 tons per acre post fire to 1.9 tons per acres post-implementation in this watershed. Even with the predicted decreased due to project implementation it is likely that implementation activities will result in some erosion and there will be some sediment delivery to the streams. The amount is not detectable above the background of the predicted fire erosion.

The proposed activities will not alter stream shading. There is very little activity proposed in this habitat area adjacent to streams and in most of the area LWD will not be altered. There are five proposed water sources in the Hunter Creek and Ponds habitat area; one water trough/tank that is not known to contain red-legged frogs, one site at the junction of Hunter Creek and Buchanan Road in breeding habitat, and three sites in non-breeding habitat along Forest Service roads 1N01, 1N27 and 1N35. Drafting in the latter four locations has the potential to entrain tadpole or smaller California red-legged frogs of they are present during activities, and can also result in disturbance in the area. There are several roads in the area that cross non-breeding habitat that provide some hydrologic connectivity. Some sediment may enter the streams from the road treatments and may continue for one to two years. These road treatments are designed to reduce hydrologically connected roads segments and any increased sediment will decrease after two years.

Ten percent of the upland habitat is proposed for roadside salvage and fuel treatment. These activities can further decrease cover from the effects of the fire, and can set back vegetative regrowth by one to two years. However, only a little more than half of the upland habitat was within the fire and experienced changes. If any California red-legged frogs are in the upland habitat at the time of activities, they would be at risk for disturbance or injury. The dispersal habitat along Hunter Creek would not be altered by the proposed activities.

Sierra Nevada Yellow-legged Frog

Effects to Individuals

The actions proposed for Alternative 1 are the same under Alternative 3 and the analysis provided for Alternative 1 applies to this alternative.

Effects to Habitats

The actions proposed for Alternative 1 are the same under Alternative 3 and the analysis provided for Alternative 1 applies to this alternative.

Foothill Yellow-legged Frog

The potential for direct and indirect effects for Alternative 3 are largely the same as those in Alternative 1. Table 3.03-10 indicates the extent to which salvage and roadside hazard abatement would affect the amount of buffer and overall area of each watershed. Table 3.03-10 also shows the number of miles of road treatment by activity type for Alternative 3. Comparing Table 3.03-10 to Table 3.03-6, there are no differences between salvage treatments (hazard tree and salvage units) between Alternatives 1 and 3. These watersheds include North Fork Merced and Tuolumne Rivers and Basin, Clavey Tributaries 1, 2, 3 and 5, Deer Lick, Grapevine, Hunter, Indian, Indian Springs, Quilty, Moore, Russell, and Scott Creeks. Direct and indirect effects described in Alternative 1 directly apply to these watersheds for Alternative 3.

There are very minor differences (less than 10 percent and mainly decreases) in either amount of salvage treatment in buffer areas or percentage of watershed area in the following watersheds: Adams, Bear Springs, Bull, Cherry, Clavey River Tributary 4, Cottonwood, Drew, Eleanor, Granite, and Reed Creeks, and the Middle and South Fork Tuolumne Rivers. The small differences between the amounts of area treated by salvage activities would not be discernible between Alternatives 1 and 3. The sediment modeling reflects little or no change in sediment delivery for these watersheds.

The following watersheds would see increases in activity from Alternative 1 to Alternative 3: Alder, Corral, and Jawbone Creeks. In Alder Creek, the amount of treatment in FYLF buffer areas increases from 0 (Alternative 1) to 34 acres and the percentage of watershed treated increases from 10 (Alternative 1) to 45 percent. This alternative includes unit L204, a forage unit in critical winter deer range, where dead trees would be removed as biomass. A review of the aerial imagery indicates widely scattered small, dead pines. The amount of disturbance created by equipment in this unit would be limited greatly (spatially) and there should be no discernible changes in sediment delivery to suitable habitat located downstream of the treatment unit.

A similar situation exists in Corral Creek where the amount of treatment in FYLF buffers increases from 81 (Alternative 1) to 106 acres (Alternative 3) and the percentage of watershed treated increases from 58 percent to 78 percent, between Alternatives 1 and 3, respectively, in critical winter deer range. The increased amount of disturbance created by additional equipment operation would increase the amount of sediment delivered to Corral Creek, especially in the lower third of the watershed. The additional sediment would slightly diminish suitability of FYLF aquatic habitat in the first year following treatment, but the steep gradient would likely transport the sediment out and to the Tuolumne River in the subsequent year.

Table 3.03-10 Watershed area, buffers and road treatments in FYLF suitable habitat in Alternative 3

Watershed (5th level HUC)	Stream	Percent FYLF Watershed Area Treated	FYLF Buffer Affected (acres)			Road Treatments (miles)			
			Hazard Tree	Salvage	Percent of total	Reconstruct	Maintain	New	Temp
Tuolumne River	Tuolumne River								
	Alder Cr.	45	0	34	30	3.2	0.2	0	0
	Corral Cr.	78	0	106	46	18.9	0	0	2.5
	Drew Cr.	12	12	0.4	11	1.9	3.6	0	0.6
	Grapevine Cr.	18	29	0	11	0.7	17.4	0	0
	Indian Cr.	2	1	0	less than 1	0	2.2	0	0
	Jawbone Cr.	27	5	81	25	18.6	7.3	0	5.3
Middle Fork Tuolumne River	Middle Fork Tuolumne River	17	22	255	46	57.2	12.5	0	11.9
North Fork Tuolumne River	North Fork Tuolumne River	2	0	0	0	0.4	22.7	0	0
	Basin Cr.	1	0	0	0	0.4	2.1	0	0
	Hunter Cr.	9	0	0	0	0	19.9	0	0
South Fork Tuolumne River	South Fork Tuolumne River	38	29	144	24	75.5	27.3	0	4
Cherry Creek	Cherry Cr.	13	6	36	9	29.3	9.9	0	1.6
	Eleanor Cr.	1	0	12	22	2.5	0	0	0.5
	Granite Cr.	21	0.2	36	25	12.4	1.1	0	0.1
Clavey River	Clavey River								
	Reed Cr.	20	1	49	49	18.2	24.7	0	2.1
	Adams Gulch	15	0	0	0	1.2	1.8	0	0
	Bear Springs Cr.	18	9	0.1	20	10	0.7	0	0
	Bull Meadow Cr.	36	0	36	50	4.0	0.4	0	0.8
	Indian Springs Cr.	19	3	2	25	1.4	0.1	0	0
	Quilty Cr.	5	0	0	0	0.1	1.1	0	0
	Unnamed Trib 1	16	3	0	8	0	2.9	0	0
	Unnamed Trib 2	24	0	0	0	0	2.5	0	0
	Unnamed Trib 3	69	0	26	46	0.8	10.3	0	0
	Unnamed Trib 4	48	2	1	13	3	0.7	0	0
	Unnamed Trib5	43	7	8	37	2.2	2.7	0	0
	Cottonwood Cr.	31	0	3	5	19.1	8.8	0	0.1
	Russell Cr.	30	0	0	0	0.9	2.3	0	0
North Fork Merced River	North Fork Merced River	2	22	18	less than 0.1	12.3	11.2	0	0.2
	Bull Cr.	2	5	0	less than 0.1	3.95	2	0	0.5
	Deer Lick Cr.	8	4	13	7	3.4	2.3	0	0.2
	Moore Cr.	4	5	5	3	2	3.8	0	1
	Scott Cr.	22	2	0	8	3.6	3.4	0	0

The percentage of FYLF buffer affected by salvage logging in Jawbone Creek would increase from 13 percent in Alternative 1 to 24 percent in Alternative 3, but the total watershed area treated would decrease from 25 percent (Alternative 1) to 15 percent under Alternative 3. The increased activity in FYLF buffers would occur in the lower fourth of the watershed, and there would be a slight increase in sediment delivered to Jawbone Creek from the additional treatment units. This increase would slightly decrease aquatic habitat suitability for the FYLF because deep water refuge habitats would be reduced. The duration of effect would remain the same between alternatives because the steep gradient of the creek in this part of the watershed would effectively transport out the sediment.

For the Tuolumne and Clavey Rivers, there would be no discernible difference in impact to aquatic and riparian habitats between Alternatives 1 and 3 because the amount of sediment predicted for both alternatives is very similar (at this large watershed scale) and there would be very little or no activity in close proximity to the rivers. High suitability habitat would be maintained in these rivers and no biological impairment would occur.

Western Pond Turtle

For 20 of the 22 aquatic features identified in Table 3.03-11, there is either no difference or very small differences (less than 2 percent) in the amount and type of treatment within WPT buffers. As such, the descriptions of environmental consequences provided for the WPT under Alternative 1 apply to Alternative 3.

Table 3.03-11 WPT buffer affected by salvage and roadside hazard tree units in Alternative 3

Watershed (5th level HUC)	Stream	WPT Buffer (acres and percent of buffer treated)	
		Salvage Units	Hazard Tree Units
Tuolumne River	Drew Cr.	27 (3 percent)	89 (9 percent)
	Jawbone Cr.	701 (22 percent)	102 (3 percent)
	Homestead Pond	15 (16 percent)	0 (0 percent)
	Three unnamed ponds	27 (10 percent)	4 (1 percent)
Middle Fork Tuolumne River	Middle Fork Tuolumne River	2113 (39 percent)	307 (6 percent)
	Abernathy Meadow	26 (20 percent)	6 (5 percent)
	Grandfather Pond	7 (9 percent)	2 (2 percent)
	Mud Lake	12 (10 percent)	0 (0 percent)
North Fork Tuolumne River	North Fork Tuolumne River	0 (0 percent)	411 (2 percent)
	Basin Cr.	0 (0 percent)	0 (0 percent)
	Hunter Cr.	0 (0 percent)	407 (2 percent)
South Fork Tuolumne River	South Fork Tuolumne River	1441 (22 percent)	537 (8 percent)
Cherry Creek	Cherry Cr.	365 (10 percent)	59 (2 percent)
	Eleanor Cr.	97 (16 percent)	0.1 (less than 1 percent)
	Big Kibbie Pond	86 (88 percent)	0 (0 percent)
	Little Kibbie Pond	52 (60 percent)	2 (2 percent)
Clavey River	Reed Cr.	438 (48 percent)	12 (1 percent)
	Cottonwood Cr.	29 (5 percent)	24 (5 percent)
North Fork Merced River	North Fork Merced River	176 (1 percent)	491 (3 percent)
	Bull Cr.	25 (less than 1 percent)	109 (1 percent)
	Deer Lick Cr.	42 (2 percent)	109 (5 percent)
	Moore Cr.	56 (2 percent)	60 (2 percent)

The two aquatic features where treatment amounts within the buffer are different are Abernathy Meadow and Mud Lake. At Abernathy Meadow, the percentage of buffer surrounding the meadow affected by salvage operations decreased from 66 acres (50 percent of total buffer area) to 26 acres (20 percent of total buffer area). The decrease in logging activity in the buffer would result in a lower potential for direct impacts to individuals, especially when the seasonal pond is losing volume and the turtles move into the upland for the summer to aestivate. The decreased logging around the meadow under this alternative would mean more trees would be available to fall and provide cover for turtles in 40 additional acres (when compared to Alternative 1). The additional amount of LWD would improve the overall upland habitat suitability, from moderate to high, in Alternative 3 compared to Alternative 1.

At Mud Lake, a similar situation would occur because the amount of buffer area treated would decrease by 9 acres (from 21 to 12 acres). This means only 10 percent of the buffer area would be treated. The direct and indirect effects discussed for Abernathy Meadow apply to Mud Lake.

Hardhead

Same as Alternative 1.

CUMULATIVE EFFECTS

California Red-legged Frog

For most of the analyzed sites, there are very small differences in the actions proposed in Alternatives 1 and 3 and probably not detectable at the habitat area or watershed scale. Because the differences between implementing either alternative would be indistinguishable, the cumulative effects for Alternative 3 are as discussed under Alternative 1.

Sierra Nevada Yellow-legged Frog

Same as Alternative 1 because the proposed action within the SNYLF analysis areas would be the same under Alternatives 1 and 3.

Foothill Yellow-legged Frog

Comparing Table 3.03-9 (cumulative effects for Alternative 1) and Table 3.03-12 (cumulative effects for Alternative 3), only four watersheds (Alder, Bull Meadow, Corral, and Jawbone Creeks) would have an increase in activities. The remaining watersheds would have no change or very little decrease in the amount of buffer or watershed area treated and the cumulative effects discussions under Alternative 1 are the same or very similar for this alternative.

The four streams with increases in buffer and watershed area treated have cumulative total increases directly related to the amount of increased activity proposed under Alternative 3 and not from additional sources. That is, no cumulative effects increase is associated with private or other public activities. The environmental outcome discussed for Alder Creek would be the same for cumulative impacts in terms of risk to individuals and habitats. Jawbone and Bull Meadow Creeks would likely see high cumulative levels of physical disturbance to individuals because extensive areas of the buffer would be treated by salvage activities. The total amount of watershed area affected would also lead to extensive modification of aquatic habitats (channel filling from sedimentation) in the first two or three years following treatment. This extent of aquatic habitat modification would potentially impact breeding and tadpole development for the first two years following treatments. As a result, lower population numbers would be expected for five to seven years. Reproduction and recruitment rate in these streams would return to “normal” levels within four years of treatment and high habitat suitability would return.

Essentially all of the buffer and watershed area of Corral Creek would be impacted by some type of salvage logging. The watershed response would be uncertain and it is possible that aquatic habitat in most of Corral Creek would be unsuitable for the FYLF due to excessive sedimentation. Based on field experience during physical habitat surveys prior to the Rim Fire, there are some high gradient sections that, when combined with the anticipated increase in stream flow, should maintain small patches of moderate suitability deep water habitat. This may provide enough of a refuge for the frog to persist until additional habitat becomes available in the next two or three years. Breeding would likely not occur under these conditions for up to two years, resulting in decreased recruitment and population size for over ten years. From two to four years from present, preferred tadpole habitat could be considerably compromised because the anticipated amount of sediment would likely fill the spaces between the larger streambed substrates and reduce foraging and escape habitats. Low suitability foraging and escape habitats could lead to poor rates of survivorship and increased predation. The cumulative effects modeling for this watershed and alternative indicate the TOC would be exceeded for the next six years suggesting the channel and streambanks could be highly unstable for up to a decade. It should be noted that the erosion and sediment modeling completed for the project indicated a reduction in sediment delivery compared to the post-fire (no action) conditions and those expected from implementing Alternative 1.

Table 3.03-12 Watershed area and FYLF and WPT buffers affected by salvage in Alternative 3

Watershed (5th level HUC) and Stream	Percent of FYLF Buffer Affected		Percent of Watershed Area Treated		Percent of WPT Buffer Affected	
	Alt 3	Alt 3+CE	Alt 3	Alt 3+CE	Alt 3	Alt 3+CE
Tuolumne River						
Alder Cr.	30	30	45	45	--	--
Corral Cr.	46	88	78	93	--	--
Drew Cr.	17	28	12	29	11	27
Grapevine Cr.	11	18	18	23	--	--
Indian Cr.	1	6	2	4	--	--
Jawbone Cr.	25	54	15	68	25	53
Homestead Pond	--	--	--	--	16	46
Middle Fork Tuolumne River						
Middle Fork Tuolumne River[1]	45	57	48	61	45	57
Abernathy Meadow	--	--	--	--	24	56
Grandfather Pond	--	--	--	--	11	30
Mud Lake	--	--	--	--	10	65
North Fork Tuolumne River						
North Fork Tuolumne River	0	2	1	6	2	6
Basin Cr.	0	0	1	5	0	less than 0.1
Hunter Cr.	6	14	9	23	8	19
South Fork Tuolumne River						
South Fork Tuolumne River[2]	10	34	36	46	31	40
Unnamed ponds near Yosemite Lakes	--	--	--	--	5	8
Cherry Creek						
Cherry Cr.	10	26	13	34	29	45
Eleanor Cr.	22	22	1	1	16	16
Big Kibbie Pond	--	--	--	--	88	88
Little Kibbie Pond	--	--	--	--	63	63
Granite Cr.	25	67	21	78	--	--
Clavey River						
Reed Cr.	50	54	20	34	50	61
Adams Gulch	0	0	15	32	--	--
Bear Springs Cr.	20	31	18	78	--	--
Bull Meadow Cr.	50	59	65	77	--	--
Indian Springs Cr.	25	25	19	29	--	--
Quilty Cr.	0	0	5	73	--	--
Unnamed Trib 1	8	8	16	16	--	--
Unnamed Trib 2	0	0	24	24	--	--
Unnamed Trib 3	46	50	69	78	--	--
Unnamed Trib 4	13	13	43	48	--	--
Unnamed Trib 5	37	37	43	45	--	--
Cottonwood Cr.	5	18	31	43	--	--
Russell Cr.	0	0	30	30	--	--
North Fork Merced River						
North Fork Merced River	2	2	3	4	4	4
Bull Cr.	less than 0.1	less than 0.1	2	2	1	1
Deer Lick Cr.	7	7	8	8	7	7
Moore Cr.	3	3	4	6	6	7
Scott Cr.	4	4	22	22	--	--

[1] Percentages calculated for the 6th level HUC Lower Middle Fork Tuolumne and not for the 5th level HUC
[2] Percentages calculated for the 6th level Lower South Fork Tuolumne River HUC

Western Pond Turtle

Comparing Table 3.03-9 (cumulative effects for Alternative 1) and Table 3.03-12 (cumulative effects for Alternative 3) indicates most values in Alternative 3 for percentage of buffer affected were the same or slightly (less than 5 percent) increased or decreased from those in Alternative 1. Given the limited amount of change (or lack of change) between the values, the extent of impact and risk to individuals is very similar between alternatives and the cumulative effects discussion for Alternative 1 applies to this alternative.

Hardhead

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

As with Alternative 3, there would be very little difference implementing Alternative 4 when compared to Alternative 1 for the three sensitive aquatic species (FYLF, WPT, and Hardhead). Further, for the watersheds that differed between Alternatives 1 and 3, there are no substantial differences in amount of watershed treated between Alternatives 3 and 4. That is, the salvage and road treatments are very similar in Alternatives 3 and 4. For 30 of the 34 watersheds listed in Table 3.03-13, there are no differences in actions proposed under Alternative 3 and 4. The following watersheds have differences between Alternative 3 and 4: Cherry and Eleanor Creeks and the South Fork Tuolumne River.

California Red-legged Frog

Table 3.03-8 shows the treatment areas and types would not change between Alternatives 3 and 4 at any of the analysis sites. Therefore, the analysis of Alternative 3 is the same for this alternative.

Sierra Nevada Yellow-legged Frog

Effects to Individuals

Tree Felling and Removal

For Reynolds Creek, Eleanor Creek, and the Middle Fork Tuolumne River, there would be no difference in implementing Alternative 4 from Alternatives 1 and 3 because the proposed actions within these analysis areas would be the same. At Big and Little Kibbie Ponds, unit O02 would be dropped from treatment but roadside salvage would occur along 1N40Y in places where the salvage unit was. Overall, there would be a decrease in the amount of upland habitat around the ponds impacted by this alternative. This alternative would affect approximately one acre of upland habitat less than Alternative 1 around Little Kibbie Pond and 0.6 acre of upland habitat less than Alternative 1 around Big Kibbie Pond. The effects and consequences of this difference are essentially the same as those described in Alternative 1, but this alternative would result in a slightly reduced risk of direct impact (injury, mortality, and physical disturbance) to individuals during tree felling and removal. At Eleanor Creek, unit O201B would be dropped and project activities would not occur along 0.15 mile of the creek. This unit was approximately 100 feet away from the creek under Alternative 1, which is a big enough operational buffer to minimize the potential for impacts to individuals. Dropping unit O201B would not result in a substantial decrease in risk to individuals when compared to the activities in Alternative 1.

Burn Piles

For Reynolds Creek, Eleanor Creek, and the Middle Fork Tuolumne River, there would be no difference in implementing Alternative 4 from Alternatives 1 and 3 because the proposed actions within these analysis areas would be the same. For Big and Little Kibbie Ponds, burn piles would not occur in 1.6 acres of upland habitat when compared to Alternative 1. The same minimization measure of locating burn piles more than 50 feet from aquatic habitats would occur in this alternative. For the 1.6 acres of upland habitat that would be untreated, the risk of an individual being impacted during pile burning would be reduced because of the lack of activity in the unaffected upland habitat.

Road Treatments

For Reynolds Creek, Big and Little Kibbie Ponds, Eleanor Creek, and the Middle Fork Tuolumne River analysis areas, there would be no difference in implementing Alternative 4 from Alternatives 1 and 3 because the proposed actions within these analysis areas would be the same.

Water Drafting

For all sites, there would be no difference in implementing Alternative 4 from Alternatives 1 and 3 because the proposed actions within these analysis areas would be the same.

Application of Registered Borate Compound

For all sites, there would be no difference in implementing Alternative 4 from Alternatives 1 and 3 because the proposed actions within these analysis areas would be the same.

Effects to Habitats

In general the risk of actions proposed in Alternative 4 would be lower than those proposed in either Alternative 1 or Alternative 3 because there would be slightly less activity in SNYLF upland habitat specifically around Big and Little Kibbie Ponds and adjacent to Eleanor Creek.

Increases in Sediment

Breeding and Non-breeding Aquatic Habitat: For Reynolds Creek, Big and Little Kibbie Ponds, and the Middle Fork Tuolumne River, there would be no difference in the amount of sediment is essentially the same for Alternative 4 as it is in Alternative 1. Because unit O02B would be dropped from the Eleanor Creek watershed, there would be slightly less sediment produced from the eastern hillslope than in Alternative 1. The amount of difference would be so small that the observable impacts to habitat in the creek would not be distinguishable from the sediment expectations in Alternative 1. As with Alternative 1, the duration of sediment in all habitats would be relatively short (up to two years) and there would be no impairment of habitat by the sediment.

Large Woody Debris

Upland Habitat: There would be no difference between Alternatives 1, 3, and 4 in LWD supply at Reynolds Creek and the Middle Fork Tuolumne River because the amount and type of activity would be the same. At Big and Little Kibbie Ponds, there would be 1.6 acres more of upland habitat that would be unimpacted by project activities and reductions in LWD would not occur in these 1.6 acres. At Eleanor Creek, there would be very little difference between Alternatives 1 and 4 because unit O02 would be dropped, but this unit was more than 100 feet away from the stream and the upland buffer is approximately 82 feet (25 meters).

Foothill Yellow-legged Frog

Similar to Alternative 1 acreage, Table 3.03-13 shows salvage and hazard tree removal activities would treat 42 acres of buffer in Cherry Creek. The environmental outcome based on this amount of buffer treated would be very similar to the outcome stated for Alternative 1; however, the total amount of watershed area treated in this alternative would be 594 acres less than what would be treated in Alternative 1 (3,302 acres in Alternative 1 versus 2,708 acres in Alternative 4).

There may be a tradeoff in terms of sediment delivery to Cherry Creek between more acres treated in the FYLF buffer and fewer acres treated in total for the watershed, meaning slightly more sediment may come from the additional buffer areas and less from the non-buffer watershed acres. The sediment modeling indicated a 4 percent overall decrease in sediment delivery to the creek between Alternative 4 and Alternative 1. A change this small means there may be no detectable difference between the two alternatives and the categorization of Cherry Creek under Alternative 1 applies to this alternative.

Table 3.03-13 Buffer and watershed area affected in FYLF suitable habitat in Alternative 4

Watershed (5th level HUC)	Stream	Percent FYLF Watershed Treated	FYLF Buffer Affected (acres)			Road Treatments (miles)			
			Hazard tree	Salvage	Percent of total	Reconstruct	Maintain	New	Temp
Tuolumne River	Tuolumne River								
	Alder Cr.	45	0	34	30	3.2	0.2	0	0
	Corral Cr.	78	0	106	46	19.6	0.2	0	1.7
	Drew Cr.	12	12	0.4	11	1.9	3.6	0	0.6
	Grapevine Cr.	18	29	0	11	0.7	17.4	0	0
	Indian Cr.	2	1	0	less than 1	0	2.2	0	0
	Jawbone Cr.	27	5	81	25	18.6	7.3	0	5.3
Middle Fork Tuolumne River	Middle Fork Tuolumne River	17	22	255	46	57.2	12.5	0	11.9
North Fork Tuolumne River	North Fork Tuolumne River	2	0	0	0	0.4	22.7	0	0
	Basin Cr.	1	0	0	0	0.4	2.1	0	0
	Hunter Cr.	9	0	0	0	0	19.9	0	0
South Fork Tuolumne River	South Fork Tuolumne River	38	29	144	24	75.8	27	0	4
Cherry Creek	Cherry Cr.	13	6	36	9	30.8	8.8	0	1.8
	Eleanor Cr.	1	0	12	22	2.5	0	0	0.5
	Granite Cr.	21	0.2	36	25	12.4	1.1	0	0.1
Clavey River	Clavey River								
	Reed Cr.	20	1	49	49	22.4	20.6	0	3.7
	Adams Gulch	15	0	0	0	1.2	1.8	0	0
	Bear Springs Cr.	18	9	0.1	20	10	0.7	0	0
	Bull Meadow Cr.	36	0	36	50	4.0	0.4	0	0.8
	Indian Springs Cr.	19	3	2	25	1.4	0.1	0	0
	Quilty Cr.	5	0	0	0	0.1	1.1	0	0
	Unnamed Trib 1	16	3	0	8	0	2.9	0	0
	Unnamed Trib 2	24	0	0	0	0	2.5	0	0
	Unnamed Trib3	69	0	26	46	0.8	10.3	0	0
	Unnamed Trib 4	48	2	1	13	3	0.7	0	0
	Unnamed Trib 5	43	7	8	37	2.2	2.7	0	0
	Cottonwood Cr.	31	0	3	5	19.1	8.8	0	0.1
	Russell Cr.	30	0	0	0	0.9	2.3	0	0
North Fork Merced River	North Fork Merced River	2	22	18	less than 0.1	12.3	11.2	0	0.2
	Bull Cr.	2	5	0	less than 0.1	3.95	2	0	0.5
	Deer Lick Cr.	8	4	13	7	3.4	2.3	0	0.2
	Moore Cr.	4	5	5	3	2	3.8	0	1
	Scott Cr.	22	2	0	8	3.6	3.4	0	0

Eleanor Creek would have no change to the amount of FYLF buffer affected by salvage operations, but there would be an 83 acre decrease in total watershed area affected by salvaging. This is a 15 percent reduction in acres treated compared to Alternative 1. The reduced amount of salvage activity would mean a slight reduction in sediment delivery to Eleanor Creek, but the magnitude of effect would be very small and may not be discernible from Alternative 1. The sediment modeling indicated a slight decrease in sediment delivery for this watershed between this alternative and Alternative 1, a difference of 482 tons (13,982 tons in Alternative 1 versus 13,496 tons in Alternative 4) or 3 percent.

For the South Fork Tuolumne River, the percentage of buffer treated in all action alternatives is the same, but the amount of watershed area treated decreases by 132 acres between Alternative 1 and Alternative 4. This difference in area treated would not have a detectable difference than that of Alternative 1. The discussion for Alternative 1, therefore, applies to this alternative.

Western Pond Turtle

For the WPT, all timber removal activities (hazard tree and salvage) proposed in Alternative 4 are the same as those proposed in Alternative 3; therefore, the effects analysis for Alternative 3 applies to this alternative. There are two exceptions to this statement and they involve Big and Little Kibbie Ponds as shown in Table 3.03-14.

Under Alternative 4, the total amount of combined salvage activity would affect 63 acres of the WPT buffer at Big Kibbie Pond and 29 acres of buffer area at Little Kibbie Pond. This is compared to the 86 and 54 acres proposed for treatment under Alternatives 1 and 3. The amount of activity in WPT buffers under Alternative 4 would lessen the potential for direct and indirect effects to individuals and upland habitat suitability. The lower amount of activity around these two ponds would decrease the total amount of time equipment and personnel spend in upland habitats which should decrease the potential for direct effect to any given individual. This would reduce the potential for injury, mortality, or physical disturbance.

Table 3.03-14 WPT buffer affected by salvage and roadside hazard tree units in Alternative 4

Watershed (5th level HUC)	Stream	WPT Buffer (acres and percent of buffer treated)	
		Salvage Units	Hazard Tree Units
Tuolumne River	Tuolumne River		
	Drew Cr.	27 (3%)	89 (9%)
	Jawbone Cr.	701 (22%)	102 (3%)
	Homestead Pond	15 (16%)	0 (0%)
	Three unnamed ponds	27 (10%)	4 (1%)
Middle Fork Tuolumne River	Middle Fork Tuolumne River	2,113 (39%)	307 (6%)
	Abernathy Meadow	26 (20%)	6 (5%)
	Grandfather Pond	7 (9%)	2 (2%)
	Mud Lake	12 (10%)	0 (0%)
North Fork Tuolumne River	North Fork Tuolumne River	0 (0%)	411 (2%)
	Basin Cr.	0 (0%)	0 (0%)
	Hunter Cr.	0 (0%)	407 (2%)
South Fork Tuolumne River	South Fork Tuolumne River	1,441 (22%)	537 (8%)
Cherry Creek	Cherry Cr.	365 (10%)	59 (2%)
	Eleanor Cr.	97 (16%)	0.1 (less than 1%)
	Big Kibbie Pond	63 (64%)	19 (19%)
	Little Kibbie Pond	29 (34%)	19 (19%)
Clavey River	Clavey River		
	Reed Cr.	438 (48%)	12 (1%)
	Cottonwood Cr.	29 (5%)	24 (5%)
North Fork Merced River	North Fork Merced River	176 (1%)	491 (3%)
	Bull Cr.	25 (less than 1%)	109 (1%)
	Deer Lick Cr.	42 (2%)	109 (5%)
	Moore Cr.	56 (2%)	60 (2%)

From an indirect effect perspective, the primary difference between Alternative 4 when compared with Alternatives 1 and 3 would be an increase in LWD in upland habitats. Full recruitment potential would occur for all trees in the 25 or so acres that would not be treated. These unaffected acres would have the highest habitat suitability for the capability of the site when compared to the other action alternatives. The LWD is used by turtles as refuge habitat. There would be no detectable difference in sediment delivery to either feature when compared to Alternative 1 because the hillslopes next to these two ponds have very low gradient (less than 10 percent). Low gradient hillslopes are typically capable of retaining sediment and not transporting it downslope.

The differences in road treatment actions are discussed under FYLF and apply to the WPT at the watershed scale. The discussion of effects to FYLF habitat applies to the WPT because there is high habitat association between the two species and because the road-stream interaction occurs in a predictable way regardless of the species involved.

Hardhead

Same as Alternatives 1 and 3.

CUMULATIVE EFFECTS

California Red-legged Frog

As Table 3.03-8 shows, the treatment areas and types would not change between Alternatives 3 and 4 at any of the analysis sites. Since the cumulative effects actions are the same for all alternatives, the analysis of Alternative 3 is the same for this alternative.

Sierra Nevada Yellow-legged Frog

The cumulative effects described under Alternative 1 would apply to this alternative. For Reynolds Creek and the Middle Fork Tuolumne, there were no differences between the actions proposed under Alternative 1 and 4. For Big and Little Kibbie Ponds and Eleanor Creek, there were no cumulative actions identified in Alternative 1 that could impact individuals or habitats. Therefore, the effects of Alternative 4 would be all that would occur at these locations.

Foothill Yellow-legged Frog

The cumulative actions proposed under Alternative 4 are the same as Alternative 3 except for Cherry and Eleanor Creeks. For these two exceptions, the amount of buffer affected increased to about the levels in Alternative 1. The cumulative effects discussion for these two streams can be found under Alternative 1.

Western Pond Turtle

The types and extent of activities described in Alternative 3 are unchanged for Alternative 4 for all but two locations: Big and Little Kibbie Ponds. For the remaining locations, the cumulative effects analysis for Alternative 1 applies to the WPT in Alternative 4. At Big Kibbie Pond, there would be a reduction in cumulative percentage of buffer area affected from 88 percent in Alternatives 1 and 3 to 64 percent under Alternative 4. At Little Kibbie Pond, there would be a reduction in cumulative percentage of buffer area affected from 63 percent in Alternatives 1 and 3 to 29 percent under Alternative 4. These reductions are related to the differences in actions proposed in the alternatives rather than from cumulative sources. There would be no other actions around the ponds other than those described for Alternative 4. Cumulatively, though, there would be a lower risk of direct impact to individuals in aquatic or upland habitats with the largest reduction occurring at Little Kibbie Pond. LWD supply and recruitment as a habitat element would be higher under this alternative and the habitat suitability would be high given the current capability.

Hardhead

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

California Red-legged Frog

The implementation of Alternative 1 poses the greatest risk to individual CRLF and their habitats although the risk is low. Breeding habitat overlaps with project activities at only 1 site (Homestead Pond) and overlap with non-breeding habitat is also relatively low (Table 3.03-8 and Table 3.03-15). Upland habitats have the greatest proportion of overlap with project activities (Table 3.03-8 and Table

3.03-15). In general the risk to CRLF and their habitats is lower under Alternatives 3 and 4 because there is less overlap with project activities.

Possible direct effects to individuals include injury, mortality, or behavioral disturbance. The direct effects to aquatic habitats are minimized by management requirements prohibiting operations within and adjacent to aquatic features. The upland habitat would be at a greater risk of direct effects from microclimate alterations affecting temperature and moisture levels required by the CRLF and a loss of LWD and other structures commonly used by CRLF as refuge. A limited operating period in conjunction with other management requirements should mitigate these risks.

A potential increase of sediment depth in breeding and non-breeding habitat is the most likely effect to CRLF habitats, but the effects under Alternatives 1, 3 and 4 are likely to be negligible in comparison to the increases in sediment from the effects of the Rim Fire.

Table 3.03-15 Comparison of CRLF suitable habitat at risk of direct effects

Habitat	Alternative 1[1]	Alternative 2	Alternative 3	Alternative 4
California red-legged frog				
Birch and Mud Lakes[2]	0(0)	0(0)	0(0)	0(0)
Miles of Non-Breeding (Per and Int.)	2.2 (30)	0(0)	2.1 (28.6)	2.1 (28.6)
Acres of Upland	801.5(28)	0(0)	800.5 (27.6)	800.5 (27.6)
Drew Creek[3]	0(0)	0(0)	0(0)	0(0)
Miles of Non-Breeding (Per and Int.)	1.0 (11)	0(0)	0.2 (2.4)	0.2 (2.4)
Acres of Upland	352.1 (9.8)	0(0)	260.2 (7.2)	260.2 (7.2)
Harden Flat[2]	0(0)	0(0)	0(0)	0(0)
Miles of Non-Breeding (Per and Int.)	0.4 (5.7)	0(0)	0.4 (5.7)	0.4 (5.7)
Acres of Upland	207.3 (13.6)	0(0)	207.3 (13.6)	207.3 (13.6)
Homestead Pond[2]	0.2 (100)	0(0)	0.1 (70.6)	0.1 (70.6)
Miles of Non-Breeding (Per and Int.)	0(0)	0(0)	0(0)	0(0)
Acres of Upland	181.6 (8.9)	0(0)	61.4 (3.0)	61.4 (3.0)
Hunter Creek and Ponds[4]	0(0)	0(0)	0(0)	0(0)
Miles of Non-Breeding (Per and Int.)	3.1 (8.8)	0(0)	3.1 (8.8)	3.1 (8.8)
Acres of Upland	1137 (9.9)	0(0)	1137 (9.9)	1137 (9.9)

[1] Percent values are included in parenthesis represent the percent of each individual habitat affected.
[2] Non-parenthetical values = acres
[3] Non-parenthetical values = miles
[4] Non-parenthetical values represent the acres and miles.

Sierra Nevada Yellow-legged Frog

Similar to the CRLF, the implementation of Alternative 1 poses the greatest risk to individual SNYLF and their habitats although the risk is low, and little difference exists between the action alternatives. For Reynolds Creek and the Middle Fork Tuolumne River the effects of the Alternatives are the same. Alternative 4 would have the lowest potential impact to individuals and habitat at Big and Little Kibbie Ponds and Eleanor Creek because there would be less activity in upland habitat and within 500 feet of the aquatic features.

Possible direct effects to individuals include injury, mortality, or behavioral disturbance. Direct effects to aquatic habitats are not expected to occur because management requirements prohibit operations within and adjacent to aquatic features. The upland habitat would be at greater risk of direct effects in comparison to the breeding and non-breeding aquatic habitats, although in comparison to CRLF, the upland habitat of SNYLF are less important to their overall survival because of their close affinity to water and the lack of habitats in close enough proximity to one another to elicit overland movements.

A potential increase of sediment depth in breeding and non-breeding habitat is the most likely effect SNYLF habitats may experience, but the effects of implementing the actions proposed under

Alternatives 1, 3 and 4 are negligible to minor in comparison to the increases in sediment from the effects of the Rim Fire.

DETERMINATIONS FOR THE CALIFORNIA RED-LEGGED FROG AND SIERRA NEVADA YELLOW-LEGGED FROG

The following determination is supported by the analysis contained in this EIS. The overall project "may affect, likely to adversely affect" California red-legged frog and Sierra Nevada yellow-legged frog. The determination of "may affect, likely to adversely affect" for California red-legged frog is limited to 7 locales. These are Drew Creek, Hunter Creek and ponds or impoundments on streams (Birch Lake, Mud Lake, Homestead Pond, Harden Flat ponds, Hunter Creek area ponds.) For the Sierra Nevada yellow-legged frog, this determination is applicable to four analysis areas: Reynolds Creek, Eleanor Creek, Big and Little Kibbie Ponds, and the Middle Fork Tuolumne River near the Yosemite National Park boundary. Because occupancy is assumed at these locations (except Big and Little Kibbie Ponds), there is the potential for project activities to directly impact to individuals occurring in aquatic or upland habitats. The most likely direct impact is physical disturbance resulting from forest workers and equipment. Through timber salvage and fuel reduction, the project would also modify the upland habitat by reducing the availability of cover objects provided by large woody debris. These effects apply to both species. There are very small differences between the action alternatives in terms of extent and intensity of impact and the determination for both species applies to all action alternatives.

For the No Action alternative, there would be no project-related effects to the California red-legged frog and Sierra Nevada yellow-legged frog.

Foothill Yellow-legged Frog

Very little difference exists between the action alternatives for most of the aquatic features assessed for the FYLF. There appears to be a direct correlation between the amounts of salvage related activity on private and public lands and the prevalence of moderate and high vegetation severity fire. This correlation means that more severely burned watersheds have higher levels of salvage activity in addition to higher levels of post-fire watershed response. The environmental outcomes in the high burn severity and salvage activity watersheds are similar in that there would be more activity in the upland buffer areas for the species and a greater risk of greatly increased sedimentation of aquatic habitats. These excess sediment-related effects would disproportionately decrease habitat suitability in smaller streams because they may not be as effective at mobilizing and transporting the sediment. In some cases, unsuitable habitat could occur at small spatial scales within a watershed, but, in most cases, patches of moderate to high suitability habitat would persist. Within five to seven years, the sediment transport-storage balance should be regained in most streams and more "normal" watershed processes would resume. Reproduction and recruitment may be adversely affected in some aquatic habitats and population size would be expected to decrease for up to ten years in the most severely burned and logged watersheds. In general, the recruitment of LWD should only be affected to a minor degree because most streams would have extensive areas of unsalvaged forest adjacent to the water. However, some streams, like Corral, Jawbone, and Granite Creeks, could have a significant reduction in recruitment rates of LWD and these effects could persist for 150 years or more.

Western Pond Turtle

Same as FYLF.

Hardhead

No differences exist between effects to hardhead or their habitats. High suitability habitat for all lifestages would be maintained in the lower North Fork Tuolumne and Clavey Rivers and habitat for adult and sub-adult lifestages would not be measurably affected by any or all actions.

DETERMINATIONS FOR THE SENSITIVE SPECIES

A determination of "may affect individuals, but is not likely to lead to a trend in federal listing or loss of viability" was made for the foothill yellow-legged frog, western pond turtle, and hardhead and are supported by the analysis contained in this EIS. For the foothill yellow-legged frog and western pond turtle, this determination was based on the potential for direct effects to individuals and indirect effects to habitats to occur as a result of project activities. The primary anticipated impact to individuals is physical disturbance and the primary anticipated impact to habitat is sedimentation of aquatic habitat. When combined with post-fire effects to habitat and individuals and watershed level impacts from cumulative actions, some localized populations could have reductions in numbers. However, these two species are expected to occur within watersheds affected by the proposed actions and are well distributed across the forest and throughout their ranges. For the hardhead, slight impacts to habitat are anticipated because of sediment delivery to aquatic habitats, but the habitats they rely upon would remain available and capable of supporting all life history requirements.

The determination applies to all three action alternatives because some level of impact, even if very small, could occur to individuals and aquatic and upland habitats at most locations.

For the No Action alternative, there would be no project related effects to foothill yellow-legged frogs, western pond turtles, or hardhead.

3.04 Cultural Resources

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The Forest Service is directed to identify, evaluate, treat, protect, and manage cultural resources by several laws. The National Historic Preservation Act (NHPA) as amended (16 U.S.C. 470 et seq.) provides comprehensive direction to federal agencies regarding historic preservation. Executive Order 11593, entitled *Protection and Enhancement of the Cultural Environment*, also includes direction about the identification and consideration of cultural resources in federal land management decisions.

The NHPA extends the policy in the Historic Sites Act of 1935 (49 Stat. 666; 16 U.S.C. 461-467) to include resources that are of State and local significance, expands the NRHP (National Register of Historic Places), and establishes the Advisory Council on Historic Preservation (ACHP) and State Historic Preservation Officers. NHPA Section 106 directs all federal agencies to take into account effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. The Advisory Council on Historic Preservation (ACHP) regulations (36 CFR 800) implements NHPA Section 106. NHPA Section 110 sets inventory, nomination, protection, and preservation responsibilities for Federally-owned cultural resources.

Section 106 of the NHPA and the ACHPs implementing regulations, *Protection of Historic Properties* (36 CFR Part 800), require that federal agencies take into account the effect of their undertakings on cultural resources, and that agencies provide the ACHP with an opportunity to comment on those undertakings. Programmatic agreements (36 CFR 800.14(b)) provide alternative procedures for complying with 36 CFR 800.

The Stanislaus National Forest developed a specialized agreement: "Programmatic Agreement Among the United States Forest Service, Stanislaus National Forest, The California State Historic Preservation Officer, and the Advisory Council on Historic Preservation, Regarding the Compliance with the National Historic Preservation Act for Proposed Actions Pertaining to the Fire Emergency Recovery Undertaking Programmatic Agreement (Rim PA)." This agreement defines the Area of Potential Effects (APE) (36 CFR 800.4(a)(1)) and includes a strategy outlining the requirements for cultural resource inventory, evaluation of cultural resources, and effect determinations; it also includes protection and resource management measures that may be used where effects may occur. Additionally, this agreement provides unique and necessary opportunities to remove both commercial value timber and hazard trees from within site boundaries utilizing a variety of harvest methods including one-end suspension and rubber tired machinery. Removal of these trees benefits the long term recovery and preservation of cultural resource sites by reducing future fuel build-up and fire weakened trees that could fall and impact already fragile resources.

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

Assumptions Specific to Cultural Resources

- Removal of salvage timber and hazard trees adjacent to Maintenance Level 2 roads through mechanical, cable and helicopter harvest methods will have no adverse effect to cultural resources.
- New road construction, reconstruction, maintenance and construction of temporary roads will not affect the integrity of cultural resource sites within the project boundary.

- Removal of hazard trees and commercial value logs from within site boundaries can have a beneficial effect on cultural resources. Harvest of these trees would lessen the potential for damage to already fragile bedrock mortar outcrops and historic earthworks such as ditches, roads trails and railroad grades.
- Use of existing breaches within linear sites such as historic railroad grades, trails, roads and ditches will cause no adverse effect to cultural resources.
- Use of existing water and rock quarry sources and development of new sources are not anticipated to affect cultural resources.
- According to the Rim PA, all archaeological and historical sites identified within the APE for all alternatives are considered cultural resources for the purposes of this undertaking, unless they already have been determined not eligible in consultation with the SHPO or through other agreed on procedures (36 CFR 60.4; 36 CFR 800).
- Activities outlined within the EIS, when combined with the past, present and foreseeable future actions are not expected to cumulatively lead to increased impacts to cultural resources.

Data Sources

- Site specific cultural resource inventories conducted between 1986 to present (which meet current archaeological survey standards) were utilized. The primary objectives of these surveys were to identify cultural resources in the APE that may be affected by the undertaking and collect information on their current condition.
- Existing information from cultural resource records, historic archives, maps, and GIS spatial layers were also used.

Cultural Resources Indicators

Indicators of direct and indirect effects include:

- Exposure of surface and subsurface artifacts through the removal of commercial value timber, hazard trees, and temporary and new road construction.
- The degree to which the integrity of historic property values are diminished.

Cultural Resources Methodology by Action

The 2013 Rim Fire on the Stanislaus National Forest, while destructive, also provided the rare opportunity to have an unimpeded view of the forest floor. Utilizing previous archaeological inventories from past projects that meet current survey standards (1986 to present) nearly 53 percent of the proposed treatment areas were eliminated from further inventory. A strategy was developed to intensively survey (15 to 30-meter interval spacing) the remaining treatment areas. The strategy is consistent with the Rim PA.

Affected Environment

Cultural resources are archaeological, cultural, and historical legacies from our past that are more than 50 years old. Cultural resource information, combined with environmental data, can illuminate past relationships between people and the land. Cultural-ecological relationships, the result of both natural processes and 10,000 years of human interaction in the central Sierra Nevada, are key topics in this region’s anthropological, archaeological, and historical research.

The Stanislaus National Forest currently contains 4,538 recorded prehistoric and historic archaeological sites (cultural resources). The vast majority of these (2,708) represent prehistoric Native Americans and ethnographic Miwok and Washoe land use. These include seasonal villages, temporary camps, toolstone quarries, and bedrock mortar milling locations. Today, the Miwok still actively use the Forest for gathering traditional food and medicine plants, hunting, and conducting ceremonies.

The project area contains 1,501 recorded sites representing historic land use of the Forest. These include emigrant trails, historic cabins, roads, bridges, lumber or mining complexes and camps, ditches, homesteads, grazing camps, arbor glyphs (tree carvings), railroad grades, trestles, mining shafts and adits, and Forest Service administrative buildings and compounds. All of the historic sites found in the Forest date from 1846 to the present.

Since people today favor many of the areas preferred by Native people, 329 sites have both a prehistoric and historic component.

Existing Conditions

This project encompasses the Forest's largest Section 106 compliance project in relation to a catastrophic wildfire event. The scale of the undertaking requires that an extensive field survey be conducted to identify cultural resources within the APE that may be affected by the various projects proposed under the post fire recovery undertaking.

The Rim Recovery project identifies 28,326 acres for salvage with an additional 16,315 acres of Maintenance Level 2 roads for hazard tree removal. These 44,641 acres constitute the Rim Recovery project APE. A pre-field review determined that 26,425 acres of the APE had been previously surveyed for cultural resources through various other projects. An additional 7,921 acres were eliminated due to slopes greater than 40 percent. The result of these surveys identified 1,901 prehistoric and historic properties within the project boundary of which 756 are located within or adjacent to treatment units and adjacent to Maintenance Level 2 roads likely to be affected by this project.

Of these 756 properties, 244 are prehistoric sites related to food processing (bedrock milling features), stone tool processing (lithic scatters) and temporary living areas (rock shelters). These sites are associated to land use by the native inhabitants of the region, known as the Central Sierra Miwok. The 756 properties include 401 historic sites related to railroad logging (camps, grades and associated features), mining (mines, hydraulic mining areas, water conveyance ditches), water development (dams and water conveyance ditches), grazing (structures and fence lines) and homesteading (structure remains). Also, 44 sites are multi-component (both prehistoric and historic) sites. The remaining sites are noted but not recorded through previous undertakings and will be documented prior to implementation.

The remaining 10,295 acres are identified by Heritage Resource Specialists as needing archaeological survey in order to ensure the protection and preservation of cultural resources. This survey will be completed prior to project implementation as stipulated in the Rim PA.

Contemporary Native American Use

From the onset of the Rim Fire incident, the Forest Archaeologist consulted with the Tuolumne Band of Me-Wuk Indians regarding protection of traditional collection areas and sites significant to the Miwok people. Native peoples continue to utilize the area for traditional gathering and will continue to do so.

Historic Use

Historic records, maps and oral accounts encompassing the project boundary indicate intensive land use since the Gold Rush era (1849) especially in the areas of mining, water development, railroad logging, and ranching. Numerous mines were located along the Eastern Belt, a zone of auriferous quartz veins in black slate or grandodiorite which ran parallel and east of the Mother Lode. Gold was also extracted from the Tertiary alluvial gravels with the development of hydraulic mining through 1884. In order to supply the mines and associated communities of Big Oak Flat and Second Garotte with sufficient water, a system of ditches and flumes was built by the Golden Rock Water Company in the late 1850s to distribute water from the Middle and South Fork Tuolumne Rivers. Remnants of the Golden Rock Ditch system and other lesser known systems run through many parts of the Rim Fire burn area. One of the Golden Rock's major engineering feats, the Inverted Syphon and the Big Gap Flume, is listed on the National Register of Historic Places.

During the first three decades of the last century, four major railroad logging systems were built into the Tuolumne and Merced River drainage basins: West Side Lumber Company (1899); Yosemite / Sugar Pine Lumber Company (1907); Hetch Hetchy Railroad (established 1917) and the associated railroad logging operation; and California Peach and Fig Growers (1917), extending from Hetch Hetchy Junction (5 miles southwest of Chinese Camp) to Hetch Hetchy Valley. The Rim Fire affected portions of all four railroad logging systems to various degrees. Associated features affected by the event include railroad grades, trestles, inclines, cut and fill structures, logging camps, donkey sets and associated equipment.

Presently, 14 grazing allotments are either wholly or partially affected by the Rim Fire. Historic records, maps and oral accounts encompassing the allotment boundaries indicate intensive livestock grazing occurred from the 1850s to the early 1920s. Some of the existing trail system is likely connected to moving livestock to summer pasturage. Associated features affected by the fire include fences, wooden troughs and collapsed wooden structures (range cabins).

Environmental Consequences

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Potential direct effects include displacement and/or obliteration of surface and subsurface deposits from mechanical harvest and road treatments. Activities conducted during this project have the potential to uncover previously unknown cultural resources where deposits are largely subsurface.

Pursuant to the Rim Fire Emergency Recovery Undertaking Programmatic Agreement (Rim PA), all sites will be delineated with coded flagging and/or other effective marking (i.e., "flag and avoid) for protection prior to project implementation. Where opportunities are identified and approved by the Forest Archaeologist, the Forest will implement Stipulation II (E)(a) of the Rim PA in order to harvest commercial value timber and hazard trees from within site boundaries utilizing a variety of harvest methods including one-end suspension, a feller-buncher and rubber tired machinery. Removal of these trees will benefit the long term recovery and preservation of cultural resource sites by reducing future fuel build-up and fire weakened trees that could fall and impact already fragile resources. These alternative methods are low risk, and pose only minimal temporary impact in the form of light surface scrapes to cultural resources. In all cases Forest heritage resource specialists will be present to authorize and direct access within site boundaries. Also, sites may be avoided through project redesign.

Additionally, Alternative 1 is not anticipated to have any effects on cultural values, particularly plant species important to California Indian Basketweavers or other Native American gatherers.

A potential indirect effect resulting from the Rim Fire incident is the exposure of many historic and prehistoric properties to potential human vandalism and to looting for financial and personal gain. Currently the area is closed under Forest Order and some roads will be closed during project implementation, which reduces access and potential for vandalism and looting in the short-term. In the long-term, harvest of timber, removal of hazard trees and treatment of fuels from within and around site boundaries will benefit cultural resources by limiting or eliminating the appearance of "timber/vegetation islands" indicating the location of a cultural site. Post-project monitoring of sites is a requirement to determine the effectiveness of treatments and lessen the potential for unanticipated effects.

Additionally, potential indirect effects from cattle grazing are moderate but may include the trampling and breakage of surface and subsurface artifacts as cattle move through allotment areas. Vegetation removed as a result of the Rim Fire exposed already fragile surface sites to further damage through trampling and crushing in high cattle concentration areas. Resting of the allotments in the heaviest burned areas will allow vegetation to regrow and remove/diminish this effect. Due to implementation of management requirements and monitoring, no effects to historic and prehistoric properties are anticipated under Alternative 1.

CUMULATIVE EFFECTS

All projects listed in Cumulative Effects Analysis (Appendix B) have been or will be subject to NHPA Section 106 compliance and potential effects to cultural resources would be identified at that time following stipulations in the Rim PA.

Alternative 1, when combined with the past, present and reasonably foreseeable future actions and events are not expected to cumulatively lead to increased impacts to cultural resources.

Alternative 1 would lessen the effects of future wildfire on these sites, protect fragile resources and return the ecological setting or appearance to the time of the Native American presence, thus preserving those values that would make these sites significant and allow for future studies.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

The no action alternative would present a low risk to cultural resources. There would be no new or increased ground-disturbing activities in the areas of known cultural resource sites, and therefore no direct effects would occur with Alternative 2.

Indirect effects to the cultural resources may occur through inaction. The existing threat of fire-weakened trees falling naturally, and potentially damaging already fragile cultural resources, would continue. The actions presented in Alternatives 1, 3 and 4 would serve to better control the placement of felled salvage and hazard trees to avoid cultural resources, and therefore reduce the potential for ground disturbance to cultural sites. The lack of action can adversely affect cultural resources through natural mortality where fire-weakened trees may uproot within archaeological sites creating increased ground disturbance and damaging already fragile resources. The reduced ground cover resulting from the lack of timber treatments may result in increased site visibility and subsequent site looting and vandalism.

Additionally, the effects from allowing cattle grazing to continue are moderate but may include the trampling and breakage of surface and subsurface artifacts as cattle move through allotment areas. Vegetation removed as a result of the Rim Fire exposed already fragile surface sites to further damage through trampling and crushing in high cattle concentration areas. Resting of the allotments in the heaviest burned areas will allow vegetation to regrow and remove/diminish this effect.

CUMULATIVE EFFECTS

As stated above, Alternative 2 may have an indirect effect to cultural resources where lack of treatments within and around cultural resource sites may increase the potential for ground disturbance and damage to site features through natural processes. Other projects in the future may affect cultural resources, however there are no actions associated with Alternative 2 that would add to these effects.

Alternative 3

DIRECT AND INDIRECT EFFECTS

The potential effects in Alternative 3 are similar to Alternative 1. Additionally, watershed treatments, including removal of conifers that are encroaching in meadows, not only improve water tables but restore the ecological setting and appearance to the time of the Native American presence. This alternative is not anticipated to have any effects on cultural values, particularly plant species important to California Indian Basketweavers or other Native American gatherers.

Due to implementation of management requirements and monitoring, no effects to historic and prehistoric properties are anticipated under Alternative 3.

CUMULATIVE EFFECTS

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Same as Alternative 3.

CUMULATIVE EFFECTS

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

For all action alternatives, commercial timber harvest, hazard tree removal along low standard roads, new construction, reconstruction, and construction of temporary roads would have no direct effect, minimal indirect effects and no cumulative effects to cultural resources. Cumulative effects for Alternatives 3 and 4 are the same as Alternative 1. There are no anticipated direct effects and cumulative effects to cultural resources under Alternative 2 (No Action), as no project activity would occur. There are some indirect effects under Alternative 2.

3.05 Fire and Fuels

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The Forest Service Handbook and the forest plan identify requirements for fire and fuels management in support of Forest Service planning and decision making. These include the following: All available methods for mitigation of danger tree hazards should be considered and applied as appropriate to local situations. These methods include but are not limited to commercial timber sales, land stewardship contracts, funds for burned area emergency rehabilitation, sales of firewood for personal use, and expenditure of appropriated funds (USDA FSH 7709.59 sec 41.7, 2e).

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan. In addition, the Forest Plan Direction (USDA 2010a) includes broad scale goals for fire and fuels that apply to this project:

- Provide a cost-effective fire management program to protect Forest resources, life and property from the effects of wildfire. Maintain natural and activity fuels at levels commensurate with minimizing resource losses from wildfire (p. 5).
- Treat fuels in a manner that significantly reduces wildland fire intensity and rate of spread, thereby contributing to more effective fire suppression and fewer acres burned (p. 13)
- Treat hazardous fuels in a cost-efficient manner to maximize program effectiveness (p. 13).
- Strategically place treatment areas across landscapes to interrupt potential fire spread, removing sufficient material in treatment areas to cause a fire to burn at lower intensities and slower rates of spread compared to untreated areas, and considering cost-efficiency in designing treatments to maximize the number of acres that can be treated under a limited budget (p. 14).

Effects Analysis Methodology

Assumptions Specific to Fire and Fuels

To assure objectivity, the same assumptions are applied to all alternatives.

- Vegetation Condition and Post-Fire Recovery will be similar to past fires in this area.
- Historical weather represents future conditions in these locations. This assumption is a conservative estimate of future weather conditions as climate change is predicted to increase surface air temperatures dramatically increasing the size and severity of fires in the Sierra Nevada (Miller et al. 2009, Miller and Safford 2012, Safford et al. 2013).
- Chapter 3.01 climate change rationale.

Data Sources

- LANDFIRE Data Access Tool (2014) used to obtain Landfire Data Products used in analysis (e.g., vegetation, fuel, fire regimes, disturbance, and topography).
- Forest GIS shapefiles displaying information within the Rim Fire

Fire and Fuels Indicators

- Flame Length. The length of flame measured in feet. Increased flame lengths increase resistance-to-control and likelihood of torching events and crown fires.
- Fireline Intensity. The rate of energy or heat release per unit length of fire front.
- Resistance-to-control. The relative difficulty of constructing and holding a control line to assist in fire suppression efforts.

- Fuel loading. The amount of flammable material that surrounds a fire. Fuel load is measured by the amount of available fuel per unit area, usually tons per acre.

These are appropriate indicators for this analysis because they give information about potential fire behavior. Resistance-to-control, flame length, and fireline intensity influence how fast firelines can be constructed by firefighters and mechanical equipment. Risks to firefighters, workers, and the public can be assessed from potential fire behavior. The fuel load not only determines whether or not a fire will occur, but together with the type of fuel affects the fire intensity of a fire.

Fuels profiles (i.e. the vertical cross section of a fuel bed down to mineral earth showing fuels type, size and amount) were gathered and analyzed using representative 1/50th acre plots throughout the project area. The data was used with the Forest Vegetation Simulator (FVS) to compare current fuel loading to projected future conditions. In some portions of the project area where FVS projections exhibited a high standard of deviation, additional plots were sampled to produce a more representative fuels profile.

Fire and Fuels Methodology by Action

In this analysis, the Rim Recovery project treatment unit area is defined as the area where timber salvage harvest and fuels reduction treatments are proposed by alternative under chapter 2 of the EIS. The direct and indirect fire effects analysis area includes 178,419 acres within the Rim Fire perimeter, but does not include Yosemite National Park. The cumulative effects analysis area boundary for fuels is the entire 257,314 acre Rim Fire area. The analysis ranges in elevation from 2,800 feet to 7,100 feet and includes conifer forests, hardwood forests, chaparral, annual grasslands and riparian areas.

The dynamics between vegetation and fire and fuels are inherently linked. Fire has a profound effect on vegetation establishment and development and conversely, vegetation treatments (and the absence thereof) have a profound effect on fuels accumulations and fire behavior. The analysis considers forest vegetation, fuels, and fire at the stand and landscape level.

The direct, indirect, and cumulative effects analyses are based on a 20 year timeframe. Existing conditions include past projects, including timber harvesting, wildfires, watershed improvements, and other activities as listed in Appendix B. Modeling indicates that within 20 years, fuels profiles change dramatically after fire and extend beyond the fire return intervals for most of the project area (Collins et al. 2007).

The effects on fire behavior and fire suppression capability for each alternative were analyzed. Analyses of fire effects used flame length and fireline intensity based on fuel models. Dead fuels, used in fuel models, are described by size. For example 1-hour fuels are typically fine, flashy fuels smaller than 0.25 inches in diameter, 10-hour fuels are 0.25 to 1 inch in diameter, 100-hour fuels are 1 to 3 inches in diameter and 1000-hour fuels are often termed coarse woody debris and greater than 3 inches in diameter. The hour refers to the timelag principle that is the amount of time a particular size fuel takes to reach 63 percent of the difference between its initial and equilibrium moisture content. Fuel models are described by the volume of 1-hour, 10-hour, 100-hour, and 1000-hour dead fuels; herbaceous and woody live fuels; and fuel bed depth and moisture of extinction (the fuel moisture content, weighed over all fuel classes at which a fire will cease spreading). Coarse woody debris (CWD) is 1,000 hour dead fuel, with a minimum diameter (or an equivalent cross section) of 3 inches at the widest point and includes sound and rotting logs, standing snags, stumps, and large branches (located above the soil) (Enrong et al. 2006; Harmon et al. 1986). Fuel conditions resulting from implementation of each of the alternatives will have associated effects on fire behavior. Analysis for this project is done on an individual treatment unit basis; however, when treatments are concentrated in an area there are additive effects. Treated areas in this project along with past and reasonably foreseeable treatments in the vicinity of the project area are analyzed.

Fire effects are estimated as the predicted flame length (feet) and the predicted fireline intensity (British Thermal Units (BTU) per foot per second) at the flaming front. Resistance-to-control ratings in Table 3.05-1 were based on the assumption that few downed pieces greater than a 10-inch diameter were present. For each level of 0-3 inch diameter fuel loading (5, 10, or 15) a loading threshold for 3-10 inch diameter fuel is displayed to meet the high and extreme resistance to control levels. In computing the ratings, the number of large pieces (greater than 10 inches) by length class is more important than their loading in determining resistance-to-control. The more pieces greater than 10-inch diameter, the less 3- to 10-inch diameter material would be required to reach the high and extreme resistance-to-control ratings (Brown et al. 2003).

Table 3.05-1 Relationship of Fuel Loading to Resistance-to-Control

0 to-3 inch diameter (Tons Per Acre)	**3 to 10 inch diameter** (Tons per Acre)	
	High	**Extreme**
5	25	40
10	15	25
15	5	15

Increased flame lengths can increase the likelihood of torching events and crown fires. Flame length is influenced in part by fuel type, fuel arrangement, fuel moisture, and weather conditions. Resistance-to-control, flame length, and fireline intensity influence production rates, or how fast firelines can be constructed by different suppression resources, including hand crews and mechanical equipment. Flame lengths over 4 feet, fireline intensities over 100 BTU per foot per second, or high resistance-to-control may present serious control problems. These conditions are too dangerous to be directly contained by hand crews (Schlobohm and Brain 2002; Andrews and Rothermel 1982). Flame lengths over 8 feet or fireline intensities over 500 BTU per foot per second are generally not controllable by ground-based equipment or aerial retardant and present serious control problems including torching, crowning, and spotting.

Flame length and fireline intensity directly affects suppression tactics. Table 3.05-2 outlines how flame lengths and fireline intensities influence fire suppression actions (Andrews et al. 2011). Predicting the potential behavior and effects of wildland fire is an essential task in fire management. Mathematical surface fire behavior and fire effects models and prediction systems are driven in part by fuelbed inputs such as load, bulk density, fuel particle size, heat content, and moisture of extinction. To facilitate use in models and systems, fuelbed inputs have been formulated into fuel models (Scott and Burgan 2005). Table 3.05-3 displays a list of fuel models that are or can be expected to be in the project area over the next 20 years.

Firefighters dig line with handtools to control the fire spread

Table 3.05-2 Surface Fire Flame Length and Fireline Intensity Suppression Interpretations

Flame length		Fireline intensity		Interpretation
Feet	Meters	Btu/ft/s	kJ/m/s	
< 4	< 1.2	< 100	<350	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
4 – 8	1.2 – 2.4	100 – 500	350 – 1700	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8 – 11	2.4 – 3.4	500 – 1000	1700 – 3500	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective
> 11	> 3.4	> 1000	> 3500	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Table 3.05-3 Fuel Models

Fuel Model	Description	Predicted Flame Length (feet)	Fireline Intensity (BTU/ft/second)
NB9	Bare Ground	0	0
GR1	Short Grass Low Load	0-3	45
GR2	Short Grass Moderate Load	1-8	300
GS2	Grass and Shrub	4-8	500
SH1	Low Load Shrub	0-1	125
SH2	Moderate Load Shrub	1-4	400
SH5	High Load Shrub	12-25	3700
TL1	Recently Burned	0-1	5
TL2	Low Load Broadleaf Litter	0-1	7
TL4	Small Down Log	1-4	25
TL5	High Load Conifer Litter	1-4	50
TL7	Large Down Logs	1-4	50
TL8	Timber Litter	1-4	150
SB4	Blowdown with brush and small tree intermixed	12-25	3000

FlamMap (Finney 2006) is designed to examine the spatial variability in fire behavior assuming that fuel moisture, wind speed and wind direction are held constant in time, thereby allowing for more direct comparison of fuel treatment effects. FlamMap's features allow the user to easily characterize fuel hazard and potential fire behavior, as well as analyze fire movement and fuel treatment interactions. The fuel models that are used in this analysis are from publication RMRS-GTR-153 (Scott and Burgan 2005). Fuel models used are estimates of what the fuel loading and fire behavior are currently and what is predicted in the future allowing for vegetation regrowth and the falling of dead trees. The results of the calculations and estimates are intended to show trends and potential effects and are not statistically accurate.

Fire behavior modeling uses three primary input variables: fuels, topography and weather to calculate fire behavior. Because fuels are the primary variable that management activity can influence it will be the variable for this analysis. Field inventories were conducted to quantify existing vegetation and fuel loads in the project area. Treatment units within the analysis area were inventoried using on-site photo interpretation, and the Forest Vegetation Simulator (FVS). These treatment units are representative of the project area and the areas to be treated in the action alternatives. Data was collected on live and dead trees. This data was used in the following analysis, data tables, graphs, and charts and are incorporated by reference. The FlamMap modeling system was used to estimate average fire behavior for each alternative. Flame length and fireline intensities were then used to measure the effects of all alternatives.

Field inventory data from the treatment units was stratified by site class to best represent the range in average conditions between higher and lower sites and were used as input to the FVS and the Fire and Fuels Extension (FFE) (Dixon 2002; Rebain 2010). FVS-FFE is a well-established tree and stand growth model that is supported and maintained by the Forest Service. A specifically calibrated variant of FVS is available for the Western Sierra Nevada. Stand development over time is modeled using existing stand conditions, as provided by post-fire field inventories. Salvage harvest and reforestation actions are modeled to provide estimates of future fuels, snags, and stand development based on realistic and predictable inputs. The model was used to quantify existing conditions and to predict the effect of alternative treatments on forest development. Model results are used to highlight relative differences, not absolute conditions. No future activities, fires, or natural regeneration events are included in the growth simulations due to the variable and unpredictable nature of such events.

For modeling purposes the fire weather adjective defined as High (90th percentile weather) was used to predict fire behavior in the analysis area. Table 3.05-4 displays the 90th percentile values taken from the Fire Family Plus (Main et al. 1990) program using the Mount Elizabeth Remote Automated Weather Station during the period of April 1, 1970 to October 31, 2013.

Table 3.05-4 Weather Parameters High Conditions (90th Percentile Weather)

Parameter	Value
1-hour fuel moisture (0 to 0.25 inch diameter)	4%
10-hour fuel moisture (0.25 to 1 inch diameter)	5%
100-hour fuel moisture (1 to 3 inch diameter)	7%
1000-hour fuel moisture (3 inch plus diameter, CWD)	9%
Herbaceous fuel moisture	30%
Woody fuel moisture	70%
20-foot wind speed	10 miles per hour

Affected Environment

CHARACTERISTIC FIRE REGIMES

Sierra Nevada forests are characterized by distinct wildfire patterns defined as fire regimes. Fire regimes are the combination of fire frequency, predictability, intensity, seasonality, and extent characteristic of fire in a particular ecosystem (Barrett et al. 2010, Sugihara et al. 2006). The common fire regimes found within the Sierra Nevada are defined in Figure 3.05-1 and displays these five fire regimes:

I. 0 to 35-year frequency and low (surface fires most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced);
II. 0 to 35-year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced);
III. 35 to 100 plus year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced);
IV. 35 to 100 plus year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced); and,
V. 200 plus year frequency and high (stand replacement) severity.

It is well documented that fire regimes are an important process in Sierra Nevada ecosystems and that large, mid-summer fires occurred frequently in pre-settlement times (Van Wagtendonk and Fites-Kaufman 2006, Van de Water and Safford 2011, Mallek et al. 2013). Fire regime changes due to land management practices and climate in the historic period have resulted in the altered spatial complexity of fuels and subsequently altered fire intensity, severity and fire type in many Sierra

Nevada forest types (Skinner SNEP, van Wagtendonk et al. 2006). Table 3.05-5 summarizes the key elements of characteristic pre-settlement fire regimes for the major forest types occurring within the Rim Fire (Mallek et al. 2013).

Table 3.05-5 Presettlement fire rotation for the major forest types in Rim Fire area

Forest type	Fire rotation – Range in years (average)
Oak Woodland	12-25 (18)
Dry Mixed Conifer	11-34 (23)
Moist Mixed Conifer	15-70 (31)
Yellow Pine	11-34 (22)
Red Fir	25-76 (61)
Lodgepole Pine	46-80 (63)

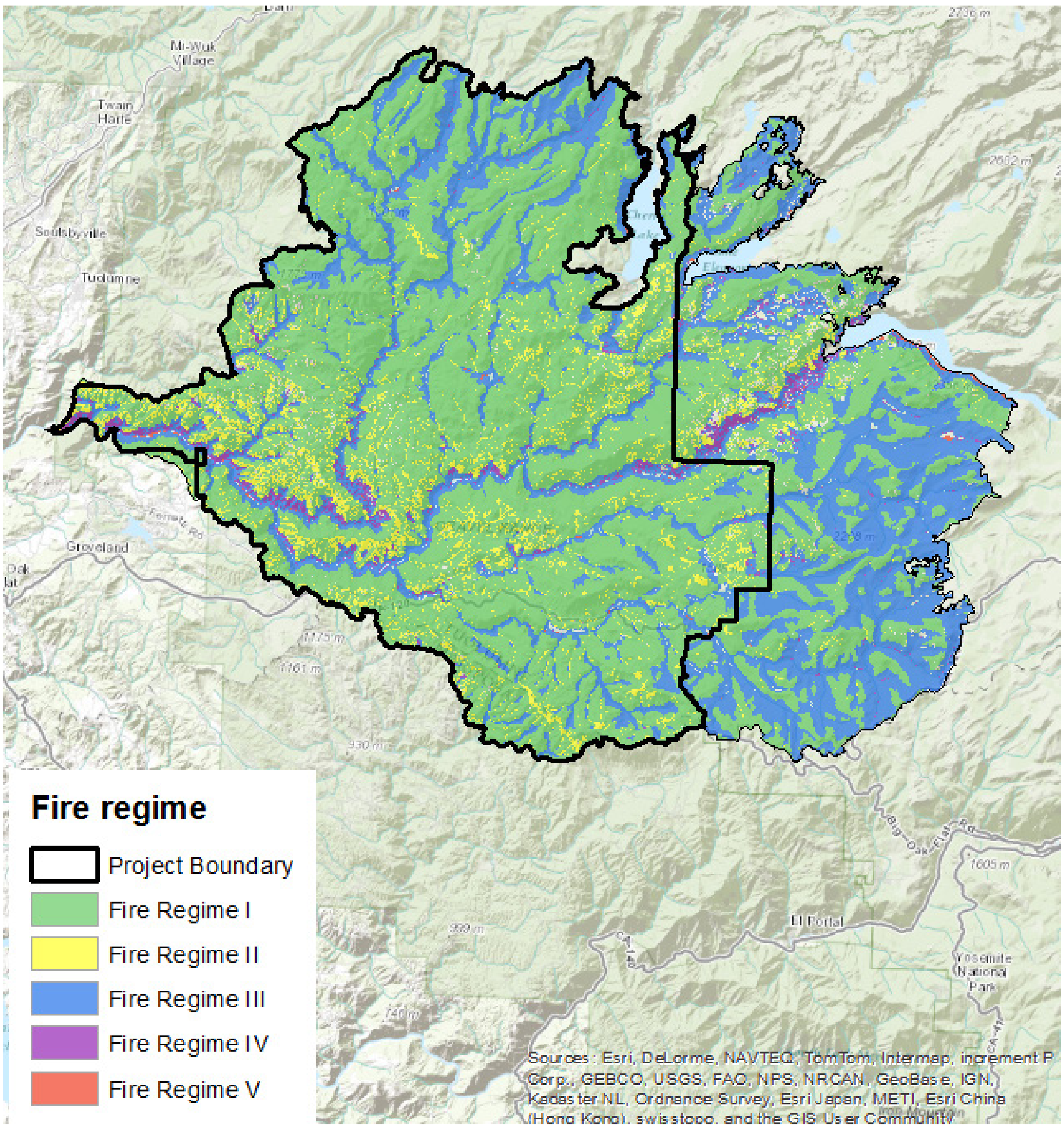

Figure 3.05-1 Fire Regime Map

The majority of the Rim Fire area is classified as Fire Regime I (Landfire 2014). The Rim Fire was not characteristic of Fire Regime I. Fires in this regime are generally nonlethal to the dominant vegetation and do not substantially change the structure of the dominant vegetation. Approximately 80 percent or more of the above ground dominant vegetation survives fires (Brown and Smith 2000). Within the 257,314 acre fire perimeter, 48 percent of the area categorized as Fire Regime I exhibited fire vegetation burn severity that was uncharacteristically high. Within the 176,768 acre analysis area, 125,046 acres were expected to burn at low to moderate severity consistent with Fire Regime I. In reality 49 percent (61,335 acres) of the analysis area classified as Fire Regime I burned at high fire severity. This Fire Regime burned with the most uncharacteristic and damaging vegetation burn severity. The 14,641 acres classified as Fire Regime II burned with somewhat lower vegetation burn severity than expected. The 31,079 acres classified as Fire Regime III burned with mixed severity as expected. The areas classified as Fire Regime IV and V accounted for very little of the total analysis area (3,292 acres) and burned with slightly lower than expected fire severity. Within the analysis area 2,710 acres did not burn. Figure 1.04-2 shows the Rim Fire Vegetation Burn Severity. Table 3.05-6 compares the expected fire severity as defined by Landfire (2014) with the actual Rim Fire severity by Fire Regime.

Table 3.05-6 Analysis Area Comparison of Expected and Actual Fire Severity by Fire Regime

Fire Regime	Fire Frequency	Fire Severity	Expected Fire Severity Acres	Actual Fire Severity Acres		
				Low	Mixed	High
I	0-35 years	Low to Mixed	125,046	20,588	43,123	61,335
II	0-35 years	High	14,641	1,573	5,095	7,972
III	35-100 plus years	Mixed	31,079	10,709	11,482	8,888
IV	35-100 plus years	High	3,095	436	1,337	1,322
V	200 plus years	High	197	82	83	32
No burn	N/A	N/A	2,710	2,710		

As can be seen from the table, the Rim Fire deviated widely from the expected severity acreage (based on the fire regime). Similar to other Sierra Nevada forests that are dominated with mixed conifer trees with a history of frequent fire an increase in tree density and shifts in species composition has occurred in the absence of fire (Knapp et al. 2013). Early logging, which removed many of the largest and most shade-intolerant trees, has also altered the structure of stands. Other legacies of historical land use may have contributed to forest densification by removing understory vegetation and fuels, thereby affecting the fire regime. The increase of acreage of actual fire severity that was experienced in the Rim Fire area is indicative of this shift in fire regime.

CONTEMPORARY FIRE REGIMES

Contemporary fire regimes are greatly altered from historic fire regimes throughout the western United States, including the Rim Fire area. Based upon a thorough literature review, Mallek et al. (2013) conclude:

> "Modern rates of burning are far below pre-settlement levels for all forest types. However, there were major differences between low to middle elevation forests and high elevation forests regarding the components of the departure. Low and middle elevation forests are currently burning at much higher severities than during the pre-settlement period, and the departure in fire area is overwhelmingly expressed in the low to moderate severity categories; in these forest types, mean annual area of high severity fire is not notably different between the modern and pre-

settlement periods. In higher elevation forests on the other hand, the modern departure in fire area is expressed equally across fire severity categories."

Existing Conditions

In many places in the western United States, organic matter is produced at a higher rate than it can be cycled by decay. The accumulation of this woody material may increase the likelihood of severe stand replacing wildfires. Over time, fuels buildups continue and become more continuous in distribution. As a consequence, subsequent occurrence of high-severity fires result in generally greater changes in plant compositions and structure than would occur if the communities had been subjected to more frequent low-intensity fires (DeBano 1998), as was common in pre-European times. As the frequency of low-intensity fires has decreased throughout the west, including in the Rim Fire area, fuel levels in excess of those produced in pre-European times have accumulated. Uncharacteristically high fuel levels create the potential for fires that are uncharacteristically intense (Franklin and Agee 2003). Fire risk is elevated in areas of human development, high-recreational use and along major roads. There is a need to reduce fuel loadings to meet desired levels and reduce adverse impacts from future wildfires.

PRE-FIRE CONDITIONS

As with many areas in the Sierra Nevada, the landscape through which the Rim Fire burned has been heavily influenced over the last 150 years by past management activities and natural occurrences that include mining, grazing, harvesting, fire exclusion, large high-severity fires, and more recent drought-related mortality during the late 1980's and early 1990's. At the stand level, the combination of past management activities, fire exclusion, and extensive drought related mortality had created relatively homogeneous areas typified by small trees existing at high densities (Oliver 1996).

High stand densities and high fuel loads were created by overstocked stands with high accumulations of ladder fuels and canopy fuels. The combination of these factors increases the potential for stand-replacing high-severity fire events which was unfortunately realized when the Rim Fire burned across the landscape.

The Rim Fire burned small densely spaced trees.

Fire Return Interval Departure

Fire return interval departure (FRID) is an assessment of changes in fire occurrence from pre-settlement to current times based upon fire history, vegetation type and the characteristic pre-settlement fire return intervals for those vegetation types (Safford and Van de Water 2014). Prior to the Rim Fire, some of the area inside the footprint burned multiple times, as shown in Figure 1.02-5. Other areas have not burned within the recorded fire history. FRID condition class categories represent departure between the historic fire occurrence and the recent fire history. As shown in Figure 3.05-2, much of the Rim Fire footprint: 1) was identified as moderate to high FRID condition class, 2) has burned less frequently, and 3) is more departed from historic condition. Prior to the fire, the moderate to highly departed areas were also heavily departed in snag density, tree size and density distribution and spatial continuity (Collins et al. 2011, Knapp et al. 2013, Lydersen et al. 2013). Similarly, the low departure areas had burned recently and the fire return intervals and recent fire history were closer to historic patterns.

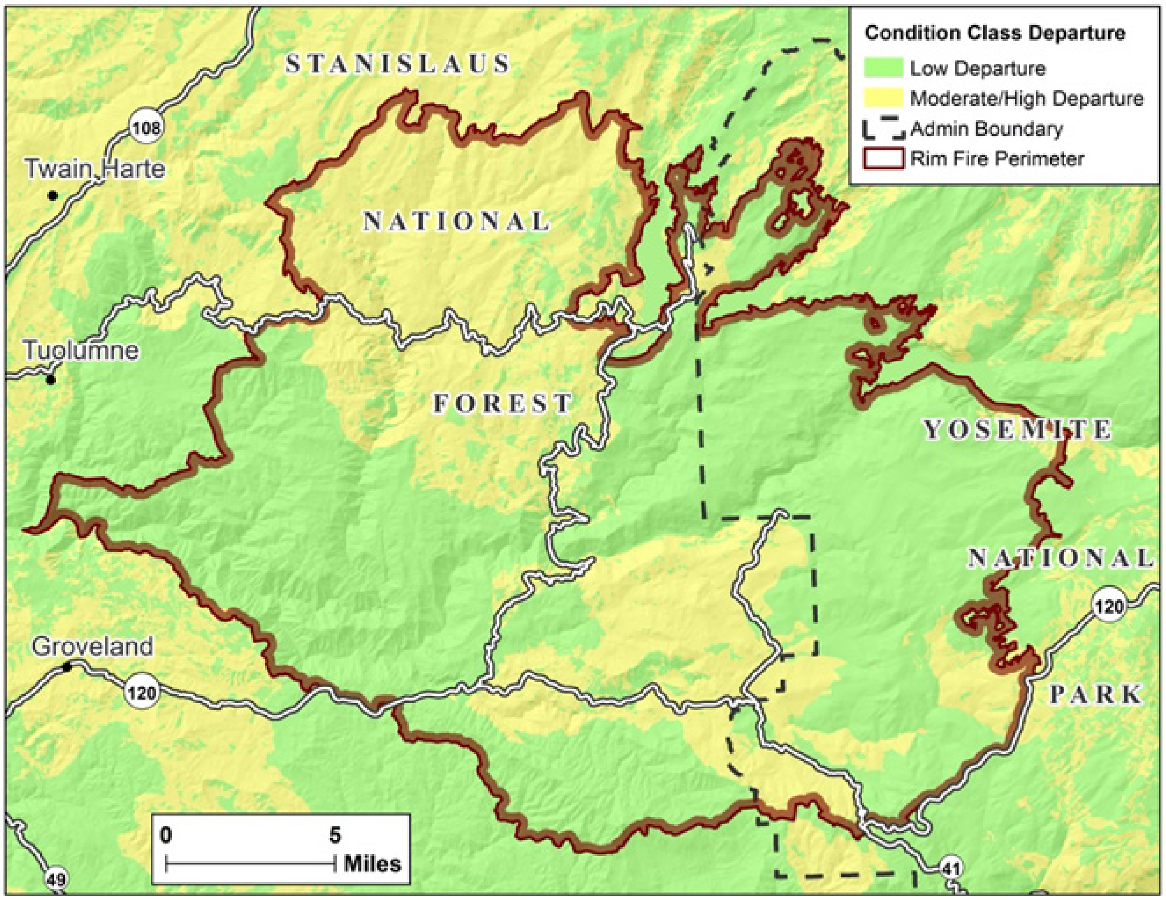

Figure 3.05-2 Fire return interval departure

Change to Stand and Fuel Structure

Exclusion of fire, from the middle elevation Sierra Nevada forests since the late 1800's, has resulted in significant change to fuel structure, tree density, and composition. Recent research in the Rim Fire area emphasizes the homogenization of mixed conifer forests and increases in factors promoting large contiguous areas of high severity fire. Knapp et al. (2013) found that 120 years of fire exclusion on the Stanislaus National Forest has resulted in uniformly increased tree density, crown closure and ladder fuels in both previously logged and unlogged stands. Collins et al. (2011) found nearly a doubling of the total live tree carbon stocks in the present forest compared to historical conditions in western Yosemite National Park and cautions that average conditions alone are an oversimplification of highly variable historical forest conditions. Lydersen et al. (2013) conclude that the contemporary forest is more homogenous than it was historically. Therefore, variability, that likely provided diverse microclimate and habitat conditions and fostered resilience to a variety of stressors and disturbances such as fire, insects, and drought, has been lost.

High Severity Fire

Low, moderate and high severity fire can occur in each of the Rim Fire forest types. Post-fire habitats created by fire, including early seral habitat that are initiated in patches of high severity fire, are important habitat elements. Recently burned forests can have dense patches of snags, abundant downed logs, montane chaparral patches and highly variable natural conifer regeneration (Swanson et al. 2010). Snags are created whenever a live tree dies from a mortality agent such as insects, disease or physical injury, including windthrow and fire. Post-fire, early seral habitat conditions are one of the important stages in ecosystem development and provide multiple benefits to many species (Hutto 2008, Hanson and Odion 2008). Fire-related seral-stage heterogeneity contributes to within and between stand heterogeneity to maximize the presence of numerous species (White et al. 2013).

The rotation of high severity fire has become an area of study and management concern, with recent studies published on the topic from the Sierra Nevada (Miller and Safford 2008, Miller et al. 2012, Mallek et al. 2013, Baker 2014). Fire rotation is the length of time necessary for an area, equal to the entire area of interest, to burn. This area of interest is clearly defined (units - years/area). Data from Table 3 in Miller et al. (2012) yields contemporary high severity rotation for mixed conifer and yellow pine of 630 years combined for Forest Service and Yosemite NP (639 years for FS only). Mallek et al. (2013) found a very similar rotation of 563 years (data from Mallek's Tables 1 and 3). Based upon those rotation estimates and an estimate of around 6 percent (Table 5) high severity on average for pre-settlement fires would result in a mixed conifer/yellow pine pre-settlement high severity rotation of between 200 and 691 years (Mallek et al. 2013). Baker (2014) found the high severity fire rotation for Sierra Nevada mixed conifer to be 281 years in the north and 354 years in the south.

Although research in the Sierra Nevada has provided conflicting results about current trends of high-severity fire (Miller and Safford 2008, Miller et al. 2012, Hanson and Odion 2014), the proportion of fire studied in the research that is high severity is higher than in pre-settlement estimates. In low and middle elevation forests like yellow pine and mixed conifer, the critical deficit is in low and moderate severity fire and the management focus must be not only on increasing the area burned, but also replacing high severity acres with low and moderate severity acres (Mallek et al. 2013). The majority of the Rim Fire area is in low and middle elevation forests.

POST-FIRE CONDITIONS

High Severity Patch Sizes as Compared to the Natural Range of Variability

The patch size of high severity wildfire is a major concern as this has had a major impact on values such as timber and wildlife habitat (Skinner and Chang 1996; Scholl and Taylor 2010). From 1984 to 2006 the mean high severity patch size for fires on NFS lands, similar to what was in the Rim Fire, nearly doubled (Miller et al. 2009). The Rim Fire was dominated by large patches of high severity fire with the largest patches of stand replacing fire ranging from 1,316 acres to 42,807 acres and accounting for 75 percent of the stand replacing fire. Compared to high severity patch sizes, in adjacent Yosemite National Park, these far exceed current reference sites and are well outside the natural range of variability (Collins and Stephens 2010, Safford 2013). These large patch sizes also exceed the 23,227 acre (9,400 hectare) largest patch size reported by Baker (2014). Miller et al. (2012) warn that uncharacteristically large high severity patches can lead to forest structure homogenization which can be enlarged and perpetuated over subsequent re-burns. This could be a management concern for species that may rely upon later-seral-stage conifer forests.

The total size of the Rim Fire remains within the natural range of variability as we are only recently beginning to approach fire sizes that are within the upper end of the pre-settlement natural fire size (Collins and Stephens 2010; Collins and Stephens 2012). However, fire severity patterns are uncharacteristic, when compared to historic fire regime patterns described by Miller et al. 2012, Mallek et al. 2013, and Baker 2014. Fire severity can be defined by the mortality of vegetation using such metrics as the Rapid Assessment of Vegetation Condition initial, immediate post-fire composite burn index map (RAVG 2013). Although vegetative severity mapping of the Rim Fire showed that nearly 40 percent of the landscape had high burn severity (75 to 100 percent decrease in vegetative canopy cover), this severity was highly variable across the landscape. Differences were observed in fire severity patterns between the areas that burned August 21st and the 22nd (the two large-growth days) and the remaining fire days. Fire intensity and severity on August 21 and 22 were highly influenced by the prevailing weather conditions. Of the almost 90,000 acres burned during those two days, 60 percent of the area was initially categorized as high severity. This far exceeds the levels that are described for historic fire regimes from the literature (Miller et al. 2012, Mallek et al. 2013, Baker 2014). Through the remaining days, fire severity was well distributed by severity type with only about a quarter of the area burning in high severity, more closely matching historic fire regime ratios (Safford et al. 2011, Havlina et al. 2010, Mallek 2013, Baker 2014).

Figure 3.05-3 shows an example the Rim Fire's high vegetation burn severity. In the high severity portions of the Rim Fire there are few surface fuels other than occasional patches of shrub, duff, and litter that remain post-fire. The standing material consists mainly of scorched trees. The patches of litter that remain will burn, but there is currently no continuity for fire spread. Ladder fuels and standing trees were either completely consumed or resulted in only boles. These severely burned areas will not currently support a new large fire or crown fire. This will change with time as limbs and dead trees fall and vegetation sprouts.

In the remainder of the burned areas (150,695 acres) the fire created a mosaic, leaving trees with brown needles and surviving trees as well as surface fuels ranging from completely consumed to pre-fire levels. Fires in this area of the project will burn with mixed fire severity. A mixed-severity fire exhibits a wide range of effects on the dominant vegetation from little effect on soil heating or overstory vegetation to complete canopy mortality or extensive soil heating.

Figure 3.05-3 High severity fire climbing into the trees

High Severity Reburn

A reburn occurs when one fire burns areas inside the perimeter of a previous fire. Following a fire such as the Rim Fire, variable severity patterns leave behind different densities of fire killed trees. As these snags fall they contribute to elevated surface fuels (McIver and Ottmar 2007). As a result areas that burn at high severity in one fire are vulnerable to future high severity fires (Ritchie et al. 2013). This vulnerability is directly correlated to remaining stand density of fire killed trees, tree species, time since fire and postfire events on the landscape (Peterson et al. 2009, Ritchie et al. 2013). There is growing concern for areas that reburn in previously large patches of high severity fire that were left untreated or treated with postfire logging (Long et al. 2014). The long-term effects of reburns, particularly as it relates to the ecological integrity of a post-fire forest have been documented by scientific studies, expert observation, and anecdotal evidence, but to date no systematic study has been completed in the Sierra Nevada.

The risk of the high severity patches in the Rim Fire reburning as high severity patches in future fires is real and significant. Both smaller and larger diameter wood can lead to higher fire hazard. The role of large wood is not always appreciated because it is not considered in fire spread models (Agee et al. 2000) and mainly affects fire behavior in the long term. Once snags and downed logs start to rot, this wood is frequently a source of embers and receptive to embers, leading to fire spread through spotting (Harrington 1982; Brown 2003). Also, the heat content of large logs is considerable and frequently the root cause of torching and extreme fire behavior. If a wildfire burns in an area with lots of dead and down rotten wood, it is unlikely that the young regenerating forest will survive. The small diameter wood is a shorter-term fire hazard and does contribute to fire spread at the flaming front, and whether this presents a problem or not depends greatly on the salvage methods used (Knapp et al. 2005; Stephens et al. 2007; Uzoh and Skinner 2009).

The increased risk of high severity fire is due primarily to 1) increased fire residence time, and severity as heavy fuels have high heat content and burn longer and heat deeper into the soil and 2) reduced ability to control subsequent fires due to the heavy fuels and hazard to firefighters from standing and down large trees. McGinnis et al. (2010) found that, although logging of fire killed trees increased dead fuel loads in the short term, fire behavior was not modeled to be different between logged and untreated stands. However, the role of large wood is not fully recognized in fire spread models. Agee et al. (2000) stated that fire killed trees and large logs do strongly influence fire effects. Harrington (1982) and Brown (2003) found that fire-killed trees contribute to extreme fire behavior through production of large amounts of heat energy, which increases crowning and spotting potential. Fire consumption of these larger fuels increases as decomposition progresses (Knapp et al. 2005, Uzoh and Skinner 2009). Decomposed large woody fuels are also receptive to ignition by embers, especially when dry (Estes et al. 2012, Zhao et al. 2014).

In dry forests of interior western North America, large woody debris was limited historically by frequent fire that consumed logs (Skinner 2002). An excess of CWD in the project area could result in a fire with intensity similar to that as seen during the Rim Fire of 2013. A fire of this magnitude could result in damage to homes and property, as well as resource damage from the fire and associated suppression actions to contain this type of fire (Long et al. 2014). In addition, fire suppression actions could be hindered by the fire effects associated with a high loading of CWD (Brown et al. 2003) by slowing fireline production (resistance-to-control) rates and limiting suppression resources to indirect attack with heavy equipment (Andrews et al. 2011).

There are mixed and differing views regarding the removal of dead trees and the severity of future fires (Bond et al. 2009, Peterson et al. 2009). The literature concerned with postfire landscapes was synthesized recently in Long et al. (2014). Studies at a productive site in Oregon indicated that areas burned at high severity in one fire led to a condition dominated by an early seral condition characterized by shrubs and tree regeneration. These areas had a tendency to burn at high severity in subsequent fires (Thompson and Spies 2010, Thompson et al. 2011). As in many studies that are retrospective, little knowledge of the pretreatment area was available and few areas were considered that were not salvaged. Van Wagtendonk et al. (2012) found that post-wildfire fuel loading influences fire intensity and resistance to control and places fire fighter safety at risk. For example, the 2009 Big Meadows Fire escaped control lines as the fire spotted into natural regeneration and heavy fuels from the 1990 Arch Rock Fire. Spotting well ahead of the main fire also occurred from snag to snag to spread fire outside of control lines and eventually lead to spotting well outside the ability of firefighters to control. Heavy fuel loading and snags were identified in the fire review as a main contributor to fire intensity and spread.

Figure 3.05-4 Conditions 12 years after the Storrie Fire and prior to Chips Fire

Figure 3.05-5 Same view after the Chips Fire passed through this site August, 2012

Recent examples of reburns in northern California include the Bear (2006) and Corral (2013) Fires that reburned the Megram Fire of 1999 on the Shasta-Trinity National Forest, the Chips Fire (2012) that reburned the Storrie Fire in 2000 on the Lassen and Plumas National Forests, and re-burn of the King-Titus Fire (1987) by the Panther Fire in 2008 on the Klamath National Forest. Figures 3.05-4 and 3.05-5 show examples of a burned and reburned area on the Chips Fire.

Some lessons may be learned by looking at the overlap between the 2000 Storrie Fire and the 2012 Chips Fire. Following the Storrie Fire, there was some hazard tree removal. There was no salvage logging or fuels treatment on the remainder of the area. Even though the two fires were only 12 years apart, the proportion of high severity within this overlap was still relatively high at 32 percent. In part, some of the high reburn severity in Chips may be a result of the large accumulation of surface fuels and woody debris that resulted from the first fire event. Figure 3.05-4 shows that in many high severity areas 12 years after the Storrie Fire, none of which were salvage logged or otherwise treated to reduce fuels post fire, fuel loads were represented by high snag densities, thick shrubs as high as 5 feet tall, and a complex arrangement of fallen trees, broken tops and branches intermixed and suspended within a heavy shrub component. It is estimated that overall fuel loading could be as high as 200 tons per acre. These elevated fuel loads and the associated risk of high severity reburn may persist for more than half a century. Figure 3.05-5 shows what these same fuel loads looked like 22 days after the Chips Fire passed through on August 1, 2012.

In summary, trees killed by the Rim Fire pose a hazard to forest workers traveling in these areas. As snags age and deteriorate, they become less stable and increase the risk to forest users. Once this material is on the ground, it contributes to higher fuel loads and fire intensity is likely to increase. Because of the higher fire intensity and increased risk of hazard trees, suppression strategies will be limited.

Environmental Consequences

Alternative 1 (Proposed Action)

Direct and Indirect Effects

The reduction of CWD through salvage harvest and treatment of nonmerchantable fire- killed material encompasses approximately 27,826 acres and 99 miles (3,260 acres) of hazard trees and treatments along strategic roads. The reduction of CWD across the treatment areas would lower fire intensities (Peterson et al. 2009) and provide advantageous areas for fire suppression actions (Fites et al. 2010).

Treatments under Alternative 1 would significantly lower fire intensities and fire effects within the treated units. Suppression forces (such as fire engines and fire fighters) could enter these areas and take appropriate actions as needed to manage fires to achieve the desired condition. The reduction in snags would result in reduced spotting that is associated with snags when they burn.

Salvage harvest would reduce the larger diameter merchantable material greater than 16 inches in diameter from the site. Yarding or biomass removal of nonmerchantable-size material (from 4 inches to 16 inches in diameter), or jackpot burning (JPB), would treat the majority of the nonmerchantable material. Piling or jackpot burning would treat the smaller diameter material (less than 4 inches in diameter) and material remaining after the yardng and biomass removal are completed. After treatments the CWD is estimated to be approximately 10 tons per acre. These areas could be directly attacked with suppression resources, increasing the chance of containing wildfires in the project area while maintaining resource needs (Brown et al. 2003; Fites et al. 2010). Fire-killed trees have lost most of their moisture making them brittle and more susceptible to breakage (Lowell et al. 2010). During the felling and removal process it is anticipated that there would be higher than normal breakage typically associated with timber felling. CWD left on site that does not exceed 10 tons per acre would meet resource needs. This compacted material would have minimal effect on fire behavior and resistance-to-control.

Proposed treatments would alter the spread and effect of fire in the project area. Units were strategically placed to affect fire movement on the landscape and provide advantageous areas for fire suppression actions. As managers continue to move the forest toward the desired condition, fire would be able to resume its natural role in developing and sustaining these ecosystems. Continued management practices can and will alter the effects of wildland fire (Agee and Skinner 2005).

Completed project activities would reduce CWD, lowering fire effects within the treated units. The fuel model in treated units would be represented by TU1 Low Load Dry Climate Timber-Shrub-Grass. The area outside treated units would burn the same as Alternative 2. Placement of the treated units would reduce overall fire size within the project area by reducing fireline intensities and fire effects, providing opportunity for suppression forces to take appropriate actions (Finney 2001). Altering the movement and effects of fire through the project area would result in more natural and mosaic burn patterns.

Fuels on the forest floor would consist of small diameter material and scattered larger logs. Snags and large logs may be present in the units to meet resource needs and Stanislaus Forest Plan Direction. These guidelines were developed with consideration for fire and its role in developing and sustaining these ecosystems. Duff and litter layers are currently not present at a level that would affect fire behavior and retaining the small diameter material on site would help accelerate the development of these layers. Out-year fire effects are expected to be dominated by young shrubs, small trees and hardwoods reoccupying the site.

As the vegetation matures, fuel loadings would increase. Continued maintenance designed to achieve the desired condition would maintain fuels profiles that allow fire to resume its ecological role and meet Stanislaus Forest Plan Direction.

Aerial hazards (snags) within the treated areas, excluding those left for resource needs, would be felled. Suppression forces would not be hindered by the high density of snags or high levels of CWD or by fire effects in the treatment units so immediate and appropriate action could be taken. Suppression actions would not be restricted by fire behavior; thus direct suppression actions would be possible within treated stands (Fites et al. 2010).

The effect on fire suppression forces beyond year 20 would depend on the continued maintenance of the stands. Stands that are maintained and managed to achieve the desired condition would not adversely impact future suppression. Table 3.05-7 displays the projected fire effects and production rates for Alternative 1 within treatment units using the FlamMap 5.0 modeling program.

Table 3.05-7 Predicted average flame lengths, fireline intensity and firefighter production rates

Alternative 1	Flame Length	Fireline Intensity	Suppression Interpretation
1 Year Post-Activity	Less than or equal to 2 feet	Less than or equal to 100 feet	Fires can generally be attacked at the head or flanks by persons using hand tools. Hand line should hold the fire.
Year 5	Less than or equal to 4 feet	Less than or equal to 100 feet	
Year 10	Less than or equal to 4 feet	Less than or equal to 100 feet	
Year 20	Less than or equal to 4 feet	Less than or equal to 100 feet	

CUMULATIVE EFFECTS

Cumulative effects for Alternative 1 include safer access to the area due to the Rim HT project and hazard tree removal along lower Maintenance Level roads in this project. In addition, fuels treatments would improve the safety for all users. Firefighter safety would be improved with the removal of the overhead snags as they pose one of the greatest hazards to firefighters. The treatment of CWD and smaller fire-killed vegetation would result in a reduction in fire effects and resistance-to-control thereby increasing safety during a wildfire event. Reduced fire effects would allow suppression forces to take appropriate action. Fire spread on public lands would be altered, reducing the chance of fire spreading between the public and private lands interface.

Future wildfires within the project area will be affected on a landscape level by the combination of treatments implemented on privately owned Sierra Pacific Industries (SPI) land, the Rim HT project and the adjacent Forest Service (Rim Recovery project treatment units) lands. Fuels treatments are strategically placed and would provide a break in the fuel profiles crossing the project area. This fuelbreak, combined with existing fuelbreaks and private land, would further break up fuel continuities in the area. More opportunities for future suppression actions would therefore be created.

The treatment units running along the west side of the SPI boundary would create lower fire effects by reducing CWD, allowing suppression resources to suppress fires coming into or leaving the private-public land interface. With the removal of fire-killed trees on both the private and public lands, future fuel loading conditions would be reduced and would result in a fire that would burn under more historical conditions. On NFS lands, residual fuels would be reduced to 10 tons per acre. As a result, the treated areas would burn as surface fires with low flame lengths and fireline intensities. These lower-intensity fires could be suppressed using direct attack with handtools.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, no actions would be implemented to address the objectives and desired conditions identified in the Purpose and Need (Chapter 1.03). Existing stand conditions would persist and develop unaltered by active management. Standing snags would persist and the site would be rapidly colonized by grasses, forbs, and shrubs within three to five years. It is a reasonable expectation that non-salvaged stands would develop comparable to that of similar non-salvaged stands in local fires that burned in the recent past. Examples of such fires include the Big Meadow Fire (2009), North Mountain Fire (2008), Early Fire (2004), Stanislaus Complex Fire (1987), and the Ackerson Fire (1996). In those areas, grasses such as cheat grass (*Bromus tectorum*) and shrubs such as Ceanothus (*C. cordulatus, C. velutinus*) and manzanita (*Arctostaphylos patula*) species occupy the site. Standing snags dominate the overstory of the high severity burn areas. Shrub fuels would be established within 10 years similar to shrub regeneration observed in past fires as Figure 3.05-6 shows for the 2009 Knight Fire

Figure 3.05-6 2009 Knight Fire, photo taken in 2013, showing shrub regeneration.

Hundreds of dead trees and very few live trees per acre characterize the forest structure following a high-intensity fire. Snag fall rates are highest the first ten years within the smaller diameter classes, while larger snags persist for relatively longer time periods, which is generally documented in existing scientific literature (Cluck and Smith 2007). Nearly all snags in the Rim Fire area would be expected to fall by 20 years post-fire, contributing to greater fuel loads. The limbs and boles from these fallen trees would accumulate as surface fuels. This fuel is expected to increase each decade as trees fall over. At year 10, surface fuels are projected to be 42 tons per acre. Surface fuels are projected to average 78 tons per acre with up to 280 tons per acre at year 30 due to dead trees falling over. In the event of a wildfire this would create serious control problems and high suppression costs, and high volumes of smoke emissions.

Additional snag recruitment would be expected through delayed mortality in the few live trees per acre. Those live trees injured during the fire may be more susceptible to biotic and abiotic agents that hasten delayed conifer mortality due to reduced tree vigor (Wagener 1961; Hood 2007).

Both grass-forb cover and shrub cover present formidable competition for water and light with tree seedlings. This competing vegetation would likely result in decreased survival of tree seedlings and would inhibit growth for years if not decades. Consequently, the site would likely be occupied by brush intermixed with grass and forbs. Over time, ladder and crown fuels would develop where natural regeneration was established via seed from surviving mature conifers.

Large areas of untreated burned areas would exist. Brush species and standing snags would dominate these areas, and, over time, these snags would fall. The result would be brush fields with high fuel loads arranged in a jackstraw pattern.

Table 3.05-8 displays predicted flame lengths and fireline intensities. Under Alternative 2, flame lengths exceed 4 feet after five years and are projected to exceed 10 feet within 20 years. Fireline Intensities would exceed 500 BTU per foot per second after five years and are projected to exceed 1,000 BTU per foot per second after 10 years. These increased flame lengths and intensities are a direct result of fire burning in dead and down logs, branches, and shrubs. Fires burning in stands under 90th percentile weather conditions in Alternative 2 are expected to result in serious control problems.

Table 3.05-8 Flame lengths and fireline intensities under Alternative 2

Alternative 2	**Flame Length** (feet)	**Fireline Intensity** (BTU/ft/sec)	**Fireline Interpretation**
Existing Condition	Less than or equal to 2 feet	100	Fires can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the fire.
Year 5	Less than or equal to 4 feet	500-1,000	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
Year 10	10	Greater than 1,000	Fires may present serious control problems torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.
Year 20	13	Greater than 1,000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

Access to the fire would be restricted by fallen trees across the roads and by standing roadside danger trees. Fire engines would not be able to access fires using the lower maintenance level roads. Fire size could quickly increase before suppression forces arrive to fight the fire. Fires may be too intense for direct attack on the head by persons using hand tools. Handline may not be relied on to hold the fire. Fires may present serious control problems such as torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective. Under Alternative 2, the general trend in high flame lengths (greater than 10 feet) and corresponding high fireline intensities are expected to continue at least 20 years into the future. Table 3.05-8 displays the projected fire effects and production rates for Alternative 2 using the FlamMap 5.0 modeling program.

Consequently, accessibility would limit future forest management activities due to the high cost of removal and safety concerns. Without treatments, survival and growth of natural regeneration that does become established would likely be reduced due to competing vegetation. These sites would be dominated by brush very similar to those effects seen on public lands as shown in the 2009 Knight Fire (Figure 3.05-6), Big Meadow Fire (2009), North Mountain (2008), Early (2004), Stanislaus Complex (1987), and Ackerson (1996) fires. This could effectively function as a vegetation type conversion from forest cover to brush cover for nearly a century based on observations from areas left to naturally regenerate in the Wright Creek Fire (1949). Over sixty years later, these areas support natural establishment of white fire, incense cedar, ponderosa pine, and sugar pine. However, the area is dominated by brush species and the tree cover is not sufficient to qualify as forest cover.

The No Action Alternative would lead to higher fuel loads from branches and boles of dead and down trees. Over the long term (10+ years), not implementing treatments would result in increased surface fuels. Increased surface fuels would result in increased flame lengths and higher fireline intensities. These would lead to increased firefighter and public risk, and higher costs. Historically fires in the project area were low intensity with less than 25 percent of the stand being killed by fire. Fire effects under the No Action Alternative would result in higher stand loss as seen in the Rim Fire, with over 50 percent of the stand killed. It is expected that some fires, both human and lightning caused, would continue to escape initial attack under more severe weather conditions over the next 20 to 30 years. These fires are expected to kill natural regeneration and residual larger trees. Overall, the No Action Alternative would not reduce potential future surface fuels or predicted fire effects.

Alternative 2 combined with the high fuel loading left in Yosemite National Park would mean that wildfires would cross boundaries with little chance of containing fires under 90th percentile weather conditions. Wildfires would burn until weather conditions changed so effective suppression actions could take place. This is similar to what occurred in the Rim Fire.

CUMULATIVE EFFECTS

Under Alternative 2, the Rim HT project would remove hazard trees along main roads. The maximum extent of these activities would be limited to 150 to 200 feet of either side of main roads. This would provide for safe travel along forest roads. However, due to the scale and scope of the project, large areas of untreated burned areas with brush and standing snags would exist. The access to these areas would be inhibited by hazard trees and downed logs along and on lower Maintenance Level roads. Limited access to areas within the analysis area would slow firefighter access for direct attack.

When the effects of Alternative 2 is combined with the effects of implementing the foreseeable private and Forest activities (Appendix B), this alternative would not create strategic fire management points. Neither would it aid in future fuels management, suppression, and beneficial fire planning objectives. The cumulative effects of No Action would be an increase in fire behavior over time and negative fire effects on the landscape.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Strategic Fire Management Feature (SFMF)

Over the last few decades, SFMFs had been identified along roads and ridgelines to take advantage of natural or topographic features and established roadways. Features were also located adjacent to private property and connected to private Sierra Pacific Industries (SPI) managed land. In addition to fire behavior modification, features create safe travel route options for emergency access and egress.

Trees that were killed by the Rim fire that are within a tree length and a half of all the SFMFs pose a hazard to the public and forest workers traveling and working in these areas. As these snags age, they become less stable and increase the risk to all who use these SFMFs. Within the treated areas, with the aerial hazards (snags) felled and the majority of the CWD removed, suppression forces, unhindered by dense snags, could take immediate and appropriate fire suppression action. Foot travel in the SFMFs would be unimpeded except for the occasional large log. Vehicles would be able to access the area and it would be less hazardous for firefighters and all forest users.

Strategically Placed Landscape Area Treatment (SPLAT)

SPLATs had been identified over the last decade along many features to reinforce and transition the vegetation density across the areas. SPLATs create locations for safer management actions as well. These areas can serve to break up the continuity of the vegetation across the landscape and create mosaic patterns. They also provide a network of opportunities for wildfire management objectives that allow for equal weight of natural resource and ecosystem benefits and protection of private property.

SPLATs and SFMFs were also located adjacent to approximately 163 private properties, Hetch Hetchy water and power infrastructure (which protects the health, safety and economic well-being of 1.7 million citizens, businesses and community organizations), and private Sierra Pacific Industries (SPI) managed land. In addition to fire behavior modification, SPLATs and SFMFs create safe travel route options for emergency access and egress. Figure 7 shows an example of fire approaching a structure in an area where ground fuel levels are low. Table 3.05-9 displays some of the larger populated areas defended by these SPLATs and SFMFs.

Table 3.05-9 Population areas adjacent to SPLATs and SFMFs

Population areas adjacent to SPLATs and SFMFs		
Businesses and Camps	**Communities**	**Ranches**
Bay Area Water Supply & Conservation Agency (Hetch Hetchy)	Buck Meadows Town	Drew Meadow Ranch
Berkeley Summer Camp	Harden Flat Community	Guinn Ranch
Evergreen Lodge	Hulls Meadow Community	Meyers Ranch
San Francisco Recreation Community Camp (Mather)	Packer Canyon Community	Quinn Ranch
San Jose Summer Camp	Peach Growers Community	Rogge Ranch
Spinning Wheel Vacation Rentals	Sawmill Mountain Community	
Tawonga Jewish Camp		

Similar to Alternative 1, Alternative 3 would reduce CWD through salvage harvest and treatment of nonmerchantable fire-killed material. Alternative 3 would encompass 30,399 acres and 315 miles (15,253 acres) of SFMFs. Treatments would lower fire intensities and provide advantageous areas for fire suppression actions.

Completed project activities would reduce CWD, lowering fire effects within the treated units. The fuel model in treated units would be represented by TU1 Low Load Dry Climate Timber-Shrub-Grass. Placement of the treated units would reduce overall fire size within the project area by reducing fireline intensities and fire effects by providing opportunity for suppression forces to take appropriate actions (Finney 2001). Altering the movement and effects of fire through the project area would result in more natural and mosaic burn patterns.

Salvage harvest would reduce the larger diameter merchantable material greater than 16 inches from the site; biomass removal (from 4 inches to 16 inches in diameter) and jackpot burning (JPB) would treat the high density of the nonmerchantable material. Piling and jackpot burning would treat the smaller diameter material and material not included in the previous treatment. After treatments the CWD in units outside SPLATs and SFMF units is estimated to be between 10 to 20 tons per acre and

10 tons per acre inside SPLAT and SFMF unitshese areas can be directly attacked with suppression resources, increasing the chance of containing wildfires in the project area while maintaining resource needs (Brown et al. 2003). CWD that is below the handpile specifications and does not exceed 10 to 20 tons per acre would be left on site. As Table 3.05-7 shows, this compacted material would have minimal effect on fire.

Figure 3.05-7 Lower ground fuels keep fire on the ground and help protect structures

Alternative 3 would result in relatively lower surface fuel loads, potential flame lengths, and potential mortality. Fuel loadings and potential flame lengths would be lowest in ground-based salvage harvest units where the treatment of submerchantable material (via biomass harvesting and removal or site preparation) would occur. While there is still potential for tree mortality in treated areas, it would remain lower than that of Alternative 2 for wildfires occurring under 90th percentile weather conditions.

Fuels on the forest floor would consist of small diameter material and scattered larger logs. Snags and large logs may be present in the units to meet resource needs and Stanislaus Forest Plan Direction. These guidelines were developed with consideration for fire and its role in developing and sustaining these ecosystems. Duff and litter layers are currently not present at a level that would affect fire behavior and retaining the small diameter material on site would help accelerate the development of these layers. Out-year fire effects are expected to be dominated by young shrubs, small trees and hardwoods reoccupying the site.

As the vegetation matures, fuel loadings would increase. Continued maintenance designed to achieve the desired condition would maintain fuels profiles that allow fire to resume its ecological role and meet Stanislaus Forest Plan Direction.

Fuels treatments are strategically placed and would provide a break in the fuel profiles crossing the project area. This break in fuels, combined with existing fuelbreaks, SPLATs, and SFMFs, would further break up fuel continuities in the area, creating more opportunities for future suppression actions and safer ingress and egress routes. In addition, the strategic placement would increase fire suppression safety, reduce potential resource damage, and potentially lower suppression costs.

Cumulative Effects

The cumulative effects for Alternative 3 are similar to Alternative 1 in having lower intensity fires and lower resistance-to-control. However, Alternative 3 would reduce residual fuels to approximately 10 to 20 tons per acre on treated NFS lands with closer to 10 tons per acre in the SPLATs and SFMFs, breaking up the fuel profiles more and providing more strategic opportunities for future suppression actions.

Alternative 4

Direct and Indirect Effects

Alternative 4 would reduce CWD through salvage harvest and treatment of nonmerchantable fire-killed material. Alternative 4 would encompass 27,826 acres and 325 miles (15,692 acres) of SFMFs. Treatments would lower fire intensities and provide advantages similar to Alternative 3 and would reduce the CWD to be between 10 to 20 tons per acre, but on 494 fewer acres than Alternative 1 and 2,571 acres less than Alternative 3. Effects on treated acres would be similar to Alternative 3.

Cumulative Effects

The cumulative effects for Alternative 4 are similar to Alternative 3, but with fewer treated acres.

Summary of Effects Analysis across All Alternatives

The purpose of the project, as stated in Purpose and Need in relation to fire and fuels, is to provide for worker and public safety and to reduce fuels for future forest resiliency.

Worker and public safety

Alternative 1, 3 and 4 will improve the safety for workers and the public, due to removal of hazard trees along lower Maintenance Level roads. In addition, fuels treatments will improve the safety for all users of the area. Firefighter safety would be improved with the removal of the overhead snags as they pose one of the greatest hazards to firefighters. The treatment of CWD and smaller fire-killed vegetation would result in a reduction in fire effects and resistance-to-control thereby increasing safety during a wildfire event. Reduced fire effects would allow suppression forces to take appropriate action. Fire spread on public lands would be altered, reducing the chance of fire spreading between the public and private lands interface.

Under Alternative 2, the Rim HT project would remove hazard trees along main roads. The maximum extent of these activities would be limited to 150 to 200 feet of either side of main roads. This would provide for safe travel along forest roads. However, due to the scale and scope of the project, large areas of untreated burned areas with brush and standing snags would exist. Safety for workers and the public would be improved only in the long-term as overhead snags naturally decay and fall. The access to these areas would be inhibited by hazard trees and downed logs along and on lower Maintenance Level roads. Limited access to areas within the analysis area would slow firefighter access for direct attack. Alternative 2 would result in increasingly hazardous travel as snags would decay and fall. Fire behavior would exceed firefighter capabilities within a few years and suppression efforts would have to use indirect tactics.

Table 3.05-10 compares fire intensities (in BTU per foot per second), flame lengths (in feet), and the fireline interpretation for each alternative. When compared with Alternative 2, implementation of Alternatives 1, 3, or 4 reduces fire intensities and improves safety so that firefighters could enter the area and take appropriate action. The three action alternatives would, therefore, meet Forest Plan direction for fire management.

Table 3.05-10 shows that fireline intensity and flame lengths are highest for Alternative 2. This means that crowning, spotting, and major fire runs are probable. That control efforts at the head of fire are ineffective, as well as very dangerous for firefighters. In Alternative 2, this kind of fire behavior is the result of the higher tons of surface fuels. In Alternatives 1, 3, and 4 the flame lengths and fireline intensity numbers are much lower, meaning that fires can generally be attacked at the head or flanks by firefighters using hand tools. A handline should hold the fire, making for safer conditions for firefighters. When compared with Alternative 2, implementation of Alternatives 1, 3, or 4 reduces fire intensities and improves safety so that firefighters could enter the area and take appropriate action against a fire.

Table 3.05-10 Fire behavior by alternative over the next 20 years

Alternative	Post Activity		5 years		10 years		20 years	
	Flame Length (feet)	Fireline Intensity (BTU/ft/sec)	Flame Length (feet)	Fireline Intensity (BTU/ft/sec)	Flame Length (feet)	Fireline Intensity (BTU/ft/sec)	Flame Length (feet)	Fireline Intensity (BTU/ft/sec)
1	1	100	2	100	4	100	4	100
2	2	100	4	500	10	Over 1,000	13	Over 1,000
3	1	100	2	100	4	100	4	100
4	1	100	2	100	4	100	4	100

Building resiliency

ALTERNATIVES 1, 3, AND 4

The treatment units running along the west side of the SPI boundary would create lower fire effects by reducing CWD, allowing suppression resources to suppress fires coming into or leaving the private-public land interface. With the removal of fire-killed trees on both the private and public lands, future fuel loading conditions would be reduced and would result in a fire that would burn under more historical conditions. On NFS lands, residual fuels would be reduced to 10 tons per acre. As a result, the treated areas would burn as surface fires with low flame lengths and fireline intensities. These lower-intensity fires could be suppressed using direct attack with handtools. Alternative 1, because of the lower CWD, further increases the opportunities for suppression resources to contain fires spreading between the private and public interface. The difference in fire effects between Alternative 1 and Alternatives 3 and 4 are negligible, as wildfire under all three action alternatives can be contained by handline and have a low resistance-to-control.

The action alternatives would result in lower surface fuel loads, shorter potential flame lengths, and potential mortality. Fuel loadings and potential flame lengths would be lowest in ground-based salvage harvest units where the treatment of nonmerchantable material (via biomass harvesting and removal or site preparation) would occur. While there is still potential for tree mortality in treated areas, it would remain lower than that of Alternative 2 for wildfires occurring under 90th percentile weather conditions.

Plane dropping retardant on the Rim Fire

Fuels on the forest floor would consist of small diameter material and scattered larger logs. Snags and large logs may be present in the units to meet resource needs and sustain ecosystems in the area. Duff and litter layers are currently not present at a level that would affect fire behavior and retaining the small diameter material on site would help accelerate the development of these layers. Out-year fire effects are expected to be dominated by young shrubs, small trees and hardwoods reoccupying the site. As the vegetation matures, fuel loadings would increase. Continued maintenance would maintain fuels profiles that allow fire to resume its ecological role and meet Stanislaus Forest Plan Direction.

ALTERNATIVE 2

Future fires would be expected to burn with high intensities, impacting resources and killing most vegetation. Therefore, Forest guidelines and direction for fire management would not be met after 5 years under Alternative 2. Under Alternative 2, surface fuels are projected to average 42 tons per acre within 10 years and 78 tons per acre within 30 years. The amount of fuels on the ground would rate wildfire under this alternative as an extreme resistance-to-control problem (Brown et al. 2003).

Alternative 2 would lead to higher fuel loads from branches and boles of dead and down trees. Surface fuels would increase over the long term (10 or more years). Increased surface fuels would result in increased flame lengths and higher fireline intensities. These would lead to increased firefighter and public risk, and higher costs. Historically fires in the project area were low intensity with less than 25 percent of the stand being killed by fire. Fire effects under Alternative 2 would result in higher stand loss as seen in the Rim Fire, with over 50 percent of the stand killed. It is expected that some fires, both human and lightning caused, would continue to escape initial attack under more severe weather conditions over the next 20 to 30 years. These fires are expected to kill natural regeneration and residual larger trees. Overall, Alternative 2 would not reduce potential future surface fuels or predicted fire effects.

Alternative 2 combined with the high fuel loading left in Yosemite National Park would mean that wildfires would cross boundaries with little chance of containing fires under 90th percentile weather conditions. Wildfires would burn until weather conditions changed allowing effective suppression actions to take place. This is similar to what occurred in the Rim Fire.

The following figures compare maps for the four alternatives. The expected fireline intensities, for the current year, would be low for the four alternatives within most of the project boundary. The expected fireline intensities for the four alternatives, shown in Figure 3.05-8 and Figure 3.05-9 for Year 20, would be much higher in the untreated areas when compared to the treatment units in the action alternatives. Modeled flame lengths for the four alternatives at Year 1 would also be similarly low. Figure 3.05-10 and Figure 3.05-11 compare maps at Year 20. These show flame lengths would increase greatly in untreated areas over time. The untreated areas would have the highest flame lengths at Year 20.

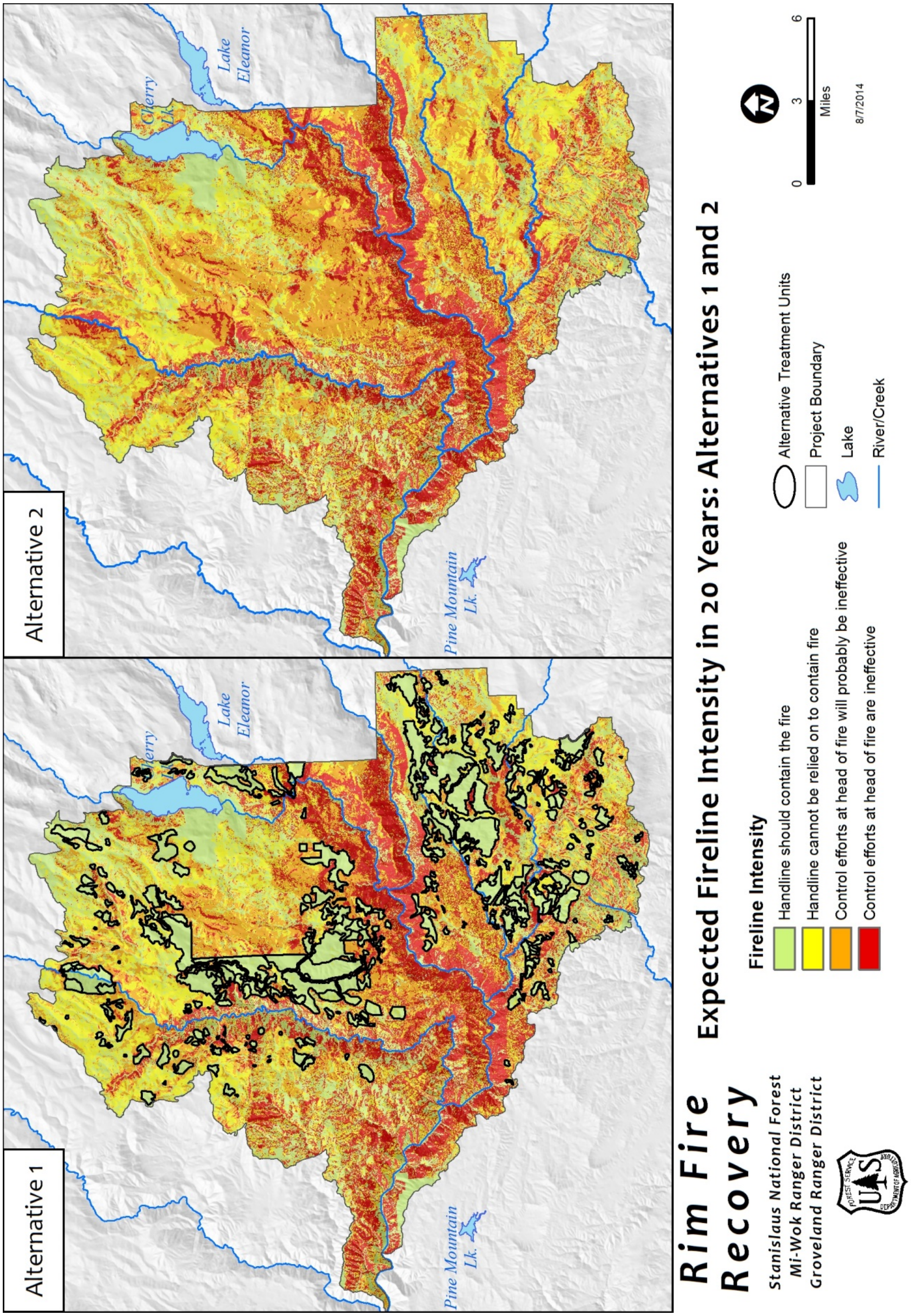

Figure 3.05-8 Expected fireline intensity in year 20 for Alternatives 1 and 2

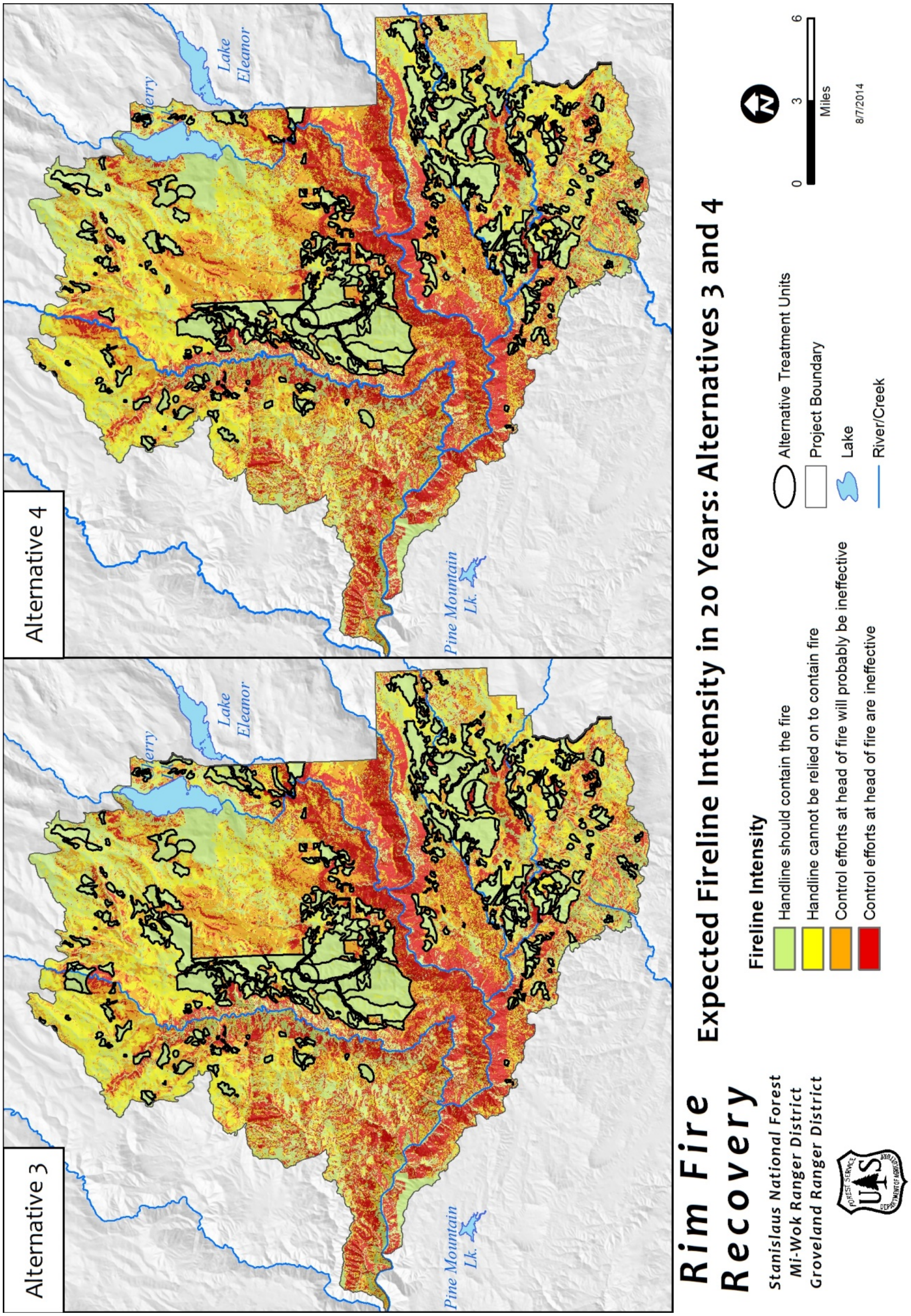

Figure 3.05-9 Expected fireline intensity in year 20 for Alternatives 3 and 4

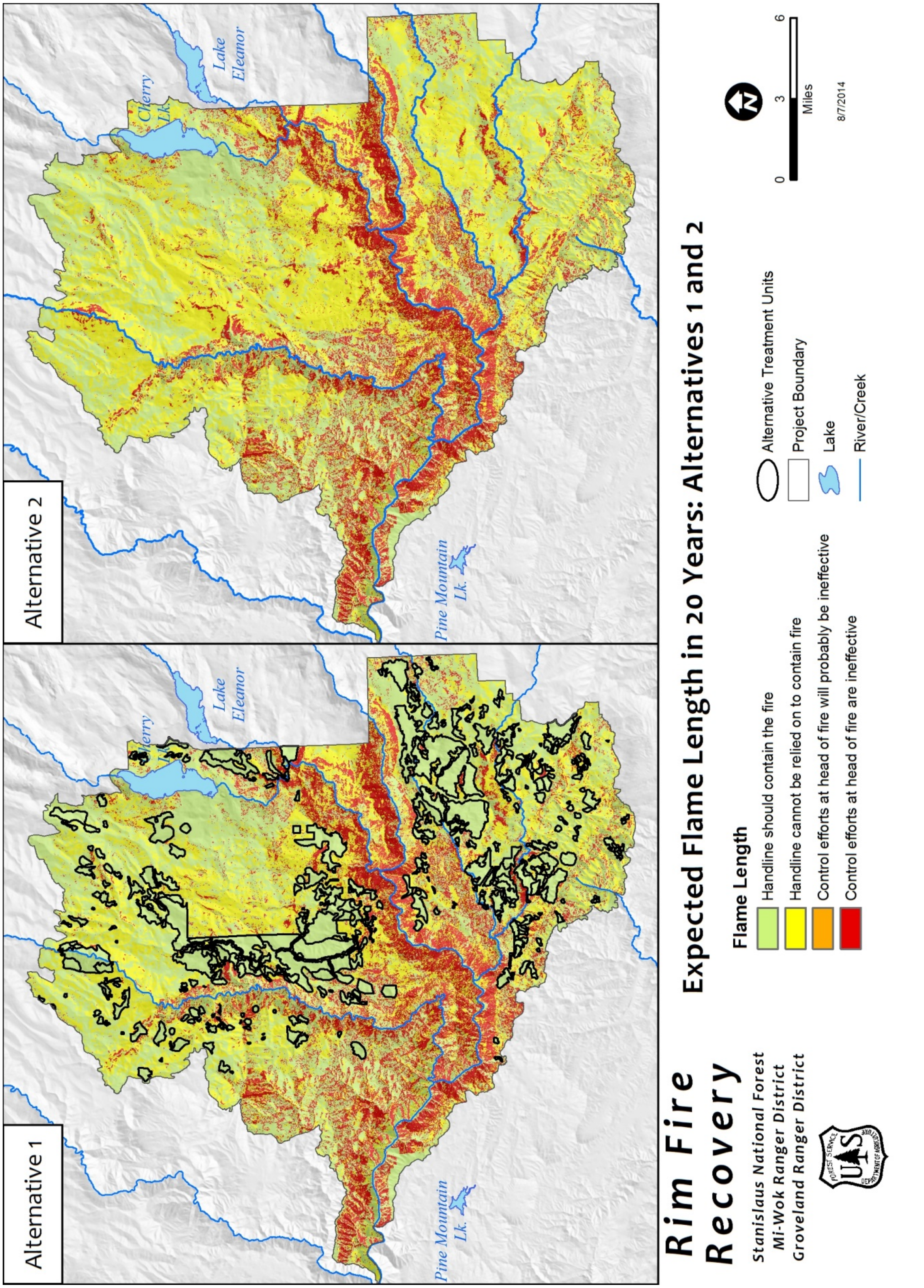

Figure 3.05-10 Expected flame lengths in year 20 for Alternatives 1 and 2

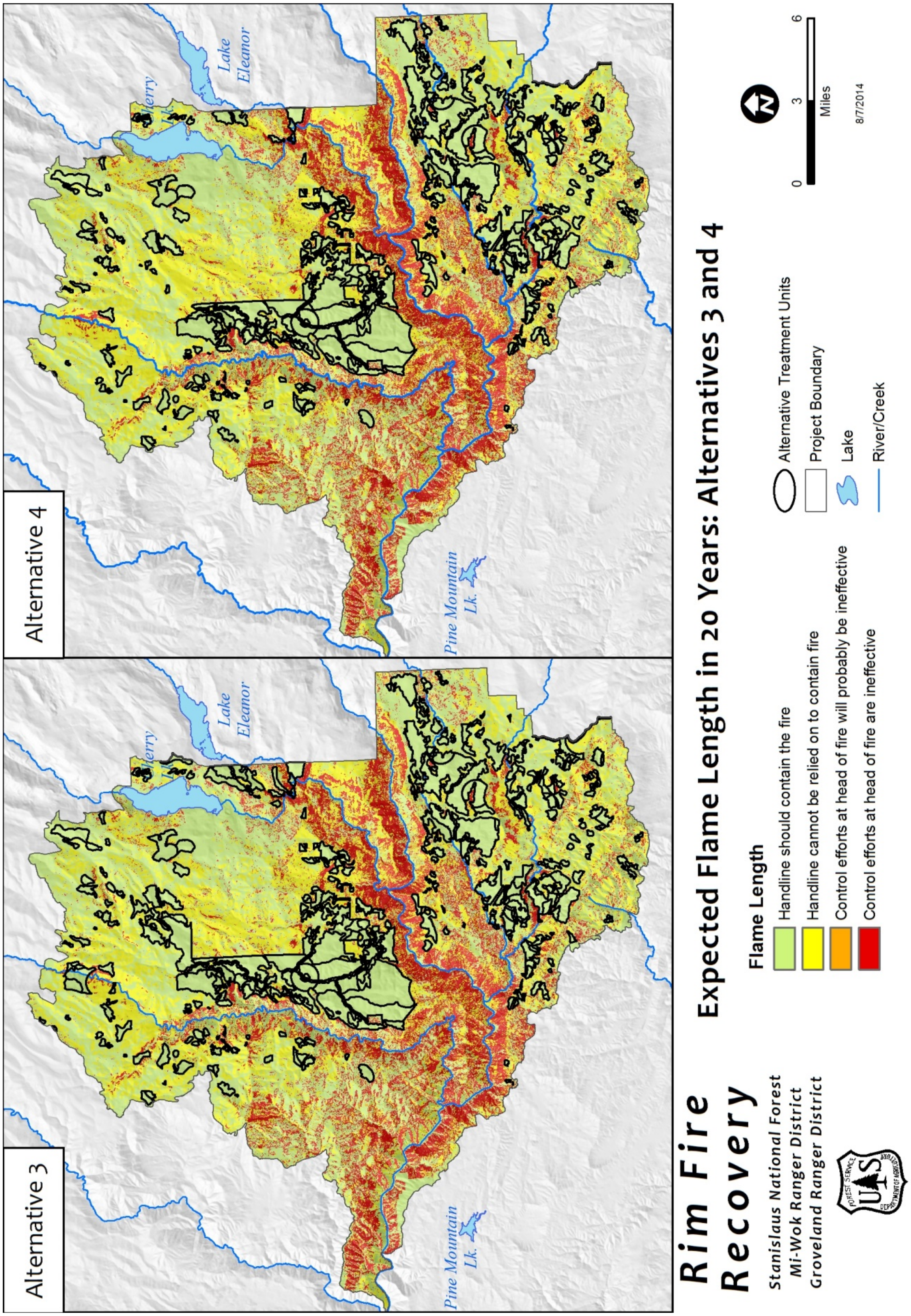

Figure 3.05-11 Expected flame lengths in year 20 for Alternatives 3 and 4

3.06 Invasive Species

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The following direction guides management of invasive plants on NFS lands:

- Executive Order 13112 Invasive Species 64 FR 6183 (Clinton 1999)
- Forest Service Manual 2900 (USDA 2011)
- Pacific Southwest Region Noxious Weed Management Strategy (USDA 2000)
- Noxious Weed Management Standards and Guidelines (USDA 2010a, p.52)

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

Assumptions Specific to Invasive Species

- Existing plant survey data covers 75 percent of the total project area.
- New and expanding infestations will result from habitat alterations caused by the fire (e.g. decreased canopy cover, increased nitrogen and water availability) and fire suppression activities.
- If an invasive weed infestation was determined to be within 15 feet of a road it was analyzed as a road maintenance, reconstruction or creation (whether temporary or permanent) impact. All other infestations within treatment units were analyzed as an impact from the proposed activities (e.g. skidding, heavy equipment piling, burning, long-lining, etc.).
- The risk of creating new or expanding invasive populations throughout the project area depends on a variety of factors (these factors are listed in the Summary of Effects Analysis across All Alternatives section).
- Without specific prevention and control measures, invasive non-native plants (weeds) will continue to spread along and within project areas and into adjacent areas.
- Weeds are likely to persist long-term once they are established in meadows.

Data Sources

- GIS layers of the following data: invasive plant infestations, units, roads, quarry sites, water sources and fire history. Information recorded in the GIS shapefiles was provided by the Mi-Wok and Groveland District botanists. All invasive plant data was collected from 2006 to 2014.
- Information on species status, distribution, and ecology was derived from general literature reviews, Forest Service documents, the Forest Service Fire Effects Information System, California Department of Fish and Wildlife, various field books, floras, and personal communications. Site surveys, in conjunction with literature and input from the District botanists were used to determine the potential occurrence of each species, and/or its habitat, as well as its priority for eradication and control.

Invasive Species Indicators

The primary indicator was acres within ground disturbing project locations (e.g. units, skid trails, road construction or maintenance, quarry sites) that contain infestations of invasive plant species.

Invasive Species Methodology by Action

This analysis evaluates the factors influencing invasive plant introduction and spread by considering the risks of, and vulnerability to, invasive plant establishment.

Affected Environment

Existing Conditions

Twenty-six species of non-native and invasive plants are present or adjacent to (within 5 miles) the project area (Table 3.06-1).

Table 3.06-1 Invasive Species within Rim Fire perimeter and each alternative

Invasive Name	In Rim Fire (acres)	Alternative 1 (acres)	Alternative 3 (acres)	Alternative 4 (acres)	Project Priority[1]
Barbed Goatgrass	4.69	1.37	1.37	1.37	High
Bachelor Button	No data	No data	No data	No data	Moderate
Blackberry, cut-leaf	0.16	0.00	0.00	0.00	Low
Blackberry, Himalayan	2.32	0.74	0.74	0.74	Low
Black mustard /Shortpod mustard	Not mapped	Not mapped	Not mapped	Not mapped	Moderate
Blessed Milkthistle	0.55	0.45	0.55	0.55	Moderate
Bull thistle	137.38	99.35	100.23	100.10	High - dense infestations Low - scattered plants
Canada thistle	0.25	0.00	0.00	0.00	High
Cheatgrass	Not mapped	Not mapped	Not mapped	Not mapped	Low
Dyers Woad	0.74	0.00	0.00	0.00	High
Field bindweed	0.72	0.00	0.00	0.00	Moderate
French broom	.001	0.001	0.001	0.001	Moderate
Hedgeparsley	0.02	0.00	0.00	0.00	Low
Italian thistle	11.20	8.15	8.624	8.62	High
Klamathweed	0.84	0.16	0.19	0.19	Low
Medusahead Grass	148.19	110.53	111.43	111.43	High
Perennial Sweetpea	0.30	0.00	0.00	0.00	Moderate
Puncturevine	0.10	0.00	0.00	0.00	High
Scotch Broom	0.09	0.00	0.00	0.00	Moderate
Johnsongrass	0.70	0.70	0.70	0.70	Moderate
Spanish Broom	0.00	0.00	0.00	0.00	Moderate
Spotted Knapweed	0.38	0.38	0.38	0.38	High
Tocalote	78.38	23.27	22.62	22.62	High
Tumble mustard	Not mapped	Not mapped	Not mapped	Not mapped	Moderate
Woolly mullein	7.61	6.67	6.46	6.12	Moderate - dense infestations Low - scattered plants
Yellow star-thistle	105.39	25.42	24.69	24.69	High
Totals	**499.47**	**277.21**	**277.97**	**277.49**	

[1] Project priority determined by the invasive characteristics, habitat degradation potential, state rating, prevalence across the fire area, and control factors of the plant. In addition, the risk of potential seed and reproductive part spread from project activities was also considered in assigning priority.

Ten species, including barbed goatgrass (*Aegilops triuncialis*), Italian thistle (*Carduus pycnocephalus*), tocalote (*Centaurea melitensis*), yellowstar thistle (*Centaurea solstitialis*), spotted knapweed (*Centaurea stoebe ssp. micranthos*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), dyer's woad (*Isatis tinctoria*), medusahead grass (*Taeniatherum caput-medusae*) and puncturevine (*Tribulus terrestris*) are considered high risk species from project activities. Eleven other species, including, bachelor buttons (*Centaurea cyanus*), field bindweed (*Convolvulous arvensis*), Scotch broom (*Cytisus scoparius*), French broom (*Genista monospessulana*), shortpod mustard (*Hirschfeldia incana*), perennial sweatpea (*Lathyrus latifolius*), milkthistle (*Silybum marianum*), tumblemustard (*Sisymbrium altissimum*), johnsongrass (*Sorghum halepense*), Spanish broom (*Spartium junceum*) and wooly mullein (*Verbascum thapsus*), are considered a moderate risk. The remaining five species are considered low risk. The Noxious Weed Risk Assessment in the project record has a complete discussion of characteristics specific to each species, their known locations in the project, habitat impacts and recommended management tools.

Past actions involving ground disturbing activities such as timber removal, fuel reduction, road and trail creation or maintenance, grazing, unauthorized OHV use and other dispersed recreation have impacted invasive plant infestations across the project area. The invasive species known to occur within the project area before the Rim Fire were introduced and spread primarily through transport on vehicles, in straw and hay, on earthmoving, mowing or weed-eating equipment, and on animals and in their manure associated with these activities. Weed seeds also spread quickly down streams and upwind along lakes and reservoirs. Livestock grazing also contributed to weed spread, due to transportation on their fur, decreased native grass and forb cover from preferential grazing of un-palatability of many invasives, trampling, and other soil disturbances (Olson, 1999). Since the fire, it is highly likely that these existing infestations created by the disturbances listed above were spread by suppression and BAER efforts.

Given the current data, shown in Table 3.06-1, it appears that Medusahead grass, tocalote, yellow starthistle, bull thistle and Italian thistle are by far the most common species within the project area. To a lesser extent, several other invasive weed species occur, primarily along roads. It should be noted however, that it is highly likely that many of the lower priority invasives (such as cheatgrass) are mapped at a fraction of their actual occurrence acreage given their commonality. All proposed treatment areas will be surveyed prior to implementation as per management requirements.

The risk of creating new or expanding populations throughout the project area depends on a variety of factors:

- **Species-specific dispersal traits of weeds**: Weed species with seeds dispersed by wind (Italian thistle), by tumbleweed (shortpod mustard), water (tamarisk), or animals (Medusahead grass) can potentially spread weed propagules miles from their original sources. Most seeds are not moved far from the parent plant, but a small proportion of seeds can be found large distances away. Even propagules with low innate dispersal abilities, such as stem fragments of giant reed or castor bean seeds which fall close to the plant, can be carried far after initial dispersal by streams or surface runoff. However, species without wind, water, or animal-mediated dispersal are less likely to disperse propagules far from the original source.
- **Habitat disturbed**: While many weed species are generalists that can potentially colonize a fairly wide range of vegetation types, it is true that some habitats, particularly those with ample nutrients and soil moisture or those that have been recently disturbed, are more susceptible to invasion. Additionally, the suite of weed species one would expect to colonize a site is dependent to some degree on the habitat where the disturbance occurred.
- **Regional patterns in weed occurrence and propagule pressure**: The project occurs across a transitional area with regards to microclimate, elevation, and vegetation communities. The most commonly observed weeds differed within these areas, possibly due to species-specific habitat preferences.
- **Type of ground disturbance**. The type of disturbance creates conditions favoring release and establishment of different weed species. For example, tree removal is expected to favor the establishment of weed species that do best in full sun, such as yellow starthistle; burning is expected to favor the establishment of fire-adapted weed species such as French broom; and soil disturbance is expected to favor the establishment of early-colonizing weed species, such as mustards or tocalote, that respond favorably to disturbed, denuded soils.

These factors were used to consider the risks associated with the establishment of new weed infestations due to project activities. In addition to these four factors, the results of the Noxious Weed Risk Assessment (project record) were focused on risks associated with 1) the release of pre-existing but currently dormant weed seed banks at disturbed sites, 2) the rapid build-up of transient weed seed banks at disturbed sites, and/or 3) the creation of conditions favoring weed establishment at disturbed sites.

Environmental Consequences

Project-related activities under all action alternatives, could contribute to an increase in invasive plants in three major ways: 1) the creation of conditions that favor establishment of invasive plant (weed) species, such as soil disturbance, removal of native vegetation, or the breakup of cryptogamic crusts[5], 2) spread of new and pre-existing weed infestations into newly disturbed areas via project tools, equipment, and personnel; and 3) the subsequent release of pre-existing weed seedbanks from dormancy or the quick build-up of new weed seedbanks on disturbed soils.

Table 3.06-2 displays invasive plant acreages for the specific treatments in each alternative, indicating that the highest invasive infestation acreages are found within the salvage units and roadside hazard tree removal areas. This is not surprising given that these project areas cover the largest overall acreages and would therefore, be the most likely to harbor weed infestations. Road treatments (maintenance, reconstruction and new construction) also have higher invasive infestation acreages. Roads and roadsides consistently experience ground disturbance, creating areas of increased sunlight, decreased native competition and increased water runoff, attributes which create an ideal environment for weed colonization.

Table 3.06-2 Invasive Plant Locations by specific treatments in each alternative

Treatments	**Invasive Plant Locations** (acres)			
	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Salvage Units	110.4	0.0	155.4	154.1
Road Treatments	44.5	0.0	44.5	44.5
Roadside Hazard Tree	122.1	0.0	78.8	78.6
Quarry	0.5	0.0	0.5	0.5
Totals	**277.5**	**0.0**	**278.2**	**277.8**

The results of the Noxious Weed Risk Assessment focused on risks associated with 1) the release of pre-existing but currently dormant weed seed banks at disturbed sites, 2) the rapid build-up of transient weed seed banks at disturbed sites, and 3) the creation of conditions favoring weed establishment at disturbed sites. The risks are labeled "high, moderate and low," and are defined as follows:

- High: Chances of weed species infesting new areas range between 76 to 100 percent.
- Moderate: Chances of weed species infesting new areas range between 31 to 75 percent.
- Low: Chances of weed species infesting new areas range between 1 to 30 percent.

Each action alternative is expected in general to be high risk (a 76 to 100 percent chance) for the potential to establish new populations of invasive species, specifically those listed as high and moderate priority in Table 3.06-1. This high risk ranking was chosen after careful consideration of the four factors listed in the Affected Environment section (i.e. weed species dispersal traits, habitat disturbed, regional patterns in weed occurrence and types of disturbance), and the three avenues for weed proliferation: 1) release of seedbanks, 2) build-up of weed seed, and 3) the creation of weed-favorable conditions. For each of action alternative, the ranking was determined to be in the high category. Some individual project sites may have a less-high risk, but given that less than 5 percent of the project has been surveyed, the more conservative ranking was chosen. Those areas that are outside of the historic fire burn return interval (i.e., burning more or less frequently) are expected to have an

[5] Crypotogamic crusts are biological soil crust composed of living cyanobacteria, green algae, brown algae, fungi, lichens, and/or mosses.

even higher risk (yet still within the high risk category) of experiencing vegetation type conversion in the project areas.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Disturbance by heavy equipment can have long-term effects to soils and favor weed establishment if unmitigated. Heavy equipment can compact soils, reducing water infiltration and accelerating erosion. It can also displace soils and sheer off vegetative roots. If these effects are severe, a loss of soil productivity may occur. Numerous passes by equipment over vegetation often causes plant mortality or severe injury, exposing the soil organic layer and making it more susceptible to erosion. Loss of vegetative cover and the soil organic layer reduces the ability of the soil to hold moisture. Many weed species are more capable of utilizing less productive soils with less soil moisture. In addition, some weeds produce secondary chemical compounds that inhibit native plant germination and growth. These compounds also affect nutrient cycling rates by inhibiting soil microbial fauna activity (Sheley et al. 1999).

Maintenance, reconstruction and the creation of roads can also spread invasives. Grading disturbs soil and competing native vegetation in addition to dispersing weed seeds and plant parts. Cleaning ditches, grading, installing overside drains and road construction moves soil and creates ideal weed seedbeds. Seeds from equipment can be deposited in stream crossings and washed downstream. This movement of weed seed or parts can happen at any time of the year since the seeds and parts are present in the soil at infested sites at all times. Stockpiles of crushed aggregate can also be infested with weeds. Weeds are dispersed when that aggregate is moved to a new location. This translocation of weed seed is of particular concern when dispersal vectors (streamside, areas of high human use, fire staging and action areas, roads, etc.) are nearby.

Even those project sites in remote areas may be expected to contain an existing weed seedbank. Seedbanks are known to regularly contain a different suite of species than is represented by the standing vegetation due to succession, low reproduction rates of some perennials (by seed), and other factors (Thompson 2000). In most cases it is rare to find species in the seedbank that are not represented to any degree in the above-ground vegetation; the exception being seeds from invasive, aggressive, disturbance-adapted, and early colonizing weeds (Thompson 2000). For example, large cheatgrass seedbanks are commonly found throughout western North America, often regardless of such factors as remoteness of the site, grazing, or fire history. Within intact native communities these seeds are typically held in the above-ground vegetation or in crevices on cryptogamic crusts. Germination is therefore prevented until disturbance allows the cheatgrass seeds to come into contact with broken soil surfaces (Boudell et al. 2002).

Following establishment, new populations of weeds are often extremely difficult to eliminate, and even if controlled or eradicated, it may take several years or decades to re-establish native soil structure and biota. If allowed to expand, dense infestations can occur that not only displace native plants and animals, but also threaten natural ecosystems by fragmenting sensitive plant and animal habitat (Scott and Pratini 1995). For example, when equipment disturbance activities introduce or release weeds, the vegetative pattern is changed, often providing more flammable fuels into the system. As the weeds spread and increase in volume, an increase in ladder fuels occurs. Weeds such as Scotch broom, Medusahead, barbed goatgrass, yellow starthistle and others, change the arrangement of vegetation, the amount of soil moisture at specific times of the year, the amount of fuel available to burn, and how fire behaves (Keeley et al. 2011). These changes in fire behavior often mean that areas that would not ordinarily burn frequently or at high intensity are now doing so (DiTomaso and Healy 2007). This is especially a concern in dry lava cap areas where weed species compete with sensitive plants.

Under Alternative 1, management requirements will help reduce the risk of spreading weeds from known dense infestations and high priority invasive infestations; however, lowering the risk ranking from high to moderate is not warranted since pre-project surveys to detect unknown weed infestations are not required. Because only 5 percent of the project area was previously surveyed, it is highly likely that a large proportion of the existing weed infestations remain undetected, preventing the mitigation of this risk.

CUMULATIVE EFFECTS

Factors which are not planned and are difficult to control (e.g., wildfire, dispersed recreation use, grazing, climate change) will likely have the greatest cumulative impact to native plant communities from the expansion of invasive plants for Alternatives 1, 3 and 4. Fully implementing any of these alternatives will add to this cumulative effect. For the purpose of this analysis, cumulative effects of past activities or natural events are represented within the existing conditions.

Appendix B provides a list and description of present and reasonably foreseeable projects, including private lands within the Rim Fire perimeter. All of these activities will contribute to effects on invasive plant proliferation. Within the project area, hazardous fuels reduction and hazard tree removal are anticipated to occur within the next few years on approximately 16,107 acres of NFS, 816 acres on NPS and 18,407 acres on private lands (Appendix B). These projects are the primary activity that will alter forest vegetation and impact invasive plants; most of the weed risk assessments for these projects show the risk to be moderate if management requirements are followed. Recreation management, road and trail work and decommissioning of unauthorized routes account for approximately 96 miles of additional ground disturbing activities anticipated to occur in the foreseeable future. Livestock grazing within the project area (13 allotments) may also proliferate weeds. All of these activities, in addition to other recreation activities such as dispersed camping, were ranked as low to moderate risk.

These present and future projects are cumulative in nature in that some of them overlap spatially with the project areas, but all of them impact the ability of the Forest Service to feasibly and adequately manage invasive plant proliferation. With all the different projects occurring across the forest (BAER treatments, hazard tree removal, fuel treatments, etc.), several of which are thousands of acres in size in addition to the large size of the Rim Fire itself, it becomes very difficult to physically visit all the affected areas, let alone perform time consuming hand removal of invasives in an adequate manner. Because of overlapping implementation timeframes of this project and above mentioned projects, it is also difficult to acquire the trained personnel necessary for mitigating project impacts.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, areas which currently have invasive plants would continue to support these species, providing seed sources for dispersal into adjacent areas. However, this alternative would eliminate the high risk of directly and indirectly spreading weeds from salvage, hazard tree removal and road construction activities (all part of Alternatives 1, 3 and 4). The reduction in invasive plant spread would equate to lower risk for vegetation type conversion to non-natives and better habitat and hydrologic function throughout the project area.

On the other hand, there is the potential that the Alternative 2 could indirectly increase invasive plant proliferation if fuel reduction activities are not completed. It is possible the next wildfire event will have high vegetation and high soil burn intensity and severity because of the amount of untreated fuels (dead trees and logs). As discussed above, these more intense or severe fires may promote weed proliferation where native vegetation recovery is slower, releasing invasive species from greater competition. However, when comparing the overall potential negative effects of the different project activities, invasive plant proliferation impacts associated with the action alternatives are of greater scope and magnitude than the impacts of no action.

Cumulative Effects

All the activities and factors listed in Appendix B may cumulatively affect the proliferation of invasive plant species. Factors that are not planned and difficult to control (e.g., wildfire, dispersed recreation use, grazing, and climate change) will likely pose the greatest risk of proliferating invasive plants. Alternative 2 will not add to these cumulative impacts.

Alternative 3

Direct and Indirect Effects

Same as Alternative 1, except additional management requirements will help to reduce the risk of establishing new populations of (high and moderate priority) invasive species from a high to a moderate ranking (31 to 75 percent chance of new infestation). However, those requirements will more than likely not reduce the high risk ranking for the spread of common invasives (typically the largest contributors to vegetation type conversion and habitat degradation) since under Alternative 3 common or “low” priority weeds are not required to be avoided or removed.

Cumulative Effects

Same as Alternative 1.

Alternative 4

Direct and Indirect Effects

Same as Alternative 3.

Cumulative Effects

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

All action alternatives have roughly the same affected environment and acreage of invasive plant species across similar treatments (Table 3.06-1 and Table 3.06-2). The direct, indirect and cumulative effects are also expected to be very similar. In terms of the risk of spreading invasive species, the main difference between the action alternatives lays in the details of the management requirements. Alternatives 3 and 4 have a lower risk of invasive weed spread and proliferation than Alternative 1. While the difference between Alternative 3 and Alternative 4 for invasive plant impacts is very slight, Alternative 4 has a lower acreage of known weed infestations, salvage removal units and road work (especially new construction and reconstruction). Alternative 4 also has the highest amount of project acreage that is within the historic fire return interval, potentially making it slightly less susceptible to weed invasion. Of all the alternatives, Alternative 2 has the lowest direct, indirect and cumulative impacts for invasive plant introduction and proliferation, given the lack of associated ground disturbance and movement of equipment or personnel.

3.07 RANGE

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Legislative authorities for administration of the National Forest System range program are shown in Forest Service Manual (FSM) 2201 and objectives, policies, and responsibilities are in the FSM 2202 through 2204 and FSM 2230 through FSM 2238. The Forest Plan Compliance (project record) document identifies the Forest Plan S&Gs that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

Assumptions Specific to Range

- The authorization for livestock grazing and the administration of allotments will not change with any of the alternatives.
- The proposed activities and the amount of rangeland infrastructure in treatment areas reflects the relative degree of impact each alternative will have on permitted grazing in the project area.
- Monitoring will occur during project implementation to inform livestock managers about the effects on grazing use and rangeland resource conditions.

Data Sources

The following information was used to describe existing condition and analyze effects on rangeland resources.

- Post-fire field visits
- Local professional knowledge
- Project Treatment Information
- Vegetation and Soil Burn Severity, Soil Erosion Hazard Rating
- California Wildlife Habitat Relationships data
- Allotment and pasture boundaries
- Land ownership data
- Capable Rangeland
- Rangeland infrastructure data
- Transportation data

Range Indicators

The following indicators were used to assess the effects of each alternative on rangeland resources.

- Proposed treatment area in each allotment (percent of allotment proposed for treatments)
- Proposed treatment area in capable rangelands within each allotment
- Road treatments (hazard tree removal and reconstruction or maintenance)
- Amount of range infrastructure encompassed by proposed treatments

Range Methodology by Action

Quantitative and qualitative comparisons of the anticipated impacts of each alternative on rangeland resources and the expected potential for moving existing conditions toward Forest Plan desired conditions were used for determining the effects on rangeland resources.

Affected Environment

Existing Conditions

The following information applies to grazing allotments affected by the Rim Fire.

Fire Extent and Burn Severity of Grazing Allotments

The Rim Fire effected thirteen grazing allotments. Some allotments were relatively less impacted due either to the proportion of the allotment burned or fire severity in the burned areas. Capable rangeland describes areas of land that can sustain domestic grazing and generally represent the portions of the landscape assumed to be most commonly used by cattle (USDA 2004). Capable rangeland was used to compare the relative effects of the fire on the allotments. Table 3.07-1 provides a summary of vegetation burn severity, soil burn severity, and erosion hazard rating for the affected allotments.

Table 3.07-1 Allotment burn severity and erosion hazard data

Allotment	Vegetation Burn Severity Mod and High (percent)	Capable Range		Soil Erosion Hazard High (percent)
		Vegetation Burn Severity Mod and High (percent)	Soil Burn Severity High (percent)	
Jawbone-Rosasco	64	72	61	15.1
Hunter Creek	54	52	49	3.5
Duckwall	14	6	8	2.2
Middle Fork, Meyer-Ferretti, Gravel Range, Curtin	65	68	56	18.1
Bonds, Bower Cave, Bull Creek, Little Crane	20	2	2	1.4
Westside, Lower Hull, Upper Hull	17	5	3	1.5

Grazing Management

Allotment Administration

Forest Plan Direction provides standards and guidelines designed to provide for resource conservation and sustainable use of rangelands. Range monitoring is conducted as needed to ensure that the grazing management strategies meet objectives for desired conditions. Administration of grazing allotments involves travel on roads by Forest Service staff and permittees. Post-fire administration of grazing allotments will require more frequent travel to and from key areas and range infrastructure. Dead trees pose a threat to human safety and make access more difficult for grazing permittees and Forest staff.

Rangeland Infrastructure

Rangeland infrastructure includes fences, water developments (troughs), cattleguards, gates and corrals designed to control livestock movements (timing, duration, and intensity of grazing). The Rim Fire and fire suppression activities damaged this rangeland infrastructure. Allotment management is difficult or impractical without this functioning critical infrastructure. Over time, standing dead and unhealthy trees will fall on range fences, as noted following the 1996 Ackerson Fire. Some improvements, particularly fences, are in need of repair. Dead trees adjacent to fences and troughs pose a safety risk for Forest staff and permittees responsible for repairing and maintaining improvements. Over time, dead trees are likely to fall and damage range infrastructure after it is repaired. Numerous water developments and cattleguards are not functioning because they were either damaged during the fire or have been affected by post-fire sediment and debris accumulation.

Livestock Movements

Livestock move through the allotments throughout the grazing season to find available forage and water. Dead or dying trees may reduce forage production to some extent due to shading and space availability. In many burned areas dead standing trees are abundant and have begun to fall. Fallen dead trees have the potential to “jackstraw” inhibiting livestock movements and reducing forage availability. Defective trees may also pose some risk to livestock, as cattle may be injured or killed by falling trees or by an excess of unburned fuel and debris. The presence of an abundance of dead timber also impedes the ability of permittees to herd livestock and achieve proper distribution.

The allotments are open range allotments. Livestock frequently travel across and along roads. When vehicles approach, the cattle generally move off of roads and out of the way of the oncoming vehicle. Fire killed trees along roadsides are expected to fall down hampering the ability of livestock to move off of roads when vehicles approach. To some extent, fallen dead trees along roadsides have the potential to cause an increase in vehicle and cattle interactions or collisions.

Rangeland Vegetation

Vegetation Types

Deerbrush (*Ceanothus integerrimus*) is the predominant local forage species used by livestock in the mid-elevation range of 3,500 to 6,000 feet. Riparian areas and meadows, which occur as patches within the forest mosaic, are also preferred by livestock due to the availability of water, shade and high quality forage. Livestock also feed in forested areas and forest openings where sufficient understory forage exists. Livestock may graze incidentally in any area of an allotment while moving between primary grazing areas.

California Wildlife Habitat Relationships (CWHR) vegetation types (Mayer and Laudenslayer 1988) and fire severity (Miller and Thode 2007) are used to describe the existing potential for landscape diversity. Pre-fire vegetation was examined using the CWHR vegetation types. Vegetation types were grouped into one of five broad categories of rangeland ecosystems. Table 3.07-2 displays pre-fire composition of rangeland vegetation types derived from CWHR data.

Table 3.07-2 General rangeland vegetation types and burn severity

Vegetation Type	Fire Area		Vegetation Burn Severity		
	acres	percent	Mod	High	M+H
Annual Grasslands	7,928	5.2	22.4	48.3	70.7
Hardwood Forests	18,737	12.3	17.0	51.3	68.3
Chaparral	22,465	14.8	15.1	65.1	80.2
Conifer Forests	101,073	66.4	13.8	37.0	50.8
Riparian	2,004	1.3	16.7	49.2	65.9

Vegetation Condition

Current vegetation conditions are the combined result of pre-fire conditions and fire effects on the landscape. Table 3.07-2 shows vegetation burn severity for five broad rangeland vegetation types. Some vegetation types inherently burn more severely (chaparral), but species that dominate these plant communities are well adapted to recover from fire. Unburned areas and areas that burned at low severity are in a condition similar to that before the fire. Areas that burned at high severity are most likely to be in poor condition, with significantly reduced plant vigor and ground cover immediately following the fire. Because burned areas will naturally recover following fire, vegetation condition will improve over time, even in severely burned areas.

Forest and rangeland ecosystems recover naturally following fire, but each vegetation type responds differently to fire. Recovery sequence and timing varies based on environmental factors such as climate, soils and land management activities. Recognizing differences in vegetation types, identifying the stages of recovery and being responsive with changes in management are crucial to facilitating recovery of the burned landscape. Fire can cause a large scale vegetation type conversion to predominantly non-forest vegetation types, with many areas often dominated by brush within a few years following fire. The increase in transitory range helps to reduce overall utilization, due to the post-fire flush of palatable and nutritious forage.

Environmental Consequences

Direct effects on rangeland resources are directly caused by project implementation. Indirect effects on rangeland resources are in response to the direct effects of treatments or, as with Alternative 2 (No Action), a lack of treatment. Project management requirements are designed to mitigate the direct and indirect effects of the project on rangeland resources.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Table 3.07-3 provides a summary of the Alternative 1 treatment areas within allotments, capable range, roadside hazard trees, and fences.

Table 3.07-3 Alternative 1 treatments in affected grazing allotments

Allotment	Alternative 1 Treatment Areas				
	Acres	**Allotment** (percent)	**Capable Range** (percent)	**Roadside Hazard Tree** (miles)	**Fences** (percent)
Jawbone-Rosasco	14,189	28	33	71.3	25
Hunter Creek	3,482	12	28	67.1	16
Duckwall	941	5	9	15.0	41
Middle Fork, Meyer-Ferretti, Gravel Range, Curtin	17,260	33	20	121.7	22
Bonds, Bower Cave, Bull Creek, Little Crane	1,487	3	2	24.5	50
Westside, Lower Hull, Upper Hull	5,087	9	5	56.4	90

Grazing Management

Allotment Administration

Alternative 1 improves safety and access conditions for allotment administration and grazing management. Alternative 1 removes hazard trees along a total of 356 miles of roads and improves (reconstruction and maintenance) 508 miles of roads inside allotment boundaries. Alternative 1 also removes hazards away from roadsides in salvage units, improving safety conditions for grazing permittees and forest staff when working away from roads. Access within the allotments would be improved from existing conditions, facilitating allotment administration activities such as herding and monitoring. Project activities involving roads could affect livestock operations if temporary road closures are needed, although alternative access may be available for permittees. Non-use as a result of project activities is not expected to be necessary; however, if non-use is necessary, this change would result in inconvenience or economic loss to the permit holders.

Rangeland Infrastructure

Alternative 1 poses some risk that harvest activities would damage range infrastructure. The potential for damage to range improvements is mitigated by management requirements and timber sale administration. Timber sale contracts would require project activities to avoid damaging functioning range fences and to repair damage to fences that occur during implementation. Long-term maintenance needs would decrease to some extent, and the functioning condition of range infrastructure increases under Alternative 1 because dead trees would be removed along 13.8 fence miles within grazing allotments. Removing snags adjacent to range infrastructure would improve safety conditions for persons responsible for infrastructure maintenance and have a positive effect on grazing management. The cattleguards on roads proposed for reconstruction and maintenance would be maintained which would also improve grazing management on affected allotments.

Livestock Movements

Alternative 1 treats 4,193 acres within capable rangelands. Long-term availability of forage may be increased by salvage logging since removing dead or dying trees can increase sunlight. Livestock distribution could potentially change or expand if treatments reduce dead and downed woody material and if transitory range is created around these areas. An increase in transitory range could improve livestock distribution and use patterns. This alternative reduces the short and long-term potential for fallen dead trees which minimizes "jackstraw" and increases livestock movement and forage availability. Removal of roadside hazard trees would reduce the potential for vehicle-cattle interactions and livestock injury or death. Alternative 1 facilitates herding and increases livestock movements and distribution.

Rangeland Vegetation

Vegetation Types

Through natural recovery, ecosystems will tend to revert back to plant communities similar to what was seen with the pre-fire state, though there may be shifts in the proportions of vegetation types, floristic composition, and elevation range. The proposed activities may result in short term changes in species composition, but is not likely to result in long-term measurable changes to the proportions and distribution of vegetation types on a landscape scale.

Vegetation Condition

Alternative 1 has a beneficial effect on vegetation condition. Proposed activities will directly increase short-term forage availability, resulting in a reduction of overall forage utilization. This alternative would indirectly improve long-term vegetation condition because fuel treatments reduce the potential for future catastrophic fires. Project activities may increase the likelihood of weed invasion and spread, a serious threat to rangelands; however, management requirements minimize the potential for weed invasion. Monitoring of grazing standards and guidelines will continue as described in the permit, Allotment Management Plan (AMP), and Annual Operating Instructions (AOI). Monitoring and adaptive management will ensure that vegetation condition meets standards and guidelines outlined in management direction.

CUMULATIVE EFFECTS

Alternative 1 when combined with the effects of other projects (Appendix B) may cause short-term negative cumulative effects on range due to the potential for soil compaction, ecological disturbance, and weed invasions. Long-term cumulative effects to range from those projects would be beneficial or neutral because they improve accessibility, curtail resource damage, or improve the ecological health of forest and rangelands. Monitoring would occur as needed to ensure that the combined effects of other projects and ongoing activities (Appendix B) meet Forest objectives for desired conditions. Since Alternative 1 implements the Forest Plan and includes management requirements that mitigate potential effects to acceptable levels, no adverse long-term cumulative effects are expected.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Grazing Management

Allotment Administration

Alternative 2 would not improve conditions for allotment administration and grazing management. The presence of hazard trees poses risks to the safety of rangeland managers and negatively affects accessibility for allotment administration. Access within the allotments would not be improved from existing conditions. Maintenance (clearing of fallen trees) of travel routes may become cumbersome in areas where roadside hazard trees are prevalent. Allotment administration activities such as herding and monitoring would be more challenging and time consuming, but would still occur.

Rangeland Infrastructure

Alternative 2 poses no risk of direct damage to range infrastructure by salvage operations; however, dead and unhealthy trees would not be removed and would fall on range fences over time, as noted following the 1996 Ackerson Fire. Allotment management would become much more difficult if critical range infrastructure is not functioning. Maintenance needs would be more significant under this alternative than for the action alternatives. Dead trees pose a safety risk for forest staff and permittees responsible for repairing and maintaining infrastructure. The long-term functioning condition of range infrastructure would be degraded as a result of this alternative.

Livestock Movements

Alternative 2 would not reduce the potential for "jackstraw", which can inhibit livestock movements and reduce forage availability. Alternative 2 would not improve livestock distribution and movements. This alternative does not reduce the risk of livestock death or injury by falling trees or by an excess of unburned fuel and debris. Permittee ability to herd and distribute livestock throughout key areas and capable range would not be improved under this alternative, which may increase the potential for localized overgrazing. This alternative may also increase the potential for vehicle-cattle interactions.

Rangeland Vegetation

Vegetation Types

Alternative 2 has no effects on rangeland vegetation types because no project activities would occur. The lack of project activities would not likely have measurable effects on post-fire recovery and vegetation dynamics. The landscape would recover naturally as early stages of forest succession take place immediately following the fire, favoring rapid revegetation of grasses, forbs, and sprouting woody plants. Forest succession in the burned area would continue over time.

Vegetation Condition

Alternative 2 may indirectly negatively affect vegetation condition. Because this alternative may increase the potential for localized overgrazing, it may also cause negative impacts on vegetation condition in some areas. Additionally, a lack of fuel treatments increases the potential for future catastrophic fire. Monitoring and adaptive management would be used to ensure that vegetation condition meets Forest standards and guidelines.

CUMULATIVE EFFECTS

Alternative 2, when combined with the effects of other projects (Appendix B), may pose some risk to rangeland health due to the potential for soil compaction, ecological disturbance and weed invasions. Long-term cumulative effects to range from those projects would be beneficial or neutral because they improve accessibility, curtail resource damage, or improve the ecological health of forest and rangelands. Other projects may to some extent alleviate the risk of high severity future fires; however, fuel loadings would be higher and the chances for a larger, hotter and more resource damaging fire would increase due to no salvage logging under Alternative 2. Combined with the increased potential for localized overgrazing, lack of road treatments, wildlife and watershed treatments, the cumulative effects of Alternative 2 are not likely to contribute to desired conditions for rangeland resources and would result in long-term negative cumulative effects to rangeland resources.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Table 3.07-4 provides a summary of the Alternative 3 treatment areas within allotments, capable range, roadside hazard trees, and fences.

Table 3.07-4 Alternative 3 treatments in affected grazing allotments

Allotment	Alternative 3 Treatment Areas				
	Acres	Allotment (percent)	Capable Range (percent)	Roadside Hazard Tree (miles)	Fences (percent)
Jawbone-Rosasco	16,569	32	46	62.3	37
Hunter Creek	3,439	11	28	66.8	16
Duckwall	940	5	9	13.8	41
Middle Fork, Meyer-Ferretti, Gravel Range, Curtin	16,813	32	21	122.4	18
Bonds, Bower Cave, Bull Creek, Little Crane	1,488	3	2	24.9	50
Westside, Lower Hull, Upper Hull	4,471	8	5	54.3	9

Grazing Management

Allotment Administration

Alternative 3 has similar effects on allotment administration and grazing management as Alternative 1. Alternative 3 removes hazard trees along 345 miles of roads and improves (reconstruction and maintenance) 503 miles of roads inside allotment boundaries. Alternative 3 improves safety conditions and access for grazing permittees and forest staff, facilitating allotment administration activities.

Rangeland Infrastructure

Alternative 3 has beneficial effects to rangeland infrastructure, similar to Alternative 1. Dead trees would be removed along 12.9 fence miles within grazing allotments and several cattleguards would be maintained, thereby improving grazing management on affected allotments.

Livestock Movements

Alternative 3 proposes treatments on 4,887 acres of capable rangelands, almost 700 more acres than Alternative 1. The effects of this alternative are similar to Alternative 1.

Rangeland Vegetation

Same as Alternative 1.

Cumulative Effects

Same as Alternative 1.

Alternative 4

Direct and Indirect Effects

Table 3.07-5 provides a summary of the Alternative 4 treatment areas within allotments, capable range, roadside hazard trees, and fences.

Table 3.07-5 Alternative 4 treatments in affected grazing allotments

Allotment	Alternative 4 Treatment Areas				
	Acres	Allotment (percent)	Capable Range (percent)	Roadside Hazard Tree (miles)	Fences (percent)
Jawbone-Rosasco	15,487	30	46	65.2	37
Hunter Creek	3,439	11	28	66.8	16
Duckwall	941	5	9	13.8	17
Middle Fork, Meyer-Ferretti, Gravel Range, Curtin	16,710	32	21	123.3	4
Bonds, Bower Cave, Bull Creek, Little Crane	1,184	2	2	24.9	50
Westside, Lower Hull, Upper Hull	3,946	7	5	55.3	9

Grazing Management

Allotment Administration

Alternative 4, similar to Alternatives 1 and 3 improves conditions for safety and access for allotment administration and grazing management. Alternative 4 removes hazard trees 349 miles of roads and improves (reconstruction and maintenance) 503 miles of roads inside allotment boundaries.

Rangeland Infrastructure

Alternative 4 poses some risk that harvest activities would damage range infrastructure, but this is mitigated by management requirements and timber sale administration. Dead trees would be removed along 8 fence miles within grazing allotments. Cattleguard maintenance would also improve grazing management on affected allotments. The effects are similar to Alternatives 1 and 3.

Livestock Movements

The effects of Alternative 4 on livestock movements are similar to Alternatives 1 and 3, except that it treats 4,850 acres in capable rangelands, almost 700 more acres than Alternative 1 and only slightly less than Alternative 3.

Rangeland Vegetation

Same as Alternative 1.

CUMULATIVE EFFECTS

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

The effects of each alternative are compared against the relative area proposed for treatment within grazing allotments, the amount of capable range in treatment areas, length of fence segments encompassed by treatments, and travel routes treated for hazard tree removal and road improvements. Table 3.07-6 displays a summary of this information for all alternatives.

Table 3.07-6 Allotment area treatments by each alternative

Treatment Areas	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Grazing Allotment (acres)	42,445	0	43,720	41,718
Capable Range (acres)	4,193	0	4,887	4,850
Fence (miles)	13.8	0	12.9	7.8
Roadside Hazard Tree (miles)	356	0	345	350
Road Improvements (miles)	508	0	503	503

All action alternatives propose a similar amount of roadside hazard tree removal and road improvement activities, and so would provide similar positive effects to allotment administration and livestock movements. Alternative 1 encompasses the most fence segments, and is the most desirable alternative for range infrastructure. Alternative 2 would not provide any improvements and would result in long-term negative cumulative effects. Alternative 3 provides the most benefits to rangeland resources. Alternatives 3 and 4 treat the largest amount of capable rangeland, and so have the potential to create the most improvements in forage availability and livestock distribution. Alternatives 1, 3 and 4 provide the most benefits for allotment administration (safety and travel).

3.08 Recreation

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan. In addition, the Forest Plan includes a specific goal applicable to recreation and the Rim Recovery project:

- **Forest Goal for Recreation**: Provide a wide range of recreation opportunities directed at various experience levels to meet current and projected demand, including campgrounds, hiking trails, picnic areas, off-highway vehicle (OHV) trails, etc. (USDA 2010a, p. 6).
- **Forest Management Direction for Visual Resources**: Meet adopted Visual Quality Objectives (VQOs) on all projects. Maintain high visual quality in areas of concentrated public use and in areas seen from major travel routes. Allow management activities in certain areas to dominate the surrounding characteristic landscape, but they should borrow from natural forms and appear as natural occurrences when viewed from background distances. Consider private land concerns during the evaluation of proposed management activities adjacent to privately developed subdivisions and recreation areas. Particular attention will be given to visual quality in the foreground view areas of these private developments as well as any other values relating to their attendant use and enjoyment of the National Forest. (USDA 2010a)

Effects Analysis Methodology

The geographic extent of this analysis is the Rim Recovery project area and includes the Cherry Valley recreation area. This unit of spatial analysis is used for determining direct, indirect and cumulative effects. A short-term timeframe of three years allows the activities associated with this project to be mostly completed. A long-term temporal bound of 10 years allows completed activities associated with this project to be established.

Assumptions Specific to Recreation

- The National Visitor Use Monitoring (NVUM data) report accurately expresses recreation use.
- Action alternatives will not cause long-term changes to recreation opportunities.
- Dust associated with the removal of logs from the Forest will be abated.
- Though the most updated dispersed camping and route data were used for this analysis, conditions change on the ground.
- Noise and ground disturbances caused by any of the action alternatives will be temporary in nature.

Data Sources

- Stanislaus GIS Library
- National Visitor Use Monitoring (NVUM) data (USDA 2014e)
- Recreation Facility Analysis (USDA 2007e)
- Recreation Opportunity Spectrum (ROS), Management Area and project area GIS maps
- Visual Quality Objectives from the Forest Plan (USDA 2010a)

Recreation Indicators

- Developed Recreation Opportunities – describe the changes in the recreation setting
- Dispersed Recreation Opportunities – describe the changes in the recreation setting

Recreation Methodology by Action

The recreation indicators identified and compared the effects of the alternatives on developed recreation, dispersed recreation and diversity of vegetation. The analysis discussed the changes in recreation and visual resource opportunities as a result of each alternative. In each of the alternatives the recreation analysis objective evaluates how well each alternative narrows the gap between the existing setting and the desired sustainable setting; and the effect on "sense of place".

Affected Environment

Existing Conditions

Rim Fire Closure

Numerous recreation and visual resources in the Rim Fire area have been damaged. The setting and diversity has changed as a result. Maintenance and rehabilitation is ongoing. Falling trees, rock falls, and debris flows will create an increased workload over the long-term to maintain these resources to Forest Service standards. Regulatory, information, directional, and interpretive signs have been damaged during the fire. Because roads and other developed facilities within the project area are faced with hazard trees that pose a threat to human health and safety, there is a need to remove those hazards to provide a safe environment for administration and public use of those facilities.

On August 22, 2013, after determining that conditions within the burn area presented unsafe conditions for public travel, Stanislaus Forest Supervisor Susan Skalski issued a temporary Forest Order (STF 2013-08) prohibiting public use within the burn area. The Forest Supervisor issued several updates changing the closure area in response to current conditions for public safety (2013-09 on 8/23/2013; 2013-10 on 8/31/2013; 2013-11 on 9/12/2013; 2013-14 on 9/27/2013; 2013-15 on 11/18/13). On April 14, 2014, the Forest Supervisor issued the current temporary Forest Order (STF 2014-01), opening portions of the previous closure area and prohibiting public use within the remaining portions of the burn area until November 18, 2014. A total of 7 campgrounds, 5 semi-developed dispersed camping or concentrated use areas, 6 day use areas, 11 non-motorized trails, 5 OHV riding areas, 4 developed recreation sites under special use permits, and 475 inventoried dispersed campsites are located within the closure. Additionally, numerous outfitters and guides have special use permits (rafting, hiking, bicycling, fishing, etc.). These locations are the key locations where people view the landscape setting.

Recreation Visitor Use

Before the Rim Fire, Forest recreation use within the project area included OHV use, passenger car driving, rafting, boating, hunting, swimming, mining, wood cutting, camping (dispersed and developed), hiking, cycling (mountain and road), fishing, backpacking, horseback riding, and winter sports. These opportunities will once again be available after the hazard trees are abated and the area is re-opened for public access. Obviously, the fire has modified the recreation setting, that provides the opportunity for recreation activities to create experiences that people remember, and changed the existing forest condition. Some of the traditional activities that have been attractive to the forest visitor will be less attractive because of the fire. Dispersed camping may be less attractive without the canopy of trees, as an example, while water features will remain as an attraction. New visual attractions will become apparent as people discover the changes within the seen environment.

The Stanislaus National Forest ranks in the top five National Forests in California for overall annual recreation use (USDA 2014e). The Forest receives more visitation than any other National Forest on the Sierra Nevada western slope. The Recreation Facility Analysis (RFA) projected an increase in overall recreation use of 43 percent over the next 20 years (USDA 2007e). This is dramatically higher than the average forest nationally, but typical of adjacent Forests in the central Sierra. The expected increase in visitor use will create challenges as demand for all types of activities approach capacity.

Visitor use estimates for the entire Forest are based on the NVUM survey conducted in 2012 and updated in April of 2014 (USDA 2014e), prior to the Rim Fire. Recreation use on the Stanislaus National Forest for this period was estimated at 1,817,200 National Forest visits and 2,100,300 site visits. The survey assessed existing recreation demand on the forest by asking visitors what they did during their visit. This assessment resulted in two categories of visitor use: all activities in which they participated in and the main activity (the primary purpose for their visit to the Forest). The survey highlighted the fact that the two uses may or may not be related. For example, 59.2 percent of the forest visitors reported participating in the viewing of natural features, but only 12.3 percent reported this as their main activity. The top five recreation activities visitors participated in were hiking/walking, relaxing, viewing natural features, viewing wildlife, and driving for pleasure. Each visitor also picked one of these activities as their main activity for their current recreation visit to the forest. Table 3.08-1 identifies the main activities as relaxing, hiking and walking, viewing natural features, fishing, and downhill skiing. (USDA 2014e).

Table 3.08-1 National Visitor Use Monitoring Activity Participation

Activity	Percent Participation[1]	Percent Main Activity[2]	Average Hours Doing Main Activity
Hiking and Walking	63.0	14.4	3.5
Relaxing	62.0	16.0	14.2
Viewing Natural Features	59.2	12.3	3.5
Viewing Wildlife	45.1	0.2	3.2
Driving for Pleasure	28.6	2.5	2.4
Picnicking	27.4	3.4	5.4
Fishing	20.5	9.5	5.1
Other Non-motorized	18.2	5.5	3.1
Developed Camping	12.6	3.5	38.3
Nature Study	8.7	0.3	1.1
Downhill Skiing	8.6	8.1	5.2
Some Other Activity	8.3	4.8	4.5
Non-motorized Water	7.8	4.6	6.9
Hunting	7.3	5.3	12.5
Gathering Forest Products	6.9	1.0	4.9
Resort Use	6.2	0.3	35.3
Primitive Camping	6.0	0.7	38.6
Visiting Historic Sites	5.7	0.2	1.3
OHV Use	5.4	1.7	7.9
Motorized Trail Activity	5.4	2.1	6.3
Bicycling	5.4	1.3	3.3
Motorized Water Activities	4.8	0.5	7.3
Nature Center Activities	3.5	0.0	0.0
Backpacking	3.0	1.1	30.5
Horseback Riding	1.3	0.3	6.3
Cross-country Skiing	1.0	0.5	3.7
Other Motorized Activity	0.5	0.0	0.0
Snowmobiling	0.3	0.2	6.4
No Activity Reported	0.2	0.2	

[1]Survey respondents could select multiple activities so this column may total more than 100 percent.
[2]Survey respondents were asked to select just one of their activities as their main reason for the forest visit. Some respondents selected more than one, so this column may total more than 100 percent.

Most visitors to the Forest participate in a variety of activities. Many activities, such as viewing natural features, can be either motorized or non-motorized. The overwhelming majority of forest visitors arrive in a motorized vehicle; the exception being immediately adjacent residents who hike or bicycle. This means that motorized and non-motorized activities are often combined as part of creating the total recreation experience.

Based on the 2012 NVUM data, an estimated 76,500 individual recreation site visits have been “lost” because of the fire and closure orders. An individual recreation site is defined as a single user visiting a single site. Because several users visit more than one individual recreation site on their visit, total individual visits to the National Forest “lost” due to the fire and closure orders is estimated to be 53,000. These figures are only valid under the assumption that none of the visits had a temporal or spatial substitute on the forest. That is, none of the visits either occurred at some other place on the forest or at some other time on the forest. If any such spatial or temporal substitution occurred, then these figures overstate the losses on the forest but not within the Rim Fire area.

Sense of Place

Visitors sometimes feel a strong sense of place and attachment to a site they frequently use. Attachments to a particular area vary substantially. This is dependent on several factors that live in the memory of recreationists. Place attachment is strongest when there are distinctive and memorable qualities to the setting, the activity that occurs there, and the duration or repetition of the activity. While a one-time visit to a common firewood gathering spot may be forgotten, the next cutting trip may be to a different area, with no regret. The annual trek to a 4th generation hunting camp, however, is imbedded in family ritual, and embellished through storytelling and photographs. Attachment to place grows through familiarity with the understanding of the area’s features. Whether it is a “cool swimming hole” for local teenagers or a “sacred site” for Native Americans, strong attachment occurs when the meaning of a place is shared with others. The place may even be given a name. “God’s Bath” on the Clavey River is an example. These “special places” have a unique identity and cannot be easily substituted for another place with similar qualities (USDA 2003).

Several tools describe the recreation and visual setting that establishes the sense of place within the project area. Recreation Opportunity Spectrum (ROS) identifies possible mixes or combinations of activities, settings, and probable experience opportunities that are arranged along a spectrum, or continuum (USDA 1986). The Forest Plan integrates ROS into the management prescriptions and associated standards and guidelines. Table 3.08-2 displays the ROS classes that exist within the project area: Semi-Primitive Non-Motorized and Roaded Natural[6]. The three components of ROS are physical setting, social setting and managerial setting. The Rim Fire has altered all three components.

Table 3.08-2 Recreation Opportunity Spectrum Classes within the Rim Recovery project area

ROS	General Direction	Standards and Guidelines
Semi-Primitive Non-Motorized NMFPA[1]	Manage the area so that on-site controls are minimized and restrictions are subtle. Provide a range of semi-primitive non-motorized recreation opportunities and experiences.	Meet the ROS objective of Semi-primitive Non-motorized. Interaction between visitors is low but there is evidence of other users. Motorized use is normally prohibited, except for: 4N80Y, 5N02R (NMFPA). Resource improvements will normally be limited to minimum, unobtrusive facilities.
Roaded Natural	Manage the area so there is only moderate evidence of the sights and sounds of man. Provide a range of roaded natural recreation opportunities and experiences.	Meet the ROS objective of Roaded Natural. Interaction between users is usually low to moderate with evidence of other users prevalent. Resource modification practices are evident. Conventional motorized use is provided for in construction standards And facilities designs. A full range of other resource activities is permitted to the extent that the general practice description is met.

[1]NMFPA=Non-motorized Forest Plan Amendment (USDA 2010a, p. 2)

[6] Not all ROS classes are present with the Rim Recovery project area (Table 3.08-2). The full range of ROS classes include: 1) Primitive; 2) Semi-Primitive Non-Motorized; 3) Semi-Primitive Motorized; 4) Roaded Natural; 5) Rural; and, 6) Urban.

The Recreation Facility Analysis (USDA 2007e) further defines the sense of place for the Stanislaus National Forest as an overnight destination for families with strong connections to the water and forested environment.

Management Areas, established as part of the Land and Resource Management Plan (USDA 2010a), help define management emphasis within the recreation setting. Visual Quality Objectives (VQOs) define the recreation setting further by describing the seen environment and providing guidelines for maintaining the scenic integrity of the places people visit. The VQOs within the project area are Retention, where alterations are not noticed, and Partial Retention, where changes in the setting are noticed but generally maintain the integrity of the viewed landscape.

Recreation Access

Traditionally, high volumes of traffic occur during peak seasons on Forest Service Maintenance Level 3, 4, and 5 roads that are subject to the Federal Highway Safety Act. These higher maintenance level roads provide access to most developed recreation and some dispersed sites. Currently, most access to developed sites is closed. The Rim HT project is expected to remove the hazard trees, opening many of these roads to public use. Logging trucks and related timber removal equipment will be operating along main corridors seven days a week. Evergreen Road on the Groveland Ranger District, however, will have no harvest operations implemented during weekends from Memorial Day and to Labor Day to allow safe public access. Evergreen Road is a main artery that provides access to several popular recreation areas:

- Dimond O Campground (Forest Service);
- Middle Fork Day-Use (Forest Service);
- Carlon Day-Use and Trailhead (Forest Service), which provides trail access to Carlon Falls in Yosemite National Park;
- Peach Growers Recreation Residence Tract, which encompasses 20 Forest Service special use cabins, roads and water infrastructure;
- Evergreen Lodge (Privately owned historic Yosemite lodge); and,
- Camp Mather (City and County of San Francisco family camp).

Some access routes show resource damage due to rain on slopes with no ground cover or vegetation. Lumsden Road (1N10) with numerous debris slides since the Rim Fire accesses dispersed areas and developed sites including the Merals Pool put-in for whitewater boating.

Developed Recreation Opportunities

Developed recreation sites provide infrastructure which typically include running water, structures, vault toilets, signage, barrier posts, interior roads, campfire rings, grills and picnic tables. Developed campgrounds within the affected area are Dimond O, Lost Claim, Lumsden Bridge, Lumsden, South Fork, Sweetwater, and Cherry Valley. Upper and Lower Carlon, Middle Fork, and Rainbow Pool Day Use Areas, Rim of the World Vista, Cherry Creek and Merals Pool Boat Launches are also found within the Rim Fire perimeter. Developed recreation sites under special use permit within the Rim Fire perimeter include Berkeley-Tuolumne Camp, Peach Growers Recreational Residence Tract, and San Jose Camp. A majority of the Berkeley-Tuolumne Camp was destroyed in the Rim Fire and is currently not available for use. San Jose Camp received some fire damage, and a vault toilet was burned at the South Fork Campground. Camp Tawonga is a privately owned camp that is accessed by Cherry Lake Road or Evergreen Road and Forest Route 1S02. Hazard trees within the Forest Service sites are addressed in the Rim HT project that precedes the actions described in this EIS. An additional 400 acres of treatment are proposed within ¼ mile of developed sites under the action alternatives reviewed in this EIS.

Dispersed Recreation Opportunities

Dispersed recreation opportunities include non-motorized system trails and motorized recreation opportunities. The project area provides a variety of dispersed recreation opportunities that include 475 inventoried dispersed campsites. Over 6,650 acres of treatment are proposed within 0.25 mile of the inventoried dispersed camps in the action alternatives reviewed as part of this analysis. Developed-dispersed camping and concentrated use areas within the Rim Fire perimeter include Camp Clavey, Cherry Borrow, Cherry Valley, Joe Walt Run, and Spinning Wheel. Many dispersed sites are accessed by Forest Service Maintenance Level 2 roads proposed for hazard tree removal in this project.

Non-motorized system trails include Andresen Mine, Carlon Falls, Hamby, Golden Stairs, Humbug/Duluke, Indian Creek, Kibbie Ridge/Huckleberry, North Mountain, Preston Falls, Tuolumne River Canyon, West Side Trail, and Lake Eleanor. Some trails access various points of interest along the Tuolumne Wild and Scenic River corridor and serve as important emergency access points for river users. Wilderness trailheads within the project area provide access to trails in Yosemite and Emigrant Wildernesses.

Motorized recreation opportunities typically provide a variety of settings and a diversity of OHV trails varying in length, degree of difficulty, and access to other recreation opportunities. Motorized Recreation Areas include Jawbone Pass, Pilot Ridge, Tuolumne Rim, Two-mile/Middle Clavey/Reynolds Creek, and West Side Rail Tour.

A Burned Area Emergency Response (BAER) team began assessing the Rim Fire area for post-fire emergencies on September 9, 2013. BAER is a rapid assessment of burned watersheds to identify imminent post-wildfire threats to human life and safety, property and critical natural or cultural resources on NFS lands and takes immediate actions to implement emergency stabilization measures before the first major storms. The Forest invested 4,600,000 dollars in BAER treatments including the following areas.

- **Roads**: out-sloped road surface, maintained and constructed drainage features (e.g., rolling dips, cleaned and replaced culverts), replaced guardrails and reflectors, installed and closed gates to close burned area to public use according to closure (STF 2014-01), felled hazard trees at intersections, cleared trees that fell across roads, replaced traffic control barriers, installed signs (e.g., warning, regulatory, and hazard signs), and continued storm patrolling.
- **Trails**: maintained and installed drainage dips, removed burned wooden retaining features and replaced with rock or rerouted trail, felled hazard trees at trailheads, cleared trees that fell across trails, replaced traffic control barriers on motorized trails, installed warning and hazard signs, closed public access to trails through winter, and continued storm patrolling.
- **Facilities**: sealed burned vault toilets, removed and replaced burned traffic barriers, installed warning and hazard signs, felled hazard trees, closed public access to trails through winter, and continued storm patrolling.

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Alternative 1 would improve administrative, visitor, and traffic safety and provide overall net benefits for recreation and visual resources because areas of the forest that are currently closed could be opened for public use. Treatment of fire-killed trees would remove dead trees from the project area; thereby, recovering commercial value and reducing excessive fuel loads. Recreation resources may need to be temporarily closed during hazard tree removal efforts, biomass removal, burning, road maintenance and other support activities, which would displace users and may affect scenic quality on a temporary basis. Evidence of disturbed settings would be apparent immediately after treatment but would recover visually more quickly than the areas that are left untreated. A natural appearing landscape would result, over time.

A limited amount of noise from chainsaws, skidders, loaders, logging trucks and personnel associated with the abatement and removal of hazard trees is expected during project implementation. Hazard tree operations can treat from 0.5 to several miles of road per day, assuring limited impacts, which would not exceed more than a few days in any one location. Noise disturbances to users of facilities within this project are inevitable, but would be very limited in duration and amount.

Upon completion of project work and the removal of hazard trees recreation visitor use would begin to grow although not immediately to the same levels as before the fire. Growth to those levels would only occur after a longer recovery period. Water attractions would become the first to show full use. New opportunities to interpret the growth of an ecosystem would increase in importance.

Developed Recreation Opportunities

Lumsden Bridge, Lumsden Campground and South Fork Campground would not be affected from the proposed activities. Sweetwater, Lost Claim, and Dimond O Campgrounds and Peach Growers Recreation Residence Tract are immediately adjacent to proposed tractor logging units and would experience temporary negative effects from noise, dust, and increased traffic associated with the cutting and removal of trees. Loading for hazard tree operations along Highway 120, where Sweetwater and Lost Claim Campgrounds are located, will be avoided during the weekends (3:00 pm Friday through Sunday). Because logging operations would not occur along or adjacent to Evergreen Road on weekends during the peak summer season (from July 3 through July 5, during Memorial Day and Labor Day weekends, and during the special event on Evergreen Road), negative effects are lessened for Dimond O Campground and Peach Growers Recreation Residence Tract, along with the private properties of Camp Mather and Evergreen Lodge. The reduced logging operations and hauling during peak travel time for visitors to the forest should reduce the potential for accidents related to industrial vehicles in use in the project area.

Activities are planned on NFS land adjacent to privately owned Camp Tawonga (Table 3.08-3). The camp would experience temporary negative effects from noise, dust, and increased traffic associated with the cutting and removal of trees. It should take 30 days or less to log and haul the dead timber on tractor units within 1 mile of the camp. Appropriate safety procedures related to traffic management requirements will be included in all Timber Sale contracts and may include placing warning or closure signs in locations that ensure maximum visibility for forest visitors.

Table 3.08-3 Tractor Units within 1 Mile of Camp Tawonga

Units	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Tractor Units	13	0	14	14
Acres	1,321	0	1,263	1,263

Cherry Valley Campground is adjacent to proposed treatment units (helicopter and tractor) as well as hazard tree removal activities occurring along the roads accessing this area. Due to heavy logging traffic on travel routes that access Cherry Lake Road, Cherry Valley campground would be closed for at least the 2014 season. Under the Forest Order discussed earlier in this section (STF 2014-01), the Forest is currently closed until hazard trees along roads are abated either under the Rim HT project or this EIS. Closure of Cherry Valley Campground would have a temporary negative financial effect to the campground concessionaire and temporary negative effects to forest visitors who prefer camping in Cherry Valley.

Recreation would become easier to manage and meet the ROS direction once the hazard trees have been removed. Safety risks would be minimized once dead trees are felled. Roads, hiking trails and facilities would become available for use. The physical setting would be diverse, and offer the landscape variety sought by the visitor. Social constraints would be lifted and impacts created by displacement of use would be lessened. Increased use and wear at Yosemite facilities would be eased as people return to sites on the forest as well. Managerial direction would shift from closure to opening areas favored by users.

Dispersed Recreation Opportunities

Considering the volume of dispersed recreation on the Stanislaus National Forest and the size and scale of the Rim Recovery project, many dispersed areas would be impacted either by or through project activities directly (e.g., landings placed on top of dispersed camping sites) or indirectly through log hauling and continued closed access routes to the sites. However, these sites are currently closed under Forest Order STF 2014-01. The positive effects of this alternative are to provide safe dispersed recreation areas and safe access. As access routes are cleared of hazard trees the Forest would open to public use including the 99 miles of motorized and non-motorized trails currently closed due to hazard trees. Not all hazardous trees would be removed along motorized and non-motorized trails; however, they would be removed in treatment areas thereby reducing safety risks along segments of trails. Any trails damaged by project activities would be re-established to allow them to be utilized again. Once the forest is reopened to public use there would remain the temptation for cross-country trails to become established. Opening existing trails under this alternative would lessen the need for unauthorized trails to show up on the landscape because adequate trail routes would be available to meet current needs. There may remain the need for recovery signage to encourage visitors to stay on designated trails, and funding for additional OHV patrols. Finally, although gravel would be used on some roads that currently have a native surface; these roads are expected to return back to their native state at the conclusion of the logging period due to the significant wear and tear imposed by the industrial traffic.

CUMULATIVE EFFECTS

Appendix B identifies other actions within the Rim Fire area including ecological restoration, soil improvement, transportation and motorized trail improvement projects. Those projects would add to the overall health of the forest and enhance recreation opportunities within the Rim Fire area. Cumulative effects would include the temporary negative effects of noise, dust and increased traffic on the recreation experiences of Forest users; however, the Rim HT project and the Rim Recovery would provide safe access and safe travel to developed recreation sites and dispersed recreation areas. The Rim Fire had the largest effect on recreation settings as many of the places people are attracted to have been changed. The visual and recreational setting will continue to evolve.

Hazard tree and other projects are expected to occur in the foreseeable future. Some proposed activities may temporarily limit access for recreation opportunities, displacing recreation use to other areas in the vicinity during project implementation. Since all projects on NFS lands are designed to meet Forest Plan direction for recreation and ROS, Alternative 1 would not result in cumulative, long-term effects on recreation.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, current management plans would continue to guide management of the project area. No hazard tree removal or road maintenance would be implemented to accomplish project goals, and thousands of currently hazardous trees would be left to fall on their own as a result of the forces of wind, snow and gravity. These trees would not be removed, would contribute to accumulation of woody debris, and may pose a risk for more intense wildfire behavior. Hazard trees and other trees previously felled during fire suppression or BAER activities would not be removed from areas adjacent to Level 2 roads, motorized or non-motorized trails, dispersed campsites, and other recreational areas.

Developed Recreation Opportunities

In a 2004 study of more than 200 BAER reports, many direct and indirect impacts and potential risks to recreation due to resource damage caused by fire were identified following fires on National Forests across the nation (Chavez 2004). Table 3.08-4 lists some potential impacts and risks to developed recreation sites. Some impacts, such as falling snags, would be long-term issues resulting from the Rim Fire. If trails and campsites remain closed it is likely that unauthorized sites and trails would be established throughout the burned area, creating further soil and erosion impacts. The current surge of use and wear on Yosemite National Park facilities would continue if forest facilities remain unavailable for use.

Table 3.08-4 Alternative 2: Potential Impacts and Risks to Developed Recreation

Developed Recreation Impacts	Direct	Risks
Closure, blocked, or restricted access	X	X
Drinking water source damage	X	X
Falling snags or hazard trees		X
Facilities and improvements damaged	X	
Tree stands severely damaged	X	
Plugged culverts	X	X
Degraded water quality for recreation purposes		X

Although the sense of place would evolve similar to other alternatives, the recreation setting would contain more risks and evolve differently. The physical setting would pose additional safety risks from falling snags and trees; the social setting, described as part of the ROS used to manage the recreation setting, would remain at least partially closed; and the managerial setting would focus on guiding people from hazards to places that provide for safe recreation use. Additional wear and crowding would occur in those remaining safe locations for people to enjoy. The diversity of the landscape, as it recovers, would not offer the scenic variety desired by the majority of viewers. People's attachment to the places they remember and value may be removed from those areas available to use and enjoy because of possible closure and changes brought about because of the fire.

Dispersed Recreation Opportunities

Continued closure of portions of the burn area would limit access to dispersed recreation opportunities and displace users. Alternative 2 indirectly would contribute to the proliferation of unplanned, unauthorized, non-sustainable roads, trails and areas created by unauthorized cross-country travel. Impacts include compacted soil, soil and vegetation loss, and habitat disturbance. Table 3.08-5 lists some potential impacts and potential risks to dispersed recreation areas (Chavez 2004). Many of these would be long-term impacts resulting from Alternative 2. Risks along both motorized and non-motorized trails would remain higher in Alternative 2 if the trails are opened for use. As recently as June of 2014, Yellowstone National Park reported the death of a hiker struck by a falling tree that was killed in a 1988 fire (USDI 2014); similar long-term hazards remain with this alternative.

CUMULATIVE EFFECTS

A total of 475 inventoried dispersed campsites exist within the project area. Continued closure of portions of the burn area under Alternative 2 would displace users to other available areas within the Rim Fire. Displaced users may impact sensitive meadows and riparian areas. Intense heat from campfires can damage vegetation and soil. Repeated use of a dispersed campsite can result in soil compaction, soil and vegetation loss, habitat disturbance, and heritage resource degradation. As such, Alternative 2 would contribute towards adverse cumulative effects on recreation and possibly other resources in the Rim Fire perimeter.

Table 3.08-5 Alternative 2: Potential Impacts and Risks to Dispersed Recreation

Dispersed Recreation Impacts	Direct	Risks
Closure, blocked, or restricted access	X	X
Drinking water source damage	X	X
Falling snags or hazard trees		X
Flooding, water erosion		X
Landslides and debris flows		X
Loss of soil productivity		X
Noxious weed infestation		X
Tree stands severely damaged	X	
Unstable hillsides	X	
Falling rock		X
Increased unauthorized motorized use		X
Plugged culverts	X	X
Sign, guard rail and cattleguard damage	X	X
Stranding people		X
Stump burnout	X	
Unstable trail conditions	X	
Degraded water quality for recreation purposes		X
Vandalism or theft of cultural resource sites		X

Alternative 3

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1.

CUMULATIVE EFFECTS

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1.

CUMULATIVE EFFECTS

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

Although the proposed acreages and treatments change across the alternatives, the effects of Alternatives 1, 3 and 4 would be the same. These include temporary negative effects of noise, dust and increased traffic on the recreation experiences of Forest users; however, the positive effect of improved forest health would benefit recreation. Alternative 2 would have long-term negative indirect and cumulative effects to developed and dispersed recreation opportunities due to limited or no access and increased safety risks.

3.09 Sensitive Plants

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

No federally listed plants occur on the Stanislaus National Forest. Forest Service Manual (FSM 2670) and the Forest Plan provide direction for management of sensitive plants.

Sensitive Plants are defined as "those plant … species identified by a regional forester for which population viability is a concern, as evidenced by: a) significant current or predicted downward trends in population numbers or density and b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution" (FSM 2670.5). It is the Secretary of Agriculture's direction to "avoid actions which may cause a species to become threatened or endangered" (USDA 2008d). Further, it is a Forest Service objective to "maintain viable populations of all native ... plant species in habitats distributed throughout their geographic range on National Forest System lands" (FSM 2670.22). Forest Service policy set out in FSM 2670.32 is to "avoid or minimize impacts to [Sensitive] species whose viability has been identified as a concern." Where it is determined that impacts cannot be avoided, "the line officer with project approval authority, [may make] the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward federal listing."

Forest Plan direction for Sensitive Plants is to "provide for protection and habitat needs of sensitive plants, so that Forest activities will not jeopardize their continued existence." Forest Plan Standards and Guidelines advise to "modify planned projects to avoid or minimize adverse impacts to sensitive plants" (USDA 2010a, p. 60). The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

Assumptions Specific to Sensitive Plants

- Unknown occurrences of Sensitive Plants exist within the project area and treatment units.
- Surveys conducted during the spring and summer 2014 will locate and document additional occurrences; management requirements would be applied to the newly discovered populations.

Data Sources

- Rare plant occurrences, survey locations and habitats (GIS).
- RareFind 5 Database from the California Natural Diversity Data Base (CDFW 2014c), California Department of Fish and Wildlife (CDFW 2014d).
- Soil Survey, Stanislaus National Forest Area, California (USDA 1981).
- Tuolumne County Lithography.
- 2009 GIS Ortho Photo layers.
- Google Earth satellite aerial photos.
- Specimen herbarium records (CCH 2014).
- The paper-based Groveland Ranger District surveys completed atlas.

Sensitive Plant Indicators

- Sensitive Plant occurrences.
- Suitable habitat for sensitive plants and the condition of those habitats.
- Number of sensitive plants impacted by the project, the intensity of the impacts and the duration of the impacts.

Sensitive Plants Methodology by Action

A list of all federally listed Threatened, Endangered or Proposed plant species which might occur in the Stanislaus National Forest was acquired from the U.S. Fish and Wildlife Service (USFWS 2014).

A prefield review was conducted to determine which sensitive plant species might occur or are known to occur within the project area (project record). Habitat attributes such as geology and soil types, elevation range, aspect and presence of closed canopy and forest openings were used to determine availability of suitable habitat for each species.

The effects of the Rim Recovery project were analyzed using data from sensitive plant inventories, local observations of effects to the various plant species, anecdotal information for specific species documented in Regional Sensitive List revision forms and, where available, published research papers or research papers acquired prior to publication.

The project area will serve as the geographic bounds for effects analysis of sensitive plants. The project area is an appropriate size to assess the effects of the proposed activities because all potential disturbances and effects to sensitive plants would occur within this boundary. Any predictable effects to vegetation would remain within this area. For sensitive plants, the project area also serves as the area of analysis for cumulative effects because effects of other past, present, and foreseeable activities would interact with effects of the proposed project only within the project area.

The time frame considered for future effects is 10 to 20 years after implementation.

Affected Environment

As described in the Sensitive Plant BE (project record) and Botany Report (project record), rarity in plants can be the result of a number of things. Loss of habitat is a key factor for some species. Reproductive isolation through loss of populations is another factor. In many cases, the scarcity of the habitat in which the species evolved is the limiting factor which makes the species rare. Many of the sensitive plants considered in the Rim Recovery project are limited to specialized or scarce habitats such as cliffs, vernal pools, fens (spring-fed seep or meadow areas containing 16 inches or more of peat), or “lava caps” (prehistoric volcanic ash mud flows also known as lahars and composed of andesitic tuff).

Sensitive Plant surveys have been conducted within the project area for the past 24 years. However, changes to the Regional Forester’s Sensitive Plant List, increased understanding of species range, the lack of floristic surveys in the past and the lack of any type of survey within some proposed treatment areas indicate the need to survey the proposed project for sensitive species. Within the Rim Recovery project, there are few treatment units which have been surveyed for all sensitive species based on the unit’s habitat attributes and the current Sensitive Plant List.

The following Sensitive Plant species are known to occur within the project area: *Allium yosemitense, Balsamorhiza macrolepis, Botrychium crenulatum, Botrychium minganense, Botrychium pedunculosum, Clarkia australis, Clarkia biloba ssp. australis, Cypripedium montanum, Eriophyllum nubigenum, Erythronium taylori, Erythronium tuolumnense, Lewisia kelloggii ssp. hutchisonii, Lomatium stebbinsii, Mielichhoferia elongata, Mimulus filicaulis, Mimulus pulchellus,* and *Peltigera gowardii.*

In addition, suitable habitat within the appropriate geographic and elevational ranges exists within the project area for the following species: *Allium tribracteatum, Arctostaphylos nissenana, Botrychium ascendens, Botrychium lineare, Botrychium lunaria, Botrychium montanum, Botrychium pinnatum, Bruchia bolanderi, Cinna bolanderi, Dendrocollybia racemosa, Eriastrum tracyi, Eriogonum luteolum var. saltuarium, Eriophyllum congdonii, Fissidens aphelotaxifolius, Helodium blandowii, Horkelia parryi, Hulsea brevifolia, Lewisia kelloggii ssp. kelloggii, Meesia uliginosa, Mielichhoferia shevockii* and *Tauschia howellii.*

The following plant profiles are for species which might be impacted by project activities.

Allium tribracteatum (three-bracted onion) is a perennial herb which grows in “lava cap” soils. Lava caps are volcanically derived formations formed by ancient ash mud flows. The occurrence sites are usually open with no overstory. *Allium tribracteatum* usually grows on the thin soils near the tops of ridges where there is little competition. Thirty-three known occurrences of *Allium tribracteatum* exist in the Stanislaus National Forest. Most are in the Mi-Wok Ranger District, none within the Rim Fire perimeter; however there is unsurveyed suitable habitat.

Clarkia australis (Small's southern clarkia) is an annual herb which grows in openings in ponderosa pine and mixed-conifer stands often in association with bear clover. *Clarkia australis* prefers sites with little or no competition from aggressive weedy species. When not associated with bear clover, the species is usually observed growing in bare mineral soil or with a very light layer of leaf litter. *Clarkia australis* has a very narrow range in Tuolumne and northern Mariposa Counties. The Rim Fire burned through a large portion of the known occurrences of this species.

Clarkia biloba ssp. *australis* is an annual herb which usually grows under light shade in oak woodland, chaparral and conifer forests. Like *Clarkia australis*, it prefers to grow where there is little competition from weedy species.

Lewisia kelloggii ssp. *hutchisonii* (Hutchison’s bitterroot) and *Lewisia kelloggii ssp. kelloggii* (Kellogg’s bitterroot) are recently described perennial herbs which grow on rocky ridges in shallow soils over bedrock or relatively flat open areas with widely spaced trees in partial to full sun. Soils are typically either sandy granitic or erosive volcanic soils. *Lewisia kelloggii* ssp. *hutchisonii* is known from 56 occurrences in five national forests in California. This species occurs in Siskiyou, Butte, Plumas, Sierra and Tuolumne Counties. There are 17 known occurrences in the Stanislaus National Forest, two inside the Rim Fire, one within a treatment unit. *Lewisia kelloggii ssp. kelloggii* is known from 25 occurrences and is found from Humboldt County in the Coast Range and from Plumas, Nevada, Sierra, El Dorado, Placer, Calaveras, Mariposa and Madera Counties in the Sierra Nevada. There is one occurrence of *Lewisia kelloggii ssp. kelloggii* in the Stanislaus National Forest in the Calaveras Ranger District, well outside the Rim Fire area. There is suitable habitat which has not been surveyed for these species in Rim Fire Recovery units.

Lomatium stebbinsii (Stebbins’ lomatium) is a perennial herb which grows in shallow soils on ridge tops and slopes of lava caps. This species is limited to Calaveras and Tuolumne Counties. There are about 90 occurrences in the Stanislaus National Forest, three in Calaveras Big Trees State Park and five on private property. The majority of the occurrences are found in the watersheds of the South Fork Stanislaus and North Fork Tuolumne Rivers on either side of Highway 108. Eight occurrences are found within the Rim Fire, made up of 34 colonies. Four colonies occur in three salvage units. There are five colonies in four roadside hazard tree units.

Mimulus filicaulis (the slender-stemmed or Hetch-Hetchy monkey flower) and *Mimulus pulchellus* (the pansy monkey flower) are annual herbs which occur in seasonally damp soils, seeps, springs, meadows and drainages in openings in forests or chaparral. *Mimulus pulchellus* is often found growing in “lava cap” soils. *Mimulus filicaulis* has a very narrow range from the Tuolumne River south to Mariposa County. Most of the occurrences are centered on the area east of Cherry Lake Road and north of Highway 120 and west of the boundary with Yosemite National Park. The range of *Mimulus pulchellus* is Calaveras, Tuolumne and Mariposa Counties. Both *Mimulus filicaulis* and *Mimulus pulchellus* prefer to grow in areas with little competition. Both tolerate low levels of soil disturbance, such as caused by gophers after the plants have gone to seed.

Peltigera gowardii (Goward’s waterfan) is a lichen which grows submerged or within spray zones of perennial streams. The streams are shallow and often fed by cold water springs. The water is very clear and peak flows are not of the intensity that would lead to scouring. The range of this species is from southern Alaska to Fresno County in California. There are 19 occurrences in the Stanislaus National Forest. Six occurrences are within the Rim Fire burned area. There is unsurveyed suitable habitat within the burned area.

In addition to Sensitive Plants, the Botany Report (project record) analyzed Forest Watchlist and Botanical Interest species. Forest Watchlist species include those which are locally rare (as opposed to declining throughout their range), are of public concern, occur as disjunct populations, are newly described taxa, or lack sufficient information on population size, threats, trend, or distribution. Botanical interest species are those which are protected or enhanced for the purpose of conserving botanical richness or diversity within the National Forest. These are typically species which are uncommon in the Forest but not necessarily uncommon at a regional or global scale. They are sometimes species at the extent of their geographic ranges, disjunct from areas where they are common, or are limited by habitats which are uncommon in the Forest but more numerous elsewhere.

Existing Conditions

The geology of the project area, as it relates to sensitive plant habitat, is quite varied. Bedrock and soil parent material are composed of granite, especially on the eastern half of the project, metasedimentary rock primarily on the western half of the project, or volcanically derived andesitic tuff (Mehrten Formation) which is isolated on some of the ridge tops and surrounding slopes. Soils in the project area are diverse, running the full range from deep sandy or loamy granitics to rocky clays of metasedimentary origin. The andesitic tuff breccia tends to be shallow, coarse and fast draining. This variety of soils and parent material allows for the establishment of rare plants, many of which have affinities for very specific types of soils or parent material. Lava caps were disturbed by the Rim Fire and some were also impacted during suppression activities. Before the fire, some of the lava caps were impacted by off-trail OHV driving causing localized disturbance.

Before the Rim Fire, plant communities within the project boundaries included Westside Ponderosa Pine Forest, Sierran Mixed Conifer Forest, several different chaparral communities such as Montane Manzanita Chaparral and Northern Mixed Chaparral, Montane Meadow, White Alder Riparian Forest, Aspen Riparian Forest, Blue Oak Woodland, and other oak woodland communities (Holland 1986). Among these were mixed conifer stands which had not burned in wildfires in more than 100 years and provided excellent habitat for occurrences of *Cypripedium montanum*, and small, low gradient perennial streams which provided excellent habitat for *Peltigera gowardii*. These high functioning ecosystems were relatively free of noxious weeds. Many of them burned with a moderate to high intensity in the Rim Fire where the conifer overstory was completely killed.

Wildfire has been an important component driving plant community composition within the analysis area during the past 100 years. Dating back as far as 1908, 124 wildfires occurred within the Rim Fire boundary (USDA 2010d). Some of the past fires overlapped with each other, burning some areas three, four or even five times prior to the Rim Fire. Other drivers of the pre-Rim Fire mix of plant communities include past logging, reforestation activities, cattle grazing and effective fire suppression.

Many of the Westside Ponderosa Pine Forest areas were conifer plantations 10 to 40 years of age. Some of the plantations were isolated and the result of old clear-cut timber harvests. However, most of the plantations were planted as part of the recovery from the1973 Granite Fire, the 1987 Stanislaus Complex fires and the 1996 Ackerson Complex or Rogge Complex fires. The Wrights Creek plantations dated from the 1950s and the Sawmill plantations dated from the 1960s and were also the result of post-fire recovery. The past wildfires and subsequent salvage logging and reforestation activities created thousands of acres of disturbed habitat. These plantations were in various phases of growth and many had been thinned in the past fifteen years. Due to their mostly early seral nature, the understories had low native plant diversity and were primarily composed of disturbance followers such as non-native annual grasses and native shrubs like deer brush (*Ceanothus integerrimus*), manzanita (*Arctostaphylos* sp.), bear clover (*Chamaebatia foliolosa*) and Sierra gooseberry (*Ribes roezlii*).

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Sensitive Plant occurrences will be flagged and avoided prior to implementation. Sensitive plants may occur within roadside hazard tree removal areas where trees will be felled. Management requirements will minimize the amount of effects to these occurrences by ensuring the smallest possible portion is impacted with the tree falling and removal or fuel abatement. No occurrences are expected to be eliminated as a result of these situations.

With avoidance of most sensitive plant occurrences, only *Clarkia australis*, *Clarkia biloba* ssp. *australis*, *Mimulus filicaulis* and *Mimulus pulchellus* would possibly be directly affected by the proposed activities. In some of these occurrences, manual fuel reduction would be allowed during the dry non-growing period when the species are present as seed, not living plants. Because they are annual plants, timing this work for the dry, non-growing period is critical for ensuring that the activity does not cause loss of entire occurrences. These occurrences would be less vulnerable to loss as seed than as living plants. Mastication and legacy skid trail subsoiling to alleviate compaction would also be allowed within occurrences of *Clarkia australis* during the dry, non-growing period.

Effects to *Clarkia australis* are reduced by not allowing equipment to track through occurrences smaller than 0.25 acre and to minimize tracking through occurrences larger than 0.25 acre. Rather than impacting growing plants, activities in *Clarkia australis* occurrences would be restricted to the dry, non-growing period, when they would have less impact by allowing annual seed set and conserving seed in the soil. These mitigations greatly reduce the risk that occurrences of *Clarkia australis* would be eliminated. The benefit of conducting mastication within occurrences of *Clarkia australis* is reduction of fuels from the small dead trees which would eventually fall or the dead brush which would contribute to fuel loading and thereby lowering the risk of losing occurrences during the next wildfire. Additionally, mastication might help prevent or reduce the establishment of dense brush which might otherwise dramatically reduce the quality of the habitat for the *Clarkia* which prefers to grow in forest openings with little or no competition from other plants. The benefit of subsoiling legacy skid trails in *Clarkia australis* occurrences is the enhancement of habitat.

Conducting manual fuel reduction within occurrences of *Clarkia australis*, *Clarkia biloba* ssp. *australis*, *Mimulus filicaulis* or *Mimulus pulchellus* poses a low to moderate risk of damage or death of some of the seeds even when implemented during the dry, non-growing period. The risk would come from trampling by workers. The amount of seed damaged or lost is expected to be minimal.

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The Sensitive aquatic lichen *Peltigera gowardii* may be affected. It is expected that activities which change these habitat characteristics – increase sedimentation, scour or sun exposure – would likely lead to a reduction or loss of individuals, and depending on the degree of impact, perhaps loss of the occurrence. Sedimentation or scouring could damage the thin, gelatinous thallus of *Peltigera gowardii* by abrading it, leading to death of the organisms (USDA 2010c). Sedimentation could also cover the organisms, blocking their ability to photosynthesize (USDA 2010c).

There are six *Peltigera gowardii* occurrences within the project area. Three of these areas, Corral Creek, an unnamed tributary to Skunk Creek and an unnamed tributary to the Clavey River, are in a portion of the project area which burned at moderate to high severity. The risk of erosion and sedimentation affecting the *Peltigera gowardii* sites in these streams is high as a result of the fire effects. The soil and watershed BMPs would prevent direct impacts to the species, and would reduce the amount of activity-created sediment in these occurrences, but might not fully alleviate additional scouring effects due to loss of soil cover combined with the logging activities.

Mastication and logging activities adjacent to “lava cap” habitats could unintentionally create motorized access to these fragile open habitats which can be home to sensitive species such as *Allium tribracteatum, Lomatium stebbinsii, Lewisia kelloggii ssp. hutchisonii, Lewisia kelloggii ssp. kelloggii and Mimulus pulchellus.* Impacts from unauthorized off road use can cause substantial damage to these habitats by compacting soil, causing erosion, killing plants, and introducing weedy species.

Some of the quarries, from which crushed rock or boulders would be obtained for use on road surface stabilization or closures, contain the invasive plant cheatgrass (*Bromus tectorum*). While this species is fairly common in disturbed places in the lower elevations of the Forest, it is not particularly common on the lava cap habitats. There is a possibility that cheatgrass seed could be carried to some of the lava caps with the crushed rock and boulders for road work, thereby introducing the weeds to rare plant habitat. The lava caps are particularly vulnerable to weed infestation. With the added disturbance of road work on some lava caps, currently suitable rare plant habitat could be degraded with the introduction of the very competitive cheatgrass, adversely affecting *Allium tribracteatum, Lomatium stebbinsii, Lewisia kelloggii ssp. hutchisonii, Lewisia kelloggii* ssp. *kelloggii* and *Mimulus pulchellus.*

CUMULATIVE EFFECTS

Forest Service projects recently planned within the Rim Fire Recovery (Appendix B) incorporate management requirements which reduced the risk of loss of occurrences. The combined effects of the proposed activities in Alternative 1 with past, present or foreseeable future actions are not expected to result in adverse cumulative effects to sensitive plants, mainly due to flagging and avoiding known sites. Individuals of certain sensitive plant occurrences may be adversely affected by proposed project activities. However, these impacts are not expected to be so great in intensity or duration that any of these occurrences would be eliminated, even when combined with other Forest activities.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Alternative 2 has no direct effects to Sensitive Plants. Indirect effects might occur in the form of dead trees falling into occurrences. The dead trees could directly kill rare plants when they fall. The downed trees could block germinating seeds, cause ground level shading for sun-loving plants, and create a high fuel accumulation which would burn at a high intensity, thereby killing plants which survive the falling trees.

CUMULATIVE EFFECTS

The cumulative effect of Alternative 2 is not expected to reduce the amount of dead material affecting plant germination and growth or reduce the fuel accumulation and risk of high intensity impacts during future fires. With no soil and watershed enhancement activities reducing or preventing sedimentation of *Peltigera gowardii* occurrences, three occurrences are at a high risk of loss to sedimentation in this alternative.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1, except that additional management requirements would prevent some of the impacts identified in Alternative 1:

- Project created access to lava cap habitats would be blocked.
- Lower risk of project-created sediment causing habitat degradation or mortality to *Peltigera gowardii*.

CUMULATIVE EFFECTS

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Same as Alternative 3.

CUMULATIVE EFFECTS

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

For all alternatives, the Rim Recovery project **will not impact** *Allium tribracteatum, Allium yosemitense, Arctostaphylos nissenana, Eriastrum tracyi, Helodium blandowii, Meesia uliginosa, Mielichhoferia elongata,* and *Mielichhoferia shevockii* because activities are not proposed in their habitats and they would remain unaffected with no action.

Because their occurrences would be protected from disturbances, all action alternatives **will not impact** any sensitive plant species, except *Clarkia australis*, *Clarkia biloba* ssp. *australis*, *Mimulus filicaulis,* and *Mimulus pulchellus.*

For *Clarkia australis*, *Clarkia biloba* ssp. *australis*, *Mimulus filicaulis,* and *Mimulus pulchellus,* all action alternatives of the Rim Fire Recovery project **may affect individuals, but are not likely to result in a trend toward federal listing or loss of species viability** because portions of their occurrences would likely receive adverse effects.

The No Action Alternative will have no impacts on 11 species as shown in Table 3.09-1. Falling dead trees would likely impact individuals of the remaining 26 Sensitive Plant species as dead trees fall and accumulate as fuel, creating a higher risk of mortality in a future fire event. The No Action Alternative **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for** the other 26 species as shown in Table 3.09-1.

Table 3.09-1 provides a summary of the effects to each species by alternative.

Table 3.09-1 Sensitive Plants Summary of Effects

Sensitive Plant Species	**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3**	**Alternative 4**
Allium tribracteatum	No impact	No impact	No impact	No impact
Allium yosemitense	No impact	No impact	No impact	No impact
Arctostaphylos nissenana	No impact	No impact	No impact	No impact
Balsamorhiza macrolepis	No impact	Some impact	No impact	No impact
Botrychium ascendens	No impact	Some impact	No impact	No impact
Botrychium crenulatum	No impact	Some impact	No impact	No impact
Botrychium lineare	No impact	Some impact	No impact	No impact
Botrychium lunaria	No impact	Some impact	No impact	No impact
Botrychium minganense	No impact	Some impact	No impact	No impact
Botrychium montanum	No impact	Some impact	No impact	No impact
Botrychium pedunculosum	No impact	Some impact	No impact	No impact
Botrychium pinnatum	No impact	Some impact	No impact	No impact
Bruchia bolanderi	No impact	Moderate impact	No impact	No impact
Cinna bolanderi	No impact	Some impact	No impact	No impact
Clarkia australis	Mixed[1]	Greatest Impact	Mixed[1]	Mixed[1]
Clarkia biloba ssp. *australis*	Mixed[1]	Greatest Impact	Mixed[1]	Mixed[1]
Cypripedium montanum	No impact	Moderate impact	No impact	No impact
Dendrocollybia racemosa	No impact	Some impact	No impact	No impact
Eriastrum tracyi	No impact	No impact	No impact	No impact
Eriogonum luteolum var. *saltuarium*	No impact	Some impact	No impact	No impact
Eriophyllum congdonii	No impact	Some impact	No impact	No impact
Eriophyllum nubigenum	No impact	Some impact	No impact	No impact
Erythronium taylori	No impact	Some impact	No impact	No impact
Erythronium tuolumnense	No impact	Some impact	No impact	No impact
Fissidens aphelotaxifolius	No impact	Moderate impact	No impact	No impact
Helodium blandowii	No impact	No impact	No impact	No impact
Horkelia parryi	No impact	Some impact	No impact	No impact
Hulsea brevifolia	No impact	Moderate impact	No impact	No impact
Lewisia kelloggii ssp. *hutchisonii*	Some impact	No impact	No impact	No impact
Lewisia kelloggii ssp. *kelloggii*	Some impact	No impact	No impact	No impact
Lomatium stebbinsii	Some impact	No impact	No impact	No impact
Meesia uliginosa	No impact	No impact	No impact	No impact
Mielichhoferia elongata	No impact	No impact	No impact	No impact
Mielichhoferia shevockii	No impact	No impact	No impact	No impact
Mimulus filicaulis	No impact	Some impact	No impact	No impact
Mimulus pulchellus	No impact	Some impact	No impact	No impact
Peltigera gowardii	Some impact	Moderate impact	No impact	No impact
Tauschia howellii	No impact	Some impact	No impact	No impact

[1] Mixed=positive and negative impacts

3.10 Society, Culture and Economy

This section presents information regarding the social and economic effects the recovery efforts may have in the surrounding area. Included in the review of possible socio-economic impacts is an assessment of environmental justice concerns that could impact specific subgroups within the larger community.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Multiple statutes, regulations and executive orders identify the general requirement for the application of economic and social evaluation in support of Forest Service planning and decision making. These include, but are not limited to, the Multiple-Use Sustained Yield Act of 1960 (74 Stat. 215: 16 USC 528-531), National Environmental Policy Act of 1969 (83 Stat. 852; 42 USC 4321, 4331-4335, 4341-4347), and the Planning Act of 1974. In addition, the following guidance also applies.

Executive Order 12898 issued in 1994 orders federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. The Order also directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife.

The Civil Rights Act of 1964 provides for nondiscrimination in voting, public accommodations, public facilities, public education, federally assisted programs, and equal employment opportunity. Title VI of the Act, Nondiscrimination in Federally Assisted Programs, as amended (42 U.S.C. 2000d through 2000d-6) prohibits discrimination based on race, color, or national origin.

The Forest Plan Compliance (project record) document identifies the Forest Plan standards and guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

Assumptions Specific to Society, Culture and Economy

As shown in figure 1.02-1, the majority of the Rim Fire burned within Tuolumne County, but the southern portion of the fire also burned into Mariposa County. The primary socioeconomic impacts would occur within a geographic region of impact defined by these two counties. Some secondary impacts would be felt in other counties as noted in the analysis.

The Environmental Justice analysis will report what effects might occur to minority and low-income populations. Of particular concern is whether job or income discrimination might occur to these groups in the area during, or resulting from, the proposed project.

Data Sources

- Bureau of Economic Analysis, U.S. Department of Commerce
- California Department of Finance
- California Employment Development Department
- Minnesota IMPLAN Group
- United States Census Bureau
- University of California, Division of Agriculture and Natural Resources

Society, Culture and Economy Indicators

Indicators used in the analysis of economic effects include jobs and incomes generated in the two-county region of impact. Jobs were selected as the single best indicator of economic health because jobs are intuitively understandable and easily observed by the communities affected, but it should be noted that beneficial or adverse economic impacts on jobs are highly correlated with such other measures of economic health as gross regional product, economic output, personal income, and the portion of gross regional product that ultimately finds its way into local and state taxes. Non-market values, such as the value of recreation experiences and ecological services, by their nature are difficult to quantify. Direction provided in 40 CFR 1502.23 and Forest Service Handbook 1909.15, (7/6/04) and 22.35 (01/14/05) provides for the use of qualitative analysis to evaluate the effects of these non-market values. The non-market aspects of each proposed activity will be described in other resource sections and specialist reports. Key indicators include:

- Employment information at the county level;
- Jobs supported by Rim Recovery project activities;
- Local population trends and community demographic statistics;
- Million board feet of merchantable lumber (MMBF);
- Recreation patterns within the region of impact (qualitative); and
- Social and cultural impacts to: American Indians, ranching, regional business owners, and summer camps (qualitative).

Society, Culture and Economy Methodology by Action

Actions, or the lack thereof, would have an effect on the society, culture and economy of Tuolumne and Mariposa Counties. Although not all of the socio-economic effects can be quantified, the methodology will at least describe the mechanisms through which effects may be felt and to characterize their relative magnitude and direction (i.e., beneficial or adverse). Actions through which socio-economic effects may be generated include:

- **Commercial Salvage**: Activities required to reduce fuel loads through timber salvage and biomass removal and to process it into lumber, electrical energy, and other forest products with commercial value.
- **Wildlife and Fuels Biomass Removal**: Activities directed by the Forest Service to gather and remove additional biomass for the benefit of wildlife and further fuel reduction.
- **Post-Contract Forest Service Activities**: Additional treatment of units after the commercial salvage operations are complete that use tractors to pile and burn excess fuels, drop and lop activities, and mastication of biomass in watershed areas.
- **Restoration of Access for Recreation and Resources**: Reopening the burn area for public access and recreational activities. Improvement of roads and clearing biomass from portions of the burn area subject to grazing permits.

COMMERCIAL SALVAGE

The Rim Recovery project and the speed with which it is proposed to be implemented are designed to take advantage of the diminishing economic value that is embodied in the standing dead trees in the burn area. The commercial value of the trees is highest now, and, although diminished by 20 percent or so, will still be valuable during the coming 2014 harvest season. During the following year’s harvest season sufficient value should still remain to salvage dead trees in the burn area, but after about two years it will not be economically feasible for private industry to conduct the operations commercially because the dead timber will have deteriorated so badly (Bowyer et al. 2007). So long as salvage timber sales can be organized fast enough, and the dead trees salvaged within two years, a major economic benefit would be gained in all the action alternatives in that a meaningful portion of the public cost of Rim Recovery project can be offset by the proceeds of the sales to private industry.

The most important economic effect within the two-county region of impact would be the support for jobs resulting from a chain of industrial activities. Direct support for jobs would come from:

- Improving roads to provide access for logging crews and equipment to the treatment units;
- Logging of dead trees through such means as tractor, skyline, and helicopter operations;

- Collection, chipping and hauling of biomass that can be done profitably for commercial purposes;
- Hauling of saw logs and biomass chips to sawmills and energy plants; and,
- Processing the raw materials into commercial commodities such as milled lumber and electrical power.

The methodology for estimating direct job support builds on work conducted by the University of California, Division of Agriculture and Natural Resources, which has tracked and analyzed the forest products industry over the years in California. An analysis by William McKillop, professor emeritus of Forest Economics at the University of California, Berkeley, found that the entire chain of activities described above directly generates the equivalent of 6.4 annual jobs per million board feet (MMBF) of timber harvest (UC Berkeley 2001). By applying this job generation factor to the estimated MMBF in each action alternative, an estimate may be made for the total jobs directly supported over the 2-year time period involved.

Additional jobs would be indirectly supported in the region of economic impact as a result of the activities described above. Economic models based on input-output analysis are used to generate “multipliers” which estimate the “indirect” and “induced” economic effects associated with “direct” impacts. For example, if the driver of a logging truck is the direct job supported, an indirect job would be held by the mechanic in Tuolumne County that services the truck. Part of an induced job is supported in the local grocery store where both of the previous employees shop after work. In the methodology used for alternative analysis, multipliers are derived from the IMPLAN (IMpact analysis for PLANning) system, developed and vended by the Minnesota IMPLAN Group, Inc. (MIG). Multipliers are lower for small economic areas than they are for the state as a whole, and the relevant multipliers for the direct industries affected average 1.5, indicating that for every job directly generated by the commercial salvage operations, another half a job would be supported in Tuolumne or Mariposa Counties through indirect or induced mechanisms.

There is also a potential fiscal impact on the federal government and federal taxpayers in that revenue can be generated from the sale of salvaged trees to private industry. Based on recent timber sales, the Forest Service is likely to receive approximately 50 dollars per thousand board feet (MBF) from each salvage timber sale. Such a beneficial fiscal impact will not be available under the no action alternative, however. Furthermore, due to the rapidly diminishing salvage value of dead trees, delay in implementing an action alternative will also diminish or eliminate any beneficial fiscal impact.

WILDLIFE AND FUELS BIOMASS REMOVAL

In some of the treatment units, some biomass would not be gathered and hauled by commercial contractors because it cannot be done profitably, but which is still desirable to have removed to improve wildlife habitat and reduce fuel loads. Biomass treatments would entail the mechanical removal of nonmerchantable trees for use as firewood, shavings logs, pulpwood, chipped for biomass fuel for electric cogeneration plants, or decked and left on site for public firewood cutting. This additional treatment would be directed by the Forest Service, and whether it is conducted by the woods contractor doing the logging for additional compensation or by a different contractor, it would generate a bit more employment. Based on the Forest Service’s recent experience with other similar post-fire fuel reduction efforts, this additional treatment could cost the Forest Service from 500 dollars per acre to over 2,000 dollars per acre.

The economic impact methodology will assume a typical budget will be the arithmetic average of 500 and 2,000 dollars, or 1,250 dollars per acre, but will apply this budget to only half the wildlife and fuels biomass acreage to be treated in each action alternative, which assumes half of the effort will be covered by commercial operations. The methodology will then assume that half of the budget ultimately goes to support employment, which is typical of most industries. The other half of gross revenue typically goes to costs of equipment, fuel, supplies, insurance, and other operating costs. Jobs are likely to be seasonal, but one annual direct job will be assumed to be supported in the local economy for every 40,000 dollars of income. An additional 0.5 jobs will be supported through indirect and induced multiplier mechanisms due to the direct job. Support for these jobs would likely be spread over a period of 2 years, but it could be longer. The biomass treatments would likely be conducted at the same time as the thinning treatments, but depending on availability of equipment and operators, this activity may occur as a second entry after the timber is removed.

There is also the potential for a fiscal impact on the federal government and federal taxpayers in that reducing fuel loads in the forest reduces the likelihood of future forest fires, and reduces the likely intensity of those that do start. While impossible to quantify both the risk and future cost, given that the cost of suppressing the Rim Fire was in excess of 125 million dollars, the value of risk reduction to the taxpayers could be significant.

POST-CONTRACT FOREST SERVICE ACTIVITIES

After the activities that are routinely included in the commercial harvesting process are completed, the Forest Service would still need to treat the majority of the acreage in the units further. The three treatments that will be estimated for the action alternatives are:

- Tractor piling of downed wood and biomass;
- Drop and lop for watershed enhancement; and,
- Mastication for watershed enhancement.

An average budget estimate for any of these treatments is 500 dollars per acre. The economic impact methodology will apply this budget to the acreage to be treated in each action alternative, and will assume that half of the budget ultimately goes to support employment, as opposed to costs of equipment, fuel, supplies, insurance, and other operating costs. Jobs are likely to be seasonal, but one annual direct job will be assumed to be supported for every 40,000 dollars of income. An additional 0.5 jobs would be supported through indirect and induced multiplier mechanisms due to the direct job. Support for these jobs would likely be spread over a period of 2 to 3 years, after the salvage harvesting is complete.

RESTORATION OF ACCESS FOR RECREATION AND RESOURCES

Recreation, and especially the tourism associated with it in Tuolumne and Mariposa Counties, has an economic impact. While the economic impacts cannot be quantified with any credible precision in terms of jobs or incomes, the direction of impacts will be described when analyzing each alternative. Recreation in the National Forests, and in the Rim Fire burn area specifically, has been an important part of the society and culture of Tuolumne and Mariposa Counties. Access to forest resources has also been a part of the society and culture for some specific communities: examples include native plants and other resources for American Indians, and firewood for residents who rely on wood burning to heat their homes. The methodology will be to describe the impacts that continued closure or restoration of public access would have on the social and cultural experience of living in the region.

The methodology will not estimate any quantitative impacts associated with livestock grazing, because the existing grazing allotments will continue to operate in very similar ways under all alternatives, including the No Action Alternative. Social and cultural effects, however, will be noted.

Thirteen grazing allotments, either wholly or partially within the analysis area, currently affect 7 ranching families in Tuolumne County. Historically, ranching has been an important part of the culture and society of Tuolumne County, and has contributed to the economic health of the community. Although the existing grazing allotments will continue under all alternatives, some alternatives would ease access for ranchers managing their range allotments and for the movement of livestock more than others.

Affected Environment

For socio-economic analysis, the primary environment impacted by the Rim Recovery project actions is defined by the two counties that contained the fire: Tuolumne and Mariposa. The resident populations have lived in a culture that has a long history of forest products industries, ranching and grazing, and other resource-based economic activities, such as mining. Residents value the recreational opportunities provided by the National Forest System lands close to home.

The affected environment counties have a long history of serving a tourism industry that has Yosemite National Park as the largest attraction in the vicinity. The industry also relies on recreational opportunities in the National Forests, including many within the Rim Fire burn area. The area has a special type of tourism associated with a collection of summer camps and private resorts that were impacted by the Rim Fire.

Existing Conditions

POPULATION

Table 3.10-1 shows rapid growth in the affected environment during the 1970s and 1980s. The population of Tuolumne and Mariposa Counties grew much faster than the state as a whole during those decades. The relative growth rate slowed during the 1990s, however, and since 2000 the counties have grown much slower than the state.

Table 3.10-2 shows growth is expected to occur at a slower rate than the state average in coming decades as well. Today Tuolumne is by far the larger of the two counties, and coupled with the location of the majority of the Rim Fire area, the majority of the primary socio-economic impacts would be felt in Tuolumne County.

Table 3.10-1 Historical Population by County 1970 – 2010

County or Region	1970	1980	1990	2000	2010
Mariposa	6,015	11,108	14,302	17,130	18,251
Tuolumne	22,169	33,928	48,456	54,504	55,368
Total 2-Co. Region	28,184	45,036	62,758	71,634	73,619
10-Year Growth, percent		60	39	14	3
California	19,953,134	23,667,902	29,760,021	33,873,086	37,253,956
10-Year Growth, percent		19	26	14	10

Source: U.S. Bureau of the Census

Table 3.10-2 Projected Population by County 2000 – 2050

County	2000	2010	2020	2030	2040	2050
Mariposa	17,150	19,108	21,743	23,981	26,169	28,091
Tuolumne	54,863	58,721	64,161	67,510	70,325	73,291
Total 2-Co. Region	72,013	77,829	85,904	91,491	96,494	101,382
10-Year Growth, percent		8	10	7	5	5
California	34,105,437	39,135,676	44,135,923	49,240,891	54,226,115	59,507,876
10-Year Growth, percent		15	13	12	10	10

Source: California State Department of Finance

ENVIRONMENTAL JUSTICE CONCERNS

Some demographic data for the affected environment describe the context for evaluating environmental justice concerns. Executive order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” signed February 11, 1994 by President Clinton states (Section 1-101), “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States."

For environmental justice analysis, Table 3.10-3 presents the ethnic distribution of the two-county population that defines the region of socioeconomic impact. The ethnic distribution of the California state population is also presented for comparison purposes. Tuolumne and Mariposa counties have very similar ethnic profiles, and both contain distinctly fewer minorities than the state as a whole, with the one exception that Native Americans are more heavily represented locally than statewide.

Table 3.10-3 Ethnic Minority Populations in the Region of Impact

Ethnic Identity	Percent Population by Region		
	Tuolumne County	Mariposa County	California
White alone, 2012 (a)	91.1	90.6	73.7
Black or African American alone, 2012 (a)	2.2	1.0	6.6
American Indian and Alaska Native alone, 2012 (a)	2.2	3.2	1.7
Asian alone, 2012 (a)	1.2	1.3	13.9
Native Hawaiian and Other Pacific Islander alone, 2012 (a)	0.2	0.2	0.5
Two or More Races, 2012	3.2	3.7	3.6
Hispanic or Latino, 2012 (b)	11.1	9.5	38.2
White alone, not Hispanic or Latino, 2012	81.7	82.5	39.4

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
Source: US Census Bureau

Environmental justice concerns can also focus on low-income populations. Similarly, age discrimination can be an issue for the Civil Rights Act. Table 3.10-4 presents the key age and income characteristics. The two-county region has fewer families with young children than the state average, and has dramatically more people of retirement age than the state average. Incomes by all measures are lower in Tuolumne and Mariposa Counties than for similar measures statewide. In spite of that, proportionately fewer people are living below the poverty line in the two-county region than those statewide.

Table 3.10-4 Age, Income and Poverty Characteristics in the Region of Impact

Key Age and Income Characteristics	Tuolumne County	Mariposa County	California
Population, 2012 estimate	54,008	17,905	37,999,878
Persons under 5 years, percent, 2012	4.0	4.4	6.7
Persons under 18 years, percent, 2012	16.9	17.3	24.3
Persons 65 years and over, percent, 2012	22.0	23.0	12.1
Per capita money income in past 12 months (2012 dollars), 2008-2012	26,043	27,670	29,551
Median household income, dollars, 2008-2012	48,169	52,584	61,400
Persons below poverty level, percent, 2008-2012	13.1	14.7	15.3

Source: US Census Bureau

INDUSTRIAL PROFILE OF THE REGIONAL ECONOMY

Table 3.10-5 (Tuolumne County) and Table 3.10-6 (Mariposa County) present the historical perspective, and the most recent available profile, of the structure of the regional economy. The industry sector for "Mining and Logging" is much larger in Tuolumne County, and almost non-existent in Mariposa County. The dramatic decline in employment in the Mining and Logging sector from 1990 through 2010 can also be seen in Tuolumne. In recent years, however, it appears the industry has stabilized. Employment in sawmills is included in the “Manufacturing” sector of the economy.

Table 3.10-5 Tuolumne County Industry Employment and Labor Force by Annual Average

Industry Title	1990	2000	2010	2012	2013
Civilian Labor Force	19,880	22,890	25,800	25,920	24,550
Civilian Employment	18,540	21,540	22,240	22,900	22,160
Civilian Unemployment	1,340	1,350	3,570	3,020	2,400
Civilian Unemployment Rate, percent	6.7	5.9	13.8	11.6	9.8
Total, All Industries	14,190	15,950	15,840	16,280	16,220
Total Farm	90	180	60	50	50
Total Nonfarm	14,100	15,760	15,780	16,230	16,170
Total Private	10,200	11,230	10,470	11,010	10,980
Goods Producing	2,320	2,250	1,340	1,470	1,460
Mining and Logging	400	200	130	120	120
Construction	1,080	920	540	530	500
Manufacturing	850	1,130	680	820	850
Durable Goods	730	890	490	660	680
Nondurable Goods	110	240	190	170	170
Service Providing	11,780	13,510	14,440	14,760	14,710
Private Service Providing	7,870	8,970	9,120	9,540	9,520
Trade, Transportation and Utilities	2,380	2,840	2,330	2,490	2,500
Wholesale Trade	190	150	190	130	140
Retail Trade	2,020	2,490	1,970	2,150	2,150
Transportation, Warehousing and Utilities	170	200	180	210	210
Information	200	230	240	210	210
Financial Activities	790	550	520	510	550
Professional and Business Services	880	890	930	930	930
Educational and Health Services	1,120	1,700	2,680	2,930	2,760
Leisure and Hospitality	1,960	2,130	2,040	1,990	2,110
Other Services	550	630	380	480	480
Government	3,910	4,540	5,310	5,220	5,190
Federal Government	560	370	440	470	480
State and Local Government	3,350	4,170	4,870	4,750	4,710
State Government	1,160	1,110	1,260	1,130	1,080
Local Government	2,190	3,060	3,610	3,620	3,630

Source: California Employment Development Department, Labor Market Information Division

The relative health of the regional economy can also be inferred from comparisons with the state average for unemployment rate. Using the same data sources and methods as shown in Table 3.10-5 and Table 3.10-6, the State of California had an unemployment rate of 8.9 percent last year in 2013. With unemployment rates of 9.8 and 9.2 percent respectively, somewhat more distress exists in the economies of both counties in 2013.

Table 3.10-6 Mariposa County Industry Employment and Labor Force by Annual Average

Industry Title	1990	2000	2010	2012	2013
Civilian Labor Force	6,780	7,980	9,610	9,450	9,260
Civilian Employment	6,390	7,490	8,470	8,410	8,400
Civilian Unemployment	380	490	1,140	1,040	860
Civilian Unemployment Rate, percent	5.7	6.2	11.9	11.0	9.2
Total, All Industries	4,780	4,890	5,330	5,240	5,410
Total Farm	30	10	20	10	10
Total Nonfarm	4,750	4,880	5,310	5,230	5,400
Total Private	3,320	3,150	3,120	3,160	3,430
Goods Producing	430	300	240	250	260
Private Service Providing	2,900	2,850	2,880	2,910	3,180
Mining and Logging	10	20	10	20	20
Construction	250	160	110	110	140
Manufacturing	160	120	120	120	110
Service Providing	4,330	4,580	5,070	4,980	5,140
Trade, Transportation and Utilities	370	340	330	330	340
Wholesale Trade	20	10	10	10	20
Retail Trade	340	320	270	270	270
Transportation, Warehousing and Utilities	10	10	50	40	40
Professional and Business Services	100	250	170	160	140
Educational and Health Services	220	150	150	180	320
Leisure and Hospitality	1,920	1,930	2,130	2,040	2,160
Private Service Providing - Residual	290	180	120	210	230
Government	1,430	1,730	2,190	2,070	1,960
Federal Government	570	620	850	810	730
State and Local Government	860	1,110	1,340	1,260	1,230
State Government	150	170	180	160	160
Local Government	710	940	1,160	1,090	1,070

Source: California Employment Development Department, Labor Market Information Division

FOREST PRODUCTS INDUSTRY IN THE REGION OF IMPACT

California's timber harvest peaked in 1955 at 6 billion board feet (Pub. 8070, UC Berkeley 2003). The trend in total industry volume statewide has been down ever since, although it was still almost 5 billion board feet in the late 1980s, 25 years ago. The number of sawmills in the state was over 100 at that time, but has declined dramatically to between 30 and 40 today. This has reduced the number of mills, within practical haul range of the Rim Fire burn area, that are available today to process salvaged logs. On the other hand, the reduction in milling capacity in California has not declined as rapidly as the number of mills, because it has been the smaller, less efficient mills that have ceased operations. Even so, the bottleneck in the industrial process for turning standing trees into lumber remains due to the combined capacities of the sawmills within reach. Other steps in the industrial process are more scalable and flexible. For example, more logging and trucking contractors can be brought into the region from further away if needed.

Two sawmills in Tuolumne County are within the analysis area:

1. The Sierra Pacific Industries Standard Mill just east of Sonora, and
2. The smaller Sierra Pacific Industries mill near Chinese Camp.

Two other sawmills are potentially able to haul logs from the Rim Fire to their facilities economically:

3. The Sierra Pacific Industries mill in Lincoln, Placer County, 104 miles north of Sonora, and
4. The Sierra Forest Products mill in Terra Bella, Tulare County, 188 miles south of Sonora.

In addition two other mills in Tuolumne County are within the region of impact that can process smaller trees and/or byproducts:

5. The Sierra Pacific Industries Bark Plant in Keystone, and
6. The American Wood Fibers plant (formerly California Wood Shavings) just south of Jamestown off Highway 108.

During the process of cutting, loading, and hauling merchantable logs out of the forest, biomass, composed of branches and tops of trees that are too small to be of use for milled lumber, is generated and can become fuel for wildfires. After the saw logs are removed, many units will still contain a dangerously high concentration of fuels remaining in small dead standing trees and other biomass. In both cases, these sources of biomass can be collected into piles at the landings along forest roads. Options at that point can be to reduce the fuel load by burning the piles in place, or hauling the biomass to a plant that can burn the material to generate electrical power. The latter option generally involves chipping or grinding the biomass on site, and hauling the material as chips to an energy plant. Under some economic conditions where the price of power is high enough, and the costs of collection, chipping, and hauling are low enough, the entire process can be self-funding as a profitable business. Under other circumstances, at least a portion of the costs of reducing fuel loads in the forest can be recovered by hauling the biomass and selling it for generating power. Although harder to quantify, there are also clearly ecosystem value benefits to be gained by burning biomass in power plants that can contain a majority of the particulates and greenhouse gases, rather than burning the material in open piles.

The biomass power generation industry is newer than the lumber industry, and at this time has a significant infrastructure of existing plants within 90 to 120 miles of the Rim Fire burn area (UC Berkeley 2014). In approximate order of proximity, the larger sized facilities in terms of megawatt capacities (MW) include:

1. Pacific Ultrapower Chinese Station, Jamestown, 22 MW
2. SPI Sonora Standard Biomass Power, Sonora, 8 MW
3. Buena Vista Biomass Power, Ione, 18.5 MW
4. DTE Stockton, Stockton, 45 MW
5. Greenleaf Tracy Biomass Plant, Tracy, 19.4 MW

Other power facilities that are further away, but under some circumstances might be able to take some Rim Fire biomass include:

6. Woodland Biomass Power Ltd., Woodland, 25 MW
7. Rio Bravo, Fresno, 25 MW
8. Rio Bravo, Rocklin, 25 MW
9. SPI Lincoln, Lincoln, 18 MW
10. Sierra Power Corp., Terra Bella, 9.5 MW (currently idle due to economic conditions)

The revenue ultimately available to biomass energy generators is limited by the market for electrical power, and is generally set in advance by fixed price energy contracts. This means there are limits to the costs that can be borne profitably to cut, collect, chip, and haul the biomass material. For treatment units that have a very high value of trees that can be used for sawlogs, it is possible for the Forest Service to require the removal of biomass at the same time as the salvage logging because the value of the trees can subsidize the costs of collecting and hauling biomass. At the other end of the spectrum, there will be units where biomass cannot be removed profitably and the Forest Service will have to use service contracts to remove material from the forest. Selling the material to an energy plant can then recover some, but not all, of the costs. There are other business models between a timber salvage sale and a service contract as well, which will accomplish the same physical outcomes.

While there are a number of options for power generating plants as end users of biomass, there are other potential bottlenecks in the industry infrastructure currently in place. Some of the chipping equipment currently available in Tuolumne and Mariposa counties is old and may need to be replaced to handle the volumes of biomass that could come out of the Rim Fire burn area in coming years. Similarly, recent California Air Resources Board rules regarding diesel truck emissions may render some of the existing chip hauling trucks obsolete, also reducing the capacity of the available fleet.

Recreation and Tourism Industry in the Region of Impact

The portion of the Stanislaus National Forest affected by the Rim Fire has a long history of recreational use. One of the social and cultural attractions for living in Tuolumne and Mariposa Counties has been the presence of recreational opportunities on the National Forest close to home.

The Rim Fire area has also historically been used extensively by non-locals. One of the reasons for this is that Highway 120, passing through the burn area, is one of the major gateways to Yosemite National Park, which has generated recreation related tourism and economic impacts in multiple ways. Some people have spent a portion of their money in the area as they passed through to their primary destination in Yosemite National Park. Others were not able to secure overnight accommodations in the park, and instead stayed in other accommodations within the burn area, such as camping on the National Forest, and made day trips into Yosemite. Yet others found that Tuolumne river rafting or other recreational offerings in the burn area were sufficiently attractive to warrant extending their visit to Yosemite by one or more days in Stanislaus National Forest. The Stanislaus has also been the primary destination for many non-locals who were motivated by the recreational activities to be had there, without visiting Yosemite at all during the same trip.

Examples of the activities historically available within the Rim Fire burn area that have drawn both locals and non-locals, in roughly descending order of participation in each activity, include:

- Viewing natural features
- Hiking and walking
- Viewing wildlife
- Picnicking
- Driving for pleasure
- Fishing
- Developed camping
- Motorized trail activity
- OHV (off highway vehicle) use
- Hunting
- River rafting (non-motorized water sports)
- Resort use
- Primitive camping

The burn area is currently closed to the public and the associated recreational opportunities that have traditionally drawn thousands of people per year to this area in Tuolumne and Mariposa Counties are not available. Developed campgrounds, dispersed camping sites, and other overnight accommodations in the burn area are currently not available, which reduces the capacity of the Highway 120 gateway region to house overnight guests. Given that the typical recreation party spends an average of 261 dollars per day, according to the most recent data available from the National Visitor Use Monitoring (NVUM) Program (USDA 2012), the region of impact has suffered a loss of tourism spending.

The Rim Fire also affected summer camps, private resorts, and other recreational facilities operated by other public agencies, private non-profit groups, and private for-profit entities including:

- City of Berkeley Tuolumne Camp,

- San Francisco's Camp Mather,
- The City of San Jose's camp,
- Camp Tawonga,
- Evergreen Lodge, and
- Other facilities.

A majority of the Berkeley Tuolumne Camp was destroyed by the Rim Fire and is currently not available for use. In other cases, damage to facilities or their access may or may not be repaired and cleared in time for the coming summer use season. To the extent the combined capacity of these facilities has been diminished, there has been a proportionate decrease in the size of the visitor-serving economy in Tuolumne County, and there have also been economic and cultural impacts on the distant cities and organizations that operate these camps and resorts.

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

The action proposed under Alternative 1 would remove hazard trees from low standard roads sufficiently to reopen the burn area for dispersed recreation. If the actions proposed in the Rim Fire Hazard Tree Environmental Assessment are implemented, developed campgrounds and developed trailheads on maintenance level 3, 4, and 5 roads will already have been opened. Biomass and other fuels would be removed from treated areas in order to create conditions to foster a healthier forest in the future, and to enhance wildlife movement and habitat. Some of the public cost of the action could be offset by the sale of salvage timber to private industry. Social, cultural, and economic impacts would be generated.

Social and Cultural Impacts

Compared with the current situation where the majority of the burn area is closed to the public, Alternative 1 would restore some of the access, recreation, and other uses of the area that have been part of the life and culture of Tuolumne and Mariposa Counties. Access for American Indians to gather native plants and other forest resources would be enhanced, and the ability of local residents to gather firewood would be restored. The ranching lifestyle for families that have grazing allotments within the burn area would be enhanced somewhat by clearing out some of the impediments to movement of their range stock and making access to their allotment areas easier. Residents of the region who own businesses or work in the tourism industry would see some restoration of lifestyles that have been diminished by the reduced volumes of visitors. Specific communities of interest that participated in the various summer camps and resorts would find some of their previous activities returning.

Compared with Alternative 2 (No Action), the social and cultural character of Tuolumne and Mariposa Counties that has been appreciated historically would return much faster.

Economic Impacts

Without taking action (i.e., Alternative 2), the current closures would continue for as much as 10 years, or until the hazard trees fall on their own. Compared with the No Action scenario, Alternative 1 would have many noticeable economic impacts.

Support for direct jobs in the region of impact would be created by the activities required to improve roads, bring in logging crews and equipment, load and chip logs and biomass, haul materials out of the burn area, and process the raw materials into merchantable lumber, electrical power, and other forest products. If the entire 661 million board feet (MMBF) contemplated by the Forest Service under Alternative 1 can be sold and harvested, then 4,230 annual jobs could be supported in the two county area over a period of two to three years (at 6.4 direct jobs per MMBF). With a surge of activity as large as the Rim Fire salvage, some entirely new jobs would likely be created in the region through new hiring, and additional contracting. On the other hand, the majority of the jobs estimated above are in positions that are already filled in the region. For example, many of the people employed at the Standard Mill near Sonora would have the same jobs that they had before, but the source of their income would shift from processing green trees to Rim Fire salvage trees for a couple years (leaving more green trees to support future economic activity). Support of employment in the logging, biomass, and wood products industries would be seen as a beneficial economic impact in the region.

Compared with the No Action Alternative, Alternative 1 would be beneficial for the public sector in that a portion of the public costs of recovery can be recaptured from the proceeds of the salvage timber sale to private industry. Given recent Forest Service experience with timber sales, an estimate of government revenue potential is 50 dollars per thousand board feet (MBF). If all 661 MMBF were sold, the government could collect approximately 33 million dollars in revenue to help offset total forest restoration costs that are expected to be larger than that amount.

Some of the Forest Service’s expenditures can then go to additional contractors to provide further treatment of some units to clear out biomass for wildlife enhancement and to remove more fuel from the Forest. These activities would also generate support for more direct jobs. Alternative 1 estimates 7,626 acres would have biomass removal for these purposes, generating support for 60 direct jobs over a period of years. Over a similar time period, another 151 direct jobs would be supported by post-contract treatments applied to an estimated 24,143 acres (at a typical cost of 500 dollars per acre, as described above in the methodology section).

Total direct job support from all three categories of activities would be 4,439 annual jobs over a period of several years. For example, this could represent 1,500 to 2,000 jobs each in 2014 and 2015 as the bulk of the salvage work is taking place, and tailing off to a few hundred jobs per year in the following few years. Associated with direct employment, another 2,220 annual jobs would be supported over the same time period through indirect and induced multiplier effects in Tuolumne and Mariposa Counties (at a multiplier of 1.5).

Total support for jobs in the region of impact would be 6,659 annual jobs over the next five years or so with the bulk of the economic support coming in the next two years. Given that Tuolumne and Mariposa Counties have higher unemployment rates than the average for the State of California, the impact on jobs would be seen as beneficial to the economy. Given that the civilian labor force in the two-county region of impact is 34,000, the Rim Fire related job support would be between 5 and 10 percent of all employment, which most likely would be seen as a significant beneficial economic impact by the Tuolumne and Mariposa County communities.

Reopening of the burn area to the public would also occur faster in Alternative 1 than it would in the No Action Alternative. This would allow more overnight camping visitors to be accommodated in dispersed locations throughout the area. Reopening recreation areas within the burn area would also give visitors more reasons to stay in the counties, or to extend their stays. Restoring some of the volume of tourism that was lost due to the Rim Fire would allow businesses in Tuolumne and Mariposa Counties to capture more tourism spending. While not as conducive to quantification as the forest products industries, the expansion of recreation and tourism would also support more employment, thereby expanding the beneficial economic impacts associated with Alternative 1. Reopening of the burn area for firewood gathering would also be seen as economically beneficial by low-income residents who rely on wood burning to supplement the heating of their homes.

While impossible to quantify, there is a potential beneficial fiscal impact on the federal government and federal taxpayers from reducing the fuel load in the Rim Fire area and thereby the risk of having to fight a future intense wildfire in the same area. The Rim Fire cost over 125 million dollars to suppress.

Cumulative Effects

Past actions in the region of impact, and throughout California, have led to a reduction in the number of sawmills available to process logs into lumber. The mills that remain today tend to be the larger and more efficient ones. Even so, the capacity of the existing private industry infrastructure to mill lumber is below historical highs. As described in the Affected Environment section above, there are other potential capacity constraints in the existing industrial infrastructure as well, such as the number of chippers, the number of trucks, and the number of mills and bioenergy plants within an economical haul range.

The Rim Fire burned over a quarter million acres including private forest lands and forest inside Yosemite National Park. Present actions contributing to cumulative effects include the emergency salvage logging of over 18,000 acres of private timber land, and over 28 miles of roadside hazard tree removal in Yosemite (over 800 acres). In addition, three National Forest timber sale contracts in progress on over 2,000 acres when the fire broke out must be honored with replacement timber resources.

Foreseeable future actions include the proposal to salvage hazard trees on over 10,000 acres within the National Forest portion of the Rim Fire burn area. Decisions have also been made to harvest 4,000 acres of green trees to reduce fuel loads and protect from future fires. Planning has also been done to improve over 90 miles of roads and trails in the National Forest.

All of these contribute to demands on private industry infrastructure available to conduct road work, log forests, haul raw materials, and produce lumber, energy and other forest products. There are several cumulative economic effects that would likely be produced by this situation:

- In the short term, capacity is limited. Given the surge in raw materials available from salvage logging, downward pressure would be placed on the prices for raw materials. This can be seen as a beneficial economic impact by buyers, such as sawmills and power plants, and an adverse economic impact by sellers, such as the Forest Service.
- Given the limited ability to expand capacity in the short term over the next two years, it is possible that the Forest Service would not be able to sell as much salvage timber as they are planning for. Although the overall impact of Alternative 1 would be beneficial to the local economy, sale of less than 100 percent of the timber would partially represent a lost opportunity from not being able to realize the full benefit.
- In the short term, capacities can be expanded for some portions of the industrial processes. Existing woods contractors can hire more workers. Additional operators and their crews can be brought in temporarily from more distant locations. Existing mills can operate a few more hours or days per week. Raw materials can be hauled further distances to other processing plants. Some of these adaptations would expand incomes in counties beyond the region of impact, but virtually all of them would also expand direct economic activity and its ripple effects locally as well. This would be seen as a beneficial economic impact on Tuolumne and Mariposa Counties.
- In the long run, implementing Alternative 1 in conjunction with other present and reasonably foreseeable actions would serve as a stimulus to expand the capacity of the industry infrastructure through capital investment. Buying new trucks, equipment, and processing capacity would be seen as a beneficial impact on the local economy. For significant capital investment to take place, however, the perception would have to be that there is some assurance that new equipment will be needed for its usable life, and not for just a one-time surge lasting a couple years.

Combined with the foreseeable future actions proposed in the Rim Fire Hazard Trees project, Alternative 1 would further expand the capacity of the tourism industry based along Highway 120, and incomes and jobs in visitor serving businesses in Tuolumne County would increase as a result. Because the Highway 120 corridor also serves as one of the major gateways to Yosemite National Park, Alternative 1 could also expand visitation to Yosemite somewhat, for example by allowing people to stay overnight in dispersed campsites in the Rim Fire area and become day visitors to Yosemite Valley. From a cumulative perspective, this could have a magnified impact on direct tourism employment gains in Tuolumne and Mariposa Counties, as well as additional beneficial indirect economic impacts through multiplier mechanisms.

The increase in employment opportunities, both from salvage harvesting operations and from restoration of some of the tourism industry, will place upward pressure on population in Tuolumne and Mariposa Counties. Given that some unemployment and underemployment already exists in the area, and that some of the jobs may be taken by seasonal or temporary workers, the growth in permanent population of the two-county area due to any of the Action Alternatives is likely to be minor and indistinguishable from organic growth.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, hazard tree removal would not occur and the area would remain closed for dispersed recreation. Biomass and other fuels would not be removed. No income from the sale of salvage timber to private industry would be available to offset the public costs of protecting wildlife and the forest environment from future catastrophic fires. Social, cultural, and economic conditions would remain much as they are today.

Social and Cultural Impacts

Alternative 2 would perpetuate the current situation where the majority of the burn area is closed to the public for the foreseeable future. After hazard trees fall through natural processes, in a decade or so, parts of the burn area might again be opened to the public. Historically, access, recreation, and other uses of the area have been an important part of the life and culture of Tuolumne and Mariposa Counties, and the fire and subsequent closure are perceived as having had an adverse impact already. Residents of the region who own businesses or work in the tourism industry have experienced some diminishment of their incomes and lifestyles due to the reduced volumes of visitors from elsewhere. Access for American Indians to gather native plants and other forest resources would continue to be limited, and the ability of local residents to gather firewood would be reduced. The ranching lifestyle for families that have grazing allotments within the burn area would continue to be negatively impacted by lack of access and impediments to movement of livestock. Specific communities of interest that participated in the various summer camps and resorts may not be able to resume past activities or use of the camps and resorts as in the past.

Alternative 2 would do nothing to remedy these adverse social and cultural impacts.

Economic Impacts

Without taking action (i.e., Alternative 2), no salvage timber sale would take place and the government would not realize any proceeds from such a sale. Private woods contractors and sawmill operators are currently busy processing salvage timber from private lands. Forest products industry employment would continue at current levels for the near term in the two-county region of impact. Compared with the current situation, no noticeable economic impacts, beneficial or adverse, would be created.

On the other hand, the perception in the tourism industry is already that it has been adversely impacted by the fire and subsequent closure. To the extent that incomes and support for jobs has been diminished, those lower employment levels would continue.

Under Alternative 2, the government would not recoup the loss of burned trees, valued at 33 million dollars, through salvage timber sales. Without the government revenues projected to be gained by harvesting timber while it is still of salvageable quality, the actions and future restoration projects that are expected to follow the Rim Fire Recovery project would be deferred until appropriated dollars were supplied. With decreasing budgets and increasing responsibilities, receiving little or no funding through nearer term timber sales is likely to postpone or make it unlikely that the forest would have the resources to implement restoration. Given the perishable nature of killed trees for use as salvage lumber, delay in taking action can produce the same results as no action in terms of losing potential funding.

While impossible to quantify, there is a potential adverse fiscal impact on the federal government and federal taxpayers which would be realized if it becomes necessary to fight a future wildfire in the same area. If the fuel load in the Rim Fire area is not reduced through human intervention, the risk of the same area burning again, and the risk of a wildfire of extraordinary intensity, goes up. The last Rim Fire cost over 125 million dollars to suppress.

Although it would be extremely difficult to quantify, the cost of reducing fuels on this landscape through means other than a timber sale would be substantial, in the millions of dollars. These costs would include: falling standing dead trees, chipping and biomass removal, tractor or grapple piling with follow-up burn treatments or jackpot burning over thousands of acres. Road maintenance funding, currently limited to a few miles per forest each year, would not begin to treat the over 500 miles of roads identified to be improved or maintained for hydrologic function and public safety.

CUMULATIVE EFFECTS

Present actions contributing to cumulative effects include the emergency salvage logging of over 18,000 acres of private timber land and over 28 miles of roadside hazard tree removal in Yosemite (over 800 acres). In addition, three National Forest timber sales in progress on over 2,000 acres when the fire broke out must be honored with replacement timber resources. Foreseeable future actions include harvesting 4,000 acres of green trees to reduce fuel loads and protect the environment from future fires, and improving over 90 miles of roads and trails in the National Forest.

All of these contribute demand on private industry infrastructure available to conduct road work, log forests, haul raw materials, and produce lumber, energy and other forest products. Without material from the Rim Fire area, these sources would run out sooner leading the industry to switch back to green tree harvesting sooner. Rim Fire actions would not add to cumulative economic effects under Alternative 2.

Under Alternative 2, the current visitor accommodating capacity of the Highway 120 corridor would remain below what it was before the Rim Fire. This could have a cumulative effect of keeping Yosemite visitation levels lower than they would have been with the visitor serving infrastructure in place.

Cumulatively, over the long run under Alternative 2, the loss of potential funding would result in the inability to fully fund and complete the planned resource protection measures that are intended to accomplish the following:

- Reduce fuels for future forest resiliency to fire because tree mortality exceeds the needs for snag and log recruitment on these lands. The excess trees would result in high fuel loading that would increase the potential of destroying the recovering forest before it could mature.
- Improve roads to enhance hydrologic function.
- Protect soils from future fires which would be of very high intensity if the dead material is not removed.
- Identify a forest carnivore connectivity corridor linking habitat areas across the landscape.
- Identify areas within critical winter deer range for salvage and nonmerchantable material removal to achieve desired forage to cover ratios.
- Enhance native vegetation cover within Riparian Conservation Areas (RCAs), stabilize channels by non-structural means, and minimize adverse effects from existing roads and exposed bare soil.

That loss of funding would also result in the inability to fund and complete future reforestation and resource restoration projects (riparian, roads, soils, watershed, wildlife, recreation, etc.) throughout the National Forest portion of the Rim Fire.

With no related increase in employment opportunities under the no action alternative, there will be no additional pressure on population growth. Tuolumne and Mariposa Counties are likely to continue to grow slowly as they have recently with additional retires moving in and with other organic growth as households form and people find jobs in other local industries.

Alternative 3

DIRECT AND INDIRECT EFFECTS

The action proposed under Alternative 3 would be essentially the same as under Alternative 1, but would cover slightly more acreage and produce slightly less salvage timber for sale. As with Alternative 1, it would remove hazard trees from lower level roads sufficiently to reopen the burn area for dispersed recreation. Biomass and other fuels would be removed from treated areas in order to create conditions to foster a healthier forest in the future, and to enhance wildlife movement and habitat. Some of the public cost of the action could be offset by the sale of salvage timber to private industry. Social, cultural, and economic impacts would be generated.

Social and Cultural Impacts

Compared with the current situation where the majority of the burn area is closed to the public, Alternative 3 would restore some of the access, recreation, and other uses of the area that have been part of the life and culture of Tuolumne and Mariposa Counties. Access for American Indians to gather native plants and other forest resources would be enhanced, and the ability of local residents to gather firewood would be restored. The ranching lifestyle for families that have grazing allotments within the burn area would be enhanced somewhat by clearing out some of the impediments to movement of their range stock, and making access to their allotment areas easier. Residents of the region who own businesses or work in the tourism industry would see some restoration of lifestyles that have been diminished by the reduced volumes of visitors. Specific communities of interest that participated in the various summer camps and resorts would find some of their previous activities returning.

Compared with Alternative 2 (No Action), the social and cultural character of Tuolumne and Mariposa Counties that has been appreciated historically would return much faster.

Economic Impacts

Without taking action (i.e., Alternative 2), the current situation of closure would continue for as much as 10 years, or until the hazard trees fall on their own. Compared with the No Action scenario, Alternative 3 would have many noticeable economic impacts.

Support for direct jobs in the region of impact would be created by the activities required to improve roads, bring in logging crews and equipment, load and chip logs and biomass, haul materials out of the burn area, and process the raw materials into merchantable lumber, electrical power, and other forest products. If the entire 623 million board feet (MMBF) contemplated by the Forest Service under Alternative 3 can be sold and harvested, then 3,987 annual jobs could be supported in the two county area over a period of two to three years (at 6.4 direct jobs per MMBF). With a surge of activity as large as the Rim Fire salvage, some entirely new jobs would likely be created in the region through new hiring, and additional contracting. On the other hand, the majority of the jobs estimated above are in positions that are already filled in the region. For example, many of the people employed at the Standard Mill near Sonora would have the same jobs that they had before, but the source of their income would shift from processing green trees to Rim Fire salvage trees for a couple years (leaving more green trees to support future economic activity). Support of employment in the logging, biomass, and wood products industries would be seen as a beneficial economic impact in the region.

Compared with the No Action Alternative, Alternative 3 would be beneficial for the public sector in that a portion of the public costs of recovery can be recaptured from the proceeds of the salvage timber sale to private industry. Given recent Forest Service experience with timber sales, an estimate of government revenue potential is 50 dollars per thousand board feet. If all 623 MMBF were sold, the government could collect approximately 31 million dollars in revenue to help offset total forest restoration costs that are expected to be larger than that amount.

Some of the Forest Service's expenditures can then go to additional contractors to provide further treatment of some units to clear out biomass for wildlife enhancement and to remove more fuel from the forest. These activities would also generate support for more direct jobs. Alternative 3 estimates 8,379 acres would have biomass removal for these purposes, generating support for 65 direct jobs over a period of years. Over a similar time period, another 160 direct jobs would be supported by post-contract treatments applied to an estimated 25,573 acres (at a typical cost of 500 dollars per acre, as described above in the methodology section).

Total direct job support from all three categories of activities would be 4,212 annual jobs over a period of several years. For example, this could represent 1,500 to 2,000 jobs each in 2014 and 2015 as the bulk of the salvage work is taking place, and tailing off to a few hundred jobs per year in the following few years. Associated with direct employment, another 2,106 annual jobs would be supported over the same time period through indirect and induced multiplier effects in Tuolumne and Mariposa Counties (at a multiplier of 1.5).

Total support for jobs in the region of impact would be 6,318 annual jobs over the next five years or so with the bulk of the economic support coming in the next two years. Given that Tuolumne and Mariposa Counties have higher unemployment rates than the average for the State of California, the impact on job support would be seen as beneficial to the economy. Given that the civilian labor force in the two-county region of impact is 34,000, the Rim Fire related job support would be between 5 and 10 percent of all employment, which most likely would be seen as a significant beneficial economic impact by the Tuolumne and Mariposa County communities.

Reopening of the burn area to the public would also occur faster in Alternative 3 than it would in the No Action Alternative. This would allow more overnight camping visitors to be accommodated in dispersed locations throughout the area. Reopening recreation areas within the burn area would also give visitors more reasons to stay in the region of impact, or to extend their stays. Restoring some of the volume of tourism that was lost due to the Rim Fire would allow businesses in Tuolumne and Mariposa Counties to capture more tourism spending. While not as conducive to quantification as the forest products industries, the expansion of recreation and tourism would also support more employment, thereby expanding the beneficial economic impacts associated with Alternative 3. Reopening of the burn area for firewood gathering would also be seen as economically beneficial by low-income residents who rely on wood burning to supplement the heating of their homes.

While impossible to quantify, there is a potential beneficial fiscal impact on the federal government and federal taxpayers from reducing the fuel load in the Rim Fire area and thereby the risk of having to fight a future intense wildfire in the same area. The Rim Fire cost over 125 million dollars to suppress.

CUMULATIVE EFFECTS

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

The action proposed under Alternative 4 would be essentially the same as under Alternative 1, but would cover slightly less acreage and produce 18 percent less salvage timber for sale. As with Alternative 1, it would remove hazard trees along lower level roads sufficiently to reopen the burn area for dispersed recreation. Biomass and other fuels would be removed from treated areas in order to create conditions to foster a healthier forest in the future, and to enhance wildlife movement and habitat. Some of the public cost of the action could be offset by the sale of salvage timber to private industry. Social, cultural, and economic impacts would be generated.

Social and Cultural Impacts

Compared with the current situation where the majority of the burn area is closed to the public, Alternative 4 would restore some of the access, recreation, and other uses of the area that have been part of the life and culture of Tuolumne and Mariposa Counties. Access for American Indians to gather native plants and other forest resources would be enhanced, and the ability of local residents to gather firewood would be restored. The ranching lifestyle for families that have grazing allotments within the burn area would be enhanced somewhat by clearing out some of the impediments to movement of their range stock, and making access to their allotment areas easier. Residents of the region who own businesses or work in the tourism industry would see some restoration of lifestyles that have been diminished by the reduced volumes of visitors. Specific communities of interest that participated in the various summer camps and resorts would find some of their previous activities returning.

Compared with Alternative 2 (No Action), the social and cultural character of Tuolumne and Mariposa Counties that has been appreciated historically would return much faster.

Economic Impacts

Without taking action (i.e., Alternative 2), the current situation of closure would continue for as much as 10 years, or until the hazard trees fall on their own. Compared with the No Action scenario, Alternative 4 would have many noticeable economic impacts.

Support for direct jobs in the region of impact would be created by the activities required to improve roads, bring in logging crews and equipment, load and chip logs and biomass, haul materials out of the burn area, and process the raw materials into merchantable lumber, electrical power, and other forest products. If the entire 541 MMBF contemplated by the Forest Service under Alternative 4 can be sold and harvested, then 3,465 annual jobs could be supported in the two county area over a period of two to three years (at 6.4 direct jobs per MMBF). With a surge of activity as large as the Rim Fire salvage, some entirely new jobs would likely be created in the region through new hiring, and additional contracting. On the other hand, the majority of the jobs estimated above are in positions that are already filled in the region. For example, many of the people employed at the Standard Mill near Sonora would have the same jobs that they had before, but the source of their income would shift from processing green trees to Rim Fire salvage trees for a couple years (leaving more green trees to support future economic activity). Support of employment in the logging, biomass, and wood products industries would be seen as a beneficial economic impact in the region.

Compared with the No Action Alternative, Alternative 4 would be beneficial for the public sector in that a portion of the public costs of recovery can be recaptured from the proceeds of the salvage timber sale to private industry. Given recent Forest Service experience with timber sales, an estimate of government revenue potential is 50 dollars per thousand board feet. If all 541 MMBF were sold, the government could collect approximately 27 million dollars in revenue to help offset total forest restoration costs that are expected to be larger than that amount.

Some of the Forest Service's expenditures can then go to additional contractors to provide further treatment of some units to clear out biomass for wildlife enhancement and to remove more fuel from the forest. These activities would also generate support for more direct jobs. Alternative 4 estimates 7,975 acres would have biomass removal for these purposes, generating support for 62 direct jobs over a period of years. Over a similar time period, another 146 direct jobs would be supported by post-contract treatments applied to an estimated 23,427 acres (at a typical cost of 500 dollars per acre, as described above in the methodology section).

Total direct job support from all three categories of activities would be 3,674 annual jobs over a period of several years. For example, this could represent 1,500 to 2,000 jobs each in 2014 and 2015 as the bulk of the salvage work is taking place, and tailing off to a few hundred jobs per year in the following few years. Associated with direct employment, another 1,837 annual jobs would be supported over the same time period through indirect and induced multiplier effects in Tuolumne and Mariposa Counties (at a multiplier of 1.5).

Total support for jobs in the region of impact would be 5,511 annual jobs over the next five years or so with the bulk of the economic support coming in the next two years. Given that Tuolumne and Mariposa Counties have higher unemployment rates than the average for the State of California, the impact on job support would be seen as beneficial to the economy. Given that the civilian labor force in the two-county region of impact is 34,000, the Rim Fire related job support would be between 5 and 10 percent of all employment, which most likely would be seen as a significant beneficial economic impact by the Tuolumne and Mariposa County communities.

Reopening of the burn area to the public would also occur faster in Alternative 4 than it would in the No Action Alternative. This would allow more overnight camping visitors to be accommodated in dispersed locations throughout the area. Reopening recreation areas within the burn area would also give visitors more reasons to stay in the region of impact, or to extend their stays. Restoring some of the volume of tourism that was lost due to the Rim Fire would allow businesses in Tuolumne and Mariposa Counties to capture more tourism spending. While not as conducive to quantification as the forest products industries, the expansion of recreation and tourism would also support more employment, thereby expanding the beneficial economic impacts associated with Alternative 4. Reopening of the burn area for firewood gathering would also be seen as economically beneficial by low-income residents who rely on wood burning to supplement the heating of their homes.

While impossible to quantify, there is a potential beneficial fiscal impact on the federal government and federal taxpayers from reducing the fuel load in the Rim Fire area and thereby the risk of having to fight a future intense wildfire in the same area. The Rim Fire cost over 125 million dollars to suppress.

CUMULATIVE EFFECTS

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

As was described in the methodology section and for each individual alternative above, a set of key measures of the actions proposed under each alternative were used to calculate economic impacts on job support. Table 3.10-7 presents the key measures for all alternatives, including:

- Estimated Salvage Timber (in MBF);
- Additional Treatment for Wildlife and Fuels Biomass (in acres); and,
- Post-Contract Treatment (in acres).

Table 3.10-7 Key Measures Used as Inputs to Calculate Economic Impacts

Key Measures of Economic Activities to be Undertaken	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Fuel Reduction Economics				
Total Acreage in Units Treated	28,326	0	30,399	27,826
Est. Salvage Timber (MBF)	**660,781**	**0**	**622,899**	**541,399**
Additional Treatments				
Wildlife and Fuels Biomass Acres	**7,626**	**0**	**8,379**	**7,975**
Post-Contract FS Activities				
Fuels Tractor Pile Acres	20,606	0	22,036	20,320
Watershed Drop and Lop Acres	2,228	0	2,228	1,798
Watershed Mastication Acres	1,309	0	1,309	1,309
Total Post-Contract Acres	**24,143**	**0**	**25,573**	**23,427**

Table 3.10-8 presents the numbers of jobs supported by these activities for each alternative. The No Action Alternative contributes no job support to Tuolumne and Mariposa Counties, but each of the action alternatives support between 5,500 and 6,700 jobs. Again, these are annual jobs and would be spread over multiple years, with the largest portions occurring in the first two years during the bulk of the salvage harvesting, and could amount to 1,500 to 2,000 jobs supported in each of those two years.

To the extent that capacity constraints in the forest products industry limits the amount of timber that can be salvaged and processed within the usable life of the damaged trees, the higher job numbers in Alternatives 1 and 3 might not be completely achieved. In such a capacity constrained scenario, the differences between the action alternatives could be reduced. In all cases, the most dramatic difference in social, cultural, and economic impacts is between the No Action alternative and any of the action alternatives.

Table 3.10-8 Annual Jobs Supported by Each Alternative

Economic Activities and Effects on Employment Generation	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Fuel Reduction Economics				
Direct Jobs Supported [1]	4,229	0	3,987	3,465
Additional Treatments and Biomass				
Direct Jobs Supported [2]	60	0	65	62
Post-Contract FS Activities				
Direct Jobs Supported [3]	151	0	160	146
Total Direct Job Support	**4,439**	**0**	**4,212**	**3,674**
Multiplier "Ripple" Effects				
Indirect and Induced Job Support [4]	2,220	0	2,106	1,837
Total Jobs Supported (Multiple Years)	**6,659**	**0**	**6,318**	**5,511**

[1] at 6.4 direct annual jobs per MMBF harvested.
[2] at 1,250 dollars per acre cost, 50 percent in addition to sawlog harvesting activities, 50 percent to labor at 40,000 dollars per job supported.
[3] at 500 per acre treated, 50 percent to labor costs, and 40,000 dollars per annual job supported.
[4] using an IMPLAN multiplier of 1.5 for Tuolumne and Mariposa Counties combined.
Source: Land Economics Consultants analysis

Social and cultural impacts, although not conducive to the quantitative style of analysis presented above for jobs and economic impacts, may be summarized as follows across alternatives.

Table 3.10-9 Qualitative Characterization of Social and Cultural Impacts

Social or Cultural Value	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Recreation and Tourism				
Access to dispersed recreation	Open	Closed	Open	Open
Visitation in Hwy 120 Corridor	Stimulated	Depressed	Stimulated	Stimulated
Access for camps and activities	Enhanced	Restricted	Enhanced	Enhanced
Cultural Activities				
Access for grazing allotments	Enhanced	Restricted	Enhanced	Enhanced
Access for Native Americans	Enhanced	Restricted	Enhanced	Enhanced
Access for local wood gathering	Reopened	Closed	Reopened	Reopened

Source: Land Economics Consultants analysis

Environmental Justice

Environmental Justice (EJ) is an executive order (EO 12898) which requires, in brief, that each Federal Agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low income populations.

USDA Civil Rights policy requires each agency to analyze the civil rights impact(s) of policies, actions, or decisions that will affect federally conducted and federally assisted programs and activities. A civil rights impact analysis (CRIA) facilitates the identification of the effects of eligibility criteria, methods of administration, or other agency-imposed requirements that may adversely and disproportionately impact employees or program beneficiaries based on their membership in a protected group. Protected groups include multiples of similarly situated persons who may be distinguished by their common race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetics, political beliefs, or receipt of income from any public assistance program.

Actions including temporary closure of the Rim Fire area to the public and its eventual reopening, and actions that are applied consistently to everyone are not discriminatory. Economically beneficial support for additional employment, generated by action alternatives, is not specific to any ethnic group or income segment of the population. No evidence suggests that considered actions (in their entirety) have disproportionately high and adverse impact on minority and low-income populations.

3.11 SOILS

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

National Forest Management Act (NFMA) of 1976 as amended and the Forest and Rangeland Renewable Resources Planning Act of 1974) require the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. NFMA specifies that substantial and permanent impairment of productivity must be avoided.

Forest Service Manual (FSM) 2550 (USDA 2010) establishes the management framework for sustaining soil quality and hydrologic function while providing goods and services outlined in the Forest Plan. Primary objectives of this framework are to inform managers of the effects of land management activities on soil quality and to determine if adjustments to activities and practices are necessary to sustain and restore soil quality. Soil quality analysis and monitoring processes are used to determine if soil quality conditions and objectives have been achieved.

Pacific Southwest Region (Region 5) FSM 2500 Chapter 2550 Supplement (USDA 2012a) establishes soil functions (support for plant growth (productivity) function, soil hydrologic function, and filtering and buffering function) that the Region uses to assess soil conditions. The analysis standards are used for areas dedicated to growing vegetation. They are not applied to lands with other dedicated uses, such as system roads and trails or developed campgrounds.

Forest Service Handbook (FSH) 2509.22, Chapter 10 (Water Quality Management Handbook) (USDA 2011**)** improves and replaces the Best Management Practices (BMPs) presented in Water Quality Management for NFS lands in California. The Forest Service water quality protection program relies on implementation of prescribed BMPs. These BMPs are procedures and techniques that are incorporated in project actions and determined by the State of California to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. Improvements to Forest Service BMPs, as presented in the 2011 Handbook amendment, include more detailed descriptions of individual BMPs (section 12), a requirement that site-specific BMPs be included in timber sale contracts (section 13), and direction that legacy sites (sites disturbed by previous land use that is causing or has potential to cause adverse effects to water quality) within timber project boundaries will be restored or improved. Additionally, the 2011 Handbook amendment establishes an expanded water quality management monitoring program (section 16). Chapter 2 includes detailed BMPs developed by watershed specialists.

National Best Management Practices for Water Quality Management on National Forest System Lands (USDA 2012b) apply to the proposed activities and are included in Chapter 2.

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

The scope of the analysis for direct and indirect effects to the soil resource is limited to the proposed treatment units and connected actions situated outside of those units. Table 3.11-1 lists activities expected to affect the soil resources.

The current soil conditions reflect the cumulative effects of past activities, regardless of when they took place. If multiple activities have occurred in a given treatment unit over the past 50 years, it is not necessary to separate the effects of older treatments from more recent ones and therefore not practical to set a time constraint on those effects. The future timeframe for the soils analysis must extend until the resource has recovered from the impact of the proposed activities. The persistence of soil effects into the future can vary widely. For example, soil cover may recover within one to three years following a treatment. Soil compaction effects, however, may last for decades (Poff 1996).

Table 3.11-1 Activities expected to affect soil resources with each action alternative

Activity	Alternative 1	Alternative 3	Alternative 4
Tractor Harvesting (acres)	24,127	26,252	24,176
Skyline Harvesting (acres)	1,253	1,096	1,066
Helicopter Harvesting (acres)	2,930	3,035	2,568
Tractor/Skyline (acres)	16	16	16
Roadside Hazard Tree Removal (acres)	16,315	15,253	15,692
Watershed Treatment, mastication (acres)	0	1,215	1,215
Watershed Treatment, mastication pre-activity (acres)	0	93	93
Watershed Treatment, drop and lop (acres)	0	2,228	1,798
Total (acres)	**44,641**	**49,188**	**46,624**
Temporary Roads, new (miles)	3.9	9.5	8.4
Temporary Roads, existing (miles)	9.3	22.7	22.1
Temporary Roads, revert to existing (miles)	8.4	3.3	3.3
Total (miles)	**21.6**	**35.5**	**33.8**

Assumptions Specific to Soils

- Effective application of BMPs for the action alternatives: In a burned soil environment, the natural filtering ability of the soil is greatly reduced and accelerated hillslope flow and erosion is expected. With the application of BMPs included in the project management requirements these effects will be substantially reduced (Watershed Report).
- Modeling parameters: Because of the size of the fire, it is assumed that the parameter development used in erosion modeling and Erosion Hazard Rating (EHR) analysis reflects site specific parameters. Based on the resolution of the tools used, this assumption holds for most of the parameters. However, the parameters based on topography add uncertainty to the models used in this analysis. For this reason, the erosion analysis in this report should only be used as a comparative tool rather than an absolute value prediction. Site monitoring during activities will verify EHR assumptions for specific areas. Assumptions for modeling of erosion and EHR analysis include:
  - All slopes are uniform. Generally, slopes are more complex than can be accounted for by modeling. Linear mid slopes and variable bottom and top slopes based on the gradient of the slopes were generalized based on the slope gradient. Also soil cover values are assumed to be uniform over a modeled hillslope.
  - The timing, intensity, quantity, and distribution of precipitation are significant factors in erosion and sedimentation and can be highly variable based on the type of precipitation event, topography and elevation. This analysis assumes a uniform climate over the fire area based on a weather station situated at 4,600 feet near the most intensely burned portion of the fire near Corral Creek.
  - Hazard tree removal was modeled for each alternative. However, it is difficult to assign parameters to the intensity of this activity since the frequency and distribution of hazard trees is highly variable along roadways. Thus, even though this activity is likely to be less intense than it is in salvage logging units, it is conservatively assumed to be the same for this analysis.
  - Pre-fire soil cover values were based on field surveys and remotely sensed data analysis and generalized over the fire area. It is not possible to know what the post-fire implementation soil cover values will be. For assigning post-implementation cover values, soil cover was

increased in high fire intensity areas due to the expected activity fuels that would remain after treatment. Cover values were decreased in low to moderate fire intensity areas. Although activity fuels in the moderate and low fire intensity areas would also increase, machine piling and prescribed fire proposed to achieve fuels objectives will likely decrease soil cover compared with pre-salvage values.

- In Alternatives 3 and 4, management requirements prescribe a cover value of 50 percent or greater in the areas identified as sensitive for soils and hydrology, termed Watershed Sensitive Areas (WSAs). The Water Erosion Prediction Program (WEPP) and EHR are modeled with a minimum of 50 percent cover in those alternatives. However, some of the areas may not have enough standing material to achieve 50 percent. For fuel objectives to be met, ground fuels cannot exceed 20 tons per acre. Depending on the average diameter of the downed material, it may not be possible to achieve 50 percent soil cover and less than 20 tons per acre. In Alternative 1, increases in soil cover are anticipated to be slight due to activity fuels; however, cover is not expected to approach 50 percent.

- Approximately 4,300 acres of aerial mulch treatments were applied as part of the Burned Area Emergency Response (BAER) implementation at a rate of up to 1.5 tons per acre and 100 percent soil cover. Most of these treatments were applied to areas designated in Alternatives 3 and 4 as WSAs and will require effort to maintain 50 percent cover during implementation of salvage activities. For the analysis, the conservative assumption was made that no mulch would remain by the time implementation occurs. This will not likely be the case, but decomposition and incorporation of the mulch into the soil could occur and the amount remaining will depend on soil moisture and intensity of equipment use.
- Soils that burned with high severity experienced sufficient heat penetration to cause the combustion of soil organic matter and this effect is considered equivalent to soil displacement.

Data Sources

- Soil spatial data and soil property tables acquired from the Natural Resources Conservation Services (USDA 2008) and derived from the Stanislaus National Forest Soil Survey.
- Soil interpretations provided by the Region 5 Soil Interpretation Guide (USDA 1999).
- The Soil Burn Severity (Figure 1.04-3) and information regarding post-fire soil conditions provided by Rust et al. (2012).
- Vegetation Burn Severity Map (Figure 1.04-2) produced by the Remote Sensing Application Center based in Salt Lake City, Utah.
- LiDAR high resolution digital elevation model acquired and processed by the Forest Service Remote Sensing Lab based in McClellan, California.
- Multi-Spectral Imagery high resolution satellite data acquired and processed by the Forest Service Remote Sensing Lab based in McClellan, California.
- All map base layers, 10 meter Digital Elevation Model, and Vegetation GIS information.

Soils Indicators

For this soils analysis, Forest Service staff developed soil quality functions and indicators that are appropriate for the proposed activities, site conditions, and soil characteristics of the project area. Soil quality functions support plant growth (soil productivity) and soil hydrologic function. Soil filtering and buffering is the function of immobilizing, degrading, or detoxifying chemical compounds or excess nutrients. The soil filtering or buffering capacity of the soil will not be affected by any proposed activity and is not analyzed in detail for this project.

Soil quality indicators have been developed to support analysis of these functions. While qualitative estimates of the effects of management activities on soils are generally considered sufficient to meet project analysis objectives, quantitative field survey results and remotely sensed information were used to describe the existing condition and to support the analysis of effects of management activities.

Soil indicators analyzed in this project support the soil quality functions of soil productivity and soil hydrologic function. Soil hydrologic function is measured by EHR which also is an indicator for soil productivity. For this analysis, all indicators are addressed in terms of soil productivity.

SOIL PRODUCTIVITY

Soil productivity is the inherent capacity of a soil to support appropriate site-specific biological resource management objectives, which include the growth of specified plants, plant communities, or a sequence of plant communities to support multiple land uses (USDA 2010b). The soil stores water and nutrients, and provides favorable habitat for soil organisms which cycle nutrients. Chemical, physical, and biological soil processes sustain plant growth which provide forage, fiber, wildlife habitat, and cover for watershed protection (USDA 2012a). Important measures of soil productivity include: soil cover, soil porosity and surface organic matter.

Indicator 1: Soil Stability and Effective Soil Cover

An adequate level of soil cover is needed to maintain soil stability and prevent accelerated erosion. Effective soil cover consists of low-growing vegetation (grasses, forbs and prostrate shrubs), plant and tree litter (fine organic matter), surface rock fragments, and may also include applied mulches (straw or chips). Effective soil cover is the most important soil property in maintaining soil stability and reducing erosion. Surface cover mitigates erosion primarily by intercepting and reducing the detachment energy of raindrops, improving soil porosity, preventing soil sealing, and increasing surface roughness (Larsen et al. 2009).

Ground cover protects soil from rain splash erosion, slows surface runoff, and filters runoff. The percent of bare soil is an important factor in controlling sediment production following timber salvage (Chase 2006). The presence of even a thin litter layer can substantially reduce soil erosion (Peterson 2009). Soil cover is the dominant control on post-fire sediment yields and generally does not begin providing protection to soil stability until a level of 50 percent is reached (Larsen et al. 2009). Figure 3.11-1 from Pannkuk and Robichaud (2003) illustrates the coverage of 50 percent ponderosa pine needles.

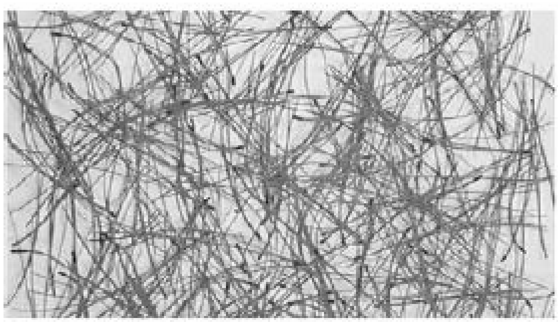

Figure 3.11-1 Fifty Percent Soil Cover from Ponderosa Pine Needles

Desired conditions for soils as stated in FSH 2550 are: "an adequate level of soil cover is maintained to prevent accelerated erosion and erosion prevention measures are effectively implemented following soil disturbing activities." Generally on slopes less than 35 percent, a minimum of 50 percent soil cover in a well distributed pattern is needed to maintain soil stability. Greater amounts of soil cover are generally needed for steeper slopes and in riparian zones.

Effective soil cover was estimated in field surveys and was used to correlate existing and potential soil cover with high resolution satellite imagery. The EHR (USDA 1990) system and the WEPP (Elliot 2010) were used to identify areas where accelerated erosion is likely to occur and to estimate the effects of management activities on erosion.

Metrics for Indicator 1 are erosion rates as modeled by WEPP, erosion hazard as measured by EHR, and Effective Soil Cover. Table 3.11-6 (in the Summary of Effects Across Alternatives section below) provides a summary by indicators for the existing condition and post-implementation values for each alternative. A soil will be considered stable if EHR ratings are moderate or below, and soil cover values are greater than 50 percent. Although threshold values for erosion rates are not established in Management Direction, this analysis uses the assumption that a soil is stable if erosion rates do not exceed rates of formation. The T-factor rating is an interpretation of acceptable soil loss (tons per acre per year) which is related to the soil rate of formation. This interpretation is provided by the Natural Resources Conservation Services (NRCS). Values for acceptable soil loss for the soils within the fire area range from 1 to 5 tons per acre per year with 1 ton per acre equivalent to the thickness of 2 sheets of paper.

Indicator 2: Surface Organic Matter

The concept of surface organic matter is related to effective soil cover, but includes the quality of the material. The amount of organic material on top of the mineral soil is maintained at levels to sustain soil microorganisms and provide for nutrient cycling. The size, amount, and distribution of organic matter maintained on the mineral soil on a long-term basis is consistent with the amounts that occur given the local ecological type, climate, and normal fire return interval for the area. Surface organic matter is characterized by its level of decomposition; **Oi** is fresh material with no decomposition, **Oe** is organic material with intermediate decomposition, and **Oa** is highly decomposed organic material with the original structure (needles and leaves) no longer discernible. The importance of the surface organic matter is comprehensively reviewed by Neary et al. (2005). Generally surface organic matter is important for moisture retention, nutrient cycling and storage, soil stability, infiltration, thermal cover, soil fauna and flora habitat, and gas exchange. Effective cover analyzed as Indicator 1 can be any material that provides for soil stability and does not factor in the quality of the cover to soil function. For example, although the organic layers are consumed by fire, needle cast additions can improve effective cover while taking years to incorporate into the soil as organic matter

Greater amounts of soil cover are generally needed for steeper slopes and in riparian zones (USDA, 2012a). Field crews collected data on the quantity and quality of soil cover and logs on the ground. Although the quantity and quality of surface organic material is unknown prior to the fire, field observations related to the Vegetation Burn Severity Map (Figure 1.04-2) allows for a good correlation of existing and potential cover as related to the canopy change caused by the fire. To estimate surface organic material, it is assumed that the amount of heat in both the moderate and high soil burn severity areas incinerate enough surface organic material to affect the soil productivity of these areas.

Indicator 3: Soil Organic Matter

Soil organic matter (SOM), also known as soil humus, is the highly decomposed organic material that is incorporated into the mineral portions of the soil. Soil organic matter is important for holding soil water, cycling nutrients, and reducing soil strength. The amount of organic matter within the mineral soil, indicated by the color and thickness of the upper soil horizon, is within the normal range of characteristics for the site, and is distributed normally across the area. The upper soil horizon is not displaced or eroded to the degree or extent that soil productivity is decreased for the desired vegetation.

Impacts to SOM generally come from both excessive soil heating and soil displacement from mechanical disturbances. Soil heating volatizes both the complex organic compounds and plant nutrients. Changes in the soil organic matter can affect soil nutrient cycling, water holding capacity and aggregate stability.

Metrics for SOM are the extent of soil depleted either by volatilization from fire or displaced by project activities. Soil burn severity ratings of high were used to determine where SOM was volatized during the fire. High soil burn severity usually indicates penetration of heat into the soil and the consumption of fine roots and soil organic matter. This indicator was not directly measured by field crews, but was evaluated by the soil assessment team during BAER operations to develop the soil burn severity map. An analysis of existing and potential skid trail locations was used to identify areas where mechanical displacement of the SOM was likely. To determine the amount of existing disturbance within units, hand-digitizing of all disturbances based on LiDAR was completed.

For the purpose of this analysis, detrimental soil displacement is defined as occurring when either 2 inches or half the total thickness (whichever is less) of the humus-enriched topsoil (A horizon) is removed from an area 3 square feet or larger.

Indicator 4: Soil Porosity

Soil porosity is the volume of pores in a soil that can be occupied by air, gas, or water and varies depending on the size and distribution of the particles and their arrangement with respect to each other. The two primary mechanisms for reducing soil porosity are compaction and soil sealing. The use of heavy forestry equipment and frequent stand entries increases bulk density and decreases the porosity of soils, which increases the potential for detrimental compaction (Powers et al 1998). Soil sealing is the process after a fire where fine soil particles fill the soil pores and reduce the flow of water through the voids.

The degree and extent of susceptibility to compaction is primarily influenced by soil texture, soil moisture, coarse fragments, depth of surface organic matter, ground pressure weight of the equipment, and whether the load is applied in a static or dynamic fashion. Soil compaction and increased soil strength can cause slowed plant growth, impeded root development, poor water infiltration, restricted percolation, increased overland flow during high precipitation events, and can cause plant nutrients to be relatively immobile or inaccessible (Poff, 1996). Recent research suggests that the effect of severe compaction on biomass productivity is highly dependent upon soil texture (Powers et al 2005). Within the Rim Recovery project area, soil textures of loam and clay loam produce widespread severe compaction ratings (Table 3.11-2).

The extent of detrimental soil compaction should not be of a size or pattern that will result in a significant change in production potential and should not result in common occurrences of overland flow and erosion within treated units (indicating that the infiltration and permeability capacity of the soil has been exceeded for the local climate).

Soil sealing and water repellency (hydrophobicity) resulting from a fire also affects area soil hydrologic function. As summarized by Larsen et al. 2009, soil seals are a thin layer of dense soil at the mineral soil surface. Metrics for soil porosity are the amount of ground that was impacted by logging equipment and high soil burn severity with the assumption that primary and secondary skid trails will be decompacted with subsoilers or ripping shanks. Compaction was identified by field crews using an evaluation of soil structure, particularly platy structure. Field observations were then used to correlate disturbances identified using the same methodology used to identify displacement. Soil sealing, evaluated using soil burn severity, is likely to occur where burn ratings are high. The amount of existing disturbance within units is estimated using the LiDAR data set; however, this indicator is discussed qualitatively.

Soils Methodology by Action

<u>SOIL DESCRIPTION AND INTERPRETATION</u>

Soils information for this analysis was derived from the Stanislaus National Forest Soil Survey and obtained from the NRCS Web Soil Survey. The Web Soil Survey provided both spatial and soil property information which was used for both field survey and analysis. Specific interpretations and soil data properties from the WSS were analyzed from the NRCS Soil Data Viewer which is a GIS extension that helps the user analyze soils in a digital environment. Properties derived from the Soil

Data Viewer include soil texture, depth, rock fragments, soil taxonomy, soil composition within a unit, and acceptable soil loss. The Soils Report (project record) includes a soil map.

SOIL EROSION HAZARD RATING

The Region 5 Soil EHR System (USDA 1990) was used to rate the risk of soil erosion for all soils in the project area post-fire, post-implementation with the incorporation of watershed treatments. This system uses various physical soil properties along with climate and site-specific conditions to rate sheet and rill erosion soil hazards.

EROSION MODELING

The disturbed WEPP batch program (Elliot 2010) was used to model predicted sedimentation resulting from the Rim Fire, salvage activities, and watershed treatments. Disturbed WEPP estimates erosion on an annual basis in contrast to the WEPP module Erosion Risk Management Tool (ERMiT) used during BAER assessment which predicts erosion for individual storm events. WEPP is a physically based erosion model which incorporates topography, soils, climate, vegetation and management activities. Because of the size and complexity of the fire, modeled erosion outputs should not be used as absolute values. The purpose of using modeled values is to illustrate relative risk from existing conditions and management activities and to evaluate the relative change in sedimentation associated with proposed activities.

SITE OBSERVATIONS

The goals of field observations were to identify soil properties useful in confirming the accuracy of the soil survey, to identify existing soil conditions, to understand soil response to proposed management activities and to correlate the site conditions to remotely sensed data. Ninety-seven plots were recorded. Site observation methods were developed for rapid assessment by field crews. Plot selection was stratified based on burn severity, soil type, topography, and visual satellite imagery expression. Soil cover is the most important soil characteristic estimate following a wildfire and any subsequent activities post fire. Observations were made to qualify the existing condition and to help watershed personnel correlate multi-spectral imagery with site characteristics.

REMOTELY SENSED DATA ANALYSIS

Analysis for this project utilized several remotely sensed sources of information to identify areas of both soil and vegetation burn severity, tree mortality, disturbances, and potential and existing cover. Unit-by-unit ocular analysis was completed using sensed data sets.

WATERSHED SENSITIVE AREAS (WSAS)

Watershed staff examined each unit and identified Watershed Sensitive Areas (WSAs). WSAs are portions of the watershed that are at high risk of soil erosion and sedimentation due to the combined effects of the Rim Fire and potential recovery activities. Criteria for evaluating the existence of WSAs included: proposed recovery activities, burn severity, percent slope and slope shape, slope length, existing and potential soil cover, proximity to intermittent and perennial drainages, and proximity to high runoff response soils.

Affected Environment

Existing Conditions

Soils within the project area are primarily derived from metamorphic rock in the lower elevations and granitic rock at mid and higher elevations. A soil map (Soils Report, Appendix A) and Table 3.11-2 display the proportion of general soil groups per alternative and the corresponding soil properties used in the analysis. Field work during the BAER assessment and for this project verified the existing soil survey information, investigated current soil conditions and effects of the fire, and management capabilities. The dominant soils within the analysis area are mostly loams, sandy loams, and loamy sands with gravelly to extremely gravelly texture modifiers, indicating high natural infiltration rates and high rock content in many areas. These soils range from shallow to deep, reflecting a wide range of soil productivity and soil hydrologic groups. Specific dominant soils include Holland, Josephine, Wintoner and Fiddletown. Rock outcrop is also common, even dominant, in several map units. Although rock outcrop does not produce sediment, it commonly produces runoff which accelerates erosion on soils downslope; a condition considered in the identification of WSAs.

Table 3.11-2 Soil families and associated properties used in analysis

Family	**Max Extent of Activities** (Percent total acres)	Soil Properties used in Analysis				
		T-Factor	**Surface Texture**	**Subsurface Texture**	**Soil Depth** (inches)	**Compaction Hazard**
Dystric Lithic Xerochrepts	2.1	1	Cobbly loam	Cobbly loam	20-40	Moderate
Dystric Xerochrepts	0.28	1	Cobbly loam	Coarse sandy loam	20-40	Moderate
Dystric Xerorthents	0.6	1	Coarse sandy loam	Coarse sandy loam	20-40	Slight
Entic Cyrumbrepts	0.06	3	Coarse sandy loam	Coarse sandy loam	20-60	Moderate
Fiddletown	7.5	2	Gravelly to Bouldery sandy loam	Gravelly sandy loam	20-60	Slight
Gerle	5.4	4	Gravelly sandy loam	Sandy loam	40-60+	Slight
Half Dome	0.17	3	Very Bouldery sandy loam	Cobbly sandy loam	40-60+	Slight
Holland	35.6	4	Loam	Clay loam	40-80+	Severe
Humic Dystroxerepts	0.1					
Josephine	27.8	4	Gravelly loam	Clay loam	20-60+	Severe
Lithic Xerumbrepts	3.7	1	Loamy sand	Sandy loam	0-20	Slight
McCarthy	4.1	3	Gravelly sandy loam	Sandy loam	20-60	Slight
Pinole	0.5	4	Gravelly loam	Clay loam	60-80+	Severe
Rock Outcrop	0.8	1	Unweathered bedrock	NA	0-10	Slight
Typic Dystroxerepts	0.4					
Ultic Haploxeralfs	1.7	1	Sandy loam	Loam		Severe
Wintoner	9.1	4	Gravelly loam	Clay loam	40-60+	Severe
Xerolls	0.1	5	Loam	Loam	40-60+	Severe

The majority of soils (about 75 percent) within the proposed action have a severe compaction rating (high probability to be compacted by activities when moist). These tend to be the most productive soils in the project area, particularly the Holland and Josephine soils. Both compaction ratings and productivity are strongly correlated with soil texture. During surveys, field crews noted severe compaction rating on nearly all sampled legacy skid trails confirming compaction potential in the project area. Fire history (Table 3.11-3) and past mechanical activities (3.14 Watershed) are the greatest influence on the existing soil condition.

Fire Disturbance

Although many activities occurred and affected the analysis area (3.14 Watershed) the existing soil condition is most dominated by recent fire history. Table 3.11-3 displays the six largest fires occurring within the Rim Fire perimeter (Figure 1.02-5). Fire can have both beneficial and negative effects on the soil resources. Fires that burn with low severity can maintain soil cover, mineralize important nutrients from plant matter stored on the soil surface, reduce fuel loads leading to possible future high burn severity, and stimulate herbaceous vegetation helping to facilitate nutrient cycling. Moderate to high severity fires can cause a loss of soil hydrologic function by sealing pores and degrading soil structure, can cause a loss of soil productivity by processes of erosion, mass-wasting, and nutrient volatization, and can allow exotic plants to establish which can affect soil productivity. The Rim Fire resulted in a deficiency of both soil cover and surface organic matter. It is estimated that 60 percent of the Rim Fire area has surface organic material coverage less than 50 percent.

Table 3.11-3 Soil Burn Severity for selected fires in relation to the Rim Fire

Fire Name	Year	Size (NFS acres)	Soil Burn Severity (Percent)		
			High	Mod	Low and Unburned
Rim	2013	154,530	7	37	56
Stanislaus Complex	1987	147,100	36	20	44
Rogge[1]	1996	19,400	0	41	59
Granite	1973	17,100	55	30	15
Ackerson[2]	1996	11,300	19	14	67
Pilot	1999	4,000	46	25	29

[1] No high soil burn severity due to low fuel loading over much of the area because of new tree plantations after the Stanislaus Complex fire.
[2] This 59,000 acre fire burned mostly in Yosemite National Park.

Although the Rim Fire was the largest fire in Sierra Nevada recorded history, the soil burn severity (SBS) was relatively low. The Granite, Ackerson, and Stanislaus Complex fires and post-fire fuel reduction activities removed significant build-up of surface fuels so the heat intensity and residence time was not favorable to high SBS. Table 3.11-4 indicates that activities occur on High and Moderate SBS in a greater proportion than the fire as a whole. This is primarily because very little tree mortality occurred in the unburned and low SBS portion of the fire. There is very little difference in the proportion of activities occurring by burn severity between alternatives.

Table 3.11-4 Soil Burn Severity of the maximum extent of activity

Burn Severity	Maximum Extent of Activities	
	Acres	Percent
Unburned	3,409	7.2
Low	15,038	31.8
Moderate	23,012	48.6
High	5,858	12.4
Total	**47,317**	**100.0**

SBS measures the direct effect of fires on soils. Whereas fire intensity measures the changes to the vegetation community, SBS indicates both changes to the above ground material, providing both existing and future soil cover, and the effects to the soil properties caused by heat penetration below ground. SBS categories are summarized as follows (Parsons et al. 2010):

- Low: Surface organic layers are not completely consumed and are still recognizable. Soil structure and roots are unchanged, and vegetation will appear green.
- Moderate: Up to 80 percent of the pre-fire ground cover may be consumed. Fine roots may be scorched but not consumed. Soil structure is not changed and there is usually potential for some immediate cover recruitment.
- High: All, or nearly all, of the pre-fire cover and organic matter has been consumed. Soil structure may be completely obliterated or strongly impaired. Fine surface roots have been

consumed and coarse roots extending from stump holes may be consumed. There is little to no chance for short-term cover recruitment; cover will not return until vegetation regeneration occurs and snags begin to fall.

Figure 1.04-3 show the SBS for the entire fire area. The Vegetation Burn Severity Map (Figure 1.04-2) shows greater vegetation effects than soil effects primarily because this was a fast moving, wind-driven fire with little time for soil heat penetration. The Rim Fire BAER Soil Report (Rust et al. 2013) details the effects of the fire on soils.

The Rim project area has a relatively high level of displacement because soils that burned with high SBS volatized the organic material in the soil that contribute to soil productivity. For the project area, the fire has resulted in an existing condition close to threshold values with the effects concentrated in units where high SBS occurred. Although displacement of soil organic matter is the combined effect of both mechanical disturbance and fire process, fire process is the dominant impact to soil organic matter.

Mechanical Disturbance

Mechanical equipment used in forest management activities compresses the soil by reducing pore size. This reduction in the pore space and the resulting increase in bulk density reduces the water holding capacity and gas exchange of soils. Compaction also increases the strength of soils restricting the ability of roots to penetrate the soil matrix. Post-fire field surveys revealed the most severe compaction in the Josephine and Holland soils on benched skid trails and legacy temporary roads and on displaced surface loam soils exposing the greater clay subsoil. In most units, the extensive skidding network resulted from past timber sales. Most skid trails sampled revealed high levels of compaction with little recovery. Within these skid trail prisms, soil cover generally is similar to the surrounding areas. Vegetation growing on these skid trails is either very stunted or non-existent reflecting a reduction of soil porosity and displacement of the soil organic material. Table 3.11-5 displays a summary of existing conditions within the maximum extent of activities, which includes all alternatives. The existing conditions include the effects from past fire and mechanical disturbance. As mentioned above displacement of soil organic matter results from the combined effect of mechanical disturbance and combustion in high SBS areas. Displacement from mechanical disturbance is relatively small compared to the effects of displacement due to organic material volatization from the Rim Fire. Without fire, the displacement and compaction footprint would essentially coincide.

Table 3.11-5 Summary of existing condition of indicators

Indicator			Total	Percent
#	Indicator	Metric		
1	Soil Stability, Erosion	Average Erosion Rate (tons per acre)[1]	3.11	
1	Soil Stability, Erosion Hazard Rating	Greater than Moderate Rating (acres)	10,725	23
1	Soil Cover	Area with less than 50 percent cover (acres)	25,322	60
2	Surface Organic Material	Area with less than 50 percent cover (acres)	28,870	61
3	Soil Organic Matter	Area with expected soil productivity loss due to displacement	6,062	13
4	Soil Porosity	Area with expected soil productivity loss due to compaction or loss of porosity	932	2

[1] Erosion rates for unburned areas tend to be 0.5 tons per acre or less.

Environmental Consequences

All mechanical harvest operations will adhere to Forest Standards and Guidelines set forth in the timber sale administration handbook (FSH 2409.15) and the Best Management Practices (BMPs) as delineated in the Region 5 Amendment to the Forest Service Water Quality Management Handbook

(USDA 2011a) and the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA 2012). Timber sale contracts contain many standard provisions that help ensure protection of soil and water resources. These include provisions for an erosion control plan, road maintenance, skid trail spacing, and restrictions for wet weather operation.

The analysis of effects is limited to the proposed activities that are expected to change the values of the indicators as compared to the existing condition. Although many unknowns exist both in existing conditions and the intensity of the activities on a site specific area, conservative estimates were made which will likely overestimate the effects of the activities. By comparing the effects to threshold values, this analysis informs the decision maker of the relative risk each alternative has to the threshold values established in management direction.

Management direction is to analyze for impacts to soils for areas of soil function. Due to implementation of BMPs those activities are expected to result in effects that are limited in extent to those specific locations and are therefore not expected to significantly impact soil productivity in the project area. Activities analyzed include tractor logging, skyline logging, helicopter logging, road work, prescribed fire, watershed treatments, hazard tree removal along roads and Best Management Practices. Road construction and rock quarry work will permanently remove those areas from soil productivity.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1: Soil Stability and Effective Soil Cover

The effects of soil stability and effective soil cover are directly related and analyzed together. Erosional processes, which are the direct measures of soil stability, are primarily changed by management activities when those activities affect soil cover and porosity. While it is not feasible to predict the soil cover following treatments for every location, general assumptions can be made in regards to the departure of soil cover from pre-existing levels based on proposed activities. Activities expected to affect soil stability and cover include harvest activities and fuels treatments.

The existing condition of soil stability and soil cover are above threshold values. The proposed activities of Alternative 1 will do little to change this indicator. There will be slight increases in soil cover due to activity fuels, but not enough of an increase in cover values (less than 50 percent) is expected where the Rim Fire resulted in deficiencies due to high vegetation burn severity. Erosion rates and Erosion Hazard Ratings will also remain little changed.

Shakesby et al. (1996) found that logging residue can decrease erosion and retain sediment in postfire logged sites. In general, harvest activities are expected to generate ground cover from both slash and breakage. However, there is conflicting research, indicating some areas may not have sufficient soil cover post treatment. Studies directly measuring the change in soil cover following salvage activities are limited; studies of fuel increases however can serve as a reasonable proxy. McIver and Ottmar (2007) found that post-fire logging in an Oregon ponderosa pine forest increased the amount of material less than 3 inches diameter to 2.8 tons per acre compared to 0.6 tons per acre in burned but unsalvaged stands. Donato et al. (2006) found that fine woody material increased above pre-fire levels following salvage logging of the 2002 Biscuit Fire. Although these studies reported material in weight as opposed to percentage ground cover, they support the idea that logging activities generate fine material that translates into soil cover. However, Chase (2006) found that both tractor logging and cable logging increased the amount of bare soil compared to burned and unlogged control plots. The amount of bare soil decreased with helicopter logging. Chapter 3.05 (Fire and Fuels) also discusses the material expected to be left after salvage operations.

Fuel treatments are also expected to affect the amount of soil cover. Machine-piling with a rake-fitted dozer followed by burning is expected to reduce soil cover to less than 20 tons per acre, creating areas where soil cover may go below threshold values. Machine-piling is not intended to reduce the fine fuels in contact with the ground, but because of “sweeping” of the surface by the larger targeted material, some surface cover will likely be displaced to piles. Monitoring by project administrators is expected to keep this displacement to a minimum. Pile-burning will have an impact on soil cover at the location of the pile. Fuel staff target 80 percent consumption of material in a pile, which will likely leave less than 50 percent ground cover in that location. Burn piles will be dispersed throughout a unit and typically burn in a mosaic. The areal extent of the piles is unknown; however it is expected that pile burning along with other soil disturbing activities will occupy less than 15 percent of a unit to conform to Forest Plan Standard and Guidelines.

A WEPP analysis was used to predict hillslope erosion. Skid trails and cable corridors are compacted surfaces with reduced ground cover that concentrate water and increase rill and gully erosion at water outlets or along the compacted surfaces. Proper installation of BMPs on skid trails will help minimize the increased sediment production due to salvage logging (Chase 2006). Decompacting of primary and secondary skid trails to increase infiltration and surface roughness along with implementation of BMPs is expected to minimize the erosion and sedimentation related to the concentration of hillslope water flow caused by skidding.

Soil cover and erosion were evaluated both at the areal extent of the proposed salvage treatments and on a per unit basis. About 59 percent of the proposed action area currently has soil cover of less than 50 percent and 304 units are currently identified as likely to have less than 50 percent cover in more than 15 percent of the area. It is not expected that these values will change significantly as a result of proposed activities. Although effective soil cover is expected to increase in areas of high vegetation burn severity, it is unlikely that activity fuels will add enough soil cover to increase values above the 50 percent threshold in these areas. In the low and moderate vegetation burn severity, harvest and fuels activity are not likely to drop soil cover values below the 50 percent threshold since only activity generated material is treated during timber sale implementation

Table 3.11-6 shows the results from modeling of the proposed activities: erosion rates drop slightly for the project area from 3.1 tons per acre to 3.0 tons per acre, while the number of units where erosion rates exceeded acceptable soil loss increase slightly from 178 to 181. This increase is likely due to the decrease in cover values on steep slopes that are proposed for helicopter or skyline logging. EHR rates also will change little as a result of proposed activities. The number of units where the EHR exceeds ‘Moderate’ in over 15 percent of the unit stayed unchanged at 188 units. The small differences in erosion rates and the lack of change in EHR ratings are considered insignificant, but it is likely that erosion will increase as a result of the proposed action.

The use and development of temporary roads is part of the connected action to timber harvest that is expected to affect both soil cover and soil stability. The temporary roads were not considered in the unit-by-unit analysis and are addressed separately. About 4 miles of temporary roads will be constructed and 18 miles of existing temporary roads will be used. Ten of those 18 miles of existing temporary roads will be obliterated. It is expected that temporary roads will be deficient in ground cover, however, subsoiling, recontouring, installation of waterbars, and application of ground cover will reduce the risk of erosion.

In summary, there is much uncertainty regarding the effects proposed activities will have on soil cover and erosion. Research on post-fire logging resulting in erosion is limited (McIver and Starr, 2001) and is not consistent. The lack of change from current conditions based on proposed activities did not show a substantial decrease or increase in EHR or erosion in the models used for this analysis. Although erosion may increase as a result of salvage activities, the magnitude, as Chou (1994) suggests is likely overwhelmed by the erosion and sedimentation resulting from the fire itself. What is clear from both research and modeling is that most of the analysis area will remain below minimum threshold values for effective soil cover and will continue to exceed soil stability thresholds.

Skid trails and cable rows provide a conduit for rill erosion formation thereby increasing the amount of erosion and sediment (Chase 2006). Management requirements are incorporated into the proposed action to mitigate the effects of logging effects on erosion and soil cover. Also, most temporary roads will be obliterated (only those currently operating under other special uses will remain). Madej (2001) found that the activities proposed for restoration of skid trails, landings and temporary roads reduced sediment and runoff significantly when applied to closing forest roads.

Indicator 2: Surface Organic Matter

Proposed activities expected to affect surface organic matter include hauling, temporary road construction and prescribed burning. Harvest activities including the use of tracked feller-buncher type equipment will affect the surface organic matter with localized surface displacement, but will not have a detrimental soil effect on the stands where those activities occur. Long-term surface organic matter is more likely to occur as a result of skidding material to landings and cable yarding material along cable corridors. Removal of the material will be highest closer to landings and on portions of the cable corridors that do not support a fully suspended load. Fresh deposits of broken branches and needle cast will occur, but this accumulation is expected to be thin with surface coverage below threshold standards.

Long-term recovery of the soil organic material in high soil burn severity areas may be affected by the removal of the overstory. With the fine organic material and needles consumed in high severity vegetation burn severity areas, surface organic matter recovery depends on snag recruitment and needle fall to the soil surface. During field surveys, those portions of the analysis area with the highest depletion of surface organic material correlate with thick stands of burned trees smaller than the 16 inch diameter at breast height that will not be removed. Therefore, material is likely to remain to decompose and rebuild soil organic layers over time.

Piling of fuels is not expected to significantly affect surface soil organic matter; however, piling will reduce the amount of material that could contribute to future surface organic matter. Tractor-piling with a rake is likely to cause limited disturbance and displacement of the organic soil layers as target material sweeps the soil surface. The burning of piles is expected to generate enough heat to consume all soil organic layers although the extent is expected to be much lower than the threshold of disturbance of 15 percent extent.

Indicator 3: Soil Organic Matter

Displacement is the removal of surface layers of the mineral soil generally by mechanical means. All salvage activities have the potential to substantially displace the SOM. Feller-buncher activity will cause limited displacement. Displacement from harvesters is generally not considered detrimental displacement because the effects are localized. In ground based mechanical harvest units higher levels of displacement are likely to occur with skidding operations. Skidder tracks along with dragging of trees digs into the mineral soil surface and wedges the surface to the side. This creates berms and piles along the edges of skid trails. Skyline units are expected to have displacement along portions of the corridors, with higher displacement levels occurring closer to the landings. The most severe displacement is expected to occur on steeper temporary roads and skid trails. The steeper the slope on both temporary roads and skid trails, the more severe the displacement is likely to be due to cut-banking. Displacement results in the removal of nutrient rich loamy material exposing the high clay content subsurface. This subsurface is deficient in soil nutrients, reduces infiltration, and has higher natural soil strength impeding root penetration. Fox et al. (1989) found displacement caused by windrowing decreased forest productivity dramatically. Displacement can also lead to channelized flow from entrainment between berms, reduced infiltration, reduced surface roughness, and in the case of roads, high levels of compaction. While local displacement damages soil function, the activities resulting in negative effects will not exceed 15 percent of the area and impacts are not expected to be significant.

The other mechanism of displacement involves heat penetration into the mineral soil sufficient enough to char or volatize the organic compounds that form SOM. The diminishment of SOM caused by the Rim Fire dominates the existing condition with 72 units exceeding the fifteen percent threshold whereas no units proposed for mechanical disturbance exceed threshold values. However, pile and jackpot burning is expected to produce enough heat where fuel loads exceed 20 tons per acre to consume SOM within the footprint of the piles. The extent and burn severity is unknown and is dependent on the size of the piles and distribution of fuels. The impact will be limited to the pile locations and small areas of high concentrations and therefore is not expected to be significant.

The development of skid trails will have an impact on SOM, but management requirements will mitigate the effects, particularly the reuse of existing skid trails where practical It is clear from LiDAR analysis, there are units with little to no displacement and 72 units where the existing condition exceeds the 15 percent threshold for disturbance. Existing skid trails will be reused where practical. For many of the tractor units, existing skid trails are expected to be adequate for salvage harvest and new skid trail development will be unnecessary or minimal. Displacement caused by new skid trails and temporary road construction will be considered a long-term disturbance as no mitigations to replace displaced SOM are planned.

SOM will recover regardless of management activities in the long-term. SOM is expected to recover more rapidly in areas where SOM was displaced by fire, because nutrient cycling of ash and rapid vegetation regrowth of root dense, nitrogen-fixing shrubs will facilitate deposition of organic matter by decomposing roots and mineralization of decaying material in the soil. On soils where SOM will be impacted by mechanical activities, the recovery is expected to be slower because residual nutrients of the fire will be displaced and SOM replenishing vegetation will be stunted where compaction occurs.

Indicator 4: Soil Porosity

Changes in porosity occur both by the reduction of soil pore space by force applied to the soil surface (compaction) and the filling of pores by soil and ash material (soil sealing). Heavy equipment use is expected to increase compaction within treated areas. For this project, the dominant soil is rated as high compaction hazard primarily because of the increasing clay at depth. Within tractor units, compaction is expected to increase depending on the number of passes and the weight of the machine. Feller-buncher harvesting equipment is considered low ground-pressure equipment and typically does not travel the same location more than twice. Compaction is therefore expected to be slight where mechanical harvesting occurs.

Skidding operations, however, will detrimentally compact the soil. Williamson and Neilson (2000) found that most maximum compaction occurs after 3 passes of log-laden equipment. Landings are areas of high compaction because they support skidding equipment, processors, and log trucks but all landings will be deep tilled after use on this project. Management requirements confine the extent of detrimental disturbance from skid trail patterns to less than 15 percent of a unit. Through LiDAR analysis supported by field verification, it was determined that past activity has resulted in only 3 units exceeding threshold values based on reduced porosity. However, it is likely that more units will exceed 15 percent disturbance because the lack of ground cover will make the soil more susceptible to compaction. Management requirements, such as subsoiling, substantially decrease the negative effects of compaction. Powers (2002) observed that subsoiling significantly improved the porosity of soils. Subsoiling temporary roads, landings and skid trails will limit the extent and duration of effects in these areas. Detrimental disturbance is expected to be minimal in helicopter units. The risk of compaction will be increased in those sky line and helicopter units where feller-buncher type harvesters assist hand fallers in removing trees. In these units where no skid trails will be used, detrimental compaction is not expected outside cable corridors.

Although the effects of soil sealing resulting from the fire may be reduced before implementation starts, it is likely that soil surface disturbance through mechanical harvest activities will further reduce the effects of soil sealing by exposing more developed soil structure. Compacted road surfaces reduce infiltration to near zero. Forest roads are the largest source of erosion. This is exacerbated in a burned environment because the capacity of the landscape to moderate flow and trap sediment is greatly reduced (Peterson et al. 2009). The extent of new and temporary road construction is limited, and while compaction of these surfaces is severe, the limited extent of activities is not expected to result in significant impacts to forest productivity.

CUMULATIVE EFFECTS

The Rim Fire resulted in significant impacts to soils within the analysis area including increases in erosion potential, loss of soil cover, loss of soil organic matter and reduction in soil porosity from soil sealing. With no other actions planned (Appendix B) within the Rim Recovery soil analysis area, the cumulative effects for Alternative 1 are the same as the direct and indirect effects of Alternative 1. The cumulative effect of Alternative 1 is expected to slightly improve soil cover from activity fuels and will increase the porosity in existing skid trails, landings, and abandoned roads identified for use as temporary roads in the project. However in general the activities are not expected to substantially improve the soil indicators within the analysis area.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1: Soil Stability and Effective Soil Cover

Under Alternative 2, only indirect effects to soils occur. Soil cover for erosion protection will be limited to natural rates of accumulation. In areas of lower burn severity, needlecast from dead tree canopies will continue to accumulate as ground cover at natural rates. Soil stability will remain reduced and erosion risk will remain elevated in the short term, for 1 to 3 years, until ground cover and vegetation are reestablished. Higher burn severity areas currently lacking effective soil cover will recover more slowly because woody material will be deposited naturally at a slower rate. Where the potential for soil cover to be added through needlecast is low, soil cover in the short term will mainly be added as dead trees shed branches and fall. Effective soil cover will only be fully reestablished after surface vegetation recovers. This will expose the soil to higher erosion potential over the next 3 to 5 years. Under this alternative, WSAs will not receive additional ground cover as proposed in Alternatives 3 and 4 and therefore the analysis area will not realize a reduction in erosion and sediment in areas identified as higher risk for sedimentation and erosion. Areas will have continued accelerated erosion for 3 to 5 years until soils stabilize and vegetation cover returns.

Indicator 2: Surface Organic Matter

The Fuels Report (project record) states that smaller diameter class snags will fall within the fire perimeter at the highest rate in the first ten years. Larger snags will persist for relatively longer time periods, but most snags will be expected to fall within 20 years post-fire (Hood, Chuck and Smith 2007). Within 10 years, surface fuels are projected to be 42 tons per acre. Within 30 years, surface fuels are projected to average 78 tons per acre due to dead trees falling over (Fuels Chapter). Richie (2013) showed that 10 years after the Black Mountain Fire, 80 percent of the basal area was on the ground. These predicted fuel loading levels pose a risk to soil productivity if reburned in a subsequent wildfire. The fuel loadings predicted exceed the levels that cause severe soil heating in a fire (Brown et al. 2003). While it is not possible to accurately predict when a fire will reburn, predicted fuel loadings in Alternative 2 will create an elevated fire hazard. This would lead to excessive soil heating damage in a wildfire. One study, in adjacent Yosemite National Park, examined the effects of multiple fires on vegetation in unlogged areas. Areas of high soil and vegetation burn severity were more likely to burn at high severity again in future fires, partly because of a post-fire vegetation shift from forest to brush or chaparral (Wagtendonk 2012). Areas that burned at low or moderate burn severity initially and maintained forest conditions were more likely to burn at low or moderate burn severity in later fires.

Other studies show that if salvaged logged areas reburn, they may have higher overall vegetation burn severity and fire effects than areas that were unlogged (Fraver et al. 2011; Thompson 2007). Most studies on this topic analyze the vegetation effects of reburn. There are fewer studies that directly compare soil effects and associated fire risk or hazard in unlogged and salvage logged areas, therefore impacts to soils in this scenario are less clear. It is expected that fuel loading in contact with the soil surface is likely to be the most important variable in determining risk of fire damage to the soil during a reburn. Alternative 2 will provide far more down woody material than treated stands in the action Alternatives.

Indicator 3: Soil Organic Matter

Without the proposed management requirements associated with soil ground cover in WSAs and other areas with elevated erosion rates, soil organic matter could be lost through surface erosion until soils stabilize. In lower burn severity areas, less soil organic matter will be lost due to erosion without alteration by active management, and in the long-term it will develop at natural rates. With increased fuel loadings described under indicator 2, it is possible that soil heating effects could increase in future fires. High surface temperatures, especially from burning downed logs, raise soil temperatures, resulting in increased volatilization of soil organic matter. Prolonged heating under burning logs will lead to lethal temperatures of greater than 122 degrees Fahrenheit for fungi and 212 degrees Fahrenheit (Boyer and Dell, 1980) for nitrifying bacteria at greater soil depths. The loss of SOM is probably the most serious concern in terms of long-term soil effects. SOM dynamics and nutrient cycling will continue to recover naturally, once vegetation becomes re-established.

Indicator 4: Soil Porosity

Existing levels of compaction will not be improved or changed. Existing compaction on abandoned roads and skid trails will remain until natural processes restore soil porosity. Additional compaction will not occur; however, areas with compacted, benched-in skid trails will not be subsoiled and are likely to remain compacted for decades.

CUMULATIVE EFFECTS

With no other actions planned (Appendix B) within the Rim Recovery soil analysis area, the cumulative effects for Alternative 2 are the same as the indirect effects of Alternative 2. The cumulative effect of Alternative 2 is not expected to improve soil cover or soil porosity.

Alternative 3

While Alternative 3 includes less commercial salvage acres, the area of impact is increased through proposed biomass removal. Impacts of biomass removal will result in similar soil effects, as machinery used to accomplish the activities are the same. The proposed temporary road use increases by 14 miles with an increase of approximately 6 miles of new temporary roads. New road construction, however, drops from 5.4 miles to 1 mile. The most substantial change, affecting the soil resource, is that Alternative 3 provides additional soil cover on 3,536 acres using watershed treatments if post-activity soil cover is not greater than 50 percent in WSAs.

DIRECT AND INDIRECT EFFECTS

Indicator 1: Soil Stability and Effective Soil Cover

The effects of activities to soil stability and effective soil cover from salvage activities and road work activities would be similar to Alternative 1. The addition of soil cover in the WSAs improves the soil stability and the amount of effective soil cover substantially due to the targeted application of soil cover in areas identified as most erodible and lacking in soil cover. Table 3.11-6 displays that the modeled erosion rate decreases from the existing 3.1 tons per acre per year down to 2.2 tons per acre per year for Alternative 3. The number of units where the average unit erosion rates exceed the T-Factor will decrease from 194 to 136 units when compared to the existing condition.

Improvement in effective soil cover is also expected to increase, but will not be as considerable as the erosion rate reduction. This is due to cover being added only in the highest potential erosion rate areas. Areas deficient in soil cover on gentle slopes are expected to remain deficient in soil cover until it recovers naturally over time. The area of Alternative 3 that is expected to have less than 50 percent soil cover will decrease as a result of proposed activities from nearly 60 percent to 53 percent. The number of units where the amount of soil cover is less than 50 percent in at least 15 percent of the unit is expected to decrease from 335 to 329 units.

The amount of area and number of units that have a ‘Moderate’ EHR rating or less improved with the modeled additions of soil cover, but not as dramatically as improvements in modeled erosion rates using WEPP. The area of EHR ratings above ‘Moderate’ decreased by 1 percent from 22 percent to 21 percent and the number of units that have more than 15 percent of the unit area with a rating of ‘High’ or ‘Very High’ decreased from 209 units to 203 units. Where EHR rating is improved from ‘Very High’ to ‘High’ it is still considered above thresholds set by management direction. Although assumptions are factored into all modeling, the improvement of erosion rates, EHR, and soil cover is substantial enough to conclude the proposed activities in Alternative 3 will decrease erosion and increase cover sufficiently that they will have a net benefit to the analysis area.

Indicator 2: Surface Organic Matter

The effects to surface fine organic matter will be the same as Alternative 1. The material added to the surface as a result of WSA treatments will not add to the surface organic matter. This material is undecomposed coarser material derived from non-commercial stems and will only cover 50 percent of the soil. Treatments will not add appreciably to soil productivity.

Indicator 3: Soil Organic Matter

Same as Alternative 1.

Indicator 4: Soil Porosity

The effects to soil porosity will be similar to what is described for Alternative 1. The additional treatment will increase the amount of compaction within the analysis area. Additional areas of soil disturbance will not be expected to increase the percent of compaction in any treated areas above the amount expected with Alternative 1. Soil disturbance within Alternative 3 will be reduced in areas where treatment proposed in Alternative 1 does not occur. However, existing compaction on skid trails and landings within untreated areas will also persist.

CUMULATIVE EFFECTS

Same as Alternative 1, except the addition of organic cover for watershed treatments would improve soil cover and reduce erosion rates as described in the direct and indirect effects of Alternative 3.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Indicator 1: Soil Stability and Effective Soil Cover

Table 3.11-6 shows the modeled erosion rate for Alternative 4 is similar to Alternative 3 with a decrease from 3.0 tons per acre per year down to 2.2 tons per acre per year. On a unit-by-unit basis, the number of units where the average unit erosion rates exceeded the T-Factor similarly decreased over the existing condition from 186 units to 131 units. The area of Alternative 4 that has less than 50 percent soil cover decreases from nearly 59 percent to 52 percent. The number of units where the amount of soil cover is less than 50 percent in at least 15 percent of the unit decreases from 317 to

311 units. The amount of area and number of units at a 'Moderate' EHR rating or less increased, but improvements from added soil cover for EHR were not as dramatic as for modeled erosion rates with WEPP. The area of EHR ratings above 'Moderate' decreased by 2 percent from 22 percent to 20 percent and the number of units that are expected to have more than 15 percent of the unit area with a rating of 'High' or 'Very High' improved from 197 units to 191 units which is the same change in the number of units as Alternative 3.

Indicator 2: Surface Organic Matter

Same as Alternative 3.

Indicator 3: Soil Organic Matter

Same as Alternative 3.

Indicator 4: Soil Porosity

The effects to soil porosity will be similar to that described for Alternative 3. Soil disturbance within Alternative 4 will be reduced in areas where treatment is proposed in Alternative 3 does not occur. However, existing compaction on skid trails and landings within untreated areas will persist.

CUMULATIVE EFFECTS

Same as Alternative 1, except the addition of organic cover for watershed treatments would improve soil cover and reduce erosion rates as described in the direct and indirect effects of Alternative 4.

Summary of Effects Analysis across All Alternatives

Table 3.11-6 provides a summary of the effects across all alternatives. For Indicators 3 and 4, the effects of each alternative are compared qualitatively. Indicators for erosion, soil cover, fine organic material, and soil organic material exceed threshold values used in the analysis.

Indicator 1: Soil Stability and Effective Soil Cover

Alternatives 1 and 2 are similar in the effects to soil stability. High erosion rates and low cover values will remain for both alternatives; however, slight improvements to average erosion rates occur in Alternative 1 due to the addition of activity fuels. Conversely, the number of units where the erosion rates exceed acceptable soil loss increases in Alternative 1 due to the decrease in soil cover in areas that have near 100 percent soil cover in the existing condition. Because of the addition of 50 percent cover prescribed in the WSA units, Alternatives 3 and 4 show marked improvement in cover values, EHR and erosion rates. The treatments are prescribed in those areas where deficiencies in soil stability pose the greatest risk to watershed resources.

Indicator 2: Surface Organic Matter

Little change is expected in surface organic matter between the four alternatives.

Indicator 3: Soil Organic Matter

Little change is expected in soil organic matter between the four alternatives.

Indicator 4: Soil Porosity

The overall porosity for Alternatives 1, 3, and 4 is expected to improve due to implementing the management requirement to subsoil primary skid trails and temporary road prisms situated on existing disturbance. The soils supporting most of the existing skid trails within the proposed units have reduced porosity exceeding threshold values. Porosity decreases in areas off of skid trails may also occur, but the effect is expected to be limited. Also, mechanical treatment in the action alternatives may increase the porosity by decreasing the effects of soil sealing. Porosity does not change under Alternative 2.

Table 3.11-6 Summary of Indicators by Alternative

Indicators			Alternative 1 (357 units + HT[1])		Alternative 2 (No Action)		Alternative 3 (368 units + HT[1])		Alternative 4 (350units + HT[1])	
#	**Indicator**	**Metric**	**Existing**	**Post**	**Existing**	**Post**	**Existing**	**Post**	**Existing**	**Post**
1	Soil Stability, Erosion	Average Erosion Rate (tons per acre)	3.1	3.0	3.1	3.1	3.1	2.2	3.0	2.2
		Number of units exceeding acceptable soil loss	178	181			194	136	186	131
1	Soil Stability, Erosion Hazard Rating	Number of units with EHR greater than Moderate rating in greater than 50 percent of unit	188	188			209	203	197	191
		Percent area greater than Moderate Rating	23	23	23	23	22	20	22	20
1	Soil Cover	Number of units with more than 50 percent of unit having less than 50 percent soil cover	304	304			335	329	317	311
		Percent area with less than 50 percent cover	58.9	58.9	60.0	60.0	59.5	52.8	58.7	51.5
2	Surface Organic Material	Percent area with less than 50 percent cover of surface organic material	61	61	61	61	61	61	61	61
3	Soil Organic Matter[2]	Number of units with greater than 15 percent disturbance	72	-			97	-	90	-
4	Soil Porosity[2]		3	-			4	-	4	-

[1] HT=Hazard Tree Removal (Roadsides).
[2] The post-activity values for indicators 3 and 4 are not predictable, but will be monitored during implementation.

3.12 Special Areas

This section describes the affected environment and the environmental consequences for Special Areas. For the purposes of this project, Special Areas are Forest Plan management area land allocations within or adjacent to the Rim Fire perimeter that include: Special Interest Areas (SIAs); Wild and Scenic Rivers and Proposed Wild and Scenic Rivers (Wild and Scenic Rivers); and, Wilderness (USDA 2010a).

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Special Interest Areas

Three SIAs are located within the Rim Fire perimeter: Bourland Creek Trestle Historic Area; Pacific Madrone Botanic Area; and, Jawbone Falls Heritage Area. The Rim Recovery project does not include treatment units within or adjacent to the Bourland Creek Trestle SIA; therefore, that SIA is excluded from further analysis. Forest Plan direction for SIAs is to protect values, make educational opportunities available and preserve the integrity of the special interest feature for which the areas were established (USDA 2010a, p. 129). Special cutting methods will be used to salvage mortality or improve the quality of resources other than the timber resource (p. 133).

Wild and Scenic Rivers

The Wild and Scenic Rivers Act (82 Stat. 906, as amended; 16 U.S.C. 1271-1287) establishes the National Wild and Scenic River System and establishes policy for managing designated rivers. Under the Act, designated rivers "shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations" (16 USC 1271). Section 10(a) states: each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance[7] the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. Section 12(a) states: particular attention shall be given to scheduled timber harvesting, road construction, and similar activities which might be contrary to the purposes of this Act.

FSH 1909.12, Chapter 8 includes direction to manage selected river corridors to preserve their notable values or features as part of, or for eventual inclusion in, the National Wild and Scenic River System.

Forest Plan direction for Wild and Scenic Rivers is to protect and enhance Proposed Wild and Scenic River characteristics and manage the same as designated Wild and Scenic Rivers (USDA 2010a, p. 117). Designated and proposed Wild and Scenic Rivers, along with immediate environments, will be managed to preserve their free flowing condition and protect their outstandingly remarkable values (p. 111). The Forest Plan allocates Wild classification river segments to Primitive or Semi-Primitive Non-Motorized ROS; and, Scenic and Recreational classification river segments to Roaded Natural Recreation Opportunity Spectrum (ROS p. 114). Special cutting methods will be used to improve the quality of Wild and Scenic River resources (p. 116).

[7] The Interagency Wild and Scenic Rivers Coordinating Council interprets **Protect** as elimination of adverse impacts and **Enhance** as improvement in conditions (IWSRCC 2002).

Wilderness

The Wilderness Act of 1964 (public Law 88-577) and the 132 subsequent laws designating Wilderness contain numerous statutory provisions addressing management of Wilderness. It establishes a National Wilderness Preservation System of federal Lands where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.

Several sections of FSM 2320 provide management direction for Wilderness:

- Wilderness values shall dominate over all other considerations except where limited by the Wilderness Act, subsequent legislation, or regulations (FSM 2320.3).
- Do not maintain buffer strips of undeveloped wild land to provide an informal extension of Wilderness. Do not maintain internal buffer zones that degrade Wilderness values (FSM 2320.5).
- Manage each Wilderness as a total unit and coordinate management direction when they cross other administrative boundaries (FSM 2320.5).
- Where a choice must be made between Wilderness values and visitor or any other activity, preserving the Wilderness resource is the overriding activity (FSM 2320.6).
- Display the relationship and coordination between the Wilderness and activities present in the Wilderness, as well as activities outside of the Wilderness that affect the management of Wilderness (FSM 2322.03).
- Protect air quality and related values, including visibility, on Wilderness land designated class I by the Clean Air Act as amended in 1977 (FSM 2323.61).

Forest Plan direction for Wilderness is to: maximize the quality and naturalness of the Wilderness environment; minimize impacts to the Wilderness resource while allowing it to be used for primitive recreation and preserving scenic, scientific, educational and historical values; all NFS lands within Congressionally designated Wilderness and areas recommended for Wilderness will be managed in accordance with the Wilderness Act of 1964 (16 USC 1131-1136) as amended (USDA 2010a, p. 67).

Effects Analysis Methodology

Assumptions Specific to Special Areas

Special Interest Areas

- The Rim Recovery project will not affect the Bourland Creek Trestle SIA because it is not located within or adjacent to any proposed treatment units.
- Salvage and fuels reduction in the Pacific Madrone SIA would be conducted in such a way that project activities would not damage the integrity of the unique botanical features, the madrone trees, or seedlings and saplings.
- Removal of salvaged timber and roadside hazard trees through mechanical, cable and helicopter harvest methods would have no adverse effect to the Jawbone Falls SIA.
- Use of existing breaches within linear sites, such as historic railroad grades and trails, would cause no adverse effect to the Jawbone Falls SIA.
- Use of existing and development of new water sources are not anticipated to affect the Jawbone Falls SIA.

Wild and Scenic Rivers

- For the purpose of this analysis, Wild and Scenic River values and Outstandingly Remarkable Values (ORVs) are used interchangeably. ORVs are specific to each river segment and may include cultural, ecologic, fish, geologic, historic, scenic, recreation, wildlife or other special and unique features (USDA 1991c).
- Proposed treatments will not affect the free flowing conditions of any Wild and Scenic Rivers.
- Management Requirements and Water Quality Best Management Practices (BMPs) outlined in Chapter 2.02 and Chapter 2.03 would protect the water quality of the rivers.

- Natural events such as landslides, downed dead trees and other hillside material falling into river corridors could block free flowing river or river segments. These natural events are unpredictable and not associated with project activity.
- Fire activity in the Tuolumne River canyon will be ongoing and is part of the evolution of the ecosystem. Scenery and other resource values are forever changing in this system with vegetative growth, fire, and regrowth.

Wilderness

- For the purposes of this project, the generic term Wilderness includes the Emigrant Wilderness and the Yosemite Wilderness.
- Due to the anticipated heavy logging traffic on Cherry Creek Road and other routes that access Kibbie Ridge and Lake Eleanor, those routes would be closed to public use for safety until the project is completed or roadside hazard trees abated.
- No helicopter flights will occur over the Emigrant Wilderness or Yosemite Wilderness.

Data Sources

Special Interest Areas

- GIS shapefiles with the location of the Pacific Madrone SIA.
- GIS Layers of the Stanislaus National Forest Basemap 2014.
- 2009 GIS Ortho Photo layers.
- Existing information from consultation with Indian Tribes, cultural resource records, historic archives, maps, and GIS spatial layers were used.

Wild and Scenic Rivers

- Stanislaus National Forest Wild and Scenic River Study (USDA 1991)
- Tuolumne River Wild and Scenic Management Plan (USDA 1988)
- Clavey River Ecosystem Project: Clavey River Watershed Assessment (USDA 2008)
- GIS
- Motorized Travel Management EIS (USDA 2009)

Wilderness

- Stanislaus National Forest GIS Library

Special Areas Indicators

Special Interest Areas

Special Interest Area Values: SIA values are specific to each SIA and may include unique botanic, cultural, geologic, scenic, historic and memorial features. Pacific Madrone Botanic Area has unique botanic features and the Jawbone Falls Heritage Area has unique cultural features.

Wild and Scenic Rivers

Wild and Scenic River Values: For a river to be eligible for Wild and Scenic River designation it must be free-flowing and, with its adjacent land area, must possess one or more outstandingly remarkable values (47 Federal Register 173, September 7, 1982; p. 39454-39461). ORVs are specific to each river segment any may include cultural, ecologic, fish, geologic, historic, scenic, recreation, wildlife or other features (USDA 1991c).

Wilderness

Wilderness Characteristics: The Wilderness Act of 1964, under Use of Wilderness Areas, Section 4(b), describes the primary direction for wilderness stewardship as follows: “each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area.” The effects of management actions on wilderness character are evaluated using the four qualities defined in “Applying the Concept of Wilderness Character to National Forest Planning, Monitoring, and Management” (Landres et al. 2008):

- **Untrammeled Quality**. The Wilderness Act, Section 2(c) states that wilderness is “hereby recognized as an area where the earth and its community of life are untrammeled by man.” Wilderness is essentially unhindered and free from modern human control or manipulation. The untrammeled quality concerns actions that intentionally manipulate or control ecological systems. Actions that intentionally manipulate or control ecological systems inside wilderness degrade the untrammeled quality of wilderness character.
- **Natural Quality**. One of the central themes throughout the 1964 Wilderness Act is that wilderness should be free from the effects of “an increasing population, accompanied by expanding settlement and growing mechanization “and that the “earth and its community of life…is protected and managed so as to preserve its natural conditions” (Sections 2(a) and 2(c), respectively). Wilderness ecological systems are substantially free from the effects of modern civilization.
- **Undeveloped Quality**. Wilderness is defined in Section 2(c) of the 1964 Wilderness Act as “an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation,” with “the imprint of man’s work substantially unnoticeable.” Wilderness retains its primeval character and influence and is essentially without permanent improvement or modern human occupation. Building infrastructure of any kind within wilderness causes the area to become occupied and modified.
- **Solitude or Primitive and Unconfined Recreation**. The Wilderness Act states in Section 2(c) that wilderness has “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” Meanings of solitude range from a lack of seeing other people to privacy, freedom from societal constraints and obligations, and freedom from management regulations (Hall 2001) and attributes such as separation from people and civilization. Primitive recreation has generally been interpreted as travel by non-motorized and non-mechanical means but also encompasses reliance on personal skills to travel and camp in an area, rather than reliance on facilities or outside help (Roggenbuck 2004). “Unconfined” encompasses attributes such as self-discovery, exploration, and freedom from societal or managerial controls (Hendee et al. 2002).

Special Areas Methodology by Action

Special Interest Areas

- For the Pacific Madrone SIA:
  - A field visit revealed that Pacific madrone trees in the SIA survived the Rim Fire.
  - Analysis of effects to Pacific madrone trees from activities proposed in the Rim Recovery project utilized existing data acquired primarily through past site monitoring and anecdotal information from botanists from other Forests.
- For the Jawbone Falls Heritage SIA:
  - Utilizing previous archaeological inventories from past projects that meet current survey standards (1986 to present), nearly 53 percent of the proposed treatment areas were eliminated from further inventory. A strategy to intensively survey (50- to 100-foot interval spacing) the remaining treatment areas is consistent with the Rim PA.
  - The timeframe for this analysis is three years, an appropriate temporal boundary because the activities associated with this project should be completed within three years.

Wild and Scenic Rivers

- The geographic extent of this analysis for direct and indirect effects is the river corridor boundary, one-quarter-mile on either side of the high water mark of the rivers.

- The analysis for cumulative effects includes those effects within the river corridor and, given that nearly the entire project area drains to these rivers, cumulative effects of this project occur at the watershed scale. Chapter 3.14 (Watershed) displays potential cumulative watershed effects (e.g., sedimentation and other impacts to water quality).
- The analysis of each alternative considers whether the activities would alter ORVs of the associated river segments.
- The short-term timeframe for this analysis is three years, an appropriate temporal boundary because the activities associated with this project should be completed within three years.
- The long-term timeframe for this analysis is ten years, an appropriate temporal boundary which allows effects of completed activities associated with this project to be established.

Wilderness

The geographic extent of this analysis is the Wilderness within one half mile of project activities. Rim Recovery project activities would occur on NFS land adjacent to the Wilderness. No project activities are planned in the Emigrant Wilderness. Yosemite National Park manages the Yosemite Wilderness. This unit of spatial analysis for determining cumulative effects is appropriate.

For the purpose of this analysis, the following approach is used:

- **Type of effect**: Impacts were evaluated in terms of whether they would be beneficial (enhance one or more of the qualities of wilderness character) or adversely affect one or more of the qualities of wilderness character.
- **Context**: Local effects are those that occur at site-specific locations within the wilderness. Regional effects would be impacts to a wilderness character quality on adjacent lands.
- **Intensity**: The intensity of the impact considers whether the effect to wilderness character is negligible, minor, moderate, or major. Negligible effects are considered not detectable to the visitor and therefore expected to have no discernible outcome. Minor effects are slightly detectable though not expected to have overbearing results on wilderness character. Moderate effects would be clearly detectable to the visitor and could have an appreciable effect on one or more aspects of wilderness character. Major effects would have highly noticeable influence on the visitors experience and could permanently alter more than one aspect of wilderness character.
- **Duration**: The duration of the effect considers whether the impact would occur in a short-term or long-term period. Short-term effects on solitude, for example, would be temporary in duration, such as an encounter while traveling or camping. A long-term effect would have lasting influence on the wilderness character, such as an impression from noticeable ecological impacts (natural quality) or the permanent closure of an area. Long-term physical effects to the wilderness character are 10 to 20 years or more in duration.

Special Interest Areas: Affected Environment

EXISTING CONDITIONS

Jawbone Falls Heritage Area

The Jawbone Falls SIA was established in 2000. Consisting of 47 acres, the area was identified by the Tuolumne Band of Me-Wuk Indians as sacred and one of the most significant traditional cultural properties of the Central Sierra Me-Wuk people. At the time it was established significant cultural values were identified through field surveys and consultation with Indian Tribes and other interested parties. The specific nature of the cultural resources is administratively confidential, under the provisions of the Archaeological Resource Protection Act of 1974, as amended (43 CFR 7).

From the onset of the Rim Fire, the Forest Archaeologist consulted with the Tuolumne Me-Wuk Tribal Council regarding protection of traditional and cultural areas significant to the Me-Wuk people. Native peoples currently utilize the area for traditional purposes and will continue to do so.

Historic records, maps and oral accounts encompassing the Jawbone Falls SIA boundary indicate moderate land use since the 1880s in the form of ranching, cattle grazing and railroad logging. Earliest records indicate a number of homesteads patented near the area of Jawbone Falls mainly for acquiring title to valuable timber. However, some of the existing trail and road system is likely connected to moving livestock to summer pasturage. Associated features affected by the fire include fences, wooden troughs and collapsed wooden structures (range cabins).

The West Side Lumber Company, founded in 1899, did not reach the area of the SIA until the 1940s. As the company expanded to its easternmost timber tracts during this time period, timber in and around Jawbone Falls was harvested. Associated features affected by the Rim Fire include railroad grades, cut and fill structures, donkey sets and associated equipment.

Pacific Madrone Botanic Area

The Pacific Madrone SIA consists of two small groves of Pacific madrone trees covering 15 acres. It is located along Road 1S13C in Packard Canyon where roadside hazard tree removal is proposed. The management emphasis of this SIA is to protect and manage the unique botanical features for which it was designated, namely the southern-most groves of Pacific madrone in the Sierra Nevada. Resource activities such as roadside hazard tree removal are allowed within the SIA provided the integrity of the SIA is protected (USDA 2010a). In recent years, discovery of young Pacific madrone trees and saplings outside of the SIA indicates madrone trees have been successfully reproducing and expanding their distribution in the vicinity.

The Pacific Madrone SIA occurs within an area which had not burned for more than 100 years. In the past, timber harvest occurred in the SIA, but more recently management activities have not taken place. As a result, the understory became overgrown with regeneration conifers. The habitat within the SIA tends to be comparatively cool and damp owing to the northeast aspect and position in the bottom of a perennial stream drainage. Madrone trees in the SIA survived the Rim Fire likely due to the microclimate of the site. Additionally, it is possible fire burned through this area at night when fire activity was lower. Madrone trees outside the SIA did not fare as well; most reportedly sustained canopy mortality. Pacific madrone is known to resprout from the root crown after fire, so many trees with canopy mortality will likely survive.

Special Interest Areas: Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Jawbone Falls Heritage Area

Cultural resource sites located within the boundaries of the SIA would be delineated with coded flagging or other effective marking (i.e., “flag and avoid”) for protection prior to project implementation as stipulated in the Rim PA and management requirements. Potential direct and indirect effects to the Jawbone Falls SIA are minimal as proposed treatments within the SIA would be limited to trees approved by the Tribe and selected to enhance or protect cultural values that make the SIA significant and unique. Additional actions include the reconstruction of Forest Service Roads 2N78 and 2N08Y to provide access to treatment units. Reconstruction would end near the decommissioned area at Jawbone Creek below the falls and would not affect the cultural values of the SIA.

Additionally, potential indirect effects from cattle grazing are moderate but may include the trampling and breakage of surface and subsurface artifacts as cattle move through allotment areas. Vegetation removed as a result of the Rim Fire exposed already fragile surface sites to further damage through trampling and crushing in high cattle concentration areas. Resting of the allotments in the heaviest burned areas will allow vegetation to regrow and remove/diminish this effect.

Pacific Madrone Botanic Area

Forest Plan direction reduces the risk of roadside hazard tree removal damaging the integrity of the Pacific Madrone SIA. Where removal of hazard trees would jeopardize the integrity of the SIA by damaging or killing madrone trees, "special cutting methods" for abating the hazards would be implemented, such as falling and leaving the hazard trees (USDA 2010a). Falling and leaving hazard trees may result in some damage to saplings and seedlings, and create some fuel accumulations. However, the fuel accumulations would be far less than those described in alternative 2. Therefore there would be minimal to no direct or indirect effects to the Pacific Madrone SIA.

CUMULATIVE EFFECTS

Jawbone Falls Heritage Area

The direct and indirect effects of Alternative 1 are minimal and would not degrade the integrity of this SIA. Other present or foreseeable future projects (Appendix B) are or will be subject to NHPA Section 106 compliance and potential effects to cultural resources would be identified at that time following stipulations in the Rim PA. Alternative 1, when combined with the past, present and foreseeable future actions and events are not expected to cumulatively lead to increased impacts to the cultural values or cultural resources of the Jawbone Falls SIA.

Pacific Madrone Botanic Area

Forest Plan direction ensures that Rim Recovery project activities would not degrade the integrity of this SIA. No other present or foreseeable future projects are planned for the SIA location (Appendix B). With minimal to no direct or indirect effects to the Pacific Madrone SIA and no foreseeable future actions, no cumulative effects occur under Alternative 1.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Jawbone Falls Heritage Area

Alternative 2 has no direct effects; indirect effects to cultural values and resources may occur through inaction. The existing threat of fire weakened trees falling naturally, and potentially damaging already fragile cultural sites, would continue unabated leading to increased potential for ground disturbance and damage to site features and cultural values.

Additionally, potential indirect effects from cattle grazing are moderate but may include the trampling and breakage of surface and subsurface artifacts as cattle move through allotment areas. Vegetation removed as a result of the Rim Fire exposed already fragile surface sites to further damage through trampling and crushing in high cattle concentration areas. Resting of the allotments in the heaviest burned areas will allow vegetation to regrow and remove/diminish this effect.

Pacific Madrone Botanic Area

Alternative 2 has no direct effects; indirect effects may occur in untreated areas where falling dead trees damage madrone trees and saplings, or kill madrone seedlings. Downed dead trees could block germinating madrone seeds, cause excess ground level shading for madrone seedlings and create high fuel accumulations, which could burn at high intensity causing madrone crown mortality and possibly killing madrone trees, saplings or seedlings.

CUMULATIVE EFFECTS

Jawbone Falls Heritage Area

Alternative 2 poses indirect effects to this SIA. Other present or foreseeable future projects (Appendix B) are or will be subject to NHPA Section 106 compliance and potential effects to cultural resources would be identified at that time following stipulations in the Rim PA. With indirect effects to the

Jawbone Falls SIA and no effects from foreseeable future actions, the minimal indirect effects described under Alternative 2 are the cumulative effects of Alternative 2.

Pacific Madrone Botanic Area

Alternative 2 poses indirect effects to this SIA. No other present or foreseeable future projects are planned for the SIA location (Appendix B). With indirect effects to the Pacific Madrone SIA and no foreseeable future actions, the indirect effects described under Alternative 2 are the cumulative effects of Alternative 2.

Alternative 3

Direct and Indirect Effects

Pacific Madrone Botanic Area

Same as Alternative 1.

Jawbone Falls Heritage Area

Same as Alternative 1.

Cumulative Effects

Jawbone Falls Heritage Area

Same as Alternative 1.

Pacific Madrone Botanic Area

Same as Alternative 1.

Alternative 4

Direct and Indirect Effects

Jawbone Falls Heritage Area

Same as Alternative 1.

Pacific Madrone Botanic Area

Same as Alternative 1.

Cumulative Effects

Jawbone Falls Heritage Area

Same as Alternative 1.

Pacific Madrone Botanic Area

Same as Alternative 1.

Wild and Scenic Rivers: Affected Environment

One congressionally designated and two proposed Wild and Scenic Rivers lie within the Rim Fire perimeter. This includes all 29 miles of the designated Tuolumne Wild and Scenic River on NFS lands; the lower half of the Clavey Proposed Wild and Scenic River (24 miles); and, all of the South Fork Tuolumne Proposed Wild and Scenic River (2 miles).

About 98 percent of the Rim Fire burned within the Tuolumne River watershed. The remaining 2 percent burned in the North Fork Merced River watershed along the southern edge of the fire. Table 3.12-1 displays the river segments affected by the Rim Fire.

Table 3.12-1 Wild and Scenic River Corridors Affected by the Rim Fire

Wild and Scenic River	Classification	Segments	Total Miles[1]	Miles within Project Area	Total Acres[1]	Acres within Project Area
Clavey River	Wild	3	33.0	16.2	10,560	4,822
	Scenic	3	14.0	7.3	4,480	2,377
Tuolumne River	Wild	3	24.0	21.5	7,680	6,050
	Scenic	1	4.7	4.7	1,381	1,381
	Recreational	1	1.0	0.6	320	96
South Fork Tuolumne River	Scenic	1	2.5	2.5	681	681

[1] Within Stanislaus NF

Clavey Proposed Wild and Scenic River

The Clavey Proposed Wild and Scenic River includes 33 miles of Wild and 14 miles of Scenic segments, including its tributaries Bell Creek and Lily Creek. It was proposed for its free-flowing characteristics, abundance and quality of life zones and vegetation, elevation range, and relative remoteness and lack of development. The Rim Fire affected half (23.5 miles) of the 47 mile river corridor: 7.3 miles of Scenic classification and 16.2 miles of Wild classification are within the analysis area. The 5 miles of Wild segments within Wilderness were not affected by the Rim Fire. The primary ORVs of the Clavey River inside the Rim Fire perimeter include ecological, fish, scenic, wildlife, and recreation (USDA 1991c, p. 46-50) as described below.

Ecological

The Clavey River (including Bell and Lily Creeks) has a combination of landscape ecology features making it distinct within the Sierra Nevada Mountains: 1) free-flowing characteristics; 2) abundance and quality of life zones and vegetation; 3) elevation range; and, 4) relative remoteness and lack of development.

The Clavey River is one of the longest remaining free-flowing streams in the Sierra Nevada. It is 47 miles from source to mouth, including both headwater forks, Bell and Lily Creeks. Free-flowing condition is an important value because little remains in the Sierra Nevada. From the Feather River on the north to the Kern River on the south, all but one (the Consumnes) of the 15 major rivers in the Sierra, are impounded. Of 90 major tributaries, only four streams greater than 40 miles are free-flowing with no impoundments or diversions from headwaters to mouth. The Clavey River contains all but one Sierra Nevada life zone within its watershed. Elevation ranges from 1,200 feet at its mouth to 9,200 feet at its headwaters, allowing for all life zones except true alpine. At its headwaters, sub-alpine forests of red fir, lodgepole, western white pine and mountain hemlock combine with mountain meadows and granite-bound lakes. All forest habitats are found as elevation decreases, ending with the California chaparral type at the mouth of the river. Within the Clavey's wide variety of high to low elevation vegetative types, one is truly unique: Bell Meadow, at 6,500 feet along Bell Creek, contains the largest stand of quaking aspen (110 acres) in the southern half of the Sierra Nevada.

Another feature of the Clavey River is its minimal development. It is almost entirely under federal ownership; even the portions outside of Wilderness are relatively undisturbed and remote. Private lands and developments such as towns and roads line portions of most other rivers in the Sierra. The Clavey, although crossed by several roads, has remained relatively undisturbed because of its remoteness, rugged nature and its north-south geographic orientation. For much of its length, the Clavey runs perpendicular to the east-west trend of major roadways in its watershed.

Fish

The Clavey was one of the first streams in California to be designated as a Wild Trout Stream, representing a mid to low elevation trout stream in a remote location. It is also now designated as a state Heritage Trout Water. See Watershed Report in the project file for details.

Wild Trout streams provide self-sustaining trout fisheries which are not supplemented by hatchery stocking. It is believed that almost the entire basin contains only fish native to this portion of the Sierra Nevada. About 95 percent of the basin has an original fish assemblage. Rainbow trout is the only trout species in the basin (Lily Creek is reported to have some non-native brook trout and non-native brown trout may spawn at the confluence with the Tuolumne River). Rainbow trout are found in all of the Clavey and its tributaries capable of supporting coldwater fish.

The lower portion of the Clavey also contains a native assemblage of warm water fish including Sacramento suckers, Sacramento squawfish and hardhead. Due to extensive planting of non-native trout species and the illegal introductions of non-native warm water fish species, few other streams in the Sierra contain the original assemblage of fish species. The Clavey River may be the only "rainbow trout" river left, in the Sierra Nevada, with its original fish assemblage still intact and relatively unaffected by introduced species.

Scenic

Outstanding Variety Class A landscape includes a deep, V-shaped, river-cut canyon through metasedimentary rock. The river provides a variety of water forms including rapids, cascades and pools. Vegetation patterns are varied, including scattered ponderosa pine and oak-grass woodland. The scenic values of the lower Clavey are similar to those of the lower Tuolumne Wild and Scenic River.

Wildlife

A large tract of late seral stage forest habitat is centered on the Clavey River between Reed Creek and Road 3N01.

Five SOHAs and two fisher reproductive units are located on or adjacent to the river, within 8,000 acres of older mature forest habitat. It is unusual to have this much older mature forest habitat at this elevation in the Sierra.

Recreation

Hiking and fishing are the popular dispersed activities. Access is limited and portions are remote and wild, resulting in a rare opportunity for solitude and non-motorized recreation experiences, below the snow and available all year.

This portion of the Clavey has been traversed by expert kayakers. It is a native trout fishery, and a State designated Wild Trout Stream which is significant to anglers. Hiking and swimming are the popular activities near the Clavey's confluence with the Tuolumne Wild and Scenic River.

The Rim Fire burned with varying intensity along the one-half mile wide river corridor, consuming vegetation with a basal area loss of less than 50 percent in 17 miles of the corridor, and a basal area loss of greater than 50 percent in the other 12 miles. Loss of vegetation has seriously altered the Scenic ORV of the river corridor and resulted in reduced visual diversity and wildlife habitat.

South Fork Tuolumne Proposed Wild and Scenic River

The South Fork Tuolumne Proposed Wild and Scenic River, located in the south-central portion of the Forest, includes the 2 mile Scenic segment from the Middle Fork Tuolumne River to the Tuolumne River. ORVs include Scenic quality and Other. There are no water-related ORVs for the South Fork. (USDA 1991c, p. 51):

Scenic

Outstanding Variety Class A landscape includes a deep, rugged canyon. The river provides a variety of water forms including rapids, cascades, waterfalls, and pools. Rim of the World Vista, located above the river area on Highway 120 (Big Oak Flat route to Yosemite National Park), provides outstanding scenic views of the deep river canyon, all the way to its confluence with the Tuolumne Wild and Scenic River.

Other

Other areas are considered sensitive because they are fragile or nonrenewable. About 65 percent of the viewshed in the one-half mile wide river corridor is affected with a basal area loss of over 75 percent due to the Rim Fire. The remaining 35 percent of the river corridor viewshed sustained 25 to 75 percent basal area loss. Some randomly scattered and small (less than 1 acre) patches of less than 25 percent basal area loss exist along the corridor. Loss of vegetation severely compromised the scenic ORV for this river.

One electricity transmission line crosses over the river corridor and an aqueduct (tunnel) crosses under and parallel to the river corridor. Two un-numbered roads totaling about one-half mile access the transmission line in the river corridor. There are no recreational facilities.

Tuolumne Wild and Scenic River

The Stanislaus National Forest portion of the Tuolumne Wild and Scenic River includes 24 miles of Wild, 4 miles of Scenic, and 1 mile of Recreational segments. The river is located in the south-central part of the Forest. ORVs include fish, geologic, historic and cultural, recreation, scenic, scientific and educational, whitewater boating and Wilderness characteristics.

Lumsden Road (1N10) runs 5.9 miles along the south and west sides of the river within the scenic corridor, crossing once at the Lumsden Bridge. Routes off the Lumsden road within the river corridor include the 0.1 mile 1S52, 0.1 mile 1N10A, and 0.2 mile 1N10E. Two hiking trails, 17E40 and 17E56, run parallel to the river on the south side and are in a Wild classification segment of the river. One trailhead, one put-in for boating, 3 camping sites, and one gaging station are the only facilities within the Scenic segment of the river. Dispersed camping associated with boating occurs along the river west of Merals Pool.

The Rim Fire burned with varying intensity along the one-half mile wide river corridor, mostly consuming vegetation greater than 50 percent of the basal area. Because of steep canyon walls, an estimated 10 to15 miles has a view from the river corridor where over 75 percent of the vegetation has been consumed. This is both the west end of the river and the easterly end of the river. In areas where the corridor is flatter, about 19 miles have basal area consumption of 0 to 50 percent. Loss of vegetation has seriously compromised the Scenic ORV of the river corridor, reduced visual diversity and wildlife habitat, and created an increased risk of soil erosion within the steep slopes of the canyon.

The Tuolumne Wild and Scenic River was divided into eight segments for planning purposes, with boundaries between segments based on the types and levels of existing development, access, recreation opportunity, and the potential for classification as a unit separate from adjacent segments. Table 3.12-2 shows the eight segments, their length and classification.

Table 3.12-2 Tuolumne Wild and Scenic River Classifications

Segment	Classification	Length (miles)
Yosemite to Early Intake	Wild	5
Early Intake to Cherry Creek	Recreational	1
Cherry Creek to Lumsden Area	Wild	4
Lumsden Area	Scenic	4
Lumsden Area to Clavey River	Wild	4
Clavey River to Indian Creek	Wild	3
Indian Creek to Mohican Mine	Wild	6
Mohican Mine to Terminus	Wild	2
Total		29

Wild and Scenic Rivers: Environmental Consequences

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Clavey Proposed Wild and Scenic River

Under Alternative 1, no research is proposed; therefore, no direct or indirect effects related to that action would occur.

Salvage

Alternative 1 proposes to treat 644 acres of salvage harvest by means of tractor (130 acres), helicopter (506 acres), and skyline (8 acres) logging methods in the Scenic corridor of the Clavey River. Landings would be constructed for decking logs and piling slash materials. Whole tree yarding would occur in tractor units to reduce fuel loading. Landings would be restored post-harvest via deep tilling, contouring, and scattering of slash. Drop and lop is proposed in helicopter units A04 and A05, for a maximum of 505 acres within the river corridor. Machine pile and burning is proposed in tractor unit A03, for a maximum of 80 acres within the river corridor. Jackpot burning is proposed as needed in units A03, A04, and A05, for a maximum total of 585 acres.

The direct effects of all these activities include ground disturbance in tractor units from skidding logs to landings, potential for sedimentation runoff, and negative visual effects from logging debris on the ground. Noise disturbance from logging equipment is not a factor as the area is closed to the public during these operations. The negative visual effects of logging debris and the already burned landscape would be tempered over time with vegetation recovery activities and natural regrowth of plants and trees. Best Management Practices (BMPs) and management design criteria mitigate the effects of soil disturbance, erosion, and restoration of disturbed ground. BMPs also mitigate disturbance and activities adjacent to the river itself as well as in the one-half mile wide river corridor.

Indirect effects of salvage harvest are short-term changes to scenic quality, an ORV for these segments of the corridor, as burned areas are converted to salvaged units. Scenic quality would be restored over time as vegetation recovers naturally, and plant and tree diversity increases.

Roadside Hazard Trees

Roadside hazard tree removal is proposed along 1N01, 2N29, 2N29A, 3N56Y in the Scenic segments. Roadside hazard tree removal is also proposed along 0.2 miles of 2N40, which runs mostly outside the edge of the Wild segment of the Clavey River. About 5.7 miles of road and 268 acres within the Wild and Scenic River corridor would be treated by this activity. Resulting short term direct and indirect effects would be visible slash piles, stumps, and other signs of logging activity. Piles would be burned, creating additional short term visual effects. Over time, vegetation would return and obscure the products of these activities, after which scenic values should not be further affected.

Roads

Alternative 1 proposes to build 0.2 miles of new road on P3N56Y to access unit A01A within the Scenic portion of the river corridor. Live tree removal as well as hazard tree removal and a landing constructed at the terminus are proposed. The road would be gated at the end of logging operations and kept for administrative use. The direct effects of new road construction are ground disturbance, a new linear feature on the Scenic landscape, and increased access to the river by bike, foot, or horse. There is no apparent indirect effect. The landscape would recover over time and the linear feature would eventually be unnoticeable from the river bottom as screening vegetation develops. BMPs and management requirements for new road construction, erosion, watershed, and aquatics would mitigate the direct effects of construction activities.

Alternative 1 also proposes to reconstruct 2.7 miles of roads 02N29, 02N29A, and 03N56Y. Improvements would provide for serviceability for project haul vehicles, as well as for enhanced hydrologic function and stream protection in accordance with applicable BMPs. Reconstruction would improve the road conditions as needed for safe and efficient haul of forest products. A number of NFS trails managed for motor vehicle use are included for reconstruction. These routes would be returned to their prior condition, including reestablishing drainage features as previously designed, when the project is complete. Direct and indirect effects from these activities include soil disturbance and vegetation removal. Reconstruction would provide safer travel for the public and a more stabilized road system for the Clavey River corridor, reducing point source sedimentation.

Alternative 1 proposes 4.7 miles of maintenance on roads 01N01, 02N29, 02N40, and 03N56Y within the river corridor. Direct and indirect effects from road maintenance are temporary in nature, resulting from soil disturbance. This is of short duration and mitigated through BMPs and management requirements for road maintenance, soils, watershed, and aquatics.

One route, P17EV11-1 accessing unit A10 is proposed for temporary use then reverted to original use post-project. Direct and indirect effects include a short term loss of recreation opportunities and are addressed in the Recreation Chapter.

Indicators

The above activities would add slightly to the already altered condition of Scenic segments of the river corridor caused by the Rim Fire. However, the activities are of short duration and would not degrade the ORVs of fish, wildlife based on the information in the fisheries and wildlife section of this EIS; or the recreation ORVs, which have already been affected by the Rim Fire itself. Where project activities are proposed within sight distance of Wild and Scenic Rivers, distance and geographic features would obscure most treatments from the casual observer or users of those areas. Vegetation recovery, woody debris in stream channels, and hazard reduction at recreation sites would all contribute to the eventual recovery of these altered values (also refer to 3.03 Aquatic Species, 3.08 Recreation and 3.14 Watershed).

South Fork Tuolumne Proposed Wild and Scenic River

Under Alternative 1, no salvage or research is proposed; therefore, no direct or indirect effects related to those actions would occur.

Roadside Hazard Trees

The proposed action includes roadside hazard tree removal on 0.2 miles and 9 acres along private road FR7858 within the Scenic portion of the South Fork Tuolumne River. Short term direct and indirect effects would be visible slash piles, stumps, and other signs of logging activity. Piles would be burned, creating additional short term visual effects. Over time, vegetation would return and obscure the effects of these activities, after which scenic values should not be further affected.

Roads

Alternative 1 proposes 0.5 miles of road maintenance within the South Fork Tuolumne River corridor on roads 01S98Y, 01S98YA spur, 01S99Y, and FR7858. Direct and indirect effects from road maintenance are temporary in nature, resulting from soil disturbance. This is of short duration and mitigated through BMPs and management requirements for road maintenance, soils, watershed, and aquatics.

Indicators

These activities are of short duration and do not degrade the ORVs of fish, wildlife or recreation which have already been affected by the Rim Fire itself. Where project activities are proposed within sight distance of Wild and Scenic Rivers, distance and geographic features would obscure most treatments from the casual observer or users of those areas. Vegetation recovery, woody debris in stream channels, and hazard reduction at recreation sites would all contribute to the eventual recovery of these altered values (also refer to 3.03 Aquatic Species, 3.08 Recreation and 3.14 Watershed).

Tuolumne Wild and Scenic River

Under Alternative 1, no salvage harvesting or research is proposed; therefore, no direct or indirect effects related to these actions would occur.

Roadside Hazard Trees

Alternative 1 includes roadside hazard tree removal on about 286 acres within the Scenic corridor around the recreation facilities and gaging station, and on 6.4 miles along Lumsden Road (1N10) and its spurs 1N10C, 1N10E, and 1S52. Short term direct and indirect effects would be visible slash piles, stumps, and other signs of hazard tree removal activity. Piles would be burned, creating additional short term visual effects. Over time, vegetation would return and obscure the effects of these activities, after which scenic values should not be further affected.

Roads

Alternative 1 proposes 6.4 miles of road maintenance within, or adjacent to, the Scenic section of the Tuolumne River corridor along Lumsden road (1N10) and its spurs (1N10C, 1N10E, and 1S52); and, 0.26 miles of road maintenance on road FR99001, within the Recreation section of the river corridor. Direct and indirect effects from road maintenance are temporary in nature, resulting from soil disturbance. This is of short duration and mitigated through BMPs and management requirements for road maintenance, soils, watershed, and aquatics.

Indicators

These activities are of short duration and do not degrade the ORVs of fish, wildlife or recreation which have already been affected by the Rim Fire itself. Where project activities are proposed within sight distance of Wild and Scenic Rivers, distance and geographic features would obscure most treatments from the casual observer or users of those areas. Vegetation recovery, woody debris in stream channels, and hazard reduction at recreation sites all contribute to the eventual recovery of these altered values (also refer to 3.03 Aquatic Species, 3.08 Recreation and 3.14 Watershed).

CUMULATIVE EFFECTS

Clavey Proposed Wild and Scenic River

Maintaining the free-flowing condition of this river is necessary to maintain the Wild and Scenic values. The treatments proposed under Alternative 1 would not affect the existing flow regimes as construction actions do not occur within the stream channels. Constriction of flow is not anticipated as a result of road construction, as no stream crossings are proposed within the one-quarter mile buffer.

Naturally occurring events could interrupt free flowing rivers such as landslides or trees falling over into the river. Introduction of woody debris into the river would occur naturally.

Minor increases in stream flow may have occurred following the fire, as fire-killed trees no longer utilize water, resulting in reduced evapotranspiration rates along the hillslopes. Removal of fire-killed trees under the proposed action would not result in any further measurable changes to evapotranspiration rates.

Maintaining high water quality is also needed to maintain Wild and Scenic values. Management requirements have been designed to minimize water quality impacts. This includes requirements such as maintaining or increasing ground cover, subsoiling compacted areas, smoothing out ruts, and improving drainage features on existing roads. While some sedimentation could occur as a result of proposed actions, it is anticipated to be minimal and of short duration and is not expected to affect the long-term beneficial uses and purposes for which the river was designated or made eligible. None of the streams with special designations such as Wild and Scenic Rivers or Heritage Trout Waters are expected to be adversely affected by sediment. No negative cumulative effects from the proposed action are expected.

Two ongoing or planned projects propose actions to occur within the Wild and Scenic River corridors: the Rim HT project, and the Twomile Ecological Restoration projects (including the Looney and Thommy timber sales, and planned activities along motorized trails and roads). Table 3.12-3 and Table 3.12-4 summarize the types and extent of activities within the river corridors proposed by these projects.

Table 3.12-3 Roadside and Powerline Hazard Tree Removal

River Corridor	Acres
Clavey Proposed Wild and Scenic River	143
Tuolumne Wild and Scenic River	20
South Fork Tuolumne Proposed Wild and Scenic River	106

Table 3.12-4 Twomile Ecological Restoration Projects in the Clavey Proposed Wild and Scenic River

Planned Actions	Treatments	Acres
Looney Timber Sale	Dozer pile, Prescribed burn	44.0
	Prescribed burn	29.0
	Thin, biomass, dozer, burn	123.0
Thommy Timber Sale	Handcut, pile, burn	7.0
Trails	Close and Restore	2.5
	New Construction	0.3
	Reconstruction	0.1
	Rock Barrier	0.1
Roads	Close	2.0
	Decommission	0.3
	Maintenance	9.0
	Reconstruction	0.1

The activities associated with these projects are not expected to affect the existing flow regimes as no construction is proposed or planned in the channel. Project implementation would have short-term effects on the scenic ORVs, but this would be mitigated over time with the regrowth of vegetation. There would also likely be temporary effects on recreational opportunities along roads or trails, or in areas, that are closed to recreational use during project implementation. Effects from these projects to water-based ORVs (fish and water quality) and to wildlife values within the river corridors (also refer to 3.03 Aquatic Species and 3.15 Wildlife) are mostly positive and the Forest Service is legally responsible to minimize or mitigate project effects to these resources through established management requirements. Therefore, overall effects of reasonably foreseeable future actions would be minimal and short-term, and no negative cumulative effects from the proposed actions are expected.

South Fork Tuolumne Proposed Wild and Scenic River

Same as Clavey Proposed Wild and Scenic River.

Tuolumne Wild and Scenic River

Same as Clavey Proposed Wild and Scenic River.

Alternative 2 (No Action)

Direct and Indirect Effects

Clavey Proposed Wild and Scenic River

No activities are proposed under this alternative. Alternative 2 would have no effect on the free-flowing condition of any of the Clavey Proposed Wild and Scenic River. Activities that may be beneficial to water quality would not occur. This includes subsoiling of existing skid trails and reconstructing roads to improve drainage and reduce hydrologic connectivity. Naturally occurring events could interrupt free flowing rivers such as landslides or trees falling over into the river. Introduction of woody debris into the river would occur naturally.

Water quality would decrease as road conditions continue to decline and sedimentation gradually increases overtime. Additionally, large woody material recruitment rates would naturally remain high in areas that sustained moderate and high vegetation severity fire conditions. In the first 10 to 20 years large woody material may alter free-flowing conditions, but would eventually provide beneficial functions such as creating pool habitats and trapping sediment.

The landscape would recover over time; vegetation such as forbs, grasses, and shrubs would reestablish on the landscape and bring visual and plant diversity back into the scenic corridors.

South Fork Tuolumne Proposed Wild and Scenic River

Same as Clavey Proposed Wild and Scenic River.

Tuolumne Wild and Scenic River

Same as Clavey Proposed Wild and Scenic River.

Cumulative Effects

Clavey Proposed Wild and Scenic River

No direct effects would result from the implementation of this alternative. The indirect effects described above focus on hydrologic connectivity and drainage of roads. Increased sediment would be expected from the road system if maintenance and reconstruction actions are not taken.

Tuolumne Wild and Scenic River

Same as Clavey Proposed Wild and Scenic River.

South Fork Tuolumne Proposed Wild and Scenic River

Same as Clavey Proposed Wild and Scenic River.

Alternative 3

Direct and Indirect Effects

Clavey Proposed Wild and Scenic River

Salvage

Direct and indirect effects of salvage harvesting in Alternative 3 are similar or less than those described under Alternative 1 because Alternative 3 would treat fewer acres within the Wild and Scenic corridor. Alternative 3 would treat 297 acres by means of tractor (54 acres) and helicopter (243 acres) logging methods in the Scenic corridor of the Clavey River. Landings would be constructed for decking logs and piling of slash materials. Whole tree yarding would occur in tractor units to reduce fuel loading. Landings would be restored post-harvest via deep tilling, contouring, and scattering of slash. Drop and lop is proposed in units A04, A05A, A05B, and A05C, for a maximum of 245 acres within the river corridor. Machine piling and burning is proposed in unit A03 for a maximum of 51 acres within the river corridor. Jackpot pile burning is proposed in all five units, as needed based on post-harvest fuel loads, for a maximum of 296 acres within the river corridor.

Roadside Hazard Trees

Roadside hazard tree removal is proposed on 6.2 miles and 287 acres along 1N01, 2N29, 2N29A, 02N40, and 3N56Y in the Scenic segments of the Clavey River. Effects of roadside hazard tree removal are similar to those described under Alternative 1.

Roads

Alternative 3 proposes to reconstruct 1.9 miles of road 2N29 and 2N29A within the river corridor; fewer than that proposed under Alternative 1. Effects of road reconstruction would be similar to those described under Alternative 1.

Alternative 3 proposes 5.4 miles of maintenance on roads 01N01, 02N29, 02N40, and 03N56Y within the river corridor; slightly more than that proposed under Alternative 1. Effects of road maintenance would be similar to those described under Alternative 1.

Research

Five of the PSW study plots designated under Alternative 3 intersect the Scenic segment of the Clavey River. However, as these areas are all control plots, no timber salvage or associated activities would occur. Proposed research activities (installing study design features and instrumentation, collecting data) are limited on a spatial scale and would have no measurable impact on any ORVs.

Indicators

The effects of Alternative 3 on water quality of Wild and Scenic Rivers is anticipated to be similar or less than those described under Alternative 1.

South Fork Tuolumne Proposed Wild and Scenic River

Under Alternative 3, no salvage or research, is proposed within this corridor; therefore, no direct or indirect effects related to those actions would occur.

Roadside Hazard Trees

The effects of roadside hazard tree removal are the same as Alternative 1.

Roads

The effects of road maintenance are the same as Alternative 1.

Indicators

The effects of treatments proposed in Alternative 3 on the water quality of the Wild and Scenic Rivers is anticipated to be similar or less than those described under Alternative 1.

Tuolumne Wild and Scenic River

Under Alternative 3, no salvage harvesting, roadside hazard tree removal, or research is proposed; therefore, no direct or indirect effects related to those actions would occur.

Roads

Alternative 3 proposes a total of 0.26 miles of road maintenance on road FR99001 within the Recreation section of the Tuolumne River corridor. Effects of less road maintenance in Alternative 3 would be similar to those described under Alternative 1.

Forest Plan Amendment

Under Alternative 3, a proposed Forest Plan amendment would create a new Forest Carnivore Connectivity Corridor (FCCC). The FCCC overlaps 1,100 acres of the Wild and Scenic sections of the Tuolumne River corridor. This Forest Plan Amendment does not affect the river or its ORVs (Chapter 3.01).

Indicators

The effects of the proposed treatments in Alternative 3 on the water quality of Wild and Scenic Rivers is anticipated to be similar or less than those described under Alternative 1.

CUMULATIVE EFFECTS

Clavey Proposed Wild and Scenic River

Same as Alternative 1.

South Fork Tuolumne Proposed Wild and Scenic River

Same as Alternative 1.

Tuolumne Wild and Scenic River

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Clavey Proposed Wild and Scenic River

Salvage

Alternative 4 proposes to treat about 7 acres of salvage harvest by means of tractor (4 acres) and helicopter (3 acres) logging methods in the Scenic corridor of the Clavey River. Landings would be constructed outside of the corridor for decking logs. Whole tree yarding and piling of slash materials would occur in tractor units to reduce fuel loading. Landings would be restored post-harvest via deep tilling, contouring, and scattering of slash. Drop and lop is proposed in units A05C and F15, for a total of 2.7 acres within the river corridor. Jackpot pile burning is proposed in units A05C and F15, as needed based on post-harvest fuel loads, for a maximum of 2.7 acres within the river corridor. The effects of these actions would be similar to those described under Alternative 1.

Roadside Hazard Trees

Roadside hazard tree removal is proposed on 1N01, 2N29, 2N29A, 02N40, and 3N56Y in the Scenic segments, covering 7.4 miles of road and 341 acres. The additional length of road compared to Alternatives 1 and 3 is due to unit acreage for salvage logging dropped in this alternative, thereby requiring hazard tree removal along roads in those units. The effects of roadside hazard tree removal are the same as those described under Alternative 1.

Roads

Under Alternative 4, no new road construction or reconstruction is proposed; however, 7.3 miles of maintenance is proposed on roads 01N01, 02N29, 02N29A, 02N40, and 03N56Y within the river corridor. Effects of road maintenance are the same as those described under Alternative 1.

Research

The effects of the five PSW study plots are the same as described under Alternative 3.

Indicators

The effects of Alternative 4 on the water quality of Wild and Scenic Rivers are anticipated to be similar or less than those described under Alternative 1.

South Fork Tuolumne Proposed Wild and Scenic River

Same as Alternative 3.

Tuolumne Wild and Scenic River

Same as Alternative 3.

CUMULATIVE EFFECTS

Clavey Proposed Wild and Scenic River

Same as Alternative 3.

South Fork Tuolumne Proposed Wild and Scenic River

Same as Alternative 3.

Tuolumne Wild and Scenic River

Same as Alternative 3.

Wilderness: Affected Environment

The Emigrant Wilderness (designated in 1975) is in Tuolumne County. The wilderness is 112,277 acres in size. It is characterized by large expanses of bare, glaciated granite and sub-alpine vegetation types, numerous glacial lakes, high quality scenery and Wilderness recreation opportunities. It is bordered on the east by Toiyabe National Forest and Yosemite National Park and is contiguous with Yosemite Wilderness (located within the national park) to its south. Most of the recreation use in the Emigrant Wilderness Area is for hiking, camping, backpacking, and horse-back riding; pack-stock are also commonly used and originate from the Kibbie Ridge and Lake Eleanor Trail Heads. Popular destinations from these trail heads include Eleanor and Kibbie Lakes in Yosemite National Park (Wilderness). Fishing is popular at most lakes, but hunting use is light.

The typical “wilderness experience” involves an appreciation of natural environments, opportunities to travel and live in a primitive way in an undisturbed environment, chances to be alone or with like individuals, and freedom from rules, regulations, and the pressure of daily life (Johnson et al. 2005).

A majority of Wilderness recreation use occurs from early July through early September. Kibbie Ridge Trail can be an exception because of exposure to summer sun and heat. Recreation use does occur outside of the peak times, but visitation is considerably lower due to weather, access, school schedules, and deer hunting season. Because of the popularity of equestrian activities the Aspen Meadow and Kennedy Pack Stations operate under Outfitter and Guide Special Use Permits to provide horseback riding and pack and saddle service to Wilderness visitors.

Commercial livestock grazing occurs in some areas. Tungsten mining in the Snow Lake area has occurred in the past. Portions of several streams which are eligible for Wild and Scenic River designation and include Kennedy Creek (proposed Wild and Scenic River), Relief Creek South Fork Stanislaus River, Buck Meadow Creek, Summit Creek, and the Cherry Creek system.

Wilderness: Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 1, treatments proposed within a half mile of Wilderness include 18 tractor units (992 acres), three helicopter units (281 acres), two skyline units (25 acres), and roadside hazard tree removal.

Road treatments proposed within one half mile of Wilderness include 5.19 miles of maintenance, 10.80 miles of reconstruction, 0.24 miles of skid zones outside treatment units, and 0.86 miles of temporary road.

Untrammeled Quality

As no actions are occurring *inside* the Wilderness to manipulate or control natural ecological processes, by definition no trammeling is taking place.

Natural Quality

Inside the wilderness, the fire burned areas in the southwestern portion of the 112,277 acre wilderness. Biophysical processes for recovery will play out naturally inside the wilderness in those areas affected by the Rim Fire. A visitor to the wilderness in this area will see obvious signs of wildfire and natural recovery processes for the next few decades. A visitor to the southwestern portion of the wilderness may see treatments and modifications to the landscape *outside* the wilderness however. These modifications to the landscape seen by the wilderness visitor are limited in scale as the treatments described above are adjacent to discrete portions of the southwest Wilderness boundary. The treatments should be complete within 5 to 7 years and the modifications to the landscape may be noticeable to a wilderness visitor for decades. Among the purposes of treating the vegetation outside the wilderness is to reduce future fire intensity and rate of spread, which will contribute to preserving and protecting wilderness character, including the natural quality of the landscape, inside and outside the wilderness. Based on the criteria previously defined, the treatments were rated as having a “minor” effect on the ecological processes and natural character of the wilderness.

The other potential impact to natural quality comes from risk of spread of invasive vegetation species. This is discussed in the summary of effects analysis across all alternatives.

Undeveloped Quality

As no treatments occur in the wilderness, the wilderness retains its primeval character and influence and is without permanent improvement or modern human occupation.

Solitude or Primitive and Unconfined Recreation Quality

In the areas of the wilderness proximate to treatments, visuals (project activity), noise and dust produced during ground based and helicopter operations may negatively disrupt the solitude of Wilderness visitors in the southwest portion of the wilderness. The amount of work proposed within a half mile of Wilderness is expected to be completed within a few weeks to a few months; therefore, negative effects to solitude would be limited in duration and the geographical extent of the disruption will be in the southwest portion of the 112,277 acre wilderness. Additionally, trailheads in areas where treatments are proposed would be closed during operational periods, which would reduce potential effects to Wilderness visitors. Effects of trailhead closures are discussed in detail in the Chapter 3.08 (Recreation). Based on the criteria previously discussed the action is rated as having a “moderate” impact on opportunities for solitude or primitive and unconfined recreation but only in a narrow geographical context of the southwestern portion of the wilderness.

CUMULATIVE EFFECTS

The Rim Fire also burned a small portion of the 704,624 acre Yosemite Wilderness, located inside Yosemite National Park to the east and south of the Emigrant Wilderness. The national park has no fire recovery activities proposed within the Yosemite Wilderness that could impact wilderness character or qualities within the Emigrant Wilderness. Reasonably foreseeable actions include additional vegetation treatments outside the southwest and western boundaries of the wilderness that may impact, in the short-term, the naturalness of the landscape as seen from within the wilderness.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

This alternative would not impact Wilderness character, except for natural quality. Since no vegetation treatments will be done outside the wilderness boundary, the potential future surface fuels and predicted fire effects in these areas would not be reduced. Among the purposes of treating the vegetation outside the wilderness is to reduce wildland fire intensity and rate of spread. Preserving and protecting the natural quality of the landscape inside the wilderness could be more difficult. (See the Fire and Fuels section 3.05)

Biophysical processes for recovery will play out naturally in areas affected by the Rim fire. A visitor to the wilderness in this area will see obvious signs of wildfire and natural recovery processes for the next few decade.

CUMULATIVE EFFECTS

The high fuel loading left in Yosemite National Park along with untreated areas outside the wilderness would mean that wildfires would cross the administrative boundary with little change of containing the fires under 90th percentile weather conditions (3.05 Fire and Fuels.) This has the potential to burn more acres of the Emigrant Wilderness affecting the naturalness of the landscape.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1.

CUMULATIVE EFFECTS

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1.

CUMULATIVE EFFECTS

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

Special Interest Areas

Jawbone Falls Heritage Area

Under Alternatives 1, 3 and 4, the direct and indirect effects are minimal and are not expected to cumulatively lead to increased impacts to the cultural values of the Jawbone Falls SIA. Indirect effects under Alternative 2 include potential for ground disturbance and damage to site features and cultural values.

Pacific Madrone Botanic Area

Under Alternatives 1, 3 and 4, no direct, indirect or cumulative effects are expected in the Pacific Madrone SIA. Indirect effects under Alternative 2 include damage from falling trees.

Wild and Scenic Rivers

Under Alternatives 1, 3 and 4, proposed activities would have negative short-term effects on the scenic quality of the river corridors; however, these effects would be minimal in comparison to the already degraded scenic quality due to the Rim Fire itself. While some sedimentation could occur, it is anticipated to be minimal and of short duration and is not expected to affect the long-term beneficial uses and purposes for which these rivers were designated or made eligible. Over time as vegetation regrows, effects to the scenic beauty, vegetative diversity, and wildlife habitat are all expected to decrease until they are no longer evident. Table 3.12-5 displays the summary of actions within the three Wild and Scenic Rivers by alternative.

Table 3.12-5 Summary of Actions by River and Alternative

Action	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3	Alternative 4
Clavey River				
Salvage	644 acres	none	297 acres	7 acres
Roadside hazard Tree Removal	5.7 miles, 268 acres on roads 1N01, 2N29, 2N29A, 3N56Y, and 2N40,	none	6.2 miles and 287 acres on roads 1N01, 2N29, 2N29A, and 3N56Y,	7.4 miles and 341 acres on roads 1N01, 2N29, 2N29A, 2N40, and 3N56Y
New Road Construction	0.2 miles on P3N56Y	none	none	none
Road Reconstruction	2.7 miles on roads 02N29, 02N29A, and 03N56Y	none	1.9 miles on roads 2N29 and 2N29A	none
Road Maintenance	4.7 miles on roads 01N01, 02N29, 02N40, and 03N56Y	none	5.4 miles on roads 01N01, 02N29, 02N40, and 03N56Y	7.3 miles on roads 01N01, 02N29, 02N29A, 02N40, and 03N56Y
South Fork Tuolumne River				
Salvage	none	none	none	none
Roadside hazard Tree Removal	0.2 miles and 9 acres on road FR7858	none	0.2 miles and 9 acres on road FR7858	0.2 miles and 9 acres on road FR7858
New Road Construction	none	none	none	none
Road Reconstruction	none	none	none	none
Road Maintenance	0.5 miles on roads 01S98Y, 01S98YA, 01S99Y,and FR7858	none	0.5 miles on roads 01S98Y, 01S98YA, 01S99Y,and FR7858	0.5 miles on roads 01S98Y, 01S98YA, 01S99Y,and FR7858
Tuolumne River				
Salvage	none	none	none	none
Roadside hazard Tree Removal	6.2 miles and 286 acres around recreation sites, along Lumsden Road, and spurs	none	none	none
New Road Construction	none	none	none	none
Road Reconstruction	none	none	none	none
Road Maintenance	6.4 miles along Lumsden Road, and road FR99001	none	0.26 miles on road FR99001	0.26 miles on road FR99001

Wilderness

Alternatives 1, 3 and 4 would have a minor effect on the natural character of the wilderness due to short-term activities and longer-term modification of the landscape outside the wilderness adjacent to the wilderness boundary. Alternative 2 would not affect the natural character. All the action alternatives are expected to have basically same effects on spread of invasive vegetation species, which can also affect the naturalness of the wilderness landscape. The no action alternative has the lowest impact predicted for invasive plant introduction and proliferation, so would have the lowest effect on the wilderness landscape.

Alternative 1, 3 and 4 would reduce future fire spread and intensity, contributing to preserving and protecting wilderness character, including the natural quality of the landscape inside and outside the wilderness.

3.13 Transportation

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Multiple statutes, regulations and executive orders identify the general requirement for transportation evaluation in support of Forest Service planning and decision making. These include, but are not limited to the following.

- **National Forest Roads and Trails Act of October 13, 1964, as amended (16 U.S.C. 532-538)** authorizes road and trail systems for the National Forests including granting of easements across NFS lands, construction and financing of maximum economy roads (FSM 7705), and imposition of requirements on road users for maintaining and reconstructing roads, including cooperative deposits for that work.
- **Highway Safety Act of 1966 (23 U.S.C. 402)** authorizes state and local governments and participating federal agencies to identify and survey accident locations; to design, construct, and maintain roads in accordance with safety standards; to apply sound traffic control principles and standards; and to promote pedestrian safety.
- **National Trails System Act of October 2, 1968 (16 U.S.C. 1241-1249)** establishes the National Trails System and authorizes planning, right-of-way acquisition, and construction of trails established by Congress or the Secretary of Agriculture.
- **Surface Transportation Assistance Act of 1978, as amended (23 U.S.C. 101a, 201-205)** supersedes the Forest Highway Act of 1958. This law authorizes appropriations for forest highways and public lands highways. Establishes criteria for forest highways; defines forest roads, forest development roads and forest development trails (referred to as “NFS roads” and “NFS trails” in Forest Service regulations and directives); and limits the size of projects performed by Forest Service employees on forest roads. It also establishes the Federal Lands Highway Program.

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

Assumptions Specific to Transportation

- The Forest transportation system is the primary data used in this effects analysis. All distance figures are approximate values based on the Forest transportation atlas (including spatial GIS data and tabular INFRA data) and are limited by the accuracy of those sources which includes measurements from GIS, GPS, field instruments and aerial photography. Mileages have been updated throughout the planning process as better information has been made available and may change slightly with additional field verification and project implementation.
- All road work and infrastructure improvements will be conducted in accordance with the project management requirements.
- The spatial boundary and subject for analysis includes the existing rock material sources and water sources and the network of roads and trails within the project area.
- Effects are assessed based on a 15-year time frame, assuming all project actions associated with the transportation network will be completed by that time.

Data Sources

Forest transportation atlas: Roads and motorized trail information as contained in geographic information system (GIS) spatial data and Forest Service Infrastructure (INFRA) tabular data.

Transportation Indicators

Indicators used in the analysis of transportation effects include summaries of road work and associated impacts to the Forest transportation system. Key indicators include:

- Forest transportation system conditions
- Traffic
- Health and safety
- Qualitative effects summary based on a scale from beneficial to adverse

Transportation Methodology by Action

Actions, or the lack of action, affect roads and motorized trails in the project area. Each alternative presents a summary of effects considering the following activities.

- **Commercial Salvage**: Activities required to reduce fuel loads and improve road user safety through timber salvage and biomass removal and to process it into lumber, electrical energy, and other forest products with commercial value.
- **Wildlife and Fuels Biomass Removal**: Activities directed by the Forest Service to gather and remove additional biomass for the benefit of wildlife and further fuel reduction.
- **Post-Contract Forest Service Activities**: Additional treatment of units after the commercial salvage operations are complete that use tractors to pile and burn excess fuels, drop and lop activities, and mastication of biomass in watershed areas.
- **Restoration of Access for Recreation**: Reopening the burn area for public access and recreational activities.

Affected Environment

Existing Conditions

The project area contains 957 miles of existing roads and motorized trails managed by a variety of agencies, landowners and organizations. Table 3.13-1 displays the existing network by jurisdiction.

Table 3.13-1 Existing Transportation System by Jurisdiction

Jurisdiction	miles
Bureau of Land Management	0.6
County	21.8
National Park Service	0.3
Other	7.6
Private	146.8
State	13.1
Stanislaus National Forest	
National Forest System Roads	707.1
National Forest System Trails	18.2
Other Non-system Routes	41.5
Subtotal National Forest	**766.8**
Total	**957.0**

Source: Forest Transportation Atlas

FOREST TRANSPORTATION SYSTEM

The Forest transportation system included in this analysis is comprised of NFS roads (also referred to as system roads) and motorized NFS trails. The NFS trails are managed for full-size motor vehicle use and are often referred to as 4-wheel-drive trails. NFS roads are broken down by operational maintenance level, which describes the standard to which the road is currently managed. Table 3.13-2 displays the National Forest System roads under Stanislaus National Forest jurisdiction by Maintenance Level and Appendix E contains a list of each individual road within the project area.

Table 3.13-2 National Forest System Roads by Maintenance Level

ML	Summary Description	miles
5	High degree of user comfort and convenience	54.7
4	Moderate degree of user comfort and convenience at moderate travel speeds	19.8
3	Maintained for travel by prudent driver in standard passenger car	59.0
2	High clearance vehicle use	535.2
1	Intermittent use road while placed in storage	38.3
	Total	**707.1**

Source: Forest Transportation Atlas; ML=Maintenance Level

NON-SYSTEM ROADS

Table 3.13-1 shows a number of routes (roads and motorized trails) in the project area are managed and under jurisdictions other than the Forest Service. Other non-system roads under Forest Service jurisdiction exist on the landscape, and are not managed as part of the Forest transportation system. These include unauthorized routes and roads associated with some sort of authorized use, such as an agreement, permit, or right-of-way.

CONDITION

The conditions of the project area routes vary from well-maintained, including those treated under BAER (Burned Area Emergency Response), to badly eroding and overgrown. Due to the limitations of the NFS road maintenance program, few of the NFS roads and trails, and none of the unauthorized roads, receive frequent or regular maintenance. Figure 3.13-1 is an example of one of the many roads within the fire boundary now lined with dead and dying trees, considered danger[8] trees or roadside hazards.

Figure 3.13-1 Dead Trees and Roadside Hazards along NFS Road 1N79

[8] While the Forest Service engineering policy uses the term "danger tree" (see glossary for definition), the synonymous term "hazard tree" is also commonly used and will be used throughout the Rim Fire Recovery EIS.

After containment of the Rim Fire, a BAER effort was conducted in order to protect roads and trails and their associated features from risks associated with the potential for high surface flows, flooding, and erosion during rainfall events. Figure 3.13-2 shows a BAER work area where a culvert has become plugged. Because of water-repellant soil qualities following the Rim Fire, water cannot penetrate into the ground causing pooling and impacting roads, erosion, and sediment flow due to decreased hydrologic function. A number of roads were maintained during the BAER effort, with dozens of stream crossing improvements or replacements as well as maintenance, improvement, and installation of hundreds of road surface drainage structures.

Figure 3.13-2 Flooded area next to a road where a culvert is plugged.

Numerous road segments accessing proposed project treatment units need improvement for logging trucks, chip vans, and other project vehicles and equipment. In the absence of regular maintenance, the surface conditions have deteriorated and the traveled ways have become partly or completely overgrown or blocked by fallen trees or washouts.

Many of the road and motorized trail segments are designated as open to public motorized traffic, for access to particular destinations, or for motorized recreation. The Forest Motor Vehicle Use Map and the Stanislaus National Forest Infra database display those designations. Currently the project area is closed to the public by temporary Forest Order, to provide for public safety and protect natural resources.

Forest system roads must be maintained to avoid problems that can arise when they fall into disrepair. Resource protection and public safety are the maintenance priorities for the forest road system. In recent years, annual road maintenance budgets have not been sufficient to maintain the entire road system to standard. In past decades, commercial users (typically timber purchasers) maintained a substantial portion of the NFS roads during permitted and contractual activities. The opportunity to maintain and reconstruct roads also exists during implementation of the proposed commercial salvage removal within the Rim Fire.

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

To support the proposed actions, existing routes will be utilized for access and removal when possible (Chapter 2.01 and Table 2.05-1). During implementation, traffic will increase due to movement of equipment, forest products, and personnel in and out of the project area. Traffic management in accordance with standard contract provisions will mitigate risks to workers and provide for public safety. Communications, including use of radios, will provide for safer and more efficient traffic flow. Temporary route closures to public traffic are expected to provide for worker and public safety during project implementation, resulting in a short-term reduction in public access. Felling and removal of roadside hazard trees will also provide for a safer and more efficient Forest transportation system use during implementation of the project.

Following implementation, the combination of road maintenance, Forest transportation system improvements, and removal of roadside hazards will provide for long-term public and administrative access throughout the project area. In addition, the roadwork applied during implementation will leave the system in a more stable and functional condition, minimizing adverse resource impacts. No long-term changes to public motor vehicle use are proposed under this alternative; previously designated routes documented on the motor vehicle use map (MVUM) will remain open following project implementation.

In summary, Alternative 1 has positive direct and indirect effects on the Forest transportation system. Benefits include catching up on deferred maintenance, improving the roads to minimize adverse resource impacts, and sustaining safe public and administrative access throughout the Rim Fire area.

CUMULATIVE EFFECTS

The Rim Hazard Tree project will remove hazard trees from main roads within the fire perimeter. The short-term combination of traffic from the Rim HT and this project will be substantial, and will require adequate traffic control, temporary public road closures, and proper communications to maintain safe and efficient traffic flow. A short-term reduction in public access will occur in order to minimize user conflicts during project implementation. Main collector and arterial forest roads will receive the majority of traffic and will have surface deterioration proportionate to the traffic volume. Maintenance activities will be necessary in order to maintain the function of these roads; otherwise the standard will be reduced.

About 100 miles of additional routes within the project area are expected to be treated under various restoration projects, including road and trail maintenance, reconstruction, and decommissioning of routes contributing to resource problems. Following implementation of these projects, a well maintained road system will exist and provide long-term public and administrative access throughout the project area.

Considering cumulative effects associated with Alternative 1, the overall long-term Forest transportation system within the project area will benefit, resulting in a safer, more efficient, and more utilized network. Long-term public and administrative access will be sustained throughout the project area.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, indirect effects include dead and weakened trees falling across roads and trails, blocking access and reducing road user safety. This will reduce access and eventually limit the long-term ability to manage and maintain the Forest transportation system within the project area. It will also result in a more dangerous, inaccessible, underutilized, and undermanaged network leading to adverse resource impacts including improperly functioning road drainage systems. Without the opportunity to utilize revenue from timber sales, the money for maintenance and improvement treatments on the Forest transportation system within the project area would be insufficient to meet safety and resource needs. It would be unlikely that the road system in this area would ever return to the condition for which it was designed and managed prior to the Rim Fire.

CUMULATIVE EFFECTS

The Rim HT project will remove hazard trees from the main roads within the fire perimeter. The amount of traffic from the removal of forest products from that project will be substantial. A short-term reduction in public access will occur in order to minimize user conflicts during project implementation. Surface deterioration proportionate to the traffic volume will occur on those main roads. Maintenance activities will be necessary in order to maintain the function of those roads; otherwise the standard will be reduced.

About 100 miles of additional routes within the project area are expected to be treated under various restoration projects, including road and trail maintenance, reconstruction, and decommissioning of routes contributing to resource problems. If no action is taken on the lower standard system roads, as proposed under the action alternatives, access to these areas will not exist for a substantial period of time and those roads outside of the 100 miles mentioned above will become inaccessible due to standing hazard trees, fallen dead trees, and road surface deterioration.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1.

CUMULATIVE EFFECTS

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1.

CUMULATIVE EFFECTS

Same as Alternative 1.

Summary of Effects Analysis across All Alternatives

Alternative 1 provides the most beneficial transportation effects (direct, indirect and cumulative) followed with less beneficial effects by Alternative 3 and then Alternative 4. Alternative 2 is the only alternative with adverse transportation effects (indirect and cumulative).

3.14 WATERSHED

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Protection of water quantity and quality is an important part of the mission of the Forest Service (USDA 2007). Management activities on NFS lands must be planned and implemented to protect the hydrologic functions of forest watersheds, including the volume, timing, and quality of streamflow. The following direction is relevant to the action alternatives as they affect water resources.

The Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as federal policy for the control of point and non-point pollution, and assigns the states the primary responsibility for control of water pollution. Compliance with the Clean Water Act by national forests in California is achieved under state law (below).

Non-point source pollution on National Forests is managed through the Regional Water Quality Management Handbook (USDA 2011), which relies on implementation of 35 prescribed regional best management practices (BMPs), as well as 23 national BMPs (USDA 2012) relevant to this project. The Watershed Report Appendix B (project record) lists these BMPs and their associated management requirements. One of the Regional BMPs (BMP 2.13) requires the development of an Erosion Control Plan for projects with ground-disturbing activities. A plan was developed for this project and is included in the project record.

The California Water Code consists of a comprehensive body of law that incorporates all state laws related to water, including water rights, water developments, and water quality. The laws related to water quality (sections 13000 to 13485) apply to waters on the national forests and are directed at protecting the beneficial uses of water. Of particular relevance for the Proposed Action is section 13369, which deals with non-point-source pollution and best management practices.

The Porter-Cologne Water-Quality Act, as amended in 2006, is included in the California Water Code. This act provides for the protection of water quality by the state Water Resources Control Board and the regional water quality control boards, which are authorized by the U.S. Environmental Protection Agency to enforce the Clean Water Act in California.

A Conditional Waiver of Waste Discharge Requirements for Discharges Relating to Timber Harvest Activities is issued to the Forest Service by the Central Valley Regional Water Quality Control Board (Water Board). These waivers are required for all timber harvest activities that will or will likely discharge waste that could affect the quality of the waters of the State.

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Effects Analysis Methodology

The four project alternatives were analyzed at three watershed scales to determine direct, indirect and cumulative watershed effects of the Rim Fire Recovery Project. These included large scale watersheds (40,000 to 250,000 acres) and two nesting smaller scales: 10,000 to 40,000 acres and 2,000 to 10,000 acres.

Beneficial uses of water and water quality objectives in the California Water Quality Control Plan (Basin Plan) of the Central Valley Regional Water Quality Control Board (CVRWQCB 2011) were utilized as a regulatory benchmark regarding the existing condition and to assess the effects of the proposed action and its alternatives on water quality. The water quality parameters considered in the watershed analysis were water temperature, sediment related parameters, and pesticides (registered borate compound). These are the pollutants with the potential of being affected by project management activities.

Assumptions Specific to Watershed

- Watershed condition from the Rim Fire will recover, as will effects of the Rim Fire Recovery Project.
- Water quality effects will occur at a magnitude below adversely affecting beneficial uses of water unless uncontrollable events occur. These include an abnormally high amount and/or intensity of precipitation or the occurrence of another fire in the project area as the watersheds recover from the effects of the Rim Fire.
- Water Quality Best Management Practices will be implemented and effective unless uncontrollable factors occur. These include an abnormally high amount and/or intensity of precipitation or the occurrence of another fire in the project area as the watersheds recover from the effects of the Rim Fire.
- The Soils Report (project record) provides assumptions associated with Disturbed Watershed Erosion Prediction Project (WEPP) modeling.
- The Watershed Report Appendix A (project record) provides assumptions associated with Equivalent Roaded Area (ERA) modeling for cumulative watershed effects.

Data Sources

- Satellite Imagery: Worldview, Landsat, and Light Detection and Ranging (LiDAR)
- Forest Land Management Databases and planning documents: Forest Service Activity Tracking System (FACTS) and the Schedule of Proposed Actions (SOPA)
- Stanislaus StreamScape Inventory: Stream Survey Data from 2005-2012
- Benthic Macroinvertebrate Inventory, Clavey River Ecosystem Project (CREP), 2007
- Burned Area Emergency Response Program: Past Fire information; Rim Fire watershed data
- Geographic Information Systems (GIS)
- CalFire: Timber Harvest Plans (THPs), Non-Industrial Timber Management Plans (NTMPs), and Notices of Emergency Timber Operations (Frese 2013-2014)
- Yosemite National Park: GIS shapefile with past and future activities within Park boundaries

Watershed Indicators

- Water Quality Parameters: temperature, sediment, pesticides (measure: meet WQ objectives)
- Stream Condition: channel form, streambank stability, pool sediment (measure: SSI protocol)
- Riparian Vegetation: recovery (measures: no damage from project activities; recruitment unimpeded)
- Ground Cover: riparian areas (measures - retention of existing; addition in riparian areas and watershed sensitive areas (WSA) (acres))
- Cumulative watershed effects (measure: ERA)

Watershed Methodology by Action

The direct, indirect and cumulative effects of the four project alternatives were evaluated using the following methods:

DIRECT AND INDIRECT EFFECTS

- Literature Review. A thorough review of the literature was conducted related to the direct and indirect effects of actions that affect the watershed resource as proposed in this project.
- Modeling. Disturbed WEPP was utilized to predict project related erosion.
- Monitoring. A review of Water Quality Best Management Practices Evaluation Program (BMPEP) results on the Stanislaus National Forest for activities related to the project was

conducted. BMPEP monitoring results over the past decade were useful for predicting outcomes of the management activities proposed in this project.

- Field Evaluation. Field review of proposed treatment units and watershed conditions within the project area was conducted.
- GIS. GIS was used for analyzing data collected from fieldwork, satellite imagery products and forest databases related to the project.

CUMULATIVE WATERSHED EFFECTS

A Cumulative Watershed Effects analysis was conducted using the CWE model adopted by the Pacific Southwest Region of the USDA Forest Service as a method of addressing cumulative watershed effects (USDA 1990). The model is referred to as Equivalent Roaded Area (ERA). ERA values are calculated using a computer model developed on the Stanislaus National Forest (Rutten and Grant 2008). The Watershed Report Appendix A (project record) provides further details.

Affected Environment

Watershed Setting

The Rim Fire burned through numerous watersheds in the central and southern portions of the Stanislaus National Forest, and some overlap eastward into Yosemite National Park where the remainder of the fire occurred. These watersheds are an important component of the water supply, fish and wildlife habitat, recreation, timber production and other values of the Sierra Nevada mountain range. Portions of the watersheds within the Rim Fire perimeter burned in several fires during the 20th century, while some areas have not burned in over 100 years. About 98 percent of the Rim Fire burned within the Tuolumne River watershed. The remaining 2 percent burned in the North Fork Merced River watershed along the southern edge of the fire.

Watersheds in the Rim Fire are delineated in accordance with the national watershed classification system (USGS 2013). This system is a spatial hierarchy of eight nesting watershed size classes ranging from very large (greater than 250,000 acres) to very small (less than 2,000 acres). This classification system uses the term Hydrologic Unit Code (HUC), as shown in Table 3.14-1, to describe all watershed size classes. They are called HUC levels and are numbered in order from one to eight in descending size class. Each HUC level code is a two digit number that ties to a watershed size and name. For example, HUC Level 1 is a two digit code whereas as HUC Level 5 is a 10 digit code. Table 3.14-1 shows an example of how this nesting system applies to the Rim Fire watersheds.

Table 3.14-1 Hydrologic Unit Code System (HUC)

HUC Level	HUC Name	HUC Size (average acres)	Rim Fire Examples
1	Region	100,000,000	NA
2	Sub-region	10,000,000	NA
3	Basin	7,000,000	San Joaquin River
4	Sub-basin	450,000	Tuolumne River
5	Watershed	40,000 to 250,000	Clavey River
6	Sub-watershed	10,000 to 40-000	Reed Creek
7	Drainage	2,000 to 10,000	Reynolds Creek
8	Sub-drainage	Less than 2,000	Lost Creek

The Stanislaus National Forest includes HUC Level 4 through 8 watersheds. (The term watershed is often used generically even though each HUC level has a unique name). The HUC Level 4 watersheds on the forest are the headwaters of large rivers that continue downstream off the forest (e.g., Tuolumne River).

Nine HUC 5 Level watersheds are within the Rim Fire; within those, are 18 HUC Level 6 watersheds. Table 3.14-2 displays the HUC Level 5 and HUC Level 6 watersheds relevant to the fire area, including total HUC Level 5 and HUC Level 6 watershed acreage. Note that the HUC Level 6 watershed acreage does not add up to that of seven of the nine HUC Level 5 watersheds. This is because in those watersheds additional HUC Level 6 watersheds are fully outside the fire perimeter. Watershed acreage within the Stanislaus National Forest boundary is less in some watersheds and will be described in the existing condition and environmental consequences sections of this report. The HUC Level 5 watersheds in Table 3.14-2 are listed clockwise around the fire area beginning where the main channel of the Tuolumne River exits the Rim Fire perimeter.

Table 3.14-2 Principal Watersheds in the Rim Fire Area

HUC Level 5 (40,000-250,000 acres)		HUC Level 6 (10,000-40,000 acres)	
Name	**acres**	**Name**	**acres**
Big Creek-Tuolumne River	81,721	Big Creek	18,734
		Grapevine Cr-Tuolumne River	23,817
		Jawbone Cr-Tuolumne River	27,629
North Fork Tuolumne River	63,849	Lower North Fork Tuolumne River	34,210
Clavey River	100,645	Lower Clavey River	17,871
		Middle Clavey River	26,912
		Reed Creek	24,527
Cherry Creek	90,892	Lower Cherry Creek	24,383
		Upper Cherry Creek	16,344
		West Fork Cherry Creek	26,149
Eleanor Creek	59,906	Miguel-Eleanor Creek	15,798
Falls Creek-Tuolumne River	124,244	Poopenaut Valley-Tuolumne River	18,232
Middle Fork Tuolumne River	46,635	Lower Middle Fork Tuolumne River	14,928
		Upper Middle Fork Tuolumne River	31,707
South Fork Tuolumne River	57,855	Lower South Fork Tuolumne River	19,988
		Upper South Fork Tuolumne River	37,866
North Fork Merced River	79,110	Bull Creek	21,064
		Bean Creek-North Fork Merced River	36,739

Given the large size of the fire, the HUC Level 6 watersheds are the most appropriate scale for watershed description and analysis of the effects of the Rim Fire Recovery Project. HUC Level 5 watersheds will be described for spatial context and broad scale analysis, and selected HUC Level 7 watersheds will be discussed where more detailed analysis is indicated. Figure 3.14-1 displays the HUC Level 6 watersheds relevant to the Rim Fire.

Existing Conditions

Several factors that affect watershed condition have occurred in the Rim Fire Recovery project area. These include natural events and management activities that create ground disturbance and alter natural hydrologic processes.

WILDFIRE EFFECTS

The Rim Fire, like almost all wildfires, is a mosaic of high, moderate and low soil burn severity plus unburned areas within its perimeter. Many past fires occurring within the Rim Fire perimeter have nearly half or more of their total acreage in the low and unburned categories that resulted in minimal to negligible watershed impact. Most watershed damage occurs from high soil burn severity, and lesser from moderate soil burn severity.

Figure 3.14-1   HUC Level 6 Watersheds in the Rim Fire Area

The principal effects of soil burn severity are the reduction of ground cover and infiltration capacity. High soil burn severity has the most watershed effect since it usually results in very low remaining ground cover, ranging from 0 to 20 percent, and the most increase in water repellency. These factors make it insufficient to adequately prevent accelerated soil erosion and, where eroded soil can reach waterways, cause stream sedimentation. Moderate soil burn severity is usually less damaging since the soil is not as impacted and the singed conifer needles fall to the forest floor initiating replacement of burned ground cover. Low soil burn severity is usually an insignificant factor since most pre-fire cover remains and infiltration is mostly retained.

High soil burn severity usually chars the soil crust, damaging soil structure, killing plant roots, removing all, or mostly all, ground cover (litter and duff) and often results in strongly water repellent soil. Moderate soil burn severity does less damage since its soil structure effect and degree of water repellency is usually lower. Low soil burn severity has minimal soil impact, usually scorching ground and portions of tree trunks and bases of tree crowns; few trees are killed. The combination of high and moderate soil burn severity usually represents what is known as a stand replacing fire since nearly all trees are killed. Often in forested areas, post-fire vegetation condition acts as a visual indicator of soil burn severity. High soil burn severity is indicated by fully killed trees with all needles and often many branches consumed. Moderate soil burn severity is viewed as killed trees with browned needles remaining (most fall before winter, providing natural ground cover). Low soil burn severity usually results in patchy ground fire with lower portions of trunks blackened and some lower crowns singed. Soil burn severity classes are shown in Figures 1.0-2, 1.0-3 and 1.0-4. These photos were taken shortly after the Rim Fire. Note the needlecast in the moderate soil burn severity photo, with more to come from needles still in the trees.

Soil burn severity is a measure of the effect of ground heat as a fire burns across a landscape, and is not the same as fire intensity or vegetation burn severity. Fire intensity is a measure of heat produced by a fire (BTUs). Vegetation burn severity measures both vegetation canopy mortality and vegetation basal area mortality resulting from wildfire. For the remainder of this report reference to burn severity will mean soil burn severity unless otherwise noted.

While the Rim Fire area is the largest of the fires within the forest to date, it does not have the highest soil burn severity. Its high soil burn severity is the second lowest of the principal fires within its perimeter since 1973. Though its high soil burn severity is much less than its next largest predecessor, the Stanislaus Complex Fire of 1987, the Rim Fire has resulted in about 10,000 acres of very low ground cover distributed in various sized large to small patches across the 154,530 acres of NFS land it burned. Table 3.14-3 displays soil burn severity for the six largest fires within the Rim Fire perimeter that have soil burn severity information.

Table 3.14-3 Soil Burn Severity for Selected Fires in Relation to the Rim Fire

Fire Name	Fire Year	NFS (acres)	Soil Burn Severity (%)		
			High	Mod	Low[3]
Rim	2013	176,800	7	37	56
Stanislaus Complex	1987	147,100	36	20	44
Rogge[1]	1996	19,400	0	41	59
Granite	1973	17,100	55	30	15
Ackerson[2]	1996	11,300	19	14	67
Pilot	1999	4,000	46	25	29

[1] No high soil burn severity due to low fuel loading over much of the area because of new plantations after the Stanislaus Complex fire.
[2] This fire was much larger overall, with most acreage in Yosemite National Park.
[3] Low and Unburned

Distribution of soil burn severity within a fire area is also important. A spatial mosaic of all severities can reduce on and off site soil and water effects while concentrations of high soil burn severity can cumulatively increase effects. The largest concentrations of high soil burn severity in the Rim Fire occurred in Granite Creek, within the 1973 Granite Fire, and in the Corral Creek and Reed Creek areas, both believed unburned in about 100 years. Other lesser high soil burn severity concentrations are scattered throughout the fire area, surrounded by moderate and/or low soil burn severity areas as well as unburned areas.

These concentration areas, and other smaller severely burned sites in the fire, were identified by the Rim Fire BAER team as a watershed value at risk for loss of soil productivity and delivery of stream sedimentation. As a result, action to minimize the risk was taken in November, 2013. Helicopters applied weed free rice straw mulch to 4,300 acres of the highest priority portions of these locations (i.e., steep slopes, high erosion risk, and stream proximity). Helicopter mulching produces a uniform layer of straw, about 1 to 1 ½ inches deep that provides 80 to 100 percent ground cover. An additional BAER action, mastication, was conducted on 40 acres of high soil burn severity area to increase ground cover. Mastication is mechanical chipping of small trees. Low-ground-pressure tracked equipment with an articulated arm and a chipping head provides immediate cover to bare areas.

Another burn concentration area in the Rim Fire is in the Tuolumne River canyon. The fire began near the Clavey River confluence and continued upstream to Cherry Creek, then up Cherry Creek to Eleanor Creek in Yosemite National Park. Much of the canyon vegetation is dominated by chaparral and other flashy fuels which burned hot and fast up canyon, where the fire then spread northward and led to the conifer dominated high soil burn severity concentrations mentioned above. The canyon soil burn severity is classed as moderate, even though vegetation was well consumed, since the fire here had little residence time and thus, minimally degraded soil properties or increased watershed runoff response. This concentration area is a near repeat of that of the Stanislaus Complex Fire in 1987. The Tuolumne River canyon burns easily, and the 26-year-old vegetation was mature and ready to burn again.

Overall in the Rim Fire, effective watershed cover exists on about 56 percent of the land within the fire perimeter (the total of the low soil burn severity and the unburned portion within the fire perimeter). This cover consists of living vegetation which primarily includes conifer trees with forest floor litter and duff, plus brush and smaller woody shrubs. This ground cover was supplemented in much of the moderately burned conifer areas due to needlecast. While this is not as effective as living cover it does provide a measure of effectiveness compared to high burn severity areas since it resists initiation of rainsplash erosion. Helicopter mulching and mastication mitigated some of the worst high soil burn severity areas, but other locations of high soil burn severity areas remain with inadequate cover.

In summary, the Rim Fire was a classic mixed severity fire, not only across the entire fire, but at all watershed scales. Patch size of each soil burn severity class in this mosaic was also mixed with some patches hundreds to several hundreds of acres, others tens to hundreds, and yet others where all three classes occurred within ten acres. Mixed severity was also distributed similarly from stream to ridge within most watersheds. Riparian areas burned in a mosaic as did the hillslopes above them. The largest high soil burn severity patches occurred in the uplands, mostly on south-facing slopes where the fire could easily pre-heat fuels.

At the Rim Fire scale, the amount of soil burn severity varies widely among and within all HUC level watersheds. In general it is least for the HUC 5 watersheds, more for the HUC 6 watersheds and greatest for the HUC 7 watersheds. Many HUC 5 watersheds, being the largest, have substantial portions outside the Rim Fire perimeter. The HUC 6 watersheds, though generally having more acreage within the fire, also have a highly variable amount of soil burn severity based on fire location and watershed acreage within the fire perimeter. The HUC 7 watersheds, that have the highest burn severity, have been selected as watershed analysis emphasis areas due to severe burn and/or concentrated post-fire management activities.

Table 3.14-4 provides an overview of the three watershed scales and the portion each occupies within the Rim Fire and the Stanislaus National Forest. It also shows the soil burn severity of each watershed as an indicator of existing condition relative to ground cover and vegetation alteration by the fire. Rim Fire information is provided at the top of the table for comparison with the HUC Level 5, 6, and 7 watersheds. Refer to Figure 3.14-1 for the locations of the HUC 6 watersheds as well as to gain an understanding of the locations of their HUC 5 and 7 counterparts.

Table 3.14-4 shows the similarities and variations among watersheds. Watershed area within the fire perimeter ranges from 1 to 100 percent among the HUC 5 and 6 watersheds, and all the HUC 7 watersheds are 100 percent within the perimeter. The percentage of watershed area within the Stanislaus National Forest is high for all watersheds except for portions of the four HUC 5 watersheds that extend east of the forest into Yosemite National Park.

Table 3.14-4 Rim Fire Watershed Condition Overview

HUC Level and Name	HUC within Rim Fire (%)	HUC within NF (%)	Soil Burn Severity (%)		
			High	Mod	Low[3]
Rim Fire Summary[1]	-	69	7	37	56
5 – Big Creek-Tuolumne River	56	70	5	27	68
6 – Big Creek	<1	52	0	<1	>99
6 – Grapevine Creek-Tuolumne River	77	82	1	26	73
6 – Jawbone Creek-Tuolumne River	99	100	14	56	30
7 – Corral Creek	100	100	31	58	11
7 – Lower Jawbone Creek	100	100	10	75	15
5 – North Fork Tuolumne River	9	92	0	3	97
6 – Lower North Fork Tuolumne River	17	89	1	6	93
5 – Clavey River	52	100	3	15	82
6 – Lower Clavey River	100	100	4	45	51
7 – Bear Springs Creek-Lower Clavey River	100	100	7	43	50
6 – Middle Clavey River	69	100	2	11	87
6 – Reed Creek	66	100	7	16	77
7 –Lower Reed Creek	100	100	21	41	38
5 – Cherry Creek	24	93	3	12	85
6 – Lower Cherry Creek	84	98	10	43	47
7 – Granite Creek	100	100	30	62	8
6 – Upper Cherry Creek	7	100	0	1	99
6 – West Fork Cherry Creek	1	100	0	<1	>99
5 – Eleanor Creek[2]	28	2	1	9	90
6 – Miguel Creek-Eleanor Creek	76	6	4	31	65
5 – Falls Creek-Tuolumne River[2]	19	4	1	5	94
6 – Poopenaut Valley-Tuolumne River	99	30	6	33	61
5 – Middle Fork Tuolumne River[2]	68	34	7	32	61
6 – Lower Middle Fork Tuolumne River	100	100	6	57	37
6 – Upper Middle Fork Tuolumne River	53	3	8	21	71
5 – South Fork Tuolumne River[2]	88	41	4	29	67
6 – Lower South Fork Tuolumne River	100	100	4	43	53
6 – Upper South Fork Tuolumne River	83	9	3	22	75
5 – North Fork Merced River	8	81	0	3	97
6 – Bull Creek	6	100	0	2	98
6 – Bean Creek-North Fork Merced River	14	92	0	4	96

[1] Soil Burn Severity Percent is of the fire area.
[2] Substantial portion of the fire extends east into Yosemite National Park.
[3] Low and Unburned

The amount of soil burn severity across the fire also exhibits similarities and variations by watershed. Moderate soil burn severity is greater than high severity in every watershed, ranging from two to ten times as much. High soil burn severity is similar in almost all HUC 5 and HUC 6 watersheds; all nine HUC 5s are less than 10 percent as are 16 of the 18 HUC 6s. HUC 7 watersheds are dissimilar to their larger counterparts in that they almost all have greater high and moderate soil burn severity.

Table 3.14-4 also shows that 25 of the 32 watersheds have more than 50 percent acreage in the low soil burn severity and unburned class. Half of those watersheds have greater than 75 percent in this same class. The remaining seven watersheds include all five HUC 7s and two of the more heavily burned HUC 6s: Lower Cherry Creek and the Lower Middle Fork of the Tuolumne River. The fire-wide average of 56 percent in the low and unburned class is made up of a high percentage of predominantly low and unburned watersheds punctuated by several highly burned ones.

The most visible watershed impact of the fire was in the high soil burn severity areas since it reduced ground cover to less than 20 percent, often near zero. Ground cover in the moderate soil burn severity areas was also substantially reduced as nearly all trees were killed by the fire, though needlecast replacement cover of 50 percent or more occurred in many of the conifer forested areas before winter.

VEGETATION CONDITION

Hillslopes

The remaining live vegetation within the Rim Fire perimeter consists largely of second growth forest stands from legacy logging as well as more recent various aged timber plantations. It also consists of unlogged natural stands, some of which are very old. Despite the diversity of this vegetation, it almost all currently shares a common trait: high stand density. An excessive number of tree stems per acre creates closed canopies and an undesirable fuel ladder. This dense condition leaves unburned forest vegetation elsewhere as vulnerable to future high severity wildfires as has recently occurred. At the scale of the Rim Fire about 44 percent of live vegetative canopy was lost, in various mosaic patterns, and about 56 percent remained largely unaffected. As Table 3.14-4 showed, the amount of soil burn severity and vegetation burn severity varied substantially among the watersheds in the fire area.

Riparian Conservation Areas

Riparian Conservation Areas (RCA) are corridors along stream channels and surrounding meadows, springs and other wetland areas that provide habitat for plants that thrive on a high water table. These riparian obligate species include resprouting trees such as alders, big leaf maples, dogwoods, cottonwoods and aspens, shrubs such as willows, and a variety of streamside and meadow herbaceous plants. Conifers also coexist in RCAs with obligate species, often growing well near streams.

Table 3.14-5 shows the watershed effect of the Rim Fire on vegetation condition in RCAs by watershed. A 100-foot zone along all perennial and intermittent streams (100 feet on each side for a total width of 200 feet) was selected to focus on the immediate near-stream complex of obligate and non-obligate vegetation in the cooler, moister microclimate along streams, often referred to as the “riparian bubble.” The upslope remainder of the 300 or 150 foot RCA widths are usually dominated by hillslope vegetation and warmer air temperatures. Both soil and vegetation burn severity measures were assessed for validation of comparability. This 100-foot buffer represents an average of about 7 percent of the total area in the Rim Fire watersheds, with a range of 5 to 9 percent among all watersheds.

In Table 3.14-5, the RCA columns display soil and vegetation burn severity for all HUC 6 and HUC 7 watersheds in the Rim Fire. The RCA H + M column is the sum of high and moderate soil burn severity in the 100-foot stream buffer. The Watershed column displays the sum of the high and moderate burn severity for the entire watershed. The RCA H + M column is the key information for comparing soil to vegetation burn severity and RCA-to-watershed soil burn severity.

Table 3.14-5 shows that RCA soil and vegetation burn severity match closely in almost all watersheds. In 21 of 23 watersheds soil and vegetation burn severity are within 5 percent of one another, and the remaining two are 7 percent and 8 percent. In most cases the vegetation burn severity is equal to or slightly less than the soil burn severity. The two measures validate they are comparable for estimating vegetation loss. Soil burn severity has the added advantage of also being able to indicate ground cover condition.

Comparing RCA to watershed, the table shows that RCA soil burn severity is in most cases less than for the watershed as a whole. RCA soil burn severity is not higher than watershed soil burn severity in 19 of the 23 watersheds in Table 3.14-5. The four that are higher are barely so, and many of the watershed soil burn severity percentages are much higher than the RCA.

Table 3.14-5 Riparian Conservation Area Soil and Vegetation Burn Severity

HUC Level and Name	Riparian Conservation Area (RCA) (100-foot stream buffer)					Watershed (total acres)
	Soil Burn Severity % acres in **RCA**				**Vegetation Burn Severity** % acres with 75-100% **Canopy Mortality**	**Soil Burn Severity** % acres in **Watershed**
	High	**Mod**	**Low**	**H+M**		**High+Mod**
5 – Big Creek-Tuolumne River						
6 – Big Creek	0	0	100	0	0	0
6 – Grapevine Creek-Tuolumne River	0	11	89	11	15	27
6 – Jawbone Creek-Tuolumne River	11	38	51	49	50	70
7 – Corral Creek	41	51	9	92	88	89
7 – Lower Jawbone Creek	3	42	55	45	49	85
5 – North Fork Tuolumne River						
6 – Lower North Fork Tuolumne River	1	8	91	9	6	7
5 – Clavey River						
6 – Lower Clavey River	1	19	80	20	19	49
7 – Bear Springs Creek-Lower Clavey River	2	17	81	19	14	50
6 – Middle Clavey River	1	7	92	8	7	13
6 – Reed Creek	3	10	87	13	11	23
7 –Lower Reed Creek	12	31	56	43	41	62
5 – Cherry Creek						
6 – Lower Cherry Creek	13	34	53	47	45	53
7 – Granite Creek	35	59	6	94	91	92
6 – Upper Cherry Creek	0	0	100	0	0	1
6 – West Fork Cherry Creek	0	0	100	0	0	0
5 – Eleanor Creek[1]						
6 – Miguel Creek-Eleanor Creek	4	34	62	38	41	35
5 – Falls Creek-Tuolumne River[1]						
6 – Poopenaut Valley-Tuolumne River	5	27	68	32	32	39
5 – Middle Fork Tuolumne River[1]						
6 – Lower Middle Fork Tuolumne River	5	50	45	55	50	63
6 – Upper Middle Fork Tuolumne River	3	22	75	25	17	29
5 – South Fork Tuolumne River[1]						
6 – Lower South Fork Tuolumne River	2	23	75	25	18	46
6 – Upper South Fork Tuolumne River	4	19	77	22	17	25
5 – North Fork Merced River						
6 – Bull Creek	0	2	98	2	2	2
6 – Bean Creek-North Fork Merced River	0	2	98	2	2	4

[1] Substantial portion of the fire extends east into Yosemite National Park.

The Rim Fire burned less severely near the streams than in the uplands in almost all watersheds, and substantially less in many. And though it burned less in RCA there was still a notable loss of the stream shade capacity of conifers and riparian obligate trees and shrubs in many watersheds. But while the conifers will be long in returning to replace shade, the riparian trees will fill the void in the short run and also provide biodiversity along stream reaches burned in the Rim Fire.

TRANSPORTATION SYSTEM CONDITION

Road density in the Rim Fire area ranges from one to six miles of road per square mile, with an average of about 4 miles per square mile. This is similar to other roaded multiple-use areas within the forest. Prior to the Rim Fire, the existing road network within its perimeter was adequate to serve the needs of forest management activities. However, minimal road construction is planned for post-fire salvage harvest to reach burned areas previously not accessible. This would add much less than one percent to the road network in the fire area, or a negligible change in road density compared with the existing road network.

A partially plugged culvert runs muddy water post-fire.

Road sediment discharge increases are expected as a result of the Rim Fire. Most increases are likely to occur in high soil burn severity areas within the Rim Fire, and to a lesser extent in moderate soil burn severity areas. Problems include locations of improper road drainage function and culverts at road-stream crossings. The undersized culverts cannot handle post-fire flow volume and the additional woody debris and sediment it carries. The quantity and effect of fire-related sediment-delivery increase is uncertain, due to variability in winter weather prior to the implementation of the Rim Fire Recovery.

STREAM CONDITION

Stream condition inventories were conducted along portions of 23 streams within the Rim Fire area between 2005 and 2012. These are part of the forestwide Stanislaus StreamScape Inventory (SSI) program to determine stream condition prior to management activities or for baseline watershed information (Frazier et al. 2008). SSI consists of 21 attributes of stream condition measured continuously along wadeable stream channels in lengths that have ranged from about 1 to nearly 10 miles. Some larger streams become wadeable by late summer, such as the Middle and South Forks of the Tuolumne River, the Clavey River and Reed Creek. They, among many of their tributaries, comprise the streams represented here. The main channel of the Tuolumne River has not been inventoried due to its size and regulated flow regime which create unsafe SSI working conditions. Table 3.14-6 summarizes the existing condition of these streams based on key indicators.

Table 3.14-6 Rim Fire Stream Condition Summary

Stream Channel Indicators				Stream Habitat Indicators					
Streambank Stability		Channel Form		Pool Tail Fine Sediment		Pool Bed Fine Sediment		Water Temperature Maximum	
%	Streams	% Normal or Rejuvenating	Streams	%	Streams	%	Streams	Deg. C and (F)	Streams
>75	21	>75	16	<10	16	<10	18	<15 (59)	10
50-75	1	50-75	4	10-20	3	10-20	3	15-20 (59-68)	9
<50	1	<50	3	>20	4	>20	2	>20 (68)	4

Stream Channels

Streambank stability is assessed in quartile percentage classes at 328-foot (100-meter) increments. The summary above represents the percentage of streambank stability on all streams inventoried. Twenty one of the 23 streams have a majority of their stream length in the greater than 75 percent stability quartile with no 328-foot increments less than 50 percent stable. This indicates the streambank stability for the surveyed stream is either fully or highly likely to be greater than 75 percent, which represents a very stable stream system. Numerous streams have over 90 percent of their length fully classified in the upper quartile.

Channel form, or cross-sectional shape, is assessed in SSI in four classes which depict excellent to poor condition. The Normal class is one whose channel fits proper morphological features for its stream type. These factors include width-to-depth and entrenchment ratios, streambank angle, and other measures of channel shape (Rosgen 1996). The Rejuvenating class is a channel form that shows evidence of legacy disturbance but is recovering or has recovered to good condition. These classes are combined to assess condition of the channel form. For example, a stream with more than 75 percent of its length in these classes, provided the Normal class is greater, is in very good condition. Sixteen of the inventoried streams are in this condition, while the remaining streams have some portions with evidence of accelerated incision or widening.

Overall, the two stream channel indicators show a high percentage of the inventoried streams were in very good condition prior to the Rim Fire. Stream condition is expected to be affected by post-fire erosion and sedimentation though the magnitude is uncertain, and is largely reliant upon winter weather events. Effects may be mitigated in areas that received BAER hillslope and road treatments in the fall of 2013.

Stream Habitat

SSI quantitatively measures stream pool sediment serving as indicators of stream habitat quality and sedimentation. Pools are the sediment reservoirs in streams. Sediment in stream pools is an indicator of erosion from the upstream watershed, and thus shows whether excessive input is present. Excessive sedimentation can arise from ground disturbing management activities such as timber harvest or roads, or from fires, floods or mass wasting (e.g., landslides, debris flows). Fine sediment is measured since it represents the smallest soil particles, which are the key components of aquatic habitat. Excessive fine sediment in stream pool tails can reduce fish spawning success. Excess pool bed sediment reduces pool area that can be used for fish rearing and productivity. Pool tail fine sediment is calculated at pool outlets, and pool bed fine sediment is measured throughout the full length of stream pools. Pool tail sediment less than 20 percent is usually considered suitable for fish spawning. Pool bed sediment, measured as the length of fine sediment deposition in a pool, characterizes the amount of settleable material (material heavy enough to sink to the bottom of a pool) sourced from the watershed. The same percentage threshold is used for pool bed sediment as for pool tails.

As shown in Table 3.14-6, pool tail and pool bed sediment were very low in the inventoried streams. It is not excessive since presence of native fish of all age classes are common or abundant in these streams. The amount of pool sediment in these streams is an indicator of a very stable watershed landscape, including recovery from past disturbances by wildfire and ground-disturbing management activities.

Water temperature was also excellent in these streams. The SSI data in Table 3.14-6 are the maximum daily temperatures and all are suitable for the native aquatic organism communities. Even the streams with maximum temperatures exceeding 68 degrees Fahrenheit, a threshold of concern for cold water fish, were only slightly higher and their minimum daily temperatures are well below the threshold.

Benthic macroinvertebrates (BMI) are another indicator of stream health. They were sampled in the Clavey River in 2007 as well as several of its tributaries within the Rim Fire perimeter as part of the stream condition inventory for the Clavey River Ecosystem Project (CREP 2008). The BMI data were evaluated using the River Invertebrate Prediction and Classification System (RIVPACS) (Hawkins et al. 2000). Numeric values very close to 1 indicate reference condition, meaning streams are in as good of condition as naturally occurs. Numbers exceeding 1 are better than what is expected. A score of 0.9 or 90 percent, means the stream health is in excellent condition. Streams and their BMI scores are as follows: Two Mile Creek (0.991), Hull Creek (1.106), Clavey River (0.927), Reed Creek (1.021), Bourland Creek (1.166), Cottonwood Creek (1.166), and Bear Springs Creek (0.932). No impairment of stream habitat or water quality was evident.

Between the time of collection of the stream condition data and the Rim Fire there were no significant management activity disturbances or natural events that would have been likely to substantially alter stream conditions.

WATER QUALITY CONDITION

Prior to the Rim Fire, water quality within the fire perimeter was considered excellent at all the watershed scales previously described. Throughout the main Tuolumne River and its tributaries there is substantial evidence of high quality water. The US Environmental Protection Agency maintains a list of waters with impaired water quality under Section 303(d) of the Federal Clean Water Act (CVRWQCB 2010). The Tuolumne River is not listed as an impaired stream, nor is the Merced River. At the smaller scale, SSI and BMI data collected in the Rim Fire area have shown evidence of excellent water quality where sampled in the watersheds across the fire area.

Water quality degradation resulting from erosion and stream sedimentation following the Rim Fire occurred as expected for a winter that turned out to be only about 50 percent of average precipitation with few storms exceeding a 1 to 2 year return interval. Early winter rainfall began to mobilize easily dislodged ash and streamside sediment in highly burned areas with little ground cover. Streams and rivers ran variably turbid, some very much so, during and after succeeding storms depending on rainfall intensity, soil type and other factors. Decreases in turbidity and sediment transport occurred between storms. This process of storm driven sediment delivery and transport repeated itself over the winter. Sediment mobilization, transport and deposition were minor to moderate, without major degradation.

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Direct and indirect effects of proposed activities are described below for 15 of 18 HUC 6 watersheds and five HUC 7 watersheds. Three HUC 6 watersheds (Big Creek, Upper Cherry Creek, and West Fork Cherry Creek) are not assessed below due to the negligible amount of high and moderate soil burn severity in their watersheds (Table 3.14-4). The selection of five HUC 7 watersheds is described in the Watershed Report Appendix A: Cumulative Watershed Effects Analysis Methodology.

Erosion and Sedimentation

Factors Affecting Erosion and Sedimentation

Soil Compaction

Compaction of soil from mechanized equipment can lead to hydrologic effects such as lower infiltration rates and increased runoff. These effects are anticipated to be greatest in the portion of the project area where ground-based salvage logging is proposed, less where cable logging is proposed, and least where helicopter logging is proposed.

Soil Displacement

In ground-based harvesting units, soil displacement may occur where logs are dragged to skid trails using end lining. Less soil displacement occurs with hand felled trees that have one-end suspension to a dozer or skidder. When feller-bunchers are used, there is less dragging of individual logs because the feller-buncher can "bunch" these logs into a pile for the skidder to move. However, additional displacement of soil may occur in the feller-buncher tracks, particularly where the equipment has turned.

In skyline harvesting units, soil displacement may occur in harvest corridors where full suspension is not possible and logs are dragged on the ground. In addition, portions of some skyline units with slopes less than 45 percent may utilize a feller-buncher to cut the trees. In these locations, additional soil displacement may occur as a result of feller-buncher tracks.

In helicopter units, hand felling and lifting of trees is anticipated to result in negligible soil displacement. However, portions of some helicopter units with slopes less than 45 percent may utilize a feller-buncher to cut the trees. In these locations, additional soil displacement may occur as a result of feller-buncher tracks.

Ground Cover

Management requirements were designed to maintain or increase ground cover in near-stream areas. Within RCAs, ground cover is expected to increase under the proposed action as a result of maintaining post-fire conifer needle cast, application of ground cover through logging slash or other means, and natural recovery of live vegetation. A maximum of 10 tons per acre of fuel loading is allowed.

Erosion and Sedimentation from Treatment Activities

BMP monitoring is completed annually on the Stanislaus National Forest to assess the effectiveness of BMPs. See the Watershed Report (project record) for a description of BMP effectiveness in preventing and minimizing erosion and sedimentation on past projects.

Salvage of Merchantable and Nonmerchantable Trees

Research on salvage logging has shown large variability in sediment production. Some studies have concluded that salvage logging may reduce post-fire sediment production rates by reducing hydrophobicity and disturbing sealed soil surfaces, while others have found increased sediment production rates due to soil compaction and ground disturbance (Chase 2006). Silins et al. found that post-fire salvage logging creates more effective terrestrial sediment transport networks to stream channels and produced more sediment than areas burned but not logged (Silins et al. 2009). Others have found difficulty in distinguishing between erosion due to logging and that from the fire itself (McIver and Starr, 2001). On the Stanislaus National Forest, research following the Stanislaus Complex Fire in 1987 found that differences in sediment production from logged and unlogged sites were not statistically significant. This was attributed to either the high variability in disturbance within each treatment or the large effect of the fire itself on sediment output (Chou et al. 1994).

The type of logging system used can affect sediment production. Helicopter logging and cable yarding systems with partial or full suspension typically have smaller impacts on sediment production (Beschta et al. 2004). Chou et al. measured 18 percent ground disturbance in cable logged units and 35 percent ground disturbance in tractor logged units following the Stanislaus Complex Fire (Chou et al. 1994). Chase found no difference in sediment production between tractor, cable, and helicopter sites due to the variability between sites. However, he was able to conclude that post-fire salvage logging treatments that increase ground disturbance and bare soil would generate more sediment (Chase 2006).

Erosion and sedimentation monitoring on green timber sales on four national forests in California has shown that timber harvest alone rarely initiates large amounts of runoff and surface erosion. Most erosion was initiated by skid trails (Litschert and MacDonald 2009). This research found that sediment delivery from timber harvest may be reduced by locating skid trails away from streams, maintaining high surface roughness downslope of waterbars, and promptly decommissioning skid trails following harvest. Concentrated flow from a skid trail or waterbar was more likely to form a rill or sediment plume when the downslope area had low surface roughness (Litschert and MacDonald 2009). Research on salvage logging tends to agree with the research on green sales. Proper installation and maintenance of waterbars on skid trails and cable corridors should help minimize the increase in sediment production due to salvage logging (Chase 2006).

Despite the variability in research results, some key points are brought up repeatedly in the literature including: (1) Minimize compaction to the extent possible; (2) Minimize soil displacement; (3) Maintain or increase ground cover to filter sediment. Management requirements and BMPs were designed to accomplish these three tasks.

Erosion modeling using Disturbed WEPP (Elliot and Hall 2010) was conducted within the fire perimeter to determine both post-fire (pre-implementation) and post-implementation annual erosion rates for the first year post-fire. These annual erosion rates are based on weather events with a 5-year recurrence interval. Chapter 3.11 (Soils) provides more information on the Disturbed WEPP model and assumptions, as well as unit specific analyses. Table 3.14-7 models erosion rates in each watershed.

Table 3.14-7 Alternative 1: Post-Fire and Post-Implementation Erosion Rates and Percent Change for Each Watershed

HUC Level and Name	Post-Fire Erosion Rate (tons per acre)	Post-Implementation Erosion Rate (tons per acre)	Erosion Rate[1] Change (%)
6 - Grapevine Creek-Tuolumne River	2.0	2.0	0.0
6 - Jawbone Creek-Tuolumne River	3.6	3.6	0.0
7 - Corral Creek	4.7	4.4	-6.4
7 - Lower Jawbone Creek	4.9	4.8	-2.0
6 - Lower North Fork Tuolumne River	0.9	0.9	0.0
6 - Lower Clavey River	2.9	2.9	0.0
7 - Bear Springs Creek	3.1	3.0	-3.2
6 - Middle Clavey River	1.2	1.2	0.0
6 - Reed Creek	1.4	1.3	-7.1
7 - Lower Reed Creek	3.2	3.1	-3.1
6 - Lower Cherry Creek	2.4	2.4	0.0
7 - Granite Creek	3.6	3.7	2.8
6 - Miguel Creek-Eleanor Creek	1.1	1.1	0.0
6 - Poopenaut Valley-Tuolumne River	1.4	1.4	0.0
6 - Lower Middle Fork Tuolumne River	2.9	2.8	-3.4
6 - Upper Middle Fork Tuolumne River	0.9	0.9	0.0
6 - Lower South Fork Tuolumne River	3.1	3.1	0.0
6 - Upper South Fork Tuolumne River	0.9	0.9	0.0
6 - Bull Creek	0.6	0.6	0.0
6 - Bean Creek-North Fork Merced River	0.7	0.7	0.0

[1] Negative percent change indicates reduced erosion. Positive percent change indicates increased erosion.

Thirteen of the fifteen HUC 6 watersheds are anticipated to have negligible changes in erosion at the watershed scale (Table 3.14-7). The two HUC 6 watersheds with projected changes in erosion (Reed Creek and Lower Middle Fork Tuolumne River) had lower erosion rates post-implementation than post-fire. This is attributed to increased ground cover in high vegetation burn severity areas due to the addition of activity fuels. The modeling indicated that all five HUC 7 watersheds would have changed erosion rates following project implementation. Four of the five watersheds would have decreased erosion rates. One of the watersheds, Granite Creek, was projected to have an increase in erosion from 3.6 tons per acre to 3.7 tons per acre. This was attributed to the hazard tree treatment in lightly burned areas where ground cover is anticipated to decrease.

Both increases and decreases in erosion rates at the watershed scale were very minimal. The largest volumetric rate change was 0.3 tons per acre in the Corral Creek watershed and the largest percent change was -7.1 percent in the Reed Creek watershed.

Although modeling results indicate that changes in erosion rates would likely be minimal as a result of the proposed action, stream sedimentation still has the potential to occur as a result of the proposed action, particularly in areas where logging activities create more effective sediment transport networks to stream channels. From a hydrologic standpoint, increased compaction, increased soil displacement, and changes in ground cover are most critical in the near stream areas where stream sedimentation is most likely. Knowledge of soil burn severity in these areas is important because areas of low soil burn severity have much greater potential to filter sediment than areas of high soil burn severity. Table 3.14-8 describes salvage logging acres (combined salvage units and hazard tree removal) within 100 feet of perennial or intermittent streams and special aquatic features (SAFs) by soil burn severity. All system types (ground-based, skyline, and helicopter) are included in this table. The table likely overestimates logging acreage in low soil burn severity areas because any green trees would not be removed unless they were an imminent hazard to a road.

Table 3.14-8 Alternative 1: Salvage Logging by Soil Burn Severity Within 100 feet of a Perennial Stream, Intermittent Stream, or Special Aquatic Feature

HUC Level and Name	**Salvage Logging Within 100 Feet of a Perennial Stream, Intermittent Stream, or Special Aquatic Feature** (acres)		
	High Soil Burn Severity	**Moderate Soil Burn Severity**	**Low Soil Burn Severity**
6 - Grapevine Creek-Tuolumne River	0	26	35
6 - Jawbone Creek-Tuolumne River	73	177	50
7 - Corral Creek	42	66	19
7 - Lower Jawbone Creek	7	49	2
6 - Lower North Fork Tuolumne River	1	14	24
6 - Lower Clavey River	6	47	54
7 - Bear Springs Creek	6	26	31
6 - Middle Clavey River	6	72	156
6 - Reed Creek	47	101	81
7 - Lower Reed Creek	46	91	25
6 - Lower Cherry Creek	58	132	35
7 - Granite Creek	47	76	4
6 - Miguel Creek-Eleanor Creek	0	4	13
6 - Poopenaut Valley-Tuolumne River	4	4	1
6 - Lower Middle Fork Tuolumne River	47	333	140
6 - Upper Middle Fork Tuolumne River	0	12	8
6 - Lower South Fork Tuolumne River	11	174	264
6 - Upper South Fork Tuolumne River	0	6	20
6 - Bull Creek	0	6	11
6 - Bean Creek-North Fork Merced River	0	17	28

Despite implementation of BMPs and management requirements, increased stream sedimentation is anticipated as a result of the proposed action, particularly in areas where logging activities create more effective sediment transport networks to stream channels. This is more likely to occur in the Jawbone Creek-Tuolumne River, Corral Creek, Reed Creek, Lower Reed Creek, Lower Cherry Creek, Granite Creek, and Lower Middle Fork Tuolumne River watersheds than in other HUC 6 or HUC 7 watersheds due to the larger acreages of near-stream high soil burn severity.

Piling and Burning

Lop and scatter in the helicopter units would increase ground cover and improve contact of ground cover with the soil, increasing the ability of the ground cover to filter sediment. This fuel reduction treatment is anticipated to reduce soil erosion in the units where it is implemented.

Jackpot burning and hand piling and burning would result in reduced fuel loading with very little ground disturbance. Although some soil movement could occur following these activities, it is anticipated to be minor and short term.

Machine piling could be implemented using either a dozer (dozer piling) or an excavator or other similar piece of equipment (grapple piling). Management requirements would prohibit machine piling within 25 feet of an ephemeral stream and within 50 feet of a perennial stream, intermittent stream, or SAF. The disturbance caused by dozer piling is expected to be greater than that caused by grapple piling. That is because the dozer would push the fuels into a pile, whereas an excavator would pick up and place fuels into a pile.

In areas of low soil burn severity, riparian buffers are anticipated to be largely intact and have ground cover capable of filtering sediment movement resulting from machine piling. In areas of moderate soil burn severity, riparian buffers may be variable. However, ground cover in the form of needle cast can help filter runoff caused by machine piling disturbance. In areas of high soil burn severity little, if any, ground cover remains to filter sediment laden runoff resulting from the impacts of machine piling. However, implementation of BMPs and management requirements, including increasing ground cover within 100 feet of perennial and intermittent streams and SAFs provides for increased ground cover in these areas. Although it is anticipated that some sediment could reach streams as a result of machine piling, streamside buffers, needle cast, and/or placed ground cover should minimize this.

Roads

Forest roads cause hydrological effects by concentrating and channelizing surface and subsurface flow. Following wildfire, the ability of the landscape to filter runoff from roads can be reduced due to a decrease in ground cover (Peterson 2009).

Road Construction

By altering infiltration rates, road construction can increase overland flow rates and sediment yields (USDA 2013). Soil erosion associated with roads is highest during the first year or two following construction. This is due to the cut banks and fill slopes needing time to revegetate and stabilize (Peterson 2009).

Increases in permanent road mileage by 5.4 miles as a result of the proposed action range from a 0.08 percent increase in the Upper South Fork Tuolumne River watershed to a 1.79 percent increase in the Middle Clavey River watershed. This would include 6 new permanent stream crossings along the newly constructed roads. BMPs and management requirements would limit sediment inputs to streams during road construction.

Although some erosion and sedimentation is anticipated as a result of these activities, particularly in the first year or two following construction, overall increases in erosion and sedimentation are anticipated to be low as the percent increase in road mileage is low.

Road Reconstruction and Maintenance

Reconstruction is proposed on 320 miles of roads and maintenance is proposed on an additional 216 miles of road. Activities on temporary use-revert roads (8.4 miles) are anticipated to be similar to reconstruction. On road surfaces that are draining well, maintenance is important because a lack of road maintenance can result in progressive degradation of road-drainage structures and functions (USDA 2013). However, increased drainage features such as culverts and dips are needed on some roads to minimize hydrologic effects. This is particularly important with increased runoff from hillslopes following fire. In these situations, reconstruction is required to adequately improve drainage features and minimize impacts.

Erosion and sedimentation is anticipated along maintained and reconstructed roads. However, implementation of BMPs and management requirements are expected to minimize these effects. Road reconstruction may actually reduce erosion and sedimentation that is currently occurring as this treatment would involve improving road drainage features.


Culvert was destroyed by the heat of the Rim Fire.

Temporary Road Construction

Of the 13.9 miles of temporary roads identified for use under Alternative 1, 10.0 miles (72 percent) already exist on the ground as non-system routes. While additional traffic on these routes would cause soil disturbance and has the potential for increased erosion and sedimentation, these routes would be decommissioned following use, resulting in a net decrease of 10.0 miles of road on the landscape. The 3.9 miles of new temporary roads would reduce infiltration and lead to potential increases in erosion and sedimentation. However, decommissioning these roads after use would reduce these impacts in the long term.

Material Source Development

Of the seven material source sites proposed for use, Jawbone Quarry, Duckwall Quarry, and Bourland Quarry are located closest to surface waters. Jawbone Quarry and Bourland Quarry are about 200 feet from the nearest stream and are bounded by a road, which would prevent further expansion towards surface waters. Duckwall Quarry is located on private land and has an intermittent channel running under the site through a culvert. Soil burn severity was primarily low surrounding this site, so the potential of vegetation to filter sediment moving off site remains high. All three sites were utilized in previous timber sales with no reports of water quality concerns.

Due to distance from surface waters, roads preventing site expansion towards surface waters, filtering potential of remaining vegetation, and applications of BMPs and management requirements, erosion and sedimentation originating from material source sites are anticipated to be negligible.

Water Source Development

Eighty-one potential water sources are identified under the proposed action. However, BMPs and management requirements include minimum flow requirements for both fish-bearing and non-fish bearing streams. It is anticipated that many of the proposed drafting sites would not be approved for use due to low flows.

BMP effectiveness monitoring shows that water source development was completed effectively in the past and resulted in only minimal sediment inputs to streams. The effects of water source development on erosion and sedimentation are anticipated to be minimal under the proposed action.

Fuel Loading

The proposed action would reduce the fuel loading in the project area watersheds. Coarse woody debris would be reduced to about 10 tons per acre. This would result in lower flame lengths and fireline intensities, allowing for direct attack of future wildfires. These reduced fuel loadings could be maintained with prescribed fire. Increased erosion following fire is related to the amount of vegetation removed. Prescribed burns, by design, do not consume extensive areas of organic matter (Baker 1990). Therefore, prescribed fires have little impact on erosion and sedimentation, whereas intense wildfires may have substantial impacts (Brooks et al. 1997). Reducing fuel loading and then maintaining this with prescribed fire has less potential for erosion and sedimentation than allowing fuel loading to increase as snags fall and having another large stand-replacing wildfire in the future. The Fuels Report (project record) has more information on fuel loading.

Riparian Vegetation

Riparian vegetation may be beneficially affected by the proposed action where burned overstory trees are removed. Increasing sunlight in streamside areas provides an energy input that often stimulates regrowth of the riparian plant community. Though this effect is largely a result of the fire removing stream shade cover and moisture competition, removal of burned tree boles may have a slight incremental effect. Another variable affecting riparian plant growth is the short term increase in streamflow and near-stream ground water following a fire as a result of a reduction in plant transpiration due to tree mortality.

One fen was identified within the roadside hazard tree removal area. No fens are within salvage treatment units. Removal of hazard trees near the fen is not anticipated to affect it, as management requirements such as equipment exclusion zones would be implemented.

There are about 60 acres of meadows identified within the proposed action treatment units. Tree removal along meadow edges is not expected to affect meadows, as management requirements would be implemented.

Stream Condition

Stream Flow

Water yield typically increases in the first year following wildfire due to a reduction in soil water storage, interception, and evapotranspiration when vegetation is killed. This change decreases with time as vegetation reoccupies a watershed (Peterson et al. 2009). Under the proposed action, live trees would only be removed if they are a hazard tree and pose a risk to health and safety. Otherwise, all trees proposed for harvest would be dead and their removal would not affect soil water storage, interception, or evapotranspiration beyond the changes that already occurred as a result of the fire.

Modeling has indicated that increased surface roughness promotes infiltration and reduces overland flows, leading to reduced storm peak events and total flows (Smith et al. 2011). BMPs and management requirements under the proposed action would involve adding ground cover and minimizing compaction. Therefore, measurable changes in stream flow are not anticipated to result under the proposed action.

Stream Morphology

Prior to the Rim Fire, stream surveys throughout the project area indicated that most stream banks were stable and that channel form was predominately either normal (no active downcutting or evidence of accelerated past incision) or rejuvenating (evidence of legacy disturbance, but channel has recovered or is recovering to good condition).

Increased high peak flows following the Rim Fire have the potential to cause channel incision, primarily in low-gradient stream reaches with small, mobile substrate. However, measureable changes in flow are not anticipated as a result of the proposed action. Therefore, if channel incision does occur within the project area, it is likely the result of the fire or from large storms, not the proposed action.

Stream banks that were stable pre-fire may no longer have adequate cover to maintain their stability. This is particularly the case in areas of high soil burn severity. As discussed above, riparian vegetation is resilient following fires and is expected to flourish in the post-fire conditions of increased sunlight and water. This would allow for natural recovery of bank stability. The effect of the proposed action on streambank stability is expected to be minimal. Mechanized equipment exclusion zones are applied to all streams so that equipment is only allowed on stream banks at designated crossing locations. Skid trail stream crossings are limited to two per mile on perennial and intermittent streams and three per mile on ephemeral streams. Management requirements to maintain or provide ground cover within 100 feet of perennial and intermittent streams would provide for stability while riparian vegetation recovers.

Large Woody Debris

Following wildfire, snags falling into streams may be the main source of wood to streams until trees in the post-fire riparian areas are large enough to fall into streams and create habitat (Reeves 2006). Under the proposed action, existing downed large woody debris in the channel would be retained. In addition, a minimum of 20 pieces of large woody debris per mile of perennial or intermittent stream would be retained and felled into the stream channel. As a result of the proposed action, large woody debris levels in streams would increase in the short term following project implementation. Levels would be lower, in the long term, however, than if harvesting did not occur near stream channels. The Aquatics section gives more information on large woody debris.

Water Quality (Beneficial Uses of Water)

Uses of water for the Tuolumne River from its source to New Don Pedro Reservoir are municipal and domestic supply, irrigation, stock watering, power, contact and non-contact recreation, warm and cold water freshwater habitat, and wildlife habitat. Existing uses of water for the Merced River from its source to McClure Lake are irrigation, power, contact and non-contact recreation, warm and cold water freshwater habitat, and wildlife habitat. A potential use for the Merced River is municipal and domestic water supply (CVRWQCB, 2011). Beneficial uses are maintained when their related water quality objectives are met. Water quality objectives that could be affected by the proposed action are water temperature, sediment related parameters (sediment, settleable material, suspended material, and turbidity), and pesticides. There are no 303(d) listed impaired waterbodies within the project analysis area. This indicates that water quality is excellent at this large scale.

Water Temperature

Stream channel shade is highly influential in regulating water temperatures (Rutherford et al. 2004). Channel shade was reduced in portions of the project area where near-stream trees were killed by the fire. Removal of the near-stream dead conifer trees is anticipated to have very little effect on stream shading. These trees, if left standing, would provide little to no shade in the future. Therefore, warm and cold water freshwater habitat would not be affected by the proposed action.

Sediment-Related Parameters

None of the sediment related beneficial uses of water should be impaired as a result of the proposed action. Minor, short term increases in sediment related parameters are expected but not to the extent of adversely affecting beneficial uses. Anticipated sediment increases vary by watershed based on amount of project activity and watershed effects of the Rim Fire. None of the streams with special designations such as Wild and Scenic Rivers or Heritage Trout Waters are expected to be adversely affected. No known impairment of beneficial uses has occurred as a result of other past fire salvage harvesting on the Stanislaus National Forest in settings where the percentage of high soil burn severity was greater than the Rim Fire.

Pesticides (Registered Borate Compound)

A registered borate compound is proposed for application to tree stumps 14 inches and greater in diameter to limit the spread and establishment of new centers of annosum root disease within mixed severity harvest areas. Following application to tree stumps, rainfall and consequent runoff could lead to contamination of standing water or streams. In addition, accidental spills into a small body of water are possible (USDA 2006). However, given the highly focused application method for borate, application of granular product to cut tree stump surfaces, the potential to contaminate surface water is limited. In addition, management requirements, including not applying within 10 feet of surface water, when rain is falling, or when rain is likely that day (i.e. when the National Weather Service forecasts 50 percent or greater chance), would minimize any actual effect to a minor or negligible amount. Effects to municipal and domestic supply and warm and cold freshwater habitat are not anticipated. Contact with borate is not anticipated by recreation activities. The Risk Assessment Report for Registered Borate Application has more information on the registered borate application.

CUMULATIVE EFFECTS

The process for analyzing cumulative watershed effects (CWE) consists of two steps: (1) an office evaluation which consists of determining the risk of cumulative effects using a predictive model and researching watershed history, and (2) field evaluation of streamcourse indicators of cumulative effects.

Step 1, the risk of cumulative effects, is evaluated using the Forest Service equivalent roaded acreage (ERA) methodology, adopted by Region 5 as a method of addressing cumulative watershed effects (USDA 1990). A description of the ERA methodology can be found in the Watershed Report Appendix A: Cumulative Watershed Effects Analysis Methodology.

Step 2, field evaluation, is necessary for comparing the modeled ERA prediction with actual and expected future field conditions. Project-related water quality parameters and watershed condition are evaluated via in-stream and near-stream indicators of condition. This evaluation is essential to help interpret cumulative effects of past projects and potential cumulative effects given proposed activities and other reasonably foreseeable future activities. Field review was used to verify that the geographic and temporal extent of analysis was adequate for evaluation of cumulative watershed effects (Connaughton 2005).

Equivalent Roaded Acres (ERAs)

The CWE ERA analysis was conducted on all lands (public and private) within twelve HUC 6 and five HUC 7 level watersheds. GIS analysis was used to calculate acreages of activities in the watersheds. ERA values for these activities were summed and then were compared to a Threshold of Concern (TOC). The TOC for all HUC 6 and HUC 7 watersheds analyzed was 12 to 14 percent. Table 3.14-9 gives a summary of ERA values by watershed.

Previous analyses on the forest have indicated that the effects of livestock grazing at the watershed scale are very low. Ground disturbance from livestock grazing is essentially a site issue rather than a watershed scale issue. This is because the spatial impacts of livestock grazing are much higher in low gradient stream channels through meadows than in upland areas, and low gradient stream areas make up an extremely small percentage of the watershed acreage in this project. This results in negligible change to ERA values. Because of this, cumulative impacts of grazing are described narratively for this project.

HUC 6 and 7 Watersheds

Management requirements and BMPs were proposed to maintain or improve current conditions in the watersheds. This includes increasing ground cover within 100 feet of perennial and intermittent streams and SAFs and exclusion zones for ground-based equipment. Effectiveness monitoring is done annually on projects throughout the forest at randomly selected sites to determine if BMPs were effective. If Alternative 1 was selected, additional monitoring beyond effectiveness monitoring would be required by the Central Valley Regional Water Quality Control Board for all watersheds (both HUC 6 and HUC 7) over the TOC. Forensic monitoring inspections would be conducted during the winter period. These inspections are designed to detect potentially significant sources of pollution such as failed management measures or natural sources. The goal of winter forensic monitoring is to locate sources of sediment production in a timely manner so that rapid corrective action may be taken where feasible and appropriate (CVRWQCB 2005). In addition, in accordance with the Region 5 Forest Service Water Quality Management Handbook, project-level in-channel monitoring would be conducted following the Stream Condition Inventory (SCI) protocol (USDA 2011, Frazier et al. 2005).

Table 3.14-9 Alternative 1: Annual Percent ERA for HUC 6 and HUC 7 Analysis Watershed

HUC Level and Name	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
6 - Grapevine Creek-Tuolumne River	4.31	3.51	2.52	2.37	2.19	2.01	1.83	1.70	1.56	1.43
6 - Jawbone Creek-Tuolumne River	16.24[1]	14.89[1]	11.79	10.34	8.80	7.08	5.46	4.51	3.57	2.63
7 - Corral Creek	20.03[1]	21.39[1]	17.96[1]	15.86[1]	13.61[1]	10.80	8.01	6.70	5.39	4.08
7 - Lower Jawbone Creek	14.00[1]	12.75[1]	9.47	8.58	7.55	6.26	4.98	4.20	3.43	2.66
6 - Lower Clavey River	9.59	8.94	7.13	6.40	5.65	4.78	3.93	3.27	2.62	2.00
7 - Bear Springs Creek	13.00[1]	12.44[1]	10.28	9.14	8.00	6.67	5.37	4.38	3.38	2.50
6 - Middle Clavey River	4.93	5.42	4.93	5.32	5.62	5.77	5.05	4.44	3.83	3.24
6 - Reed Creek	8.23	9.47	8.48	8.05	7.17	6.12	5.04	4.30	3.58	2.85
7 - Lower Reed Creek	17.47[1]	18.10[1]	15.40[1]	13.40[1]	11.50	9.23	7.07	5.90	4.73	3.56
6 - Lower Cherry Creek	11.36	10.11	7.91	6.95	5.93	4.82	3.74	3.15	2.55	1.96
7 - Granite Creek	26.52[1]	24.13[1]	19.54[1]	16.92[1]	14.18[1]	11.18	8.29	6.82	5.35	3.90
6 - Miguel Creek-Eleanor Creek	3.69	2.64	1.36	1.12	0.89	0.63	0.37	0.32	0.28	0.23
6 - Poopenaut Valley-Tuolumne River	4.56	3.30	1.91	1.63	1.32	0.99	0.66	0.60	0.54	0.49
6 - Lower Middle Fork Tuolumne River	12.72[1]	15.13[1]	13.25[1]	12.18[1]	10.92	9.34	7.82	6.62	5.43	4.25
6 - Upper Middle Fork Tuolumne River	3.74	2.78	1.74	1.36	0.99	0.60	0.22	0.20	0.17	0.15
6 - Lower South Fork Tuolumne River	9.13	9.91	8.58	7.94	7.50	6.51	5.59	4.87	4.15	3.44
6 - Upper South Fork Tuolumne River	3.19	2.47	1.56	1.34	1.11	0.88	0.66	0.60	0.54	0.47

[1] Denotes watersheds over the TOC

Stream condition in the project area watersheds was evaluated to identify indications of past or present cumulative effects, and the potential for adverse impacts from future cumulative effects. The evaluation of stream condition included pre-fire stream surveys in most watersheds following the StreamScape Inventory (SSI) Protocol, which included observations of streambed sediment, streambank stability, and attributes of stream morphology (Frazier et al. 2008).

All watersheds which exceeded the TOC are discussed in detail below.

Jawbone Creek-Tuolumne River (HUC 6), Corral Creek (HUC 7), and Lower Jawbone Creek (HUC 7)

ERA Summary

Under Alternative 1, the ERA in the Jawbone Creek-Tuolumne River watershed would increase from its current 14.68 percent (no action) to 16.24 percent in the first year of implementation, 2014. This is the maximum ERA. The ERA falls back below the TOC by 2016 and by 2023 is down to 2.63 percent. The previous activities in the watershed, which have an ERA value of 9.99 percent in 2014, are large contributors to the high ERA values. These activities include the fire itself, fire suppression, timber harvest on private and NFS lands before the fire, and salvage activities on private lands after the fire.

The ERA in the Corral Creek HUC 7 watershed would increase from its current 16.33 percent (no action) to 20.03 percent in the first year of implementation, 2014. This would further increase in 2015, with a maximum ERA of 21.39 percent. The ERA falls back below the TOC by 2019 and by 2023 is down to 4.08 percent. The ERA is over the 12 to 14 percent threshold of concern for this watershed. This is due in large part to the previous activities in the watershed, which have an ERA value of 12.71 percent. With few previous land management activities in the watershed, the main reason the previous activities ERA was so high was because 89 percent of the watershed burned at high or moderate soil burn severity.

The ERA in the Lower Jawbone Creek HUC 7 watershed would increase from its current 11.80 percent (no action) to 14.00 percent in the first year of implementation, 2014. This is the maximum ERA. The ERA falls back below the TOC by 2016 and by 2023 is down to 2.66 percent. The ERA is over the 12 to 14 percent threshold of concern for this watershed. This is due in large part to the previous activities in the watershed, which have an ERA value of 9.95 percent. With few previous land management activities in the watershed, the main reason the previous activities ERA was so high was because 85 percent of the watershed burned at high or moderate soil burn severity.

Stream Condition Summary

Pre-fire stream surveys in the Jawbone Creek-Tuolumne River watershed were conducted in Drew Creek and Corral Creek. Surveys indicated that the condition of Drew Creek was good overall (i.e., stable banks, normal channel morphology, and low pool bed sediment). The RCA surrounding Drew Creek burned at low severity, so stream condition post-fire is likely the same as pre-fire. Very little treatment is proposed under Alternative 1 in the southern part of the Jawbone Creek-Tuolumne River watershed near Drew Creek, so stream condition is anticipated to remain good.

Pre-fire stream surveys in Corral Creek, on the other hand, showed much of the channel to be rejuvenating from past disturbance. Pre-fire bank stability was moderate, and was substantially reduced by the fire. This stream is still sensitive to further disturbance. Due to this sensitivity, additional management requirements were put in place for Corral Creek. A large equipment exclusion zone prohibits mechanized equipment between Corral Creek and its near-stream roads. Ground cover will be maintained or provided along its banks to minimize erosion and increase stability. This is in addition to 700 acres of straw mulch that was applied to the watershed as part of BAER treatments. Despite these treatments, Corral Creek is one of the areas which have the greatest potential for stream sedimentation following treatment.

Pre-fire stream surveys were not conducted in the Lower Jawbone Creek HUC 7 watershed. However, the acreage of high soil burn severity in this watershed was relatively low (10 percent). There was only 3 percent high soil burn severity within 100 feet of streams, meaning that most of the high soil burn severity was on the hillslopes. In this watershed, only 7 acres of salvage logging treatment is proposed in a high soil burn severity area within 100 feet of a perennial stream, intermittent stream, or SAF. This low acreage of treatment proposed within the highest risk area makes it likely that any increases in sedimentation would be minimal.

The proposed action is anticipated to result in increased sedimentation in the Jawbone Creek-Tuolumne River watershed, particularly in the Corral Creek HUC 7 watershed. However, management requirements and BMPs are anticipated to minimize these effects to the extent feasible. Monitoring is anticipated to identify any problem areas so that corrective action could be taken quickly. Due to these mitigations, the proposed action is not anticipated to result in adverse off-site cumulative effects to sediment-related water quality parameters or to watershed condition (i.e. degradation of stream channel morphology, accelerated erosion or loss of soil productivity). The proposed action also is not anticipated to result in cumulative effects to water temperature, as only dead trees would be removed and these provide minimal shade.

Bear Springs Creek (HUC 7)

ERA Summary

The ERA in the Bear Springs Creek HUC 7 watershed would increase from its current 11.36 percent (no action) to 13.00 percent in the first year of implementation, 2014. This is the maximum ERA. The ERA falls back below the TOC by 2016 and by 2023 is down to 2.50 percent. The ERA is over the 12 to 14 percent threshold of concern for this watershed. This is due in large part to the previous activities in the watershed, which have an ERA value of 5.92 percent. These previous activities include the fire itself, in which 50 percent of the watershed burned at moderate or high soil burn severity, as well as timber activities (both green tree sales and salvage) on private lands. An additional 4.20 percent of the ERA is attributed to planned salvage activities on private land as well as hazard tree removal on NFS lands along maintenance level 3, 4, and 5 roads.

Stream Condition Summary

Pre-fire stream surveys were not conducted in the Bear Springs Creek HUC 7 watershed. However, the acreage of high soil burn severity in this watershed was low (7 percent). Only 2 percent high soil burn severity occurs within 100 feet of streams, meaning that most of the high soil burn severity was on the hillslopes. In the Bear Springs Creek watershed, only 6 acres of salvage logging treatment is proposed in a high soil burn severity area within 100 feet of a perennial stream, intermittent stream, or SAF. This low acreage of treatment proposed within the highest risk area makes it likely that any increases in sedimentation would be minimal. Due to implementation of management requirements and BMPs, as well as monitoring to identify problem areas, the proposed action is not anticipated to result in adverse off-site cumulative effects to sediment-related water quality parameters or to watershed condition (i.e. degradation of stream channel morphology, accelerated erosion or loss of soil productivity). The proposed action also is not anticipated to result in cumulative effects to water temperature, as only dead trees would be removed and these provide minimal shade.

Lower Reed Creek (HUC 7)

ERA Summary

The ERA in the Lower Reed Creek HUC 7 watershed would increase from its current 14.98 percent (no action) to 17.47 percent in the first year of implementation, 2014. This would further increase in 2015, with a maximum ERA of 18.10 percent. The ERA falls back below the TOC by 2018 and by 2023 is down to 3.56 percent. The ERA is over the 12 to 14 percent threshold of concern for this watershed. This is due in large part to the previous activities in the watershed, which have an ERA value of 12.38 percent in 2014. These previous activities include the fire itself, in which 62 percent of the watershed burned at moderate or high soil burn severity, as well as timber activities (both green tree sales and salvage) on private and NFS lands.

Stream Condition Summary

Reed Creek and Niagara Creek are the main channels in the Lower Reed Creek watershed. Reed Creek had high bank stability pre-fire and had 99 percent of its length in a normal channel form. Niagara Creek had more evidence of past instability, with sections of low bank stability (6 percent of surveyed length) and almost half its length incised, incised and widened, or rejuvenating. Despite this, both streams had low pool bed and pool tail sediment.

In the Lower Reed Creek watershed, 46 acres of salvage logging treatment is proposed in a high soil burn severity area within 100 feet of a perennial stream, intermittent stream, or SAF. Reed Creek is bedrock controlled and highly erosion resistant, so changes in stream channel form are unlikely. Niagara Creek is more sensitive to disturbance, as its dominant substrate is gravel which is much more easily mobilized in high flows. Management requirements and BMPs were designed to address this sensitivity. This includes equipment exclusion zones and ground cover treatments. In addition, about 1,900 acres of straw mulch was applied to this watershed as part of BAER treatments. Despite these treatments, the Lower Reed Creek HUC 7 watershed is one of the areas which have the greatest potential for stream sedimentation following treatment.

The proposed action is anticipated to result in increased sedimentation in the Lower Reed Creek watershed. However, management requirements and BMPs are anticipated to minimize these effects to the extent feasible. Monitoring is anticipated to identify any problem areas so that corrective action could be taken quickly. Due to these mitigations, the proposed action is not anticipated to result in adverse off-site cumulative effects to sediment-related water quality parameters or to watershed condition (i.e. degradation of stream channel morphology, accelerated erosion or loss of soil productivity). The proposed action also is not anticipated to result in cumulative effects to water temperature, as only dead trees would be removed and these provide minimal shade.

Granite Creek (HUC 7)

ERA Summary

The ERA in the Granite Creek HUC 7 watershed would increase from its current 24.68 percent (no action) to 26.52 percent in the first year of implementation, 2014. This is the maximum ERA. The ERA falls back below the TOC by 2019 and by 2023 is down to 3.90 percent. The ERA is over the 12 to 14 percent threshold of concern for this watershed. This is due primarily to the previous activities in the watershed, which have an ERA value of 17.66 percent in 2014. These previous activities include the fire itself, in which 92 percent of the watershed burned at moderate or high soil burn severity, as well as timber activities (both green tree sales and salvage) on private and NFS lands.

Stream Condition Summary

No pre-fire SSI data was collected for the Granite Creek watershed. In this watershed, 47 acres of salvage logging treatment is proposed in a high soil burn severity area within 100 feet of a perennial stream, intermittent stream, or SAF. The granitic soil prevalent in this watershed is highly erodible. About 30 percent of the watershed burned at high soil burn severity, and an additional 62 percent burned at moderate soil burn severity. Because of this sensitivity, about 750 acres of straw mulch was applied to the Granite Creek watershed as part of BAER treatments.

The proposed action is anticipated to result in increased sedimentation in the Granite Creek watershed. This watershed experienced the greatest burn severity of any of the HUC 7 watersheds. However, management requirements and BMPs are anticipated to minimize these effects to the extent feasible. Monitoring is anticipated to identify any problem areas so that corrective action could be taken quickly. Due to these mitigations, the proposed action is not anticipated to result in adverse off-site cumulative effects to sediment-related water quality parameters or to watershed condition (i.e. degradation of stream channel morphology, accelerated erosion or loss of soil productivity). The proposed action also is not anticipated to result in cumulative effects to water temperature, as only dead trees would be removed and these provide minimal shade.

Lower Middle Fork Tuolumne River (HUC 6)

ERA Summary

The ERA in the Lower Middle Fork Tuolumne River watershed would increase from its current 9.96 percent (no action) to 12.72 percent in the first year of implementation, 2014. This would further increase in 2015, with a maximum ERA of 15.13 percent. The ERA falls back below the TOC by 2018 and by 2023 is down to 4.25 percent. The ERA is over the 12 to 14 percent threshold of concern for this watershed. This is due in large part to the previous activities in the watershed, which have an ERA value of 7.21 percent in 2014. These previous activities include the fire itself, in which 63 percent of the watershed burned at moderate or high soil burn severity, as well as timber activities on private and NFS lands.

Stream Condition Summary

Nearly 10 miles of pre-fire stream survey data was collected on the main channel of the Middle Fork Tuolumne River. Bank stability was very high and channel form was normal for its entire length, indicating no evidence of past channel incision. Pool tail and pool bed fine sediment was also low. Part of this watershed was burned previously in the Pilot Fire, and good pre-Rim Fire condition indicates that impacts of past wildfire have not affected stream channel stability. The areas of high soil burn severity in the Lower Middle Fork Tuolumne River watershed were relatively small patches well distributed throughout the watershed. The spatial mosaic of severity classes can reduce on and off site soil and water effects by interrupting erosion pathways and reducing sediment delivery to streams.

The proposed action is anticipated to result in increased sedimentation in the Lower Middle Fork Tuolumne River watershed. However, management requirements and BMPs are anticipated to minimize these effects to the extent feasible. Monitoring is anticipated to identify any problem areas so that corrective action could be taken quickly. Due to these mitigations, the proposed action is not anticipated to result in adverse off-site cumulative effects to sediment-related water quality parameters or to watershed condition (i.e. degradation of stream channel morphology, accelerated erosion or loss of soil productivity). The proposed action also is not anticipated to result in cumulative effects to water temperature, as only dead trees would be removed and these provide minimal shade.

Grazing

Active grazing allotments are located in all of the analysis HUC 6 and HUC 7 watersheds except Miguel Creek-Eleanor Creek. The resumption of grazing on these allotments has the potential to slow recovery of riparian vegetation and increase ground disturbance, particularly along stream banks. However, Forest Plan Standards and Guidelines require the prevention of disturbance from livestock from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. It also limits browse to no more than 20 percent of the annual leader growth on mature riparian shrubs and no more than 20 percent of individual seedlings. In this project area the browse limit would apply to streamside areas where riparian obligate trees and shrubs are naturally resprouting and reseeding after the fire. Although resumption of grazing within the analysis watersheds is anticipated to result in ground disturbance and a reduction in riparian vegetation, these effects are anticipated to be localized and adherence to Standards and Guidelines should allow for riparian vegetation recovery to progress naturally.

Alternative 2 (No Action)

Direct and Indirect Effects

Erosion and Sedimentation

Factors Affecting Erosion and Sedimentation

Soil Compaction

Under the no action alternative, soil compaction from management activities would not occur. However, activities under the action alternatives designed to reduce soil compaction would not occur either. Field review and LiDAR imagery has indicated an extensive skid trail network within the project area. Many of these pre-existing skid trails were not properly decommissioned in the past, and thus are concentrating runoff and causing erosion and sedimentation. Under the action alternatives, existing skid trails would be re-used to the extent practicable, and then subsoiled and waterbarred, reducing compaction and the risk of erosion and sedimentation. This would not occur under Alternative 2.

Soil Displacement

Soil displacement would not occur as a result of Alternative 2.

Ground Cover

Under the no action alternative, ground cover in high soil burn severity areas is expected to be lower than that found under any action alternative. That is because ground cover treatments such as drop and lop, mastication, and lop and scatter of activity fuels would not occur. Over time, trees falling would increase ground cover in these areas. Live vegetative recovery would increase over time under the no action alternative. This recovery is anticipated to be faster than under the action alternatives because disturbance by heavy equipment would not occur. Ground cover is expected to be less under Alternative 2 than the action alternatives until the area naturally regains ground cover through falling of snags and recovery of live vegetation.

Erosion and Sedimentation from Treatment Activities

Salvage of Merchantable and Nonmerchantable Trees

Erosion modeling using Disturbed WEPP was conducted within the fire perimeter to determine both post-fire (pre-implementation) and post-implementation erosion rates for the first year post-fire. With only one exception, erosion rates for HUC 6 and HUC 7 watersheds under the no action alternative were either the same or greater than erosion rates under any action alternative. This was attributed to the increase in ground cover that would occur under the action alternatives, but would not occur under the no action alternative. Logging activities create more effective sediment transport networks to stream channels. These transport networks would not be created under Alternative 2. However, sediment transport networks originating from existing skid trails would not be mitigated by subsoiling under Alternative 2, as they would be under the action alternatives.

Piling and Burning

No piling and burning would occur under Alternative 2, so there is no risk of erosion and sedimentation.

Roads

<u>Road Construction</u>

The increased overland flow rates and sediment yields associated with road construction would not occur under Alternative 2. However, this is a minor benefit since there is minimal road construction in the proposed action, much less in Alternative 3 and none in Alternative 4.

<u>Road Reconstruction and Maintenance</u>

One of the purposes of the Rim Fire Recovery project is to improve road infrastructure to enhance hydrologic function. Reconstruction and maintenance would not occur under Alternative 2, so the goal of enhancing hydrologic function would not be met. Any sediment related issues associated with roads within the project area would continue on current trends and may degrade with time. Roadside hazard trees would not be removed under the no action alternative. This means that many maintenance level 2 roads would be closed to access either through gates or through snags falling across roads. This would limit the ability of the forest to conduct storm patrols on roads. Excessive concentrations of downed trees and debris above stream crossings could increase the risk of future crossing failures by causing plugging problems at culverts and bridges. Because access on these roads would be limited, discovery of the problem sites would be delayed, likely resulting in greater damage to road surfaces and subsequent stream sedimentation.

<u>Temporary Road Construction</u>

The increased overland flow rates and sediment yields associated with new temporary road construction would not occur under Alternative 2. However, 70 to 72 percent of the temporary roads proposed for use under the action alternatives already exist on the ground. These roads would be decommissioned following use, resulting in a net decrease of up to 22.7 miles of road on the landscape. This decommissioning of existing roads would not occur under the no action alternative.

Material and Water Source Development

No material or water sources would be developed under Alternative 2, so there is no risk of erosion and sedimentation.

Fuel Loading

The no action alternative would allow for fuel loading to increase in the project area. Nearly all snags would be expected to fall by 20 years post-fire. The limbs and boles from these fallen trees would accumulate as surface fuels. This fuel is expected to increase each decade as trees fall over. Within 10 years, surface fuels are projected to average 42 tons per acre due to dead trees falling over. Within 30 years, surface fuels are projected to average 78 tons per acre.

Increased erosion following fire is related to the amount of vegetation removed. Prescribed fires, by design, do not consume extensive areas of organic matter (Baker 1990). Therefore, they have little impact on erosion and sedimentation, whereas intense wildfires may have substantial impacts (Brooks et al. 1997). The high fuel loadings that are projected to occur under Alternative 2 could not be maintained with prescribed fire. Fire behavior is expected to increase once standing dead is on the ground. A future reburn under such extreme fuel loading would likely lead to soil erosion and sedimentation much more severe than that caused by the reduction of fuel loading under the action alternatives and maintaining these reduced loadings in the future by utilizing prescribed fire.

Riparian Vegetation

Under Alternative 2, there would be no disturbance to riparian vegetation. However, the removal of burned tree boles could have a slight incremental effect on increasing sunlight, and this would not occur under Alternative 2.

Stream Condition

Stream Flow

No changes in stream flow are anticipated as a result of the no action alternative.

Stream Morphology

Ground cover treatments along stream banks have the potential to increase bank stability post-fire, particularly in areas where a high percentage of ground cover was consumed by the fire. These treatments would not occur under Alternative 2. Bank stability would increase over time as live vegetation recovered, but percent cover along stream banks would likely be lower under Alternative 2 than the action alternatives until live vegetative recovery occurs.

Large Woody Debris

Levels of large woody debris (LWD) in streams would be high under Alternative 2 as all snags would be retained and over time many near-stream snags would fall into streams. The effects of these fallen snags on roads were discussed above in the Erosion and Sedimentation section. The effect of this high level of LWD on stream condition is uncertain. In streams with low levels of LWD this extra loading may be beneficial in storing stream sediment. In streams with high levels of LWD, this extra loading may be excessive. Larger rivers should be capable of transporting these high loads of LWD to downstream reservoirs.

Water Quality (Beneficial Uses of Water)

Water Temperature

No effect to water temperature is anticipated under Alternative 2.

Sediment-Related Parameters

Ground disturbance from mechanized equipment that could lead to stream sedimentation would not occur under Alternative 2. However, activities that could reduce stream sedimentation, such as ground cover treatments, subsoiling of existing skid trails, road reconstruction to reduce hydrologic connectivity, and decommissioning of existing temporary roads would not occur.

Pesticides (Registered Borate Compound)

A registered borate compound would not be used under Alternative 2.

Summary

Beneficial uses of water would continue to be met.

CUMULATIVE EFFECTS

Equivalent Roaded Acres (ERAs)

Table 3.14-10 shows ERAs were calculated for twelve HUC 6 and five HUC 7 watersheds.

HUC 6 and 7 Watersheds

ERAs exceed the threshold of concern in one HUC 6 and three HUC 7 watersheds under the no action alternative. These high values can be attributed to the fire itself as well as past and future management activities on private and NFS lands.

Grazing

Same as Alternative 1.

Table 3.14-10 Alternative 2: Annual Percent ERA for HUC 6 and HUC 7 Analysis Watershed

HUC Level and Name	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
6 - Grapevine Creek-Tuolumne River	3.91	2.99	2.05	1.95	1.83	1.70	1.58	1.51	1.43	1.35
6 - Jawbone Creek-Tuolumne River	14.68[1]	11.68	8.58	7.33	5.99	4.68	3.47	2.93	2.38	1.84
7 - Corral Creek	16.33[1]	12.95[1]	9.39	7.76	6.03	4.31	2.60	2.37	2.14	1.91
7 - Lower Jawbone Creek	11.80	8.73	5.61	4.98	4.17	3.39	2.60	2.31	2.02	1.73
6 - Lower Clavey River	8.41	6.45	4.44	3.93	3.39	2.86	2.33	1.99	1.66	1.37
7 - Bear Springs Creek	11.36	9.11	6.82	5.95	5.06	4.18	3.29	2.72	2.14	1.67
6 - Middle Clavey River	3.64	3.25	2.73	3.36	3.86	4.28	3.82	3.46	3.10	2.76
6 - Reed Creek	7.06	6.17	5.50	5.30	4.63	3.95	3.22	2.85	2.48	2.11
7 - Lower Reed Creek	14.98[1]	12.43[1]	9.51	7.92	6.39	4.85	3.43	2.98	2.53	2.07
6 - Lower Cherry Creek	10.58	8.30	5.99	5.16	4.28	3.41	2.56	2.20	1.84	1.48
7 - Granite Creek	24.68[1]	20.33[1]	15.82[1]	13.39[1]	10.86	8.33	5.92	4.93	3.94	2.96
6 - Miguel Creek-Eleanor Creek	3.47	2.22	0.98	0.77	0.56	0.36	0.15	0.15	0.14	0.14
6 - Poopenaut Valley-Tuolumne River	4.45	3.06	1.68	1.41	1.11	0.81	0.51	0.48	0.46	0.43
6 - Lower Middle Fork Tuolumne River	9.96	7.68	5.23	4.66	3.95	3.36	2.84	2.62	2.41	2.21
6 - Upper Middle Fork Tuolumne River	3.66	2.61	1.56	1.20	0.83	0.47	0.11	0.11	0.11	0.11
6 - Lower South Fork Tuolumne River	7.01	5.62	3.97	3.75	3.69	3.30	2.91	2.72	2.53	2.34
6 - Upper South Fork Tuolumne River	3.07	2.22	1.28	1.09	0.88	0.69	0.50	0.47	0.44	0.41

[1] Denotes watersheds over the TOC

Alternative 3

DIRECT AND INDIRECT EFFECTS

Erosion and Sedimentation

Factors Affecting Erosion and Sedimentation

The potential for soil compaction and displacement are similar to Alternative 1 because similar acreages of mechanical treatment are proposed and because management requirements and BMPs prescribed under Alternative 1 are also prescribed under Alternative 3.

Alternative 3 includes site-specific requirements for increasing ground cover to reduce erosion and sedimentation in watershed sensitive areas (WSAs). WSAs are portions of the watersheds that were determined to be at high risk of soil erosion and sedimentation due to the combined effects of the Rim Fire and proposed recovery activities. Criteria for evaluating the existence of WSAs include: proposed recovery activities, burn severity, percent slope, slope shape, slope length, existing and potential soil cover, proximity to intermittent and perennial drainages, and proximity to high runoff response soils. Two treatments are prescribed to achieve increased ground cover: mastication and drop and lop. Mastication is proposed on 1,309 acres of WSAs and would involve grinding or shredding dead trees less than 10 inches dbh into chunks less than 2 feet in length to create ground cover. Drop and lop is proposed on an additional 2,228 acres of WSAs under Alternative 3. This treatment would involve felling nonmerchantable trees less than 10 inches dbh and lopping them into pieces in lengths short enough such that the dropped material is not stacked and has as much ground contact as practical. A minimum 50 percent effective ground cover is desired under both treatment techniques. A maximum of 10 to 20 tons per acre of fuel loading is allowed. Under Alternative 3, research would be conducted to determine the effectiveness of these ground cover treatments at reducing erosion and sedimentation.

Erosion and Sedimentation from Treatment Activities

Salvage of Merchantable and Nonmerchantable Trees

As described under Alternative 1, erosion modeling using Disturbed WEPP was conducted within the fire perimeter to determine both post-fire (pre-implementation) and post-implementation erosion rates. Table 3.14-11 models erosion rates in each watershed.

Table 3.14-11 Alternative 3: Post-Fire and Post-Implementation Erosion Rates and Percent Change for Each Watershed

HUC Level and Name	Post-Fire Erosion Rate (tons per acre)	Post-Implementation Erosion Rate (tons per acre)	Erosion Rate1 Change (%)
6 - Grapevine Creek-Tuolumne River	2.0	1.9	-5.0
6 - Jawbone Creek-Tuolumne River	3.6	3.3	-8.3
7 - Corral Creek	4.7	3.5	-25.5
7 - Lower Jawbone Creek	4.9	4.4	-10.2
6 - Lower North Fork Tuolumne River	0.9	0.9	0.0
6 - Lower Clavey River	2.9	2.7	-6.9
7 - Bear Springs Creek	3.1	2.7	-12.9
6 - Middle Clavey River	1.2	1.1	-8.3
6 - Reed Creek	1.4	1.2	-14.3
7 - Lower Reed Creek	3.2	2.5	-21.9
6 - Lower Cherry Creek	2.4	2.3	-4.2
7 - Granite Creek	3.6	3.4	-5.6
6 - Miguel Creek-Eleanor Creek	1.1	1.1	0.0
6 - Poopenaut Valley-Tuolumne River	1.4	1.4	0.0
6 - Lower Middle Fork Tuolumne River	2.8	2.4	-14.3
6 - Upper Middle Fork Tuolumne River	0.9	0.9	0.0
6 - Lower South Fork Tuolumne River	3.1	2.8	-9.7
6 - Upper South Fork Tuolumne River	0.9	0.9	0.0
6 - Bull Creek	0.6	0.6	0.0
6 - Bean Creek-North Fork Merced River	0.7	0.7	0.0

[1] Negative percent change indicates reduced erosion. Positive percent change indicates increased erosion.

Seven of the fifteen HUC 6 watersheds are anticipated to have negligible changes in erosion at the watershed scale (Table 3.14-11). The eight HUC 6 watersheds with projected changes in erosion had lower erosion rates post-implementation than post-fire. This is attributed to increased ground cover in high vegetation burn severity areas due to mastication, drop and lop, and the addition of activity fuels. The modeling also indicated that all five HUC 7 watersheds would have decreased erosion rates following project implementation. The largest erosion rate change was a reduction of 1.2 tons per acre (-25.5 percent) in the Corral Creek watershed.

Although modeling results indicate that erosion rates either would not measurably change or would decrease as a result of Alternative 3, stream sedimentation still has the potential to occur as a result of this alternative, particularly in areas where logging activities create more effective sediment transport networks to stream channels. Table 3.14-12 shows salvage logging acres (combined timber units and hazard tree removal) within 100 feet of perennial or intermittent streams and SAFs by soil burn severity. All system types (ground-based, skyline, and helicopter) are included in this table. The table likely overestimates logging acreage in low soil burn severity areas because green trees would not be removed unless they are an imminent hazard to a road.

Despite implementation of BMPs and management requirements, increased stream sedimentation is anticipated as a result of Alternative 3, particularly in areas where logging activities create more effective sediment transport networks to stream channels. This is more likely to occur in the Jawbone Creek-Tuolumne River, Corral Creek, Reed Creek, Lower Reed Creek, Lower Cherry Creek, Granite Creek, and Lower Middle Fork Tuolumne River watersheds than in other HUC 6 or HUC 7 watersheds due to the larger acreages of high soil burn severity areas near streams proposed for treatment.

Table 3.14-12 Alternative 3: Salvage Logging by Soil Burn Severity Within 100 feet of a Perennial Stream, Intermittent Stream, or Special Aquatic Feature

HUC Level and Name	Salvage Logging Within 100 Feet of a Perennial Stream, Intermittent Stream, or Special Aquatic Feature (acres)		
	High Soil Burn Severity	Moderate Soil Burn Severity	Low Soil Burn Severity
6 - Grapevine Creek-Tuolumne River	0	23	34
6 - Jawbone Creek-Tuolumne River	76	234	78
7 - Corral Creek	45	92	23
7 - Lower Jawbone Creek	8	53	3
6 - Lower North Fork Tuolumne River	1	14	24
6 - Lower Clavey River	6	56	78
7 - Bear Springs Creek	6	26	31
6 - Middle Clavey River	6	49	134
6 - Reed Creek	48	105	82
7 - Lower Reed Creek	47	94	25
6 - Lower Cherry Creek	49	113	38
7 - Granite Creek	37	55	3
6 - Miguel Creek-Eleanor Creek	0	4	13
6 - Poopenaut Valley-Tuolumne River	4	4	1
6 - Lower Middle Fork Tuolumne River	47	327	137
6 - Upper Middle Fork Tuolumne River	0	12	8
6 - Lower South Fork Tuolumne River	11	169	260
6 - Upper South Fork Tuolumne River	0	3	23
6 - Bull Creek	0	7	11
6 - Bean Creek-North Fork Merced River	0	17	28

Mastication

Mastication is proposed on 1,309 acres of WSAs and would involve grinding or shredding dead trees less than 10 inches dbh into chunks less than 2 feet in length to create ground cover. Research in the Lake Tahoe Basin indicated that creating 25 percent ground cover with masticated material was effective at filtering sediment in unburned areas (Harrison 2012).

Although heavy equipment is used in the mastication treatment, it is not expected to cause measurable erosion and sedimentation. This treatment creates ground cover and thus is used to prevent erosion and filter sediment. BMPs and management requirements for ground-based mechanized equipment apply to mastication. This includes requirements such as equipment exclusion zones and restrictions on wet weather operations.

Piling and Burning

The effects of piling and burning under Alternative 3 are anticipated to be similar or less than those found under Alternative 1. One difference is that dozer piling is prohibited in WSAs. In these areas, grapple piling is the only machine piling technique allowed. Because of this, fewer dozer piling acres are proposed under Alternative 3 than Alternative 1. The effects of grapple piling on erosion and sedimentation are anticipated to be less than dozer piling because materials are picked up and moved into piles rather than pushed into piles. Another difference is that allowable fuel loading under Alternative 1 is 10 tons per acre, while it is 10 to 20 tons per acre under Alternative 3. This would result in the need for slightly less piling under Alternative 3.

Roads

Alternative 3 includes about 1 mile of new road construction, 324 miles of road reconstruction, 201 miles of road maintenance, 3.3 miles of temporary use-revert and 35 miles of temporary road construction. This would include 1 new permanent stream crossing along a newly constructed road.

Road Construction

The effects of new road construction on erosion and sedimentation are anticipated to be less under Alternative 3 than Alternative 1. This is because only 1.04 miles of new road construction are proposed under Alternative 3, whereas Alternative 1 proposes 5.4 miles. In addition, Alternative 1 proposed 6 perennial and intermittent stream crossings, while Alternative 3 proposes only 1 intermittent stream crossing. The change in permanent road mileage as a result of Alternative 3 is a 0.65 percent increase in the Middle Clavey River watershed. BMPs and management requirements would limit sediment inputs to streams during road construction. Although some erosion and sedimentation is anticipated as a result of this activity, particularly in the first year or two following construction, overall increases in erosion and sedimentation are anticipated to be low as the percent increase in road mileage is low.

Road Reconstruction and Maintenance

Effects of road reconstruction and maintenance on erosion and sedimentation are expected to be similar to those described for Alternative 1, as the mileage proposed for these treatments are similar and the same BMPs and management requirements would be implemented.

Temporary Road Construction

Of the 32.2 miles of temporary roads identified for use under Alternative 3, 22.7 miles (70 percent) already exist on the ground as non-system routes. While additional traffic on these routes would cause soil disturbance and has the potential for increased erosion and sedimentation, these routes would be decommissioned following use, resulting in a net decrease of 22.7 miles of road on the landscape. The construction of new temporary roads would reduce infiltration and lead to potential increases in erosion and sedimentation. However, decommissioning these roads after use would reduce these impacts in the long term.

Material and Water Source Development

The effects of material source development on erosion and sedimentation are anticipated to be the same for Alternative 3 as Alternative 1 as the sites proposed for use are the same. The effects of water source development on erosion and sedimentation are anticipated to be similar for Alternative 3 as described for Alternative 1 as BMPs would be implemented the same under either alternative. However, there are 13 additional potential water sources identified under Alternative 3 that are not proposed under Alternative 1.

Fuel Loading

Fuel loading would decrease in the project area watersheds under Alternative 3. Coarse woody debris would be reduced to 10 to 20 tons per acre in all units proposed for treatment. This is slightly higher than the 10 tons per acre prescribed under Alternative 1. Allowable tons per acre increase under Alternative 3 to provide for increased ground cover capable of filtering erosion, and for other resource benefits. This tonnage would still result in lower flame lengths and fireline intensities, allowing for direct attack of future wildfires. Reducing fuel loading and then maintaining these fuel loads with prescribed fire has less potential for erosion and sedimentation than allowing fuel loading to increase as snags fall and having another large stand-replacing wildfire in the future.

Riparian Vegetation

The effects of Alternative 3 on riparian vegetation are similar to that described for Alternative 1. Management requirements require retention of remaining post-fire obligate riparian shrubs and trees that have live crown foliage or are resprouting. Riparian vegetation may be beneficially affected by Alternative 3 where burned overstory trees are removed.

One fen exists within the roadside hazard tree removal area. No fens are within salvage treatment units. Removal of hazard trees near the fen is not anticipated to affect it, as management requirements such as equipment exclusion zones would be implemented.

Alternative 3 includes 63 acres of meadows within treatment units. Removal of trees along meadow edges is not expected to affect meadows, as management requirements would be implemented.

Stream Condition

Stream Flow

The effects of Alternative 3 on stream flow are anticipated to be similar to those described for Alternative 1. Live trees would only be removed if they are a hazard tree and pose a risk to health and safety. Otherwise, all trees proposed for harvest would be dead and their removal would not affect soil water storage, interception, or evapotranspiration beyond the changes that already occurred as a result of the fire. Treatments that increase ground cover, such as mastication and drop and lop, or mitigate compaction, such as subsoiling, promote infiltration and reduce overland flows, leading to reduced storm peak events and total flows. Therefore, measurable changes in stream flow are not anticipated to result under Alternative 3.

Stream Morphology

The effects of Alternative 3 on stream morphology are anticipated to be similar to those described under Alternative 1. Channel incision is not expected as a result of Alternative 3, as measureable changes in stream flow are not anticipated. Management requirements and BMPs are expected to protect bank stability.

Large Woody Debris

Under Alternative 3, existing downed large woody debris (LWD) in the channel would be retained. In addition, a minimum of 5 large snags per acre would be retained within 100 feet of perennial streams to provide for future recruitment of LWD. As a result of this snag retention, large woody debris levels in streams would increase over time following project implementation. Levels would be lower, however, than if harvesting did not occur near stream channels and all snags were retained. The Aquatics Report (project record) provides more information on large woody debris.

Water Quality (Beneficial Uses of Water)

The effects of Alternative 3 on water temperature, sediment-related parameters, and water quality as a result of pesticides (registered borate compound) are anticipated to be similar to those described under Alternative 1. There is a slight increase in total unit acreage under Alternative 3, due primarily to the addition of 3,000 acres of wildlife treatment units designed to allow for improved deer passage. However, management requirements and BMPs are designed to minimize impacts. Alternative 3 also identified watershed sensitive areas for additional ground cover treatments (mastication and drop and lop), which should further mitigate impacts under these alternatives.

CUMULATIVE EFFECTS

Equivalent Roaded Acres (ERAs)

ERAs were calculated for twelve HUC 6 and five HUC 7 watersheds. Results of these analyses were similar to that found under Alternative 1. Table 3.14-13 shows the ERA values for Alternative 3.

HUC 6 and 7 Watersheds

ERA values for twelve of the seventeen HUC 6 and HUC 7 watersheds were equal or slightly less for Alternative 3 than Alternative 1. These values decreased by up to 0.50 percent for Alternative 3 in 2014. Five HUC 6 and HUC 7 watersheds had higher ERA values than Alternative 1. The largest increase in 2014 was 0.95 percent in the Corral Creek watershed. ERA increases were attributed primarily to the addition of wildlife treatment units to improve deer passage. The other substantial difference between Alternative 1 and Alternative 3 was the development of WSA treatments for increased ground cover under Alternative 3. This increased ground cover is anticipated to reduce the risk of cumulative watershed effects.

With slight differences in ERA values between Alternative 1 and Alternative 3, the watersheds that exceeded the TOC were the same. Therefore, cumulative effects for Alternative 3 are anticipated to be the same as described for Alternative 1.

Grazing

Same as Alternative 1.

Table 3.14-13 Alternative 3: Annual Percent ERA for HUC 6 and HUC 7 Analysis Watershed

HUC Level and Name	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
6 - Grapevine Creek-Tuolumne River	4.31	3.50	2.51	2.36	2.18	2.00	1.83	1.69	1.56	1.43
6 - Jawbone Creek-Tuolumne River	16.561	16.081	12.961	11.41	9.78	7.91	6.15	5.05	3.96	2.87
7 - Corral Creek	21.081	25.401	21.841	19.431	16.861	13.551	10.24	8.42	6.60	4.79
7 - Lower Jawbone Creek	14.171	13.271	9.95	9.01	7.94	6.59	5.25	4.41	3.59	2.77
6 - Lower Clavey River	9.62	9.80	8.20	7.40	6.57	5.59	4.61	3.82	3.04	2.30
7 - Bear Springs Creek	12.911	12.781	10.76	9.58	8.40	7.02	5.66	4.61	3.56	2.62
6 - Middle Clavey River	4.76	5.15	4.65	5.07	5.39	5.58	4.90	4.31	3.73	3.17
6 - Reed Creek	8.20	9.40	8.40	7.96	7.06	6.02	4.94	4.22	3.51	2.79
7 - Lower Reed Creek	17.381	17.991	15.261	13.201	11.25	8.99	6.86	5.70	4.55	3.40
6 - Lower Cherry Creek	11.27	9.96	7.77	6.80	5.79	4.70	3.64	3.07	2.49	1.92
7 - Granite Creek	26.021	23.021	18.471	15.931	13.291	10.41	7.65	6.30	4.96	3.63
6 - Miguel Creek-Eleanor Creek	3.68	2.61	1.34	1.09	0.86	0.61	0.36	0.31	0.27	0.22
6 - Poopenaut Valley-Tuolumne River	4.56	3.29	1.89	1.61	1.30	0.97	0.64	0.59	0.53	0.48
6 - Lower Middle Fork Tuolumne River	12.771	15.171	13.261	12.161	10.87	9.28	7.77	6.56	5.38	4.21
6 - Upper Middle Fork Tuolumne River	3.74	2.78	1.74	1.36	0.99	0.60	0.22	0.20	0.17	0.15
6 - Lower South Fork Tuolumne River	9.12	9.83	8.50	7.87	7.42	6.44	5.52	4.81	4.10	3.40
6 - Upper South Fork Tuolumne River	3.18	2.42	1.50	1.28	1.06	0.84	0.62	0.57	0.51	0.46

[1] Denotes watersheds over the TOC

Alternative 4

DIRECT AND INDIRECT EFFECTS

The direct and indirect effects of Alternative 4 are the same as those for Alternative 3 with the exception of those described below.

Erosion and Sedimentation

Factors Affecting Erosion and Sedimentation

Drop and lop is proposed on an additional 1,309 under Alternative 4 compared to an additional 2,228 acres of WSAs under Alternative 3. This treatment would involve felling nonmerchantable trees less than 10 inches dbh and lopping them into pieces in lengths short enough such that the dropped material is not stacked and has as much ground contact as practical. A minimum 50 percent effective ground cover is desired. A maximum of 10 to 20 tons per acre of fuel loading is allowed. Under Alternative 4, research would be conducted to determine the effectiveness of these ground cover treatments at reducing erosion and sedimentation.

Erosion and Sedimentation from Treatment Activities

Salvage of Merchantable and Nonmerchantable Trees

As described under Alternative 1, erosion modeling using Disturbed WEPP was conducted within the fire perimeter to determine both post-fire (pre-implementation) and post-implementation erosion rates. Table 3.14-14 models erosion rates in each watershed.

Seven of the fifteen HUC 6 watersheds are anticipated to have negligible changes in erosion at the watershed scale (Table 3.14-14). The eight HUC 6 watersheds with projected changes in erosion had lower erosion rates post-implementation than post-fire. This is attributed to increased ground cover in high vegetation burn severity areas due to mastication, drop and lop, and the addition of activity fuels. The modeling also indicated that all five HUC 7 watersheds would have decreased erosion rates following project implementation. The largest erosion rate change was a reduction of 1.2 tons per acre (-25.5 percent) in the Corral Creek watershed.

Table 3.14-14 Alternative 4: Post-Fire and Post-Implementation Erosion Rates and Percent Change for Each Watershed

HUC Level and Name	Post-Fire Erosion Rate (tons per acre)	Post-Implementation Erosion Rate (tons per acre)	Erosion Rate[1] Change (%)
6 - Grapevine Creek-Tuolumne River	2.0	1.9	-5.0
6 - Jawbone Creek-Tuolumne River	3.6	3.3	-8.3
7 - Corral Creek	4.7	3.5	-25.5
7 - Lower Jawbone Creek	4.9	4.4	-10.2
6 - Lower North Fork Tuolumne River	0.9	0.9	0.0
6 - Lower Clavey River	2.9	2.7	-6.9
7 - Bear Springs Creek	3.1	2.7	-12.9
6 - Middle Clavey River	1.2	1.1	-8.3
6 - Reed Creek	1.4	1.2	-14.3
7 - Lower Reed Creek	3.2	2.7	-15.6
6 - Lower Cherry Creek	2.4	2.3	-4.2
7 - Granite Creek	3.6	3.4	-5.6
6 - Miguel Creek-Eleanor Creek	1.1	1.1	0.0
6 - Poopenaut Valley-Tuolumne River	1.4	1.4	0.0
6 - Lower Middle Fork Tuolumne River	2.8	2.4	-14.3
6 - Upper Middle Fork Tuolumne River	0.9	0.9	0.0
6 - Lower South Fork Tuolumne River	3.1	2.8	-9.7
6 - Upper South Fork Tuolumne River	0.9	0.9	0.0
6 - Bull Creek	0.6	0.6	0.0
6 - Bean Creek-North Fork Merced River	0.7	0.7	0.0

[1] Negative percent change indicates reduced erosion. Positive percent change indicates increased erosion.

Although modeling results indicate that erosion rates either would not measurably change or would decrease as a result of Alternative 4, stream sedimentation still has the potential to occur as a result of this alternative, particularly in areas where logging activities create more effective sediment transport networks to stream channels. Table 3.14-15 shows salvage logging acres (combined salvage units and hazard tree removal) within 100 feet of perennial or intermittent streams and SAFs by soil burn severity. All system types (ground-based, skyline, and helicopter) are included in that table. The table likely overestimates logging acreage in low soil burn severity areas because any green trees would not be removed unless they were an imminent hazard to a road.

Table 3.14-15 Alternative 4: Salvage Logging by Soil Burn Severity Within 100 feet of a Perennial Stream, Intermittent Stream, or Special Aquatic Feature

HUC Level and Name	Salvage Logging Within 100 Feet of a Perennial Stream, Intermittent Stream, or Special Aquatic Feature (acres)		
	High Soil Burn Severity	Moderate Soil Burn Severity	Low Soil Burn Severity
6 - Grapevine Creek-Tuolumne River	0	23	34
6 - Jawbone Creek-Tuolumne River	76	234	78
7 - Corral Creek	45	92	23
7 - Lower Jawbone Creek	8	53	3
6 - Lower North Fork Tuolumne River	1	14	24
6 - Lower Clavey River	6	56	78
7 - Bear Springs Creek	6	26	31
6 - Middle Clavey River	5	35	125
6 - Reed Creek	30	91	81
7 - Lower Reed Creek	29	80	25
6 - Lower Cherry Creek	49	113	38
7 - Granite Creek	37	55	3
6 - Miguel Creek-Eleanor Creek	0	4	12
6 - Poopenaut Valley-Tuolumne River	4	4	1
6 - Lower Middle Fork Tuolumne River	47	327	137
6 - Upper Middle Fork Tuolumne River	0	12	8
6 - Lower South Fork Tuolumne River	11	168	259
6 - Upper South Fork Tuolumne River	0	3	23
6 - Bull Creek	0	7	11
6 - Bean Creek-North Fork Merced River	0	17	28

Roads

Alternative 4 includes about 315 miles of road reconstruction, 209 miles of road maintenance, 3.3 miles of temporary use-revert, and 34 miles of temporary road construction. No road construction, with associated stream crossings, is planned.

Road Construction

The increased overland flow rates and sediment yields associated with road construction would not occur under Alternative 4, as no road construction is proposed.

Temporary Road Construction

Of the 30.5 miles of temporary roads identified for use under Alternative 4, 22.1 miles (72 percent) already exist on the ground as non-system routes. While additional traffic on these routes would cause soil disturbance and has the potential for increased erosion and sedimentation, these routes would be decommissioned following use, resulting in a net decrease of 22.1 miles of road on the landscape. The construction of new temporary roads would reduce infiltration and lead to potential increases in erosion and sedimentation. However, decommissioning these roads after use would reduce these impacts in the long term.

Water Quality (Beneficial Uses of Water)

Alternative 4 includes a slight decrease (500 acres) in total unit acreage under as compared to Alternative 1.

CUMULATIVE EFFECTS

Equivalent Roaded Acres (ERAs)

ERAs were calculated for twelve HUC 6 and five HUC 7 watersheds. Results of these analyses were similar to that found under Alternative 1. Table 3.14-16 shows the ERA values for Alternative 4.

Table 3.14-16 Alternative 4: Annual Percent ERA for HUC 6 and HUC 7 Analysis Watershed

HUC Level and Name	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
6 - Grapevine Creek-Tuolumne River	4.31	3.50	2.51	2.36	2.18	2.00	1.83	1.69	1.56	1.43
6 - Jawbone Creek-Tuolumne River	16.56[1]	16.08[1]	12.96[1]	11.41	9.78	7.91	6.15	5.05	3.96	2.87
7 - Corral Creek	21.08[1]	25.40[1]	21.84[1]	19.43[1]	16.86[1]	13.55[1]	10.24	8.42	6.60	4.79
7 - Lower Jawbone Creek	14.17[1]	13.27[1]	9.95	9.01	7.94	6.59	5.25	4.41	3.59	2.77
6 - Lower Clavey River	9.62	9.80	8.20	7.40	6.57	5.59	4.61	3.82	3.04	2.30
7 - Bear Springs Creek	12.91[1]	12.78[1]	10.76	9.58	8.40	7.02	5.66	4.61	3.56	2.62
6 - Middle Clavey River	4.66	5.02	4.54	4.98	5.30	5.50	4.83	4.26	3.69	3.14
6 - Reed Creek	8.01	8.70	7.58	7.19	6.34	5.41	4.43	3.81	3.19	2.57
7 - Lower Reed Creek	16.77[1]	15.93[1]	12.93[1]	10.99	9.19	7.22	5.37	4.50	3.64	2.77
6 - Lower Cherry Creek	11.22	9.71	7.49	6.54	5.54	4.49	3.46	2.92	2.38	1.84
7 - Granite Creek	26.02[1]	22.93[1]	18.29[1]	15.69[1]	12.98[1]	10.14	7.41	6.10	4.79	3.50
6 - Miguel Creek-Eleanor Creek	3.66	2.54	1.26	1.02	0.79	0.55	0.30	0.27	0.23	0.20
6 - Poopenaut Valley-Tuolumne River	4.56	3.29	1.89	1.61	1.30	0.97	0.64	0.59	0.53	0.48
6 - Lower Middle Fork Tuolumne River	12.77[1]	15.17[1]	13.26[1]	12.16[1]	10.87	9.28	7.77	6.56	5.38	4.21
6 - Upper Middle Fork Tuolumne River	3.74	2.78	1.74	1.36	0.99	0.60	0.22	0.20	0.17	0.15
6 - Lower South Fork Tuolumne River	9.11	9.76	8.41	7.79	7.35	6.38	5.47	4.77	4.07	3.38
6 - Upper South Fork Tuolumne River	3.18	2.41	1.48	1.27	1.04	0.83	0.61	0.56	0.51	0.45

[1] Denotes watersheds over the TOC

Summary of Effects Analysis across All Alternatives

Erosion and Sedimentation

Under Alternative 1, erosion rates as a result of salvage harvest are anticipated to have negligible change in most HUC 6 watersheds. Two HUC 6 watersheds are projected to have decreased erosion and one watershed is projected to have increased erosion. Sedimentation increases due to salvage harvest are anticipated to be highest in HUC 6 watersheds with treatments proposed within 100 feet of streams in high soil burn severity areas (Jawbone Creek-Tuolumne River, Reed Creek, Lower Cherry Creek, and Lower Middle Fork Tuolumne River). Of the piling and burning activities, dozer piling has the highest potential for sedimentation and could occur in any of the treatment units. This alternative has the highest mileage of road construction, leading to the largest potential for road related erosion and sedimentation. Alternative 1 proposed 6 perennial and intermittent stream crossings, while Alternative 3 proposes only 1 intermittent stream crossing and Alternative 4 has no road construction nor proposed stream crossings. While road reconstruction and maintenance cause disturbance, improving and maintaining drainage features can reduce erosion from current levels. Temporary road construction would involve the construction of new temporary roads and the use of existing non-system roads, all of which would be decommissioned following use. This decommissioning would result in fewer roads on the landscape post-project than pre-project. Some sedimentation could occur as a result of material source and water source development.

Under Alternative 2, erosion rates in HUC 6 watersheds are anticipated to be similar to those watersheds under Alternative 1 and similar to or higher than those watersheds under Alternatives 3 and 4 due to a lack of ground cover. New sediment transport networks would not be created. However, reductions in soil compaction on existing skid trails would not occur, so these sediment transport networks would remain in place. There is no risk of erosion and sedimentation from piling and burning, road construction, material source development, or water source development. Road reconstruction and maintenance would not occur, so hydrologic connectivity of roads and streams would remain. Temporary road construction would not occur, so temporary roads already existing on the landscape would not be decommissioned.

Under Alternatives 3 and 4, erosion rates for HUC 6 watersheds are anticipated to have either negligible change or reduced erosion rates. Sedimentation increases due to salvage harvest are anticipated to be highest in HUC 6 watersheds with treatments proposed within 100 feet of streams in high soil burn severity areas (Jawbone Creek-Tuolumne River, Reed Creek, Lower Cherry Creek, and Lower Middle Fork Tuolumne River). Watershed sensitive areas (WSAs) were delineated for these alternatives and ground cover treatments were prescribed (mastication and drop and lop) to reduce the risk of sedimentation. Of the piling and burning activities, dozer piling has the highest potential for sedimentation. These alternatives have restrictions that prohibit dozer piling in WSAs. Alternative 3 has only 1 mile of permanent road construction with 1 associated stream crossing and Alternative 4 has no permanent road construction. While road reconstruction and maintenance cause disturbance, improving and maintaining drainage features can reduce erosion from current levels as described in Alternative 2. Temporary road construction would involve the construction of new temporary roads and the use of existing non-system roads, all of which would be decommissioned following use. This decommissioning would result in fewer roads on the landscape post-project than pre-project. Some sedimentation could occur as a result of material source and water source development.

Fuel Loading

Under Alternative 1, fuel loading would be reduced to 10 tons per acre of surface fuels, allowing for direct attack of future wildfires and maintenance of reduced fuel loading with prescribed fire.

Under Alternative 2, fuel loading would increase over time, to an estimated 98 tons per acre of surface fuels in 30 years. This would not allow for direct attack of wildfires or use of prescribed fire. A future reburn under such extreme fuel loading conditions would likely lead to soil erosion and sedimentation more severe than that caused by fuel reduction treatments.

Under Alternatives 3 and 4, fuel loading would be reduced to 10 to 20 tons per acre of surface fuels, allowing for direct attack of future wildfires and maintenance of reduced fuel loading with prescribed fire.

Riparian Vegetation

Under Alternatives 1, 3 and 4, removal of burned overstory trees may provide slight increases in sunlight, benefitting regrowth of riparian obligate trees and shrubs. Management requirements would prevent disturbance to riparian vegetation, including at a fen and numerous meadows.

Under Alternative 2, no removal of burned overstory trees would occur, so no benefits of slight increase in sunlight would occur. There would be no disturbance to riparian vegetation.

Stream Condition

Under Alternative 1, measurable changes in stream flow or channel incision are not anticipated. Stream banks in high soil burn severity areas may receive increased cover as part of ground cover treatments, resulting in improved bank stability. Snags would be felled into stream channels for increased LWD.

Under Alternative 2, no changes in stream flow or channel incision are anticipated. There would initially be less ground cover along stream banks than the action alternatives because no ground cover would be added. Over time, some near-stream snags would fall into streams, leading to increased levels of LWD.

Under Alternatives 3 and 4, measurable changes in stream flow or channel incision are not anticipated. Stream banks in high soil burn severity areas may receive increased cover as part of ground cover treatments, resulting in improved bank stability. Snags would be left adjacent to stream channels, allowing for natural recruitment of LWD, but at levels much less than Alternative 2.

Water Quality (Beneficial Uses of Water)

Under Alternatives 1, 3, and 4, water temperature is not expected to be affected. Some sedimentation would likely occur, particularly in areas which have high soil burn severity adjacent to streams. The potential for the registered borate compound to contaminate surface water is limited. Effects to beneficial uses are not anticipated.

Under Alternative 2, no changes to water temperature, stream sedimentation, or water quality related to pesticide applications are anticipated. Effects to beneficial uses are not anticipated.

Compliance with the Forest Plan and Other Direction

Standards and Guidelines

The Watershed Report and Forest Plan Compliance Checklist (project record) describe the Standards and Guidelines applicable to watershed resources, as well as how the Standards and Guidelines would be met under the action alternatives.

Beneficial Uses of Water

All alternatives are expected to result in maintenance of the applicable beneficial uses of water in the Water Quality Control Plan (Basin Plan) for the California Central Valley Water Quality Control Board (CVRWQCB 2011). Water temperature, sediment, and water quality following pesticide use are not expected to be adversely altered. Domestic and municipal water supplies and power are not adversely affected by the proposed action or alternatives. Recreational contact and non-contact waters are suitable for human use. Warm and cold freshwater habitat and wildlife habitat are not adversely affected by the proposed action or alternatives.

Water Quality Best Management Practices (BMPs)

Alternatives 1, 3 and 4 comply with the intent and procedural requirements of BMPs (USDA 2011, USDA 2012). If any of the action alternatives are implemented, or a combination thereof, applicable BMPs would be followed. BMPs would not be implemented under Alternative 2 (No Action), as no recovery activities would occur under this alternative.

3.15 WILDLIFE

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The purpose of this section is to evaluate and disclose the effects of the Rim Recovery project to Threatened, Endangered, and Sensitive terrestrial wildlife species; pursuant to:

Regional Forester Sensitive Species

DEPARTMENTAL REGULATION 9500-004 PROVIDES THE FOLLOWING DIRECTION TO DEPARTMENT AGENCIES:

1. Assure that the values of fish and wildlife are recognized, and that their habitats, both terrestrial and aquatic, including wetlands, are recognized and enhanced where possible as the Department carries out its overall missions.
2. Consider fish and wildlife and their habitats in developing programs for these lands. Alternatives that maintain or enhance fish and wildlife habitat should be promoted. When compatible with objectives for the area, management alternatives that improve habitat will be selected.
3. Balance the competing uses for habitat supporting fish and wildlife through strong, clear policies, relevant programs, and effective actions to sustain and enhance fish and wildlife in desired locations and numbers.
4. Recognize that fish and wildlife have inherent values as components and indicators of healthy ecosystems, and that they often demonstrate how altered environments may affect changes in quality of life for humans.
5. Avoid actions "which may cause a species to become threatened or endangered".

Threatened, Endangered, Candidate, and Proposed Species

DEPARTMENTAL REGULATION 9500-004 DIRECTS DEPARTMENT AGENCIES TO:

1. Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."
2. Avoid actions "which may cause a species to become threatened or endangered."
3. Consult "as necessary with the Departments of the Interior and/or Commerce on activities that may affect threatened and endangered species."
4. Not "approve, fund or take any action that is likely to jeopardize the continued existence of threatened and endangered species or destroy any habitat necessary for their conservation unless exemption is granted pursuant to subsection 7(h) of the Endangered Species Act of 1973, as amended."

The Forest Plan Compliance (project record) document identifies the Forest Plan Standards and Guidelines that specifically apply to this project and related information about compliance with the Forest Plan.

Threatened and Endangered species are those federally listed by the USFWS; Candidate species are candidates to become Proposed species but issuance of a proposed rule is currently precluded by higher priority listing actions (USFWS 1998). Sensitive species are those designated by the Regional Forester with the goal of proactively developing and implementing management practices to ensure that those species do not become Threatened or Endangered.

Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by USDA 2001, 2004, the R5 Sensitive species evaluation form 2012, and Keane 2014 and are incorporated here by reference. Table 3.15-1 shows the wildlife species addressed in the first portion of section 3.15. Rationale for why a species is not addressed in this section is in the Wildlife BE.

Table 3.15-1 Threatened, Endangered and Sensitive Species and Other Species of Conservation Concern

Common Name	Scientific Name	Status[1]
Threatened and Endangered		
Valley Elderberry Longhorn Beetle	*Desmocerus californicus dimorphus*	T
Sensitive		
Bald Eagle	*Haliaeetus leucocephalus*	S
California Spotted Owl	*Strix occidentalis occidentalis*	S, MIS
Great Gray Owl	*Strix nebulosa*	S
Northern Goshawk	*Accipiter gentilis*	S
Willow Flycatcher[2]	*Empidonax traillii*	S
Pacific Marten	*Martes caurina*	S, MIS
Fisher	*Pekania pennanti (formerly, Martes pennanti pacifica)*	S, C
California Wolverine[2]	*Gulo gulo luteus*	S
Sierra Nevada Red Fox[2]	*Vulpes vulpes necator*	S
Fringed Myotis	*Myotis thysanodes*	S
Pallid Bat	*Antrozous pallidus*	S
Townsend's Big-Eared Bat[2]	*Corynorhinus townsendii*	S
Other Species of Conservation Concern		
Black-backed Woodpecker	*Picoides arcticus*	MIS, SCC
Mule Deer	*Odocoileus hemionus*	MIS, SCC

[1] **MIS**=Management Indicator Species; **T**=Threatened; **C**=Candidate; **S**=Sensitive; **SCC**=Species of Conservation Concern.
[2] Not detailed in this section (see Terrestrial BE for exclusion rationale).

Effects Analysis Methodology

Assumptions Specific to Wildlife

While some of these assumptions may be debatable, the comparison of alternatives using these assumptions is valid because the same assumptions are applied to all alternatives.

- For the snag retention management requirement in Old Forest Emphasis Area (OFEA), Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC) units, intent is to retain legacy structure where it exists for long-term resource recovery needs (i.e. the development of future old forest habitat with higher than average levels of large conifer snags and down woody material). This management requirement will retain all hardwood snags greater than or equal to 12 inches diameter at breast height (dbh) and in addition, retain 30 square feet basal area of conifer snags per acre by starting at the largest snag and working down, with a minimum of four and a maximum of six per acre (the maximum number was identified to meet economic and fuel reduction objectives in the purpose and need). We assume based on pre-fire stand exam data that on average this will result in retention of six 30 inch dbh snags per acre on a unit basis (six 30 inch dbh trees equal to 30 square feet basal area per acre). This requirement applies to Alternatives 3 and 4.
- For the snag retention management requirements in General Forest and other land allocations not managed for old forest emphasis objectives, intent is to retain snags in patches, avoiding uniformity across large areas. This management requirement will retain all hardwood snags greater than 12 inches dbh and in addition, retain the largest conifer snags greater than 15 inches dbh at the rate of 4 per acre on a unit basis in mixed conifer (6 per acre in red fir). We assume based on pre-fire stand exam data that this is equivalent to an approximate basal area retention rate of 12 square feet per acre (four 24 inch dbh trees equal to 12 square feet basal area per acre). This requirement applies to all action alternatives. In Alternative 1, this requirement applies to all units.

- Snag retention along range fence units is a best estimate but is dependent on hazard tree criteria developed in cooperation with Yosemite National Park. On FR6469 in great gray owl PAC 16, hazards to the range fence may be felled but will be left in place.
- For the down woody material retention management requirement, emphasis is for retention at a rate of 15 to 20 tons per acre on a unit basis in OFEA, HRCA, FCCC, and roadside hazard units within Protected Activity Centers (PACs) while retention in general forest units is within the broader range of 10 to 20 tons per acre. "Of the largest" is defined as greater than 12 inches in diameter at midpoint and first retaining greater than 45 inches at midpoint if available, then greater than 24 to 45 inches at midpoint if available, then greater than 12 inches to 24 inches at midpoint if available.
- Pile and burn treatments will only take place where fuel loading exceeds 20 tons per acre and burning will not reduce large coarse woody debris below the 10 tons per acre standard.
- Hazard tree abatement would include the removal of all dead trees that have the potential to hit a target. A target is defined as the road prism or facilities such as fences or structures. Live trees may qualify as hazards if they are expected to fall and hit a target within the next two years. Very few green trees are expected to be removed based on the criteria, and all green trees would be identified and marked by qualified Forest Service personnel. We assume the amount of green tree removal as hazards will be conservative and that strict guidelines for marking, developed by Forest Health Protection (FHP) staff, will be followed.
- Dead trees have been defined for this project as trees with no visible green needles. Salvage of fire-killed trees would result in the removal of dead trees only, not trees that are declining or may die in the near future.
- The proposed application of a borax-based fungicide (Sporax) on cut stumps is considered very low risk and is not expected to result in adverse effects to terrestrial wildlife. The risk of exposure or ingestion is far below the level of concern (USDA 2006b).
- Unit boundaries were developed using GIS data at various scales. The level of inaccuracy of a line on a map at most scales used was approximately 20 feet. When utilizing these data on the ground, some variation in unit boundaries may occur. The scope of these variations were considered in our effects analysis.

Data Sources

- California Natural Diversity Database (CNDDB, CDFW 2014c).
- California Wildlife Habitat Relationships (CWHR, CDFW 2014b).
- Natural Resource Information System (NRIS Wildlife, USDA 2014b).
- Deer telemetry data (GIS spatial data, CDFW).
- Black-backed woodpecker occupancy model by Tingley et al. 2014a.
- GIS layers including: RAVG database, Worldview Imagery, Stanislaus vegetation database, land allocations, project unit boundaries and road treatments.
- Project survey reports and incidental detection records.
- Scientific literature and internal reports.
- Terrestrial BE Appendix.

Wildlife Indicators

Wildlife indicators vary by species and are stated under the environmental consequences for each species.

Wildlife Methodology by Action

PROJECT ACTION AREA

Unless otherwise specified, the analysis area used to analyze the direct and indirect effects on wildlife and wildlife habitat is approximately 155,000 acres and includes Stanislaus National Forest System lands within the Rim Fire perimeter. The analysis area is based on 1) acres burned in a distinct geographic area and administrative setting that influences the purpose and need of proposed activities, 2) area of impact to forest vegetation from the wildfire and subsequent proposed project activities, 3) furthest measurable extent of changes to disturbance levels and habitat modification that would occur as a result of implementing any of the proposed alternatives, and 4) consistency with the analysis area described in the Rim Recovery EIS reports for fire and fuels, soils, and vegetation because, ecologically, the dynamics among these elements are inherently linked with terrestrial wildlife habitat.

CUMULATIVE EFFECTS

The Rim Fire perimeter (257,314 acres) was chosen as the cumulative effects analysis area for several reasons. Treatments are proposed in and would modify burned areas within the Rim Fire area only. Selection of the Rim Fire area for analysis provides an appropriate context for the reasonable determination of effects to species considered herein and their habitat. Relevant cumulative effects, particularly other projects that have or will treat areas within the fire perimeter, are effectively addressed. This analysis is bounded in time for short-term effects (up to 20 years) and long-term effects (20 to 50 years). Past activities are considered part of the existing condition. Appendix B provides a list and description of past, present and reasonably foreseeable future actions considered for the Rim Recovery project. All activities listed and described are not expected to affect all species considered in this document. See individual species analysis sections for further discussion of relevant present and reasonably foreseeable future actions.

Valley Elderberry Longhorn Beetle: Affected Environment

Species Account

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is listed as Threatened under the Endangered Species Act. There is no Designated Critical Habitat on the Stanislaus National Forest. The valley elderberry beetle (VELB) is thought to range from the Central Valley into the eastern portion of the Coast Range and the foothills of the Sierra Nevada up to approximately 3,000 feet (USFWS 1999). This species is most often found along the margins of rivers and streams in the lower Sacramento River and upper San Joaquin Valley. The current known range of the VELB extends from southern Shasta County south to Fresno County (Barr 1991). When the VELB was originally listed as Threatened, it was only known from 10 populations. However, after extensive surveys it is known from almost 200 locations. USFWS has proposed to delist the VELB, based on the ongoing protection and restoration of habitat and because of the many populations of VELB discovered after the species was listed (USFWS 2006). At the time of listing, the main risk to VELB was the loss of valley riparian habitat. From 80 to over 90 percent of this habitat had been lost in the Central Valley. In recent years, this loss has been somewhat mitigated through regulatory protection, creation of reserves, and restoration efforts. However, the primary habitat in the Central Valley remains limited due to levee and river maintenance projects (USFWS 2006).

Although surveys confirmed similar occupancy between 1991 and 2001, Collinge (2001) documented a 10 percent decline in the number of sites with elderberry shrubs. This decline resulted in a reduction in total numbers of occupied sites and shrub groups. Loss of riparian habitat and resulting fragmentation in the VELBs range may have resulted in a loss of populations and reduced occupancy rates (Ibid).

Surveys focus on suitable habitat in project areas below 3,000 feet in elevation. Low suitability areas (i.e., dense shrubs and forested stands) are not typically surveyed, but it is likely mature plants would have been detected if present. Elderberry plants with the distinctive exit holes VELB create have been documented in the Tuolumne and Clavey River Canyons. Most documented sites are alongside roads, due to the limited access and management in much of the river canyons. While several elderberry plants with exit holes have been documented within the analysis area, no VELB detections were made as a result of surveys.

The project is located within the potential elevation and geographic range of the species. The nearest documented occurrence was one beetle on an elderberry shrub almost 24 miles to the west of the fire near Jamestown in 2002. Their presence within the analysis area is unknown. However, presence is assumed where elderberry plants of adequate size occur below 3,000 feet in elevation. Adequate size is defined as stems greater than one inch in diameter at the base (Barr 1991).

Habitat Account

Habitat for the VELB consists of elderberry shrubs and trees in a variety of habitats and plant communities, but most often in riparian, elderberry savannah or moist valley oak woodlands. Common associated plants include *Populus* spp., Salix spp., *Fraxinus* spp., *Quercus* spp., *Juglans* spp., *Acer negundo, Rubus* spp., *Toxicodendron diversiloba, Vitis californica, Rosa* spp., and *Bacrecharis* spp. (USFWS 2006). VELB appear to favor sites with high elderberry densities and are limited in dispersal and colonization of new sites (Collinge et al. 2001).

The Rim Fire may have eliminated much of the suitable habitat for VELB in the Tuolumne and Clavey River Canyons in the short-term. Elderberry plants damaged by fire are expected to resprout and new plants typically appear the season following fire (Crane 1989). Nonetheless, resprouting plants and new sprouts will likely take several seasons to reach suitable size for VELB. Several recorded plants on the Lumsden Road (1N10), on Road 1S01along Highway 120, and the Cherry Lake Road were severely damaged by the fire. Any beetles or larvae in these areas would likely have perished with the plants, and would be unlikely to recolonize from other locations because of the extent of fire in the Tuolumne River Canyon. The burn severity of known plants along the Tuolumne River is not known, but they may have burned with lower intensity.

There are about 24,713 acres of potential habitat within the analysis area. There are about 24,817 acres of potential habitat area within the cumulative analysis area. This is mainly in the river canyons where treatments are not proposed.

Eggs are laid in late spring on elderberry stems greater than 1 inch in diameter, as measured at the base, on healthy and unstressed plants. Larvae excavate passages into the elderberry shrub where they may remain in larval form for as long as two years before they emerge as adults. Exit holes are usually on stems greater than 0.5 inches in diameter, with 70 percent of the exit holes at heights of 4 feet or greater; these holes are circular to slightly oval, with a diameter of 7 to 10 mm (Barr 1991).

VELB has been found only in association with its host plant, elderberry. Adults feed on the foliage and perhaps flowers, and are present from March through early June (Barr 1991).

Risk Factors

Risk factors for VELB include:

- Loss or alteration of habitat. The primary threat to VELB survival is the loss or alteration of habitat. Stream development and urbanization have resulted in the removal of significant amounts of suitable habitat. On NFS lands, cattle grazing has heavily damaged elderberry in some areas and may have reduced the quantity and quality of available habitat.
- Pesticides and Herbicides. Individual beetles, localized beetle populations, and plants are subject to injury or loss from pesticide applications. Pesticides pose a risk to the VELB and its host plant. Some chemicals from the valley are known to drift upslope and into the Sierra on prevailing wind currents (McConnell et al. 1998, Bradford et al. 2010). Smaller amounts of herbicides are used in the local area by the Forest Service to control shrubs and noxious weeds, and surrounding local landowners.
- Predation. Predation by birds, other insects, and small mammals may have negative effects on localized populations.
- Argentine Ant. The widely established non-native Argentine ant (*Linepithema humile*) also poses a threat to VELB. While Argentine ants are common in the core valley habitat of the VELB, it

does not appear to be widely established in the Sierra foothills, likely due to summer drought or winter cold.

Management Direction

Conservation Guidelines for VELB are provided in USFWS (1999). The proposed management requirements would mitigate adverse effects to this species under the proposed action and are consistent with the VELB Conservation Measures.

Valley Elderberry Longhorn Beetle: Environmental Consequences

The action alternatives could result in direct and indirect effects to the VELB through the following activities:

- Salvage of fire-killed trees, including roadside hazard trees.
- Fuel treatments (e.g., pile burning).

These activities may have direct and indirect effects on VELB through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quality.

Death, injury, or displacement

Death or injury from project related activities would be unlikely to occur given the mechanical activity buffers around suitable habitat (elderberry plants with stems greater than one inch) and Limited Operating Periods (LOPs) which would eliminate the potential for dust and smoke impacts. Larvae and the elderberry plants would be protected by buffers from mechanical operations. However, there is the potential for death or injury if a tree were felled and it crushed an elderberry plant or beetle.

Habitat modification

Because all identified elderberry plants with stems greater than one inch in diameter would be flagged and a buffer applied restricting mechanical activities, no modifications to habitat quality are expected.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the VELB and to determine how well project alternatives comply with Forest Plan Direction and the species' conservation strategies.

1. Disturbance potential
2. Habitat alteration potential

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Because there is a small difference in the amount of treatment areas proposed under the action alternatives, the effects are expected to be the same and are therefore analyzed together.

Indicator 1. Because virtually all of the VELB lifecycle is spent on elderberry shrubs, either inside the stems as larvae or on the foliage or flowers as adults, the greatest risk to individuals would come from activities in the immediate vicinity of elderberry plants.

Buffers applied to individual plants where no mechanical activity would occur and LOPs in place during the adult flight period restricting mechanical activities and pile burning would eliminate almost all risk to individuals associated with implementation of the action alternatives.

Indicator 2. Table 3.15-2 displays the proposed activities within the potential elderberry habitat area for the action alternatives.

Table 3.15-2 Proposed treatments within potential elderberry habitat area

Alternative	Removal of Fire-Killed Trees: Salvage and Hazard tree (acres)	Road Treatments: (temporary road construction, reconstruction, maintenance) (miles)	Percent of Potential Habitat Area Treated
1	1,055	13	4
3	573	13	2
4	573	13	2

Under Alternative 1, the additional 482 acres of proposed treatment is associated with hazard tree removal along Lumsden Road where there are documented occurrences of elderberry plants. Very few, if any, hazard trees remain along this route so any additional effects associated with these acres are considered negligible.

Most of the documented plants in the project area were burned at varying levels of intensity in the Rim Fire. Because of the current open condition in burned areas where trees would be removed, it is expected that any plants sufficiently large enough to support VELB will be found. It is likely that if plants are not detected during surveys, they are small and isolated, and would not provide suitable habitat value for VELB. If new plants are detected prior to or during project implementation, all management requirements would be applied.

The management requirements proposed for this project have been applied repeatedly on the Stanislaus National Forest, for road improvements, noxious weed control, vegetation management, and prescribed burning, and have been successful in preventing damage to individual plants.

While there is some risk of disturbance or damage during implementation from vehicles using adjacent roads or people on foot, this risk is considered negligible and not beyond risks associated with ongoing activities and uses on public lands. Operating heavy equipment may result in excess deposition of dust and other particulate matter on individual plants; however, a study of proximity to roads and dust impacts to elderberry plants found no evidence of negative effects (Talley et al. 2006).

Elderberry plants in the project area may benefit from mechanical removal of dead trees because it would reduce the risk of direct impacts when the trees fall. Elderberry plants burned by the fire are expected to resprout vigorously and benefit from the more open, post-fire habitat, along with the greater availability of water, light, and minerals.

Thus, based on the above analysis, the potential for disturbance or habitat alteration with respect to VELB is either insignificant (cannot be meaningfully measured, detected, or evaluated) or discountable (extremely unlikely to occur).

CUMULATIVE EFFECTS

In making the determination for Alternative 1, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B.

Habitat modification was used as a relative measure of cumulative effects of the action alternatives.

Habitat Modification

The potential habitat below 3,000 feet elevation within the cumulative effects analysis area is almost entirely within the Tuolumne River Canyon and its tributaries. Most of this area is managed by the Forest Service and the Bureau of Land Management. Much of the Tuolumne River is designated and managed as Wild and Scenic River.

Federal Lands

The Rim Hazard Tree Removal project is the only present action on public lands within the potential habitat area. This project is not likely to affect habitat suitability for VELB because management requirements in place will protect elderberry plants and the valley elderberry longhorn beetle.

There are no reasonably foreseeable future actions on federal lands within the potential habitat area below 3,000 feet.

Private Lands

The cumulative effects analysis area contains private timberland, residential areas, and rangeland. Some of the private inholdings include meadows and associated riparian habitat that may support elderberry shrubs. There are also power plants, dams, powerlines, and other facilities associated with Hetch-Hetchy in the Tuolumne River Canyon and Cherry Creek within the elevation range of VELB. There are 58 acres of private land where emergency fire salvage plans have been submitted to Cal Fire.

Headwater disturbances, which result in downstream flooding or mudslides, could result in the destruction of elderberry plants (USFWS 1984). Activities on private lands that may result in the incidental take of elderberry plants include removal of fuels around residences and infrastructure, grazing, introduction of noxious weeds, irrigation and landscaping, or habitat conversion such as recreation buildings or paved areas.

Alternative 1 Contribution/Summary

Because the Rim Recovery project is not expected to result in any measurable effects to VELB, it is not expected to contribute to cumulative effects.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact VELB habitat.

Indicator 1. Because no management activities would occur under this alternative, there would be no project related direct effects to individual valley elderberry longhorn beetles or larvae.

Indicator 2. Within the areas that burned at high severity, elderberry shrubs and other herbaceous and shrub vegetation is expected to be established within 3 to 5 years. Elderberry shrubs that are of appropriate size for beetle and larvae occupancy would provide additional suitable habitat for VELB. These benefits are expected in the short-term (10 to 20 years).

When wildfire returns to this landscape, the elderberry shrubs providing suitable habitat for VELB in or near areas that burned at high severity may be at increased risk of loss. One of the greatest risks to VELB is habitat loss. Within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons per acre) than the desired condition (Rim EIS Fire and Fuels Report). There is uncertainty predicting the effect no action would have on future wildfires and VELB habitat given the numerous factors involved over time. However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fire and Fuels Report).

CUMULATIVE EFFECTS

The cumulative effects discussion under Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands and listed in Appendix B.

Alternative 2 Contribution/Summary

The cumulative contribution of Alternative 2 is attributed to the influence no action may have on how future wildfires may adversely impact elderberry habitat. Since no fire killed trees would be removed, fuel loading would increase over time, resulting in increased fire intensity and a greater potential for loss of suitable habitat when wildfire returns to this landscape.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Same as Alternative 1 except Alternative 3 does not treat the 482 acres along Lumsden Road.

CUMULATIVE EFFECTS

Same as Alternative 1.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Same as Alternative 3.

CUMULATIVE EFFECTS

Same as Alternative 1.

Valley Elderberry Longhorn Beetle: Summary of Effects

Alternatives 1, 3, and 4 would be unlikely to have any adverse direct or indirect effects to the VELB.

All elderberry plants capable of supporting VELB would be flagged and avoided. LOPs would be in place under all action alternatives to eliminate negative impacts from dust or smoke. Since there would be no removal of dead trees under Alternative 2, there would be no potential direct and indirect effects such as death or injury of individuals, or loss of potential habitat if a tree fell onto an elderberry shrub that is occupied by individuals.

DETERMINATIONS

Implementing the Rim Recovery Project action alternatives has a very small potential to impact individual valley elderberry longhorn beetles and the elderberry habitat required by the species. The planned surveys and buffers established around individual plants and project management requirements would greatly reduce the potential risk associated with potential direct and indirect effects to individual VELB or associated elderberry plants. The project does not occur within Designated Critical Habitat for the species and would have no effect on critical habitat. However, the primary constituent elements occur within and adjacent to the planning area indicating suitable habitat is present. Therefore, the following determinations are supported by the analysis contained herein. Specifically, the potential for effects to VELB from implementation of the alternatives are either discountable (i.e. extremely unlikely to occur) or insignificant (i.e. cannot be meaningfully measured, detected, or evaluated).

Alternative 1

Alternative 1 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

Alternative 1 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

This determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest, a discountable effect.

- All elderberry plants greater than one inch stem diameter will be flagged and avoided where they occur below 3,000 feet in elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal, a discountable effect.
- Any ground based mechanical equipment operations and burning within 50 feet of elderberry plants will be prohibited, a discountable effect.
- Pile burning and mechanical activities within 100 feet of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles, a discountable effect.

Alternative 2

Alternative 2 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

Alternative 2 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

This determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest.
- There is potential for a fire-killed tree to fall and crush an elderberry plant or beetle.

Alternative 3

Alternative 3 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

Alternative 3 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

This determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest. (discountable effect)
- All elderberry plants greater than one inch stem diameter will be flagged and avoided where they occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal). (discountable effect)
- Any ground based mechanical equipment operations and burning within 50 feet of elderberry plants will be prohibited. (discountable effect)
- Pile burning and mechanical activities within 100 feet of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles. (discountable effect)

Alternative 4

Alternative 4 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

Alternative 4 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

This determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest. (discountable effect)
- All elderberry plants greater than one inch stem diameter will be flagged and avoided where they occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal). (discountable effect)
- Any ground based mechanical equipment operations and burning within 50 feet of elderberry plants will be prohibited. (discountable effect)
- Pile burning and mechanical activities within 100 feet of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles. (discountable effect)

Valley Elderberry Longhorn Beetle: Compliance

On August 8, 1980, VELB was listed as a Threatened species (45 FR 52803). Critical Habitat was also designated at this time, but does not occur on the Stanislaus National Forest. The action alternatives would not affect the recovery plan objectives for the VELB. The recovery plan objectives for VELB are to minimize further degradation, development, or environmental modification of VELB habitat, and to delist the VELB (USFWS 1984).

VELB Conservation Strategy Guidelines

The United States Department of the Interior, Fish and Wildlife Service issued Conservation Guidelines (USFWS 1999) to assist Federal agencies, during project planning, to avoid or minimize adverse effects on the valley elderberry longhorn beetle. The following guidelines and previous consultation recommendations from the Service were used when developing management requirements the Rim Recovery project:

Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100 foot buffer has been approved by the Service, provide a minimum setback of 20 feet from the dripline of each elderberry plant.

Apply a limited operating period from April 1 through June 30 prohibiting pile burning and mechanical activities within 100 feet of elderberry plants to prevent smoke and dust impacts to beetles.

Bald Eagle: Affected Environment

Species and Habitat Account

The bald eagle (*Haliaeetus leucocephalus*) is currently managed as a USDA Forest Service Sensitive species (Update to the Regional Forester's Sensitive species list, July 3, 2013, USDA 2013g). In USFS Region 5 the bald eagle breeds primarily in specific and localized areas of large rivers and lakes of the northern third of California with scattered nesting throughout the state (R5 Sensitive species evaluation form of 2012, USDA 2012d).

Bald eagles typically nest in live trees, some with dead tops, and build a large (about 6 foot diameter), generally flat-topped and cone-shaped nest usually below the top with some cover above the nest (Jackman and Jenkins 2004). In general, bald eagles require a large tree to accommodate a large nest in a relatively secluded location within the range of their tolerance of human disturbance (Ibid). Diurnal perch habitat is characterized by the presence of tall, easily accessible; often predominate trees adjacent to shoreline foraging habitat (Buehler 2000). The entire breeding cycle, from initial activity at a nest through the period of fledgling dependency, is about 8 months (Ibid).

In the Rim Fire area there is one bald eagle nest. The nest is at Cherry Lake. This site has been occupied for more than 15 years. Although nest trees have changed over this period, the nest site has consistently been in the same general stand on the Cherry Lake shoreline. The post-fire condition of the nest, nest tree, and nest stand all appear intact and suitable (Roy Bridgman, pers.comm.). After over 15 years of being occupied as a bald eagle territory, it appears the carrying capacity of Cherry Lake is limited to one pair of breeding bald eagles. Bald eagles also use the Cherry Lake area during migration and for overwintering (NRIS Wildlife database, USDA 2014b).

Risk Factors

Risk factors potentially affecting bald eagle abundance and distribution include nest site loss and disturbance, and loss of habitat and habitat elements such as potential nest or roost trees (USDA 2001, R5 Sensitive species evaluation form 2012).

Management Direction

Current management direction is to follow all law, regulation, and policy as it relates to bald eagle. The species is still vulnerable to potential disturbance impacts and is still within the delisting monitoring period (R5 Sensitive species evaluation form of 2012). Forest Plan Direction (USDA 2010a) p. 43 states: When nesting bald eagles are found, implement suitable restrictions on nearby activities based on the Regional habitat management guidelines and the habitat capability model for the species. Protect all historic and active nests, as required by the Eagle Protection Act and the Migratory Bird Treaty Act.

The Eagle Protection Act (16 U.S.C. 668 to 668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who disturb nest sites by substantially interfering with normal breeding, feeding, or sheltering behavior (USFWS 2007).

The Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 to 712, prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors.

Habitat management guidelines for bald eagle are provided by the National Bald Eagle Management Guidelines (USFWS 2007).

Bald Eagle: Environmental Consequences

The project alternatives could result in direct and indirect effects to the bald eagle through the following activities:

- Salvage harvest of fire-killed trees.
- Salvage harvest of roadside hazard trees.
- New permanent road construction, temporary road construction, and road reconstruction.
- Landing construction and use.
- Use of material sources and water sources.
- Biomass and similar fuel treatments.

These actions may have direct and indirect effects on bald eagles through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quantity and/or quality.

Death, injury or disturbance

Death, injury, and disturbance are potential direct effects to consider for bald eagle (USDA 2004). Project activities have the potential to cause death or injury by tree-falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are not protected and are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed if not identified and protected.

Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. Human presence in nest stands and loud noise in the vicinity of nest stands have the potential to change normal behavior and potentially impair essential behavior patterns of the bald eagle related to breeding, feeding, or sheltering. The potential for disturbance is minimized by following the National Bald Eagle Management Guidelines (USFWS 2007) and by the implementation of Limited Operating Periods (LOPs). Disturbance issues are expected to be most pronounced within a half-mile of nests (USFWS 2007).

Habitat modification

Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees could remove snags or live trees that could potentially serve as bald eagle perch sites or nest trees. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage units because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status.

New permanent road construction, temporary ("temp") road construction, road reconstruction, and landing construction may also modify bald eagle habitat. If conducted in or too near bald eagle nest stands, project roads or landings could result in increased habitat fragmentation, disturbance, and lower habitat capability for bald eagle (USFWS 2007, Pyron et al. 2009). Biomass removal and other understory treatments outside of nest stands is generally not an issue and none are proposed in the nest stand.

As bald eagles focus nesting, roosting, and perching behaviors along lake shorelines, habitat modification effects are expected to be most pronounced within 500 feet of those shorelines (Jackman and Jenkins 2004).

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the bald eagle and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Project activities within a half-mile of the known bald eagle nest.
2. Treatment units within 500 feet of lake shorelines.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1. Four salvage units occur within a half-mile of the known bald eagle nest: O1A, O1B, O08, and O09. These units are subject to the bald eagle Limited Operating Period (LOP) management requirement. One roadside hazard tree salvage unit skirts the edge of the half-mile buffer but is basically outside the ½ mile buffer circle. No landings, water sources, or material sources occur in the half-mile buffer. As any tree removal is beyond the critical distance identified in USFWS 2007, and as LOPs are in place for all project activities within a half-mile of the bald eagle nest, the potential effect of this indicator is minimized and below identified concern thresholds.

Indicator 2. Only one treatment unit occurs within 500 feet of the Cherry Lake shoreline, as noted in the Wildlife BE maps appendix. The unit is a roadside hazard salvage unit on route 1N15Y. Route 1N15Y is gated closed to public access, but may be used for facility maintenance needs. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage units because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status. If conducted aggressively, hazard tree salvage could remove trees bald eagles are known to use within this unit (Rich, pers.obs.) and, thus, lower habitat capability in approximately 25 acres of prime bald eagle habitat. However, because the road is gated closed to public use, and because it is unlikely that a target would be present within potential tree failure zones, probably fewer than three and more likely no trees would be removed. Assuming the latter, no measurable effect to bald eagle would occur within the expected treatment scope of this unit.

CUMULATIVE EFFECTS

Relevant risk factors potentially affecting bald eagle abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements such as potential nest or roost trees (USDA 2001, R5 Sensitive species evaluation form 2012).

Based on relevant risk factors and location, the following present and reasonably foreseeable actions from Appendix B are the most relevant to bald eagle: Rim HT project, and recreation. As this project and the Rim HT project includes implementation of required LOPs, and as recreation is limited to existing and mostly quiet uses in this area (i.e. primarily trailhead parking and hiking), Alternative 1 will not likely contribute cumulatively to other actions.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are uncertain but not an issue because the influence no action would have on fire risk to bald eagle habitat is probably not measurable.

Cumulative Effects

The effects of no action would be localized to the area surrounding Cherry Lake. The influence no action would have on bald eagle is uncertain but probably not measurably significant.

Alternative 3

Direct and Indirect Effects

Same as Alternative 1.

Cumulative Effects

Same as Alternative 1.

Alternative 4

Direct and Indirect Effects

Same as Alternative 1.

Cumulative Effects

Same as Alternative 1.

Bald Eagle: Summary of Effects

Numerical values for both indicators are the same for all action alternatives. Thus, effects are the same for all action alternatives.

Determination

Alternatives 1, 3, and 4

The action alternatives may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the bald eagle. This determination for Alternative 1, 3, and 4 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- This alternative occurs in or affects suitable habitat but compliance with existing forest plan direction (USDA 2010) and the National Bald Eagle Habitat Management Guidelines (USFWS 2007) is clearly demonstrated.

Alternative 2

Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the bald eagle. This determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.
- Compliance with existing conservation strategies and forest plan direction is demonstrated.

Bald Eagle: Consistency with habitat management guidelines

Regional habitat management guidelines are provided by USFWS 2007. As per USFWS 2007, the proposed activities in the action alternatives fall under Category C. Timber Operations. Under Category C, the following is required:

- Avoid removal of trees within 330 feet of the nest at any time.
- Avoid timber harvest operations during the breeding season within specified buffers.

The action alternatives demonstrate compliance with USFWS 2007 as follows:

- No tree removal is proposed within 330 feet of the nest.
- The following is a management requirement that avoids timber harvest operations during the breeding season:

Maintain a Limited Operating Period (LOP) prohibiting vegetation treatments, new road construction, blasting, landing construction, and helicopter flight paths within 0.5 miles of the known bald eagle nest (January 1 through August 31) unless surveys conducted by a Forest Service biologist confirm non-nesting status.

This project complies with forest plan direction and the National Bald Eagle Management Guidelines (USFWS 2007).

California Spotted Owl: Affected Environment

Species and Habitat Account

The California spotted owl (*Strix occidentalis occidentalis*) is currently managed as a USDA Forest Service Sensitive species (Update to the Regional Forester's Sensitive Species list, July 3, 2013). Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by USDA 2001, 2004, the R5 Sensitive Species Evaluation Form 2012, and Keane 2014, and are incorporated here by reference. Key suitable habitat for spotted owl consists of 1) two or more tree canopy layers, 2) trees in the dominant and co-dominant crown classes averaging 24 inches dbh or greater, 3) at least 70 percent tree canopy cover (including hardwoods). As per the California Habitat Wildlife Relationships model or CWHR (CDFW 2014b), this means stands in descending order of priority: 6, 5D, 5M, 4D, and 4M and other stands with at least 50 percent canopy cover (USDA 2004). Nests and roosts are typically located in stands that have 70 percent or greater canopy cover. They typically contain one to several large trees of declining vigor, and multiple canopy layers resulting from mixtures of different aged trees (Keane 2014). Recent research suggests that, within their habitat matrix, spotted owls depend on "green" stands with the aforementioned characteristics for nesting and repeated roosting, as well as for foraging. Spotted owls use a broader range of vegetation conditions for foraging than they do for nesting and roosting (Ibid.), and this includes post-fire habitats as discussed below.

The most recent population status and trend information can be found in Keane 2014, Conner et al. 2013, Tempel and Gutiérrez 2013, and Tempel et al. 2014. In summary, the most recent estimate of population size for California spotted owls in the Sierra Nevada reported 1,865 owl sites, with 1,399 sites on National Forest System lands. Ongoing research of recent population trends indicates increasing evidence for population declines on the three demographic study areas on National Forest System lands and a stable or increasing population on the National Park study area, (Conner et al.

2013, Tempel and Gutiérrez 2013, Tempel et al. 2014). The factors driving these population trends are not known (Keane 2014).

California spotted owls are top trophic-level avian predators associated with heterogeneous forests characterized by areas with large trees, large snags, and large down woody material (North et al. 2009, Roberts and North 2012, Keane 2014). California spotted owls show the strongest associations with mature forest conditions for nesting and roosting, but will forage in a broader range of vegetation types (Keane 2014). Recent research indicates that California spotted owls will occupy landscapes that experience low-to moderate-severity wildfire, as well as areas with mixed-severity wildfire that include some proportion of high-severity fire (Bond et al. 2009, Bond et al. 2010, Roberts et al. 2011, Lee et al. 2012, Bond et al. 2013, Lee et al. 2013). However, applying results from these studies to the Rim Fire should be done with caution. As shown in Figure 3.15-1, it is important to note that, because of the overall size and severity of the Rim Fire, many owl sites in the Rim Fire had far larger proportions of core areas burned at high severity relative to any of these studies. Further, several of the studies had limited sample sizes. For example, Bond et al. (2009) studied only seven owls from four sites. High standard errors indicate that there is individual variability in selection among study owls. How owls use habitat for foraging where high-severity patch sizes are relatively large, and the relationship of owl use to the amount and arrangement of burned-unburned edge, among other factors, would benefit from further study such as that proposed in the Rim EIS Appendix D. In the closely related northern spotted owl, Clark (2007) found that while spotted owls did roost and forage within high severity burn areas, the use was very low. The results suggest that this cover type was poor habitat for spotted owls. Clark et al. (2013) summarized the results provided by the few studies that have been conducted on spotted owls in burned landscapes and noted that results were equivocal. Thus, uncertainties remain regarding long-term occupancy and demographic performance of spotted owls at burned sites (Keane 2014). Specifically, uncertainty exists regarding how the amounts and patch sizes of high-severity fire will affect California spotted owl occupancy, demographics, and habitat over long time frames (Ibid).

For the past two decades, California spotted owl management has been based on recommendations provided by the California Spotted Owl Technical Report (Verner et al. 1992) and incorporated into forest plan direction at a bioregional scale (USDA 1993, 2001, 2004). This direction uses a system of land allocations of protected activity centers (PACs) and home range core areas (HRCAs) that are specifically managed for owl habitat and heterogeneous old forest conditions. The management of owl habitat and heterogeneous old forest condition is specifically focused on large structures, with an emphasis on a primarily green forest mosaic infused with large trees, large snags, and large down logs as shown in Figure 3.15-2 and described by North et al. 2009 and Roberts and North 2012. Spotted owl sites are known as “activity centers” because the spotted owl is a central place forager, meaning activities are typically centered around a specific location (Verner et al. 1992). Sites are identified through the use of protocol surveys (USDA 1991a). Protocol surveys have been conducted throughout the Rim Fire area for the past two decades. These surveys are best described as opportunistic, depending upon planned activities and funding levels, but have occurred at a level such that inventory information for the analysis area is considered essentially complete (USDA, unpublished data, NRIS Wildlife database).

California spotted owl PACs are delineated surrounding each territorial owl activity center detected on National Forest System lands since 1986 (USDA 2010a, p. 183). PACs are delineated to encompass the best available 300 acres of habitat in as compact a unit as possible. A home range core area (HRCA) includes the PAC, and is established surrounding each territorial California spotted owl activity center detected after 1986. The core area amounts to 1,000 acres based on 20 percent of the area described by the sum of the average breeding pair home range plus one standard error (USDA 2010a, p. 188).

Forest Plan direction requires that, after a stand-replacing event such as the Rim Fire, specialists evaluate habitat conditions to determine if there is sufficient suitable habitat remaining, and if there are opportunities for re-mapping to better encompass suitable habitat. If there is insufficient suitable habitat for a PAC around the activity center, the PAC may be removed from the conservation network (USDA 2010a, p. 184). The post-fire PAC evaluation for the Rim Fire area was completed with technical assistance from Pacific Southwest Region Research Station (PSW) owl scientists. For the analysis, each PAC was evaluated within the Rim Fire boundary using several criteria. The three main criteria used were 1) acres of post-fire suitable habitat defined as CWHR 4M, 4D, 5M, and 5D (including class 6) burned at less than 75 percent basal area mortality, 2) percent of PAC within a 496-acre (200-hectare) circle burned at high severity (defined as greater than 75 percent basal area mortality), and 3) percent of pre-fire suitable habitat burned at high severity. Forty-six California spotted owl sites are located substantially within the Rim Fire perimeter. An additional four sites are located substantially outside of the Rim Fire perimeter. These four sites were not included in the larger analysis because 1) the activity center did not occur within the fire perimeter, 2) no PAC acres occurred within the fire perimeter, and 3) approximately 10 percent or less of the home range core area occurred within the fire perimeter. Thus, these four sites were considered suitable and their boundaries were left as is. Of the 46 sites substantially within the Rim Fire perimeter, they clustered into three categories as shown in Figure 3.15-1. In that figure, 10 sites cluster into Category 1 (red), 27 sites into Category 2 (green), and 9 sites into a Category 3 (orange). Details on individual sites are provided in the Terrestrial BE Appendix.

Category 1 (red): These 10 sites burned primarily at high severity across the 496-acre analysis area, had nearly all pre-fire suitable habitat burn at high severity, and have small amounts of post-fire suitable habitat. It is clear that these sites have very low to no probability of continued occupancy. Thus, it is appropriate to remove these sites from the conservation network.

Category 2 (green): These 27 sites have lower amounts of high severity fire within the 496-acre analysis area, lower amounts of suitable habitat loss, and high amounts of remaining suitable habitat. Available literature suggests that these sites have high probabilities of continued occupancy. Thus, it is appropriate to consider these sites as suitable post-fire, and it is appropriate to keep the boundaries intact as is.

Category 3 (orange): These 9 sites have intermediate high severity values. Based on the scientific literature, there is some uncertainty as to the probability of occupancy for sites within this range of values. The literature does document that individuals can persist in sites within these ranges of high severity burn, though this is an uncertainty requiring further research to identify where more specific thresholds might exist. Thus, in order to reduce uncertainty in occupancy, it is appropriate to re-map the boundaries of these sites to encompass habitat of better quality where possible, and to consider the re-mapped sites as suitable. It would also be particularly important to research owls in these sites so more can be learned about occupancy thresholds.

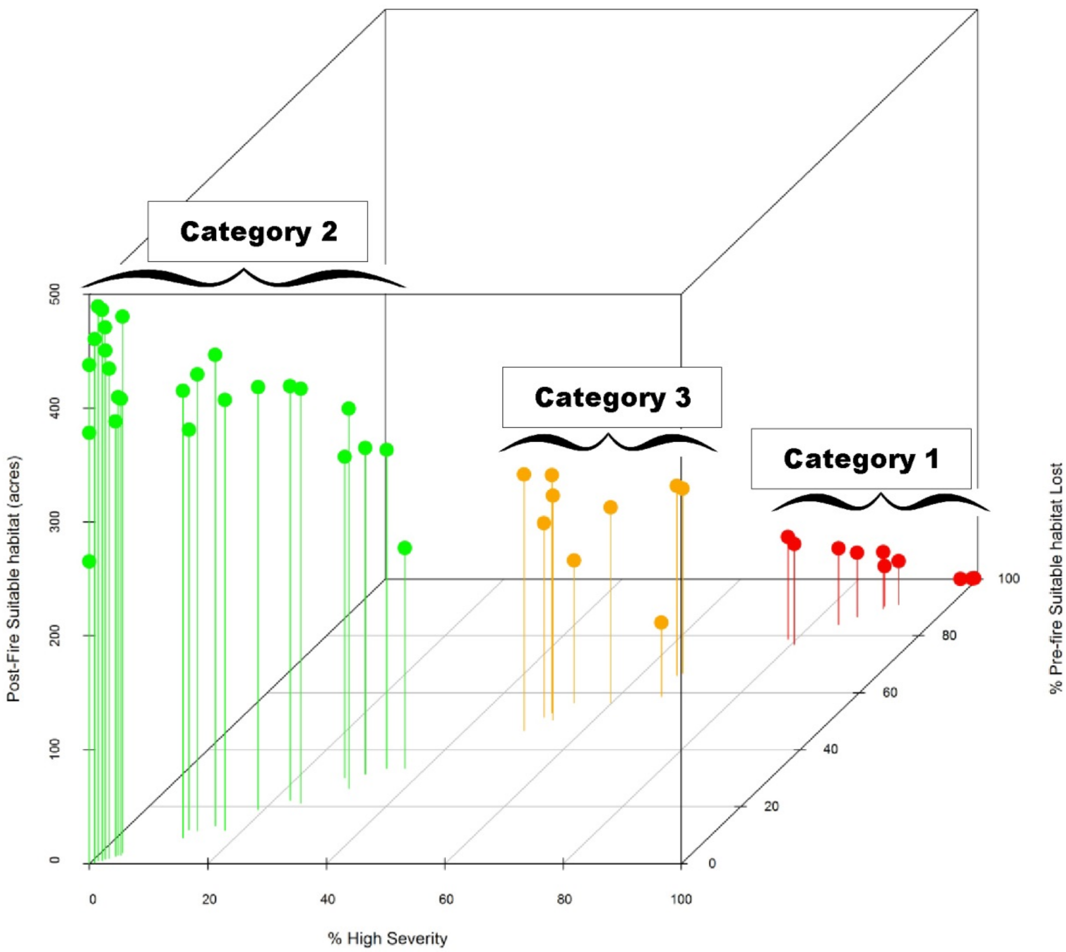

Figure 3.15-1 Pin graph of post-fire California spotted owl PAC condition

Area of Concern

The Rim Fire area is located in Spotted Owl Area of Concern 6. Areas of concern were identified in the California Spotted Owl Technical Report (Verner et al. 1992) and were defined as areas within the range of California spotted owl where potential gaps in habitat and the associated loss of forest connectivity were a potential issue. Area of Concern 6 was identified as an area with habitat fragmentation, which creates a potential bottleneck in the distribution of owls on the west slope of the Sierra Nevada. Thus, the Rim Fire area may be considered particularly important to the distribution of California spotted owl. An analysis of how changes to habitat in each alternative relates to the distribution of the California spotted owl can be found in MIS policy and the MIS Report written for this project (USDA 2007 MIS FEIS, Rim Recovery MIS Report 2014). Areas of Concern represent areas where management decisions may have a disproportionate potential to affect the California spotted owl population (USDA 2004).

Risk Factors

Risk factors potentially affecting California spotted owl abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements, especially large snags and large down woody material (USDA 2001, USDA 2012d). The primary driver for nest habitat loss is stand-replacing wildfire. The extent and severity of wildfire has increased in the Sierra Nevada as a result of climate change (Keane 2014). The twelve-month listing decision of the US Fish and Wildlife Service found stand-replacing fire to be the primary threat to California spotted owl (Federal Register 2006).

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The California spotted owl is a Region 5 Sensitive species associated with old forest ecosystems (USDA 2004). The following land allocations pertain to California spotted owl and old forest ecosystems: Protected Activity Centers (PACs), Home Range Core Areas (HRCAs), Old Forest Emphasis Area (OFEAs), and proposed Forest Carnivore Connectivity Corridor (FCCC).

The desired condition for a California spotted owl PAC is to have 1) at least two tree canopy layers; 2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; 3) at least 60 to70 percent canopy cover; 4) some very large snags (greater than 45 inches dbh); and 5) snag and down woody material levels that are higher than average.

The desired condition for a California spotted owl HRCA is to encompass the best available habitat in the closest proximity to the owl activity center (USDA 2004, pp. 39 to 40). HRCAs consist of large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for an Old Forest Emphasis Area (OFEA) is to provide habitat conditions for mature forest associates (spotted owl, northern goshawk, Pacific marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large-diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Figure 3.15-2 shows forest structure and function generally resembling pre-settlement conditions (SNEP 1996, drawing by Robert Van Pelt).

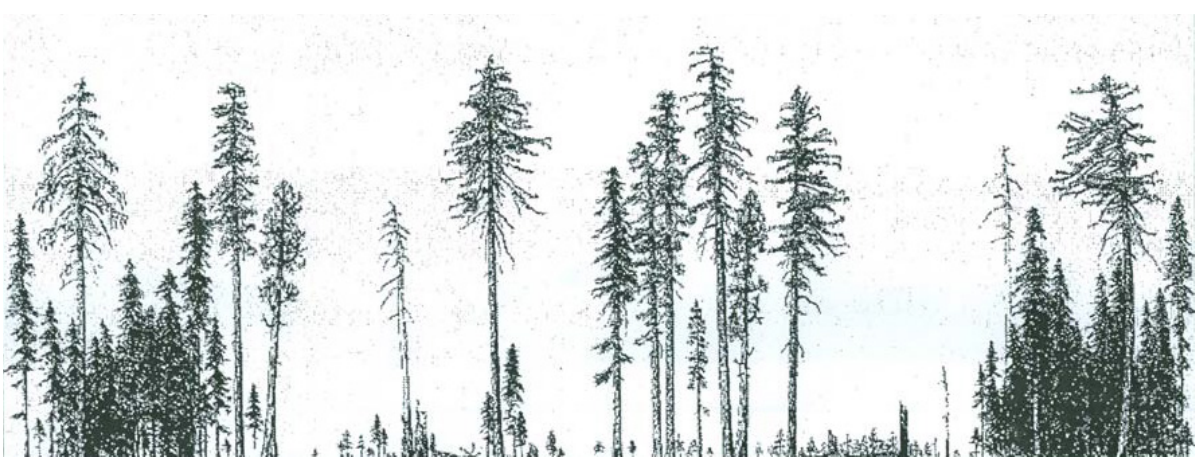

Figure 3.15-2 Typical pre-settlement mixed conifer forest, western Sierra Nevada

The desired future condition of the FCCC is to provide habitat connectivity for fisher and marten, linking Yosemite National Park and the North Mountain Inventoried Roadless Area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as described in USDA 2004). Habitat structures that may constitute rest sites (as described in Lofroth et al. 2010, plate 7.8) are important to retain. Desired conditions in FCCC for fisher and marten also provide suitable habitat conditions for California spotted owl.

California Spotted Owl: Environmental Consequences

The project alternatives could result in direct and indirect effects to the California spotted owl through the following activities:

- Salvage harvest of fire-killed trees.
- Salvage harvest of roadside hazard trees.
- New permanent road construction, temporary road construction, and road reconstruction.
- Landing construction and use.
- Use of material sources and water sources.
- Biomass and similar fuels treatments.

These actions may have direct and indirect effects on California spotted owls through the following:

- Project-related death, injury, or disturbance.
- Project-related modifications to habitat quantity and/or quality.

Death, injury or disturbance

Project activities have the potential to cause death or injury by tree falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed. The mobility of the species in question and the management requirement of LOPs, make it highly improbable that death or injury would occur as a result of project activities. Flagging and avoiding current and historic nest trees (a management requirement under Alt. 3 and 4) provide a way to minimize nest tree loss.

Project activities have the potential to cause disturbance mainly because of the use of loud machinery. Loud noise from equipment such as chain saws or tractors is expected to occur in or along salvage units, project roads, landings, material sources, and water sources. Loud noise has the potential to change normal behavior patterns during the period operations would take place. The noise would potentially impair essential behavior patterns of the spotted owl related to breeding, feeding, or sheltering. The potential for disturbance is minimized by the implementation of Limited Operating Periods (LOPs) as a management requirement under all action alternatives.

The location of nest sites or activity centers are more uncertain following large-scale disturbance events (Keane, pers. comm.); conducting surveys to establish or confirm any new locations of nests or activity centers is a way to address this movement uncertainty. Conducting protocol surveys is a management requirement common to all alternatives.

Habitat modification

Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees primarily removes snags and existing down woody material. Salvage harvest of roadside hazard trees may also remove existing living trees meeting certain criteria for hazard definition. The removal of snags reduces future recruitment of down woody material.

Short-term, within the next ten years, snags and down woody material function as habitat elements important for owl prey. Snags also serve as potential hunting perch sites that may be utilized by foraging owls. Recent research indicates that prey species may be abundant and available in the post-fire environment. Work by Bond et al. (2009, 2013) indicates that owls may use high-severity fire areas for foraging and that foraging owls with burned forest in their home range appear to utilize a variety of prey, particularly gophers (*Thomomys* spp.) and flying squirrels (*Glaucomys sabrinus*). Bond et al. (2013) also found that wood rats (*Neotoma* spp.), sciurid squirrels (Family Sciuridae), and deer mice (*Peromyscus* spp.) were represented as important prey items for owls within a post-fire habitat mosaic. Results from studies of small mammal habitat associations demonstrate the species-specific importance of habitat elements such as shrubs, downed logs, snags, and truffles (Keane 2014). The time elapsed since a fire is closely correlated with habitat elements and the composition of prey species (Roberts 2008, Roberts and van Wagtendonk 2008). For example, post-fire habitats are typically rich in gophers and deer mice in the first decade following a fire, followed by wood rats when understory conditions are well developed in the first and following decades, and finally by sciurid squirrels and flying squirrels when trees reach maturity (Ingles 1965, Quinn and Keeley 2006). A diversity of prey species within a habitat mosaic can be expected to benefit predators such as the spotted owl (Roberts and North 2012). Post-fire salvage logging may adversely affect rates of owl occupancy (Lee et al. 2012), but more research, as shown in Appendix D, is needed to determine owl response to post-fire land management activities. For example, Clark et al. (2013) found that habitat disturbance due to wildfire and subsequent salvage logging on private lands negatively affected site occupancy by northern spotted owls. However, Clark et al. (2013) were unable to separate the impacts of wildfire from land management activities. Further, salvage logging treatments on private land are different from salvage logging treatments on National Forest System land with regards to various project requirements and environmental protection measures. While research (such as that proposed in Appendix D) will help better determine retention thresholds and spatial arrangements of snags compatible with owl use, areas where snag retention is required on National Forest System land outside of the research sample units (e.g. 4 to 6 per acre) are likely to allow for an adequate number of perch sites for owl foraging in post-fire environments.

Long term (over several decades), large snags and large down logs are considered biological legacies in the post-fire environment and play important roles in the structure of the future forest (Lindenmayer et al. 2008). For example, large snags and large down logs are fundamental to the definition of old forest and are important attributes for the development of the old forest ecosystem and associated species such as the spotted owl. Snags may stand for decades and, in time, may become future nest trees for spotted owl as the regenerating forest nears maturity, although few large snags may be expected to remain intact by that time. Snag dynamics in the Sierra Nevada are complex and snags fall at different rates depending on many factors (Cluck and Smith 2007). Once recruited into the down woody material on the ground, this coarse woody debris again serves as an important element in owl habitat (Verner et al. 1992). Thus, decaying wood serves different functional roles overtime, first providing cover for spotted owl prey in the complex early seral stage of the forest, and ultimately decaying and playing a critical role in soil development of old forests. For example, logs in decay class five (i.e. highly decayed) are associated with hypogeous fungi (i.e. truffles), which in turn serve as a primary food source for spotted owl prey in old forests, the flying squirrel in particular (Verner et al. 1992).

New permanent road construction, temporary road construction, road reconstruction, and landing construction also modify habitat. In particular, road construction and continued use can result in increased habitat fragmentation, disturbance, and lower habitat capability for spotted owl (Pyron et al. 2009). Basic road maintenance such as grading and cleaning culverts is generally not an issue for wildlife. Basic road maintenance protects water quality and soils by preventing degradation of road drainage structures and function (3.14 Watershed in the EIS). The use of water sources may reduce water availability for spotted owls and their prey, especially in drought years. Landing construction results in habitat fragmentation. Helicopter landings are typically between 1 and 3 acres in size and tractor landings are typically 0.25 to 1 acre in size.

The removal of snags and down woody material will reduce fuel loading. The reduction in fuel loading may be expected to promote the development of old forest habitat. However, the effectiveness of the various treatments proposed is difficult to predict and there is considerable uncertainty with how salvage logging influences future fire. A review of recent research on this topic and the associated controversy can be found in Long et al. (2014, Ch. 4.3 pp. 195-197). Salvage logging is controversial because few short-term positive ecological effects and many potential negative effects have been associated with post-fire logging (Ibid). That said, it is certain that salvage harvest reduces fuel loading over time (i.e. as snags fall, large surface fuel loadings result) and reduced surface fuel loads may reduce soil and forest regrowth damage in a reburn (as was observed on the Chips Fire, discussed in 3.05 Fire and Fuels in the EIS). Reburns of high severity lengthen the time for establishment of suitable nesting habitat, the most limiting factor needed to improve reproductive performance and population trend for the spotted owl (Federal Register 2006). Further, salvage may improve the likelihood of future regeneration efforts that, contingent upon future surface fuels management and treatment at appropriate scales, would re-establish forests with large trees and sufficient canopy cover within shorter time frames.

The effect salvage logging has on reburn fire severity of future mature forest habitat is likely to remain widely variable depending on numerous factors including how future prescribed fire management is planned and implemented. However, as stated in Chapter 3.05 (Fire and Fuels),reducing fuel loads, especially activity fuels and biomass, is likely to be effective in reducing flame lengths and fire line intensities. Piling and burning activity fuels is an effective method for disposal and is expected to promote development of mature forest habitat (Stephens et al. 2009). Also, preventing high fuel loadings along roadsides can reasonably be expected to play an important role in reducing fire severity to developing mature forest habitat, especially where roads are identified as critical fire management features (Crook et al. 2013). Roadside hazard salvage treatments involve the removal of snags and live trees identified as hazards to public safety. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage units because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status.

As spotted owls focus their activities in the best available habitat around roost and nest sites known as activity centers (Verner et al. 1992), habitat modification effects are expected to be most pronounced in PACs.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the spotted owl and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Number of current and historic nest sites within PACs in treatment units or within 0.25 mile of potentially disturbing activities.
2. Acres of treatment unit overlap within PACs.
3. Acres of areas managed for old forest condition with higher than average levels of large snags and higher than average levels of large down woody material.
4. Miles of new permanent road construction and other project road miles in PACs by road type.
5. Number of material sources, water sources, and landings in owl habitat.
6. Acres of fuels treatments by type (biomass, pile and burn) including deer forage units and watershed soil cover treatments (mastication, drop and lop).

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1. Potentially five known activity center nest trees are within roadside hazard tree units and 26 known activity center nest trees are within 0.25 mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys will minimize disturbance potential to these sites. However, there is no requirement in this alternative to flag and avoid current and historic nest trees and no required trigger of special coordination measures designed to promote protection of current and historic nest trees. Therefore, it is likely that approximately 14 percent of spotted owl territories would be negatively affected by nest tree loss.

Indicator 2. Table 3.15-3 shows under Alternative 1, 2,017 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs. Site-specifically, California spotted owl sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent of a PAC. There is no provision in this alternative to mitigate treatment overlap by adding equivalent acreage to the PAC. This would result in a potential net loss of 2,015 acres of owl habitat and possibly influence continued occupancy probabilities (Seamans and Gutierrez 2007) in approximately 50 percent of spotted owl territories.

Indicator 3. Under Alternative 1, zero acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the average management rate of 10 to 20 tons per acre for all units. Higher than average levels of large conifer snags and large down woody material is a desired condition in areas managed for old forest condition (USDA 2010a p. 190). Table 3.15-3 shows acres by snag retention levels in basal area (BA) in areas managed for old forest condition. Not leaving higher than average levels of large conifer snags and large down woody material would likely reduce long-term habitat quality of future forest habitat (i.e. habitat elements that define old forest habitat) and would fall short of desired conditions described above under management direction and habitat modification sections for this species.

Indicator 4. Table 3.15-3 shows Alternative 1 has 0.9 miles of new permanent road construction, 31.3 miles of road reconstruction, 0.6 miles of “skid zones”, and 2.2 miles of temporary road occurring in suitable PACs. A total of 35 project road miles intersect PACs. Of the road reconstruction miles, 2.2 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads.

The management requirement of re-closing all routes post-project that are currently designated closed is expected to minimize long-term habitat fragmentation and disturbance potential. Under this alternative, 0.5 miles of new permanent road construction would occur in PAC# TUO0258 and 0.4 miles of new permanent road construction would occur in PAC# TUO130. The management requirement of designating any new permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round is expected to minimize long-term disturbance potential to affected sites. With the minimization of long-term disturbance potential, this disturbance effect is expected to be minor.

Table 3.15-3 for Alternative 1 shows a total of 107 miles of project road treatments would occur in HRCAs. The management requirement of re-closing all routes post-project that are currently designated closed pre-project, and the management requirement of designating any new permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round are expected to minimize long-term habitat fragmentation and disturbance potential. The two HRCAs with new permanent road construction proposed are associated with the corresponding PAC and roads in the table.

Indicator 5. Alternative 1 has no material sources. Table 3.15-3 shows nine water sources and six landings in suitable PACs. Of the landings in suitable PACs, two are helicopter landings and four are tractor landings. One PAC contains two proposed landings; the remainder contain one each. The implementation of BMPs at project water sources is expected to minimize potential effects to spotted owls and their prey related to water availability. There is no provision in this alternative to mitigate habitat loss caused by landing construction by adding acreage to the PAC. This would result in a minimal amount of potential net loss of spotted owl habitat on 10 acres across 5 PACs.

Indicator 6. Alternative 1 proposes 7,626 acres of biomass fuel treatment. Table 3.15-3 shows 1,064 biomass acres occur in critical winter deer range and have a cover/forage ratio emphasis for deer habitat. Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals. Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development.

Specifically, fuels management actions in the deer range units, which are located downslope of the old forest corridor and PAC TUO021, are likely to break up fuel continuity and prevent fire spread into the developing forest upslope, at least in the short-term. Based on location, these treatments would likely influence old forest development in at least three spotted owl territories. However, long-term effectiveness is uncertain because future long-term management actions (e.g., prescribed burn schedules) are unknown at this time. This would likely play a critical role in contributing to the development of future old forest linking Yosemite National Park and the North Mountain Inventoried Roadless Area to the Clavey River watershed. More details are in the Terrestrial BE Appendix).

CUMULATIVE EFFECTS

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions (found in Appendix B, Cumulative Effects) was considered,. Relevant risk factors potentially affecting California spotted owl abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements, especially large snags and large down woody material (USDA 2001, R5 Sensitive Species Evaluation Form 2012). The removal of fire from the ecosystem and resulting fuel loadings is a primary driver for nest habitat loss through stand-replacing wildfire. Coupled with climate change, the extent and severity of wildfire has increased in the Sierra Nevada as a result (Keane 2014). The twelve-month-finding listing decision of the US Fish and Wildlife Service found stand-replacing fire to be the primary threat to the California spotted owl (Federal Register 2006).

Based on relevant risk factors, the following present and reasonably foreseeable actions from Appendix B are the most relevant to spotted owl: green thinning sales, emergency fire salvage on private land, and the Rim HT project.

The green thinning sales are designed to reduce ladder fuels and retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, and hardwoods. As documented in the biological evaluations for each of these projects, spotted owl habitat is expected to improve in the long-term with implementation of these projects.

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acres on private land are presently being salvage logged. These salvage activities generally remove all fire-killed and dying trees, important habitat elements to spotted owl habitat in the short and long term. There is considerable uncertainty regarding the ecological effects of varying levels of salvage treatments to this species (Appendix D).

The Rim HT project removes snags along high-use, typically paved roads (Maintenance Level 3 to 5 roads). The hazard tree removal along Maintenance Level 3, 4 and 5 roads was considered when remapping Category 3 PACs (PACs for which the boundaries were re-mapped and that are considered suitable as re-mapped).for Alternatives 1, 3, and 4. For Category 2 PACs (PACs that are considered as suitable post-fire, and for which boundaries were not re-mapped), hazard tree removal was considered in Alternative 3 and 4, but not Alternative 1 (Spotted Owl PAC evaluation/remapping narratives in the Terrestrial BE Appendix).

Alternative 1 may contribute cumulatively to short and long-term effects on spotted owl. The combination of past Forest Service and private timber harvests has cumulatively reduced the amount of suitable habitat available across the analysis area, and the area has been identified as an area of concern (areas within the range of California spotted owl where potential gaps in habitat and the associated loss of forest connectivity are a potential issue [Verner et al. 1992]). The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are primarily related to the influence no action may have on future wildfires and how future wildfires may impact spotted owl habitat.

A growing body of evidence indicates that spotted owls persist within fire-affected landscapes (Bond et al. 2002, Roberts et al. 2011, and Lee et al. 2012). At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and spotted owl habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuels, potential fire behavior may be expected to increase (Rim EIS Fire and Fuels Report) and ultimately affect the amount of mature forest habitat available for spotted owl nesting and roosting. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines). The alternative could also result in severe effects to forest soils at large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre. Within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Rim EIS Fuels Chapter).

Not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of mature forest conditions. Development of suitable nesting and roosting habitat for spotted owl may be delayed under this alternative, resulting in long-term negative effects. When wildfire returns to this landscape, the remaining mature forest adjacent to or near areas that burned at high severity may be at increased risk of loss. As noted above, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons per acre on average) than the desired condition (Rim EIS Fire and Fuels Report). This would significantly increase the risk of fire suppression activities when wildfire occurs in the future. In conclusion, although uncertainty exists, this alternative may result in negative long-term effects on habitat for spotted owl.

Cumulative Effects

The cumulative effects discussion under Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, no direct cumulative effect is expected because no active management would occur. The cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past, thus increasing the risk of loss of remaining suitable habitat to wildfire in the long-term. The short-term beneficial impacts to spotted owl such as retention of snags may be outweighed by the increased risk of additional habitat loss in the next wildfire. Thus, no action is not expected to result in any definitive direct or indirect cumulative effects.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Indicator 1. Potentially five known activity center nest trees are within roadside hazard salvage treatment units and 26 known activity center nest trees are within 0.25 mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. Under Alternative 3, the management requirement to flag and avoid current and historic nest trees is expected to protect nest trees. The risk of nest tree loss is minimized and not expected to occur.

Indicator 2. Table 3.15-3 shows 2,015 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs. Site-specifically, spotted owl sites would be potentially affected by habitat fragmentation at varying degrees, ranging from 0 acres of overlap to an overlap of approximately 40 percent of a PAC. The Alternative 3 overlap with roadside hazard treatments would be mitigated by adding acreage to the PAC equivalent to the treatment acres. Under Alternative 3, the loss of 85 percent of affected PAC acres would be mitigated; six PACs would have unmitigated treatment overlap. For unmitigated acres, additional acres of suitable habitat were not available. PAC evaluation narratives and maps are in the Terrestrial BE Appendix. Unmitigated habitat alteration and the potential influence on continued occupancy probabilities would be minimized to the greatest extent possible. Few studies are available for guidance on specific thresholds (Seamans and Gutierrez 2007). Although precise thresholds for the analysis area are not known, potential net loss is mitigated over the majority of acres in all but 2 PACs (Harden Flat and Hunter Creek).

Indicator 3. Table 3.15-3 shows Alternative 3 has 12,359 acres of salvage units managed for old forest condition. These units would be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the rate of 10 to 20 tons per acre, with 20 tons per acre emphasized in units managed for old forest condition. Higher than average levels of large conifer snags and large down woody material is a desired condition in areas managed for old forest condition. Areas managed for old forest condition include: OFEA, HRCA, and FCCC. Under Alternative 3, 2,089 acres would receive low-intensity salvage treatment as part of a PSW research project. The PSW research project is designed to address questions related to salvage logging intensities, spotted owl occupancy, and use of post-fire environments. This research will provide information to better understand the effects of wildfire and salvage logging on California spotted owl and serve as an empirical basis for informing future management decisions (Keane, pers.comm.). Thus, the PSW research is expected to benefit California spotted owl conservation by addressing the uncertainty related to thresholds of effect. Retaining higher than average levels of large conifer snags and large down woody material in areas managed for old forest condition would be consistent with the desired condition of habitat for this and other old forest associated species. The importance of higher than average levels of large conifer snags and large down woody material to habitat quality is described in the "habitat modification" section above. Generally, habitat managed for higher than average levels may be best qualified as developing into highly suitable habitat, while habitat managed at average levels may be best qualified as developing into low to moderate suitability.

Indicator 4. Table 3.15-3 shows Alternative 3 would have 0.2 miles of new permanent road construction, 29.1 miles of road reconstruction, 0.1 miles of "skid zones", and 0.6 miles of temporary road occurring in suitable PACs. A total of 30 project road miles intersect PACs. Of the road reconstruction miles, 2.8 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads. The management requirement of re-closing all routes post-project that are currently designated closed is expected to minimize long-term habitat fragmentation and disturbance potential. Under this alternative, 0.2 miles of new permanent road construction would occur in PAC TUO130. The management requirement of designating any new permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round is expected to minimize long-term disturbance potential of affected sites.

Table 3.15-3 for Alternative 3 shows a total of 97.7 miles of project road treatments that would occur in HRCAs. The management requirement of re-closing all routes post-project that are currently designated closed, and the management requirement of designating any new permanent road construction as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round, are expected to minimize long-term habitat fragmentation and disturbance potential. The one HRCA with new permanent road construction proposed is associated with the corresponding PAC and road in the Table 3.15-3.

Indicator 5. Table 3.15-3 shows Alternative 3 has zero material sources, nine water sources, and two landings in suitable PACs. Two PACs contain one tractor landing each. The implementation of BMPs at project water sources is expected to minimize potential effects to spotted owls and their prey related to water availability. Under this alternative, habitat loss caused by landing construction was mitigated by adding equivalent acreage to the PAC. No net habitat loss is expected for this indicator.

Indicator 6. Alternative 3 has 8,379 acres of biomass fuels treatments. Table 3.15-3 shows 1,739 of those biomass acres occur in critical winter deer range and have a cover/forage ratio emphasis for deer habitat. Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals. Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development. In particular, for critical winter deer range units located downslope of forest carnivore connectivity corridor units and PAC TUO0218, breaking up fuel continuity within the deer range units is likely to influence the development of future old forest linking Yosemite National Park and the North Mountain Inventoried Roadless Area to the Clavey River watershed as shown in the Terrestrial BE Appendix). Additional fuels treatments include 22,036 acres of pile and burn. Pile and burn treatments may consist of machine piling or hand piling with the objective of disposing of activity fuels. The 3,537 acres of watershed treatments involving mastication or “drop and lop” techniques would be used to provide soil cover in watershed sensitive areas. The provided soil cover would benefit vegetation establishment and spotted owl habitat development. Alternative 3 treats 675 more biomass acres than Alternative 1 in critical areas and may potentially be more effective in managing fuels and future fire behavior downslope of an estimated 4 owl territories.

CUMULATIVE EFFECTS

The Cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities relevant to Alternative 3 as well. The cumulative contribution of Alternative 3 would be less than Alternative 1 because management requirements minimize the potential for nest tree loss, habitat loss, and reduction in habitat quality of future old forest. In particular, snag retention would be higher within OFEA, HRCA, and FCCC units, and new permanent road construction would be greatly reduced. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Alternative 4 is the same as Alternative 3 except that it drops all new permanent road construction and the following eighteen units from treatment: A01B, A03, A04, A05A, A05B, D01A, D02, E01A, E01B, E02, O01, O02A, O02B, O04, O05, O12, R01A, and R02.

Indicator 1. Same as Alternative 3.

Indicator 2. Same as Alternative 3.

Indicator 3. Similar to Alternative 3, except Alternative 4, would drop 2,571 acres from salvage treatment specifically for species associated with post-fire environments (black-backed woodpecker section). Units designated for full snag retention incorporate 97 acres of retired PAC TUO030, 289 acres of retired PAC TUO0145, 57 acres of re-mapped PAC TUO078, and 148 acres of re-mapped PAC TUO0257. Although it was determined that these areas have little to no probability of continued occupancy for nesting or roosting as discussed in the PAC evaluation narratives and maps in the Terrestrial BE Appendix, recent research indicates that the proposed retention may provide foraging habitat for spotted owls at least over the next decade (Bond et al. 2009). Retaining higher than average levels of large conifer snags and large down woody material in areas managed for old forest condition would improve habitat quality in the majority of territories in this project.

Indicator 4. Under Alternative 4, project road miles in PACs by road type would be the same as described in Alternative 3 above, except that there would be no new permanent road construction within any PACs or HRCAs. Thus, in Alternative 4, long-term habitat fragmentation and disturbance potential from new permanent roads would not be an issue for the following two PACs and HRCAs: PAC# TUO0258 and PAC# TUO130.

Indicator 5. Same as Alternative 3.

Indicator 6. Because units are dropped under Alternative 4, there would be 404 fewer acres of biomass treatments and 1,716 fewer acres of pile and burn treatments than under Alternative 3. As in Alternative 3, biomass treatments in critical winter deer range would occur downslope of an estimated 4 owl territories.

CUMULATIVE EFFECTS

The cumulatve effects of Alternative 4 are similar to those for Alternative 3, However, Alternative 4 would have the least habitat alteration with full retention of snags across 2,571 more acres would be treated than under Alternative 3. Alternative 4 is not expected to affect the viability of spotted owl.

California Spotted Owl: Summary of Effects

Indicator 1. Table 3.15-3 shows that the number of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within 0.25 mile of potentially disturbing activities are the same for all alternatives. LOPs are common to all action alternatives. However, Alternatives 3 and 4 include a management requirement to minimize the potential for an effect on nest trees. Alternative 1 does not.

Indicator 2. Table 3.15-3 shows acres of treatment unit overlap within suitable PACs is mitigated wherever possible in Alternatives 3 and 4 but not mitigated in Alternative 1.

Indicator 3. Table 3.15-3 shows the acres under Alternatives 3 and 4 managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material. In contrast, Alternative 1 manages no acres for higher than average levels of large snags. For retention of large down woody material, all action alternatives manage to a 10 to 20 tons per acre standard but Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons per acre) while Alternative 1 does not. Alternative 4 additionally manages 2,571 acres under full retention of snags and down woody material (1,414 acres from Alternative 3's 12 square feet BA per acre category and 1,157 acres from Alternative 3's 30 square feet BA per acre category are moved to the full retention category).

Table 3.15-3 California Spotted Owl Summary of Effects

Indicator	Metric	Alternative			
		1	2	3	4
1. Nest sites	Number of nest sites in treatment units	5	0	5	5
	Number of nest sites within 0.25 mile of potentially disturbing activities	26	0	26	26
	Management requirement to flag and avoid nest trees	N	N/A	Y	Y
2. Treatment unit overlap within PACs	Roadside hazard tree treatment acres overlapping post-fire PACs	2,017	N/A	2,015	2,015
	Treatment overlap acres replaced	0	N/A	1,715	1,715
	Management requirement to add acreage to PAC	N	N/A	Y	Y
3. Snag Retention	Acres of snag retention: 12 square feet basal area per acre[1]	28,326	0	15,955	13,427
	Acres of snag retention: 30 square feet of basal area per acre[2]	0	0	12,359	12,315
	Acres of snag retention: 100-120 square feet of basal area per acre[3]	0	0	2,089	2,089
	Full snag retention[4]	0	30,403	0	2,571
4. Road treatments in PACs	New permanent road construction in PACs (miles)	0.9	0	0.2	0
	Road reconstruction in PACs (miles)	31.3	0	29.1	29.1
	Skid zones in PACs (miles)	0.6	0	0.1	0.1
	Temporary road in PACs (miles)	2.2	0	0.6	0.6
	Total miles in PACs	35	0	30	28.8
4. Road treatments in HRCAs	New permanent road construction in HRCAs (miles)	2.1	0	0.3	0
	Road reconstruction in HRCAs (miles)	95.3	0	91.7	91.7
	Skid zones in HRCAs (miles)	3.4	0	1.8	1.8
	Temporary road in HRCAs (miles)	6.2	0	3.9	3.9
	Total miles in HCRAs	107	0	97.7	97.4
5. Water, material sources, and landings in PACs	Water sources in PACs (count)	9	0	9	9
	Material (rock) sources (count)	0	0	0	0
	Tractor landings in PACs (count)	4	0	2	2
	Helicopter landings in PACs (count)	2	0	0	0
6. Acres of fuels treatments by type	Biomass	6,562	0	6,640	6,236
	Biomass deer units	1,064	0	1,739	1,739
	Pile and burn	0	0	22,036	20,320
	Watershed soil cover treatments	0	0	3,537	3,537

HRCA=Home Range Core Area; PAC=Protected Activity Center

[1] Converted from 4 snags per acre for comparison purposes and assuming retention of 24-inch dbh snags; snag retention considered management average.

[2] Old Forest Emphasis Area, Home Range Core Area, Forest Carnivore Connectivity Corridor; snag retention considered above management average.

[3] Treatment type may change in specific plots based on experimental design needs during implementation; we report total treatment unit acres as a best net estimate across plots based on the overall study design (refer to PSW Research appendix).

[4] Represents the maximum number of proposed treatment acres within potential habitat. Used as a relative measure to compare alternatives.

Indicator 4. Table 3.15-3 shows miles of new permanent road construction and other project road miles in PACs and HRCAs is highest in Alternative 1. Alternatives 1 and 3 include new permanent road construction in PACs and HRCAs. Alternative 4 proposes no new permanent road construction.

Indicator 5. Table 3.15-3 shows the number of water sources in PACs is the same in all action alternatives. Of the action alternatives, the number of landings in PACs is highest in Alternative 1 and lowest in Alternatives 3 and 4.

Indicator 6. Table 3.15-3 shows Alternatives 3 and 4 best address disposal of activity fuels and the need for soil cover treatments for watershed protection. Biomass treatments in critical areas are expected to be effective in managing fuels and future fire behavior downslope of developing owl habitat.

DETERMINATION

Alternative 1

Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl. The determination for Alternative 1 is based on the following rationale:

- This alternative includes actions to reduce fuel loading and the long-term risk of high-severity fire effects and habitat loss to this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.

Alternative 2

Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl. The determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.

Alternative 3

Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl. The determination for Alternative 3 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.
- This alternative includes several project requirements to minimize potential effects to individuals and habitat. Specifically, this alternative 1) mitigates for potential nest tree loss in suitable PACs, 2) accounts for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) adds acreage to PACs equivalent to unavoidable treatment acres, and 4) manages HRCA and other appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

Alternative 4

Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl. The determination rationale for Alternative 4 is the same as Alternative 3.

Great Gray Owl: Affected Environment

Species and Habitat Account

The great gray owl (*Strix nebulosa*) is currently managed as a USDA Forest Service Sensitive species (Update to the Regional Forester's Sensitive species list, July 3, 2013). Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by Beck and Winter 2000, USDA 2001, 2004, and the R5 Sensitive species evaluation form of 2012 (USDA 2012d), and are incorporated here by reference.

Great gray owls are regarded as locally rare throughout their range in USFS Region 5 and no more than 100 to 200 individuals have been estimated in California since 1980. Only 80 were estimated in 2006 (R5 Sensitive Species Evaluation Form 2012). Although the great gray owl population in California is small, the Stanislaus National Forest contains more great gray owl sites than any other National Forest in Region 5, or any area outside of Yosemite National Park (Siegel 2001, 2002, NRIS Wildlife database, CNDDB database). Of the great gray owl sites on the Stanislaus National Forest, most are concentrated within the Rim Fire perimeter in areas that border Yosemite National Park (Rich, pers.obs.).

Hull et al. 2010 and Hull et al. 2014 found that great gray owls in the Yosemite area (including the Rim Fire area) are a genetically-unique population warranting subspecies status as ssp. *yosemitensis*. The genetic analysis completed by Hull et al. 2010 indicates that the *S.n. yosemitensis* population has experienced a recent genetic bottleneck and exhibits a small effective population size -- both of these latter factors are a significant conservation concern. The limited genetic diversity in this population may contribute to population instability because of the already low population levels, the low census numbers, the limited migration potential, and the potential for inbreeding depression (Hull et al. 2010).

Habitat requirements of great gray owls in the Sierra Nevada were summarized by Beck and Winter (2000), studied specifically by Greene (1995), Sears (2006), Powers et al. (2011), and Kalinowski et al. (2014), and are currently under additional investigations by PSW research (Keane, pers.comm.).

Great gray owls in the Sierra Nevada inhabit coniferous forest surrounding wet meadows (USDA 2001). Great gray owls typically breed in large flat-topped broken snags located in conifer stands with higher than average levels of large snags and woodland cover in the immediate vicinity of montane meadows (Bull and Duncan 1993, Beck and Winter 2000). Great gray owls may also utilize abandoned nests of other birds of prey, and mistletoe or other broom growths (Ibid).

Recent burns, where they exist in the Sierras, provide some structural similarity to a meadow ecosystem for a few years before the trees or brush shade out the grasses and forbs (Beck and Winter 2000). Such sites can provide foraging areas for nearby breeding great gray owls, but only on a short-term basis (Greene 1995, Beck pers.comm.). Meadows or meadow complexes at least 25 acres in size appear to be necessary for persistent occupancy and reproduction but meadows as small as 10 acres will support infrequent breeding (Beck and Winter 2000). Reproductive sites are associated with high vole abundance and high vole abundance is associated with meadow vegetation height (Beck 1985; Greene 1995; Sears 2006, Kalinowski et al. 2014).

Mean home-range size in the Sierra Nevada during a radio-tagging study was estimated at 148 acres in females and 50 acres in males during the breeding season (generally March through August) Great gray owls enlarge their home ranges substantially in winter (Van Riper and Van Wagtendonk 2006).

Great gray owl sites are identified through the use of protocol surveys (Beck and Winter 2000, Keane et al. 2011). Protocol surveys for great gray owl have been conducted throughout the Rim Fire area for the past two decades. Together these efforts have occurred at a level such that inventory information for the analysis area is considered essentially complete (USDA unpublished data, NRIS Wildlife database).

Great gray owl PACs are established and maintained to include the forested area and adjacent meadow around all known great gray owl nest stands. A PAC encompasses at least 50 acres of the highest quality nesting habitat (CWHR types 6, 5D, and 5M) available in the forested area surrounding the nest. The PAC also includes the meadow or meadow complex that supports the prey base for nesting owls (USDA 2010a p.187).

A post-fire PAC evaluation on NFS land in the Rim Fire area identified 13 historic great gray owl sites. This represents half of all great gray owl sites on the Stanislaus National Forest and a significant proportion of the estimated population size of 80 to 100 individuals for this subspecies (R5 Sensitive species evaluation form 2012, USDA 2010d). All of the great gray owl PACs in the Rim Fire burned at mixed severity. Approximately half of all PAC acres burned at high severity (greater than 75 percent basal area mortality). Although only preliminary ground assessment work has been completed, at least two known historic nest trees were lost in the fire. However, since great gray owls may nest in burned forest (Beck, pers.comm.), and since post-fire conditions may provide preferred foraging habitat in the short-term (Greene 1995), all great gray owl PAC boundaries were left intact except along roads where hazard tree removal was identified as a public safety need. Acreage was added to these PAC boundaries to offset unavoidable treatment overlap. Details on individual sites can be found in the Terrestrial BE Appendix and in the effects analysis below. Based on early survey results this season using an Automatic Recording Unit (ARU), continued great gray owl use has been confirmed in one Rim Fire great gray owl PAC (USFS unpubl. data). The vocalizations obtained at this site involve courtship calls of a pair, suggesting an imminent nesting attempt. Occupation of additional great gray owl PACs post-fire is highly likely.

Management Direction

The Regional Forester for the Pacific Southwest Region has listed the great gray owl (GGOW) as a Sensitive Species. Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The desired condition for great gray owl PACs described in the Forest Plan Direction focuses on protecting nest sites with a minimum 50-acre buffer and managing meadow habitat for sufficiently large vole populations to provide a food source for great gray owls through the reproductive period (USDA 2010a p. 187).

There is also an emphasis to conduct additional surveys to established protocols to follow up reliable sightings of great gray owls (USDA 2010a p. 43).

Great Gray Owl: Environmental Consequences

The project alternatives could result in direct and indirect effects to the great gray owl through the following activities:

- Salvage harvest of fire-killed trees.
- Salvage harvest of roadside hazard trees.
- New permanent road construction, temporary road construction, and road reconstruction.
- Landing construction and use.
- Use of material sources and water sources.
- Biomass and similar fuels treatments.

These actions may have direct and indirect effects on great gray owls through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quantity and/or quality.

Death, injury or disturbance

Death, injury, and disturbance are potential direct effects to consider for great gray owl (USDA 2004). Project activities have the potential to cause death or injury by tree-falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed. The great gray owl is also susceptible to getting "roadkilled". Collision with vehicles is a major cause of mortality (Keane et al. 2011): great gray owls tend to fly low over the ground in open areas especially adjacent to meadows (Bull and Duncan 1993). The management requirement of LOPs, mitigates the probability that death or injury would occur as a result of project activities. Flagging and avoiding current and historic nest trees (a management requirement under Alt. 3 and 4) provides a way to minimize nest tree loss. Additionally, keeping screening vegetation intact within 500 feet of nests (also a management requirement under Alt. 3 and 4) helps to minimize disturbance potential and/or nest abandonment. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, along project roads, and at landings, material sources, and water sources. Human presence in nest stands and loud noise in the vicinity of nest stands have the potential to change normal behavior and potentially impair essential behavior patterns of the great gray owl related to breeding, feeding, or sheltering. The potential for disturbance is minimized by the implementation of Limited Operating Periods (LOPs) as a management requirement.

The location of nest sites or activity centers is more uncertain following large-scale disturbance events (Keane, pers. comm.). Conducting surveys to establish or confirm any new locations of nests or activity centers is a way to address this movement uncertainty (USDA 2004). Conducting protocol surveys is a management requirement common to all action alternatives.

Habitat modification

Post-fire salvage harvest is identified as a risk factor for great gray owl (Hull et al. 2010). Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees primarily removes snags and existing down woody material. Salvage harvest of roadside hazard trees may also remove existing living trees meeting certain criteria for hazard definition. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage units because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status. The removal of snags reduces future recruitment of down woody material. Snags and down logs are important habitat elements for great gray owls and their prey (USDA 2001, Bull and Henjum 1990). Sears (2006) found that sites with a higher density of large snags were more likely to be occupied by great gray owl. Salvage logging typically reduces snag densities, especially of large-diameter snags used for nesting and of leaning trees used by juveniles for roosting before they can fly. The treatment also reduces high stem density in stands used by juveniles for cover and protection (Bull and Henjum 1990). Bull and Henjum (1990) noted that roosts accessible to flightless young, such as leaning and deformed trees and perches high enough to avoid terrestrial predators, may increase reproductive success. Additionally, if perches are not left, great gray owls cannot readily hunt in those areas (Ibid). Because fledglings leave the nest before they can fly, screening cover around the nest is considered important for their survival (Hayward and Verner 1994).

New permanent road construction, temp road construction, road reconstruction, landing construction, and biomass removal also modify habitat. In particular, road construction and continued use can result in increased habitat fragmentation, disturbance, and lower habitat capability for great gray owl (Pyron et al. 2009). Basic road maintenance such as grading and cleaning culverts is probably not an issue provided vehicles are slow moving. In this project, landings and biomass removal are not proposed in great gray owl PACs. The use of water sources is probably not an issue given that great gray owls typically nest adjacent to wet meadow sites and wet meadow sites typically have high water availability. Further, the implementation of Best Management Practices (BMPs) at project water sources is expected to minimize potential effects to great gray owls and their prey related to water availability.

As great gray owls concentrate foraging around wet meadows and have relatively small breeding home ranges, the potential for habitat modification effects are expected to be most pronounced in the nesting habitat within PACs.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the great gray owl and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Number of current and historic nest sites within PACs in treatment units or within 0.25 mile of potentially disturbing activities.
2. Acres of treatment unit overlap within suitable PACs.
3. Miles of new permanent road construction and other project road miles in PACs by road type.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1. Potentially two known historic nest trees are within roadside hazard salvage treatment units and 22 known historic nest trees are within 0.25 mile of potentially disturbing activities. This represents approximately 70 percent of the known great gray owl nest trees on the Stanislaus National Forest. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. However, there is no provision in Alternative 1 to flag and avoid current and historic nest trees and specify coordination triggers.

Indicator 2. Table 3.15-5 shows, under Alternative 1, 201 acres of roadside hazard salvage treatments within great gray owl PACs. Site-specifically, great gray owl sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 50 percent overlap of a PAC. No provision in this alternative mitigates treatment overlap by adding equivalent acreage to the PAC.

Indicator 3. Table 3.15-5 shows the proposed activities within great gray owl PACs. The management requirement of re-closing all routes post-project that are currently designated closed is expected to minimize long-term habitat fragmentation and disturbance potential. The management requirement of designating any new permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round is expected to minimize long-term disturbance potential of affected sites, but not habitat fragmentation effects. For example, although locations are approximate, it appears that the placement of the new permanent road in the Drew Meadow PAC would partially go through a surviving group of green trees, potentially lowering capability of suitable roosting and nesting habitat for great gray owl.

CUMULATIVE EFFECTS

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Cumulative Effects.

Relevant risk factors potentially affecting great gray owl abundance and distribution have been identified and primarily include nest site loss and disturbance, roadkill, livestock grazing, and loss of habitat and habitat elements, especially large snags and large down woody material adjacent to wet meadows (USDA 2001, R5 Sensitive species evaluation form 2012, USDA 2012d).

Based on relevant risk factors and location, the following present and reasonably foreseeable actions from Appendix B are the most relevant to great gray owl: livestock grazing, meadow restoration, and the Rim HT project.

There are 13 grazing allotments either wholly or partially within the analysis area, resulting in a maximum number of 1,632 cow/calf pairs across the landscape. Livestock grazing may influence the abundance and availability of prey in wet meadows great gray owls use for foraging (Kalinowski et al. 2014). Livestock grazing is subject to utilization and forest plan standards, some of which are specifically designed to minimize grazing impacts on great gray owl prey. Meadow restoration projects are expected to improve foraging habitat for great gray owl. As documented in the biological evaluations for each of these projects, short-term impacts are minimized and great gray owl habitat is expected to improve in the long-term with implementation of these projects.

Hazard tree removal along Maintenance Levels 3, 4 and 5 roads (i.e. typically paved) is occurring within great gray owl PAC, as shown in Table 3.15-4.

Table 3.15-4 Treatment overlap of hazard tree EA and habitat replaced in Great Gray Owl PACs

Great Gray Owl PAC	Overlap (acres)	Replaced[1] (acres)
Ackerson 11-15	0	N/A
Ackerson 16	13	13
Ackerson 1ABC	0	N/A
Ackerson 3	0	N/A
Ackerson 4	14	0[2]
Ackerson 6	28	28
Ackerson South	0	N/A
Crocker Meadow	17	17
Drew Meadow	93	55[2]
North Stone Meadow	4	4
Spinning Wheel	30	30
Wilson Meadow Lower	0	N/A
Wilson Meadow Upper	10	0[2]

[1] PAC acres replaced by adding acres equivalent to the treated acres using adjacent areas of comparable quality wherever possible.
[2] No additional comparable habitat available to offset total overlap.

Cumulative effects of roadside hazard salvage treatments, both from the Rim Fire Hazard Trees and the Rim Fre Recovery projects, would be mitigated in five PACs, partially mitigated in the Drew Meadow PAC, and could not be mitigated in two PACs. This would result in a net loss of habitat for three great gray owl territories, although precise thresholds of significance are unknown.

Alternative 1 may contribute cumulatively to short and long-term effects on great gray owl and there is at least a moderate level of uncertainty with thresholds of significance. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are primarily related to the influence no action may have on future wildfires and how future wildfires may impact great gray owl habitat.

At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and great gray owl habitat given the numerous factors involved over time. Potential fire behavior in the future may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, fire behavior may be expected to increase (3.05 Fuels).

Cumulative Effects

The cumulative effects discussion under Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, no direct cumulative effect is expected because no active management would occur. At the landscape scale, the cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past. Thus, the risk of loss of suitable nesting and roosting habitat to wildfire in the long term is increased.

Alternative 3

Direct and Indirect Effects

Indicator 1. Similar to Alternative 1, but under Alternative 3, the management requirement to flag and avoid current and historic nest trees and screening vegetation is a measure expected to protect nest trees.

Indicator 2. Table 3.15-5 shows acres of roadside hazard salvage treatments overlapping great gray owl PAC. The measure for this indicator is similar to Alternative 1, but Alternative 3 has a management requirement that adds acreage to the PAC, equivalent to the treated acres using adjacent acres of comparable quality wherever possible. Two PACs would not be affected by overlapping treatment units. Treatments overlapping great gray owl PACs were almost entirely mitigated in four out of 11 cases. Treatments overlapping great gray owl PACs were partially mitigated in one case. The remaining six cases had no additional comparable habitat available to offset treatment acres proposed inside the respective PAC. (Details on individual sites are in the Terrestrial BE Appendix.)

Indicator 3. Same as Alternative 1.

Cumulative Effects

The cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities relevant to this alternative as well. The cumulative contribution of Alternative 3 would be less than Alternative 1 because management requirements minimize the potential for nest tree and net habitat loss, and new permanent road construction would be greatly reduced. Alternative 3 is not expected to affect the viability of great gray owl.

Alternative 4

Direct and Indirect Effects

Alternative 4 is the same as Alternative 3 except that it drops the following eighteen units from treatment: A01B, A03, A04, A05A, A05B, D01A, D02, E01A, E01B, E02, O01, O02A, O02B, O04, O05, O12, R01A, and R02. Numerical values for indicators 1, 2, and 3 are the same in Alternative 4 as in Alternative 3. Under Alternative 4, the group O units are adjacent to great gray owl PACs

Wilson Meadow Lower and Wilson Meadow Upper. Full retention in the O units under Alternative 4 would increase habitat capability for great gray owl in the Wilson Meadow area. Full retention would maintain the maximum number of snags for potential nests and hunting perches for great gray owl, reduce disturbance potential, and provide high stem densities great gray owls are likely to use for screening and cover.

CUMULATIVE EFFECTS

The incremental impact of Alterative 4 is very similar to Alternative 3 but, overall, Alternative 4 would have the least amount of habitat alteration. As in Alternative 3, Alternative 4 is not expected to affect the viability of great gray owl.

Great Gray Owl: Summary of Effects

Indicator 1. Table 3.15-5 shows the number of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within 0.25 mile of potentially disturbing activities are the same for all alternatives. However, Alternatives 3 and 4 include a management requirement to minimize the potential for an effect on nest trees and Alternative 1 does not.

Indicator 2. Table 3.15-5 shows acres of treatment unit overlap within suitable PACs is mitigated wherever possible in Alternatives 3 and 4 but not mitigated in Alternative 1. For Alternatives 3 and 4, 30 percent of treatment overlap acres were mitigated. No additional comparable habitat was available to offset the remaining 70 percent. In Alternative 4, full retention of six units in Group O may reduce treatment effect magnitude to two PACs (Wilson Meadow Lower and Wilson Meadow Upper).

Indicator 3. Table 3.15-5 shows miles of project road in great gray owl PACs is the same in all action alternatives.

Table 3.15-5 Great Gray Owl Summary of Effects

Indicator	Metric	Alternative			
		1	2	3	4
1. Nest sites	Number of nest sites in treatment units	2	0	2	2
	Number of nest sites within 0.25 mile of potentially disturbing activities	22	0	22	22
	Management requirement to flag and avoid nest trees	N	N/A	Y	Y
2. Treatment unit overlap within PACs	Roadside hazard tree treatment acres overlapping post-fire PACs	201	0	201	201
	Percent area of all PACs affected	16	0	11	11
	Treatment overlap acres replaced	0	N/A	61	61
	Management requirement to add acreage to PAC	N	N/A	Y	Y
3. Road treatments in PACs	New permanent road construction in PACs (miles)	0.1	0	0	0
	Road reconstruction in PACs (miles)	3.1	0	3.5	3.5
	Skid zones in PACs (miles)	0	0	0	0
	Temporary road in PACs (miles)	0.6	0	0.3	0.3
	Total miles in PACs	3.8	0	3.8	3.8

PAC=Protected Activity Center

DETERMINATION

Alternative 1

Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl. The determination for Alternative 1 is based on the following rationale:

- This alternative includes actions to reduce fuel loading and the long-term risk of high-severity fire effects and habitat loss to this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.

Alternative 2

Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl. The determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.

Alternative 3

Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl. This determination for Alternative 3 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.
- This alternative includes several project requirements to minimize potential effects to individuals and habitat. Specifically, this alternative 1) mitigates for potential nest tree loss in suitable PACs, 2) accounts for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) adds acreage to PACs equivalent to unavoidable treatment acres, and 4) manages appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

Alternative 4

Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl. The determination rationale for Alternative 4 is the same as Alternative 3.

Northern Goshawk: Affected Environment

Species and Habitat Account

The northern goshawk (*Accipiter gentilis*) is currently managed as a USDA Forest Service Sensitive Species (Update to the Regional Forester's Sensitive Species List, July 3, 2013). Sensitive species are species identified by the Regional Forester where population viability is a concern because of 1) downward population trends and/or 2) diminished habitat capacity that would reduce species distribution. Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by USDA 2001 and the R5 Sensitive Species Evaluation Form 2012, and are incorporated here by reference.

The northern goshawk has attracted substantial interest over the past two decades because management activities in forest environments have the potential to affect nesting habitat and, hence, population levels of this species (Woodbridge and Hargis 2006). Northern goshawks are associated with large trees, large snags, large downed logs, and use forests with a mix of dense tree cover interspersed with meadows, shrub patches, riparian areas, and other natural or artificial openings for foraging (Reynolds et al. 2008). In California, the occupancy rate of nest stands is positively correlated with stand size but smaller nest stands (less than 25 acres) are occasionally occupied (Woodbridge and Detrich 1994). Goshawk breeding area reoccupancy appears to be a function of the amount of potential nesting habitat available in the area surrounding the nest; goshawks tend to reoccupy breeding areas when greater than 39 percent potential nesting habitat remains (Moser and Garton 2009). Stand-replacing fire events have eliminated nesting territories, but goshawks are known to nest in stands that have experienced understory fires that did not reduce canopy cover and numbers of large trees below suitable levels (USDA 2001).

Northern goshawk sites are identified through the use of protocol surveys (USDA 2000a). Protocol surveys for goshawk have been conducted throughout the Rim Fire area for the past two decades. These surveys are best described as opportunistic, depending upon planned activities and funding levels but have occurred at a level such that inventory information for the analysis area is considered essentially complete (USDA, unpublished data, NRIS Wildlife database).

Northern goshawk sites receive special management consideration with protected activity centers (PACs). Goshawk PACs are delineated surrounding all known and newly discovered breeding territories detected on NFS lands. Northern goshawk PACs are designated based upon the latest documented nest site and location(s) of alternate nests. If the actual nest site is not located, the PAC is designated based on the location of territorial adult birds or recently fledged juvenile goshawks during the fledgling dependency period.

PACs are delineated to: (1) include known and suspected nest stands and (2) encompass the best available 200 acres of forested habitat in the largest contiguous patches possible, based on aerial photography. Where suitable nesting habitat occurs in small patches, PACs are defined as multiple blocks in the largest best available patches within 0.5 miles of one another. Best available forested stands for PACs have the following characteristics: (1) trees in the dominant and co-dominant crown classes average 24 inches dbh or greater; (2) in westside conifer and eastside mixed conifer forest types, stands have at least 70 percent tree canopy cover; and (3) in eastside pine forest types, stands have at least 60 percent tree canopy cover. Non-forest vegetation (such as brush and meadows) should not be counted as part of the 200 acres.

PACs may be removed from the network after a stand-replacing event if the habitat has been rendered unsuitable as a northern goshawk PAC and there are no opportunities for re-mapping the PAC in proximity to the affected PAC (USDA 2010a p. 184).

The post-fire PAC evaluation was completed with technical assistance from PSW scientists. For the analysis, each PAC was evaluated within the Rim Fire boundary using several criteria. The three main criteria used were 1) acres of post-fire suitable habitat defined as CWHR 4M, 4D, 5M, and 5D (including class 6) burned at less than 75 percent basal area mortality, 2) percent of PAC within a 496-acre circle burned at high severity (defined as greater than 75 percent basal area mortality), and 3) percent of pre-fire suitable habitat burned at high severity. Twenty-two northern goshawk sites are located within the Rim Fire perimeter. Figure 3.15-3 shows it is clear that sites cluster into three categories: 4 Category 1 (red) sites, 15 Category 2 (green), and 3 Category 3 (orange). Details on individual sites are provided in the Terrestrial BE Appendix; categories may be summarized as follows:

Category 1 (red): These sites burned primarily at high severity across the 496-acre analysis area, had nearly all pre-fire suitable habitat burn at high severity, and have small amounts of post-fire suitable habitat. These sites lack attributes for suitable habitat (Laudenslayer and Parisi 2007). It is clear that these sites have very low to no probability of continued occupancy. Thus, we concluded that it is appropriate to remove these sites from the conservation network.

Category 2 (green): These are sites with lower amounts of high-severity fire within the 496-acre analysis area, lower amounts of suitable habitat loss, and high amounts of remaining suitable habitat. Available literature suggests that these sites have high probabilities of continued occupancy. Thus, it is appropriate to consider these sites as suitable post-fire, and it is appropriate to keep the boundaries intact as is.

Category 3 (orange): These are sites with intermediate values. There is some uncertainty as to the probability of occupancy for sites within this range of values. In order to reduce uncertainty in occupancy, it is appropriate to re-map the boundaries of these sites to encompass habitat of better quality where possible and to consider the re-mapped sites as suitable. It would be particularly important to monitor these sites so more can be learned about occupancy thresholds.

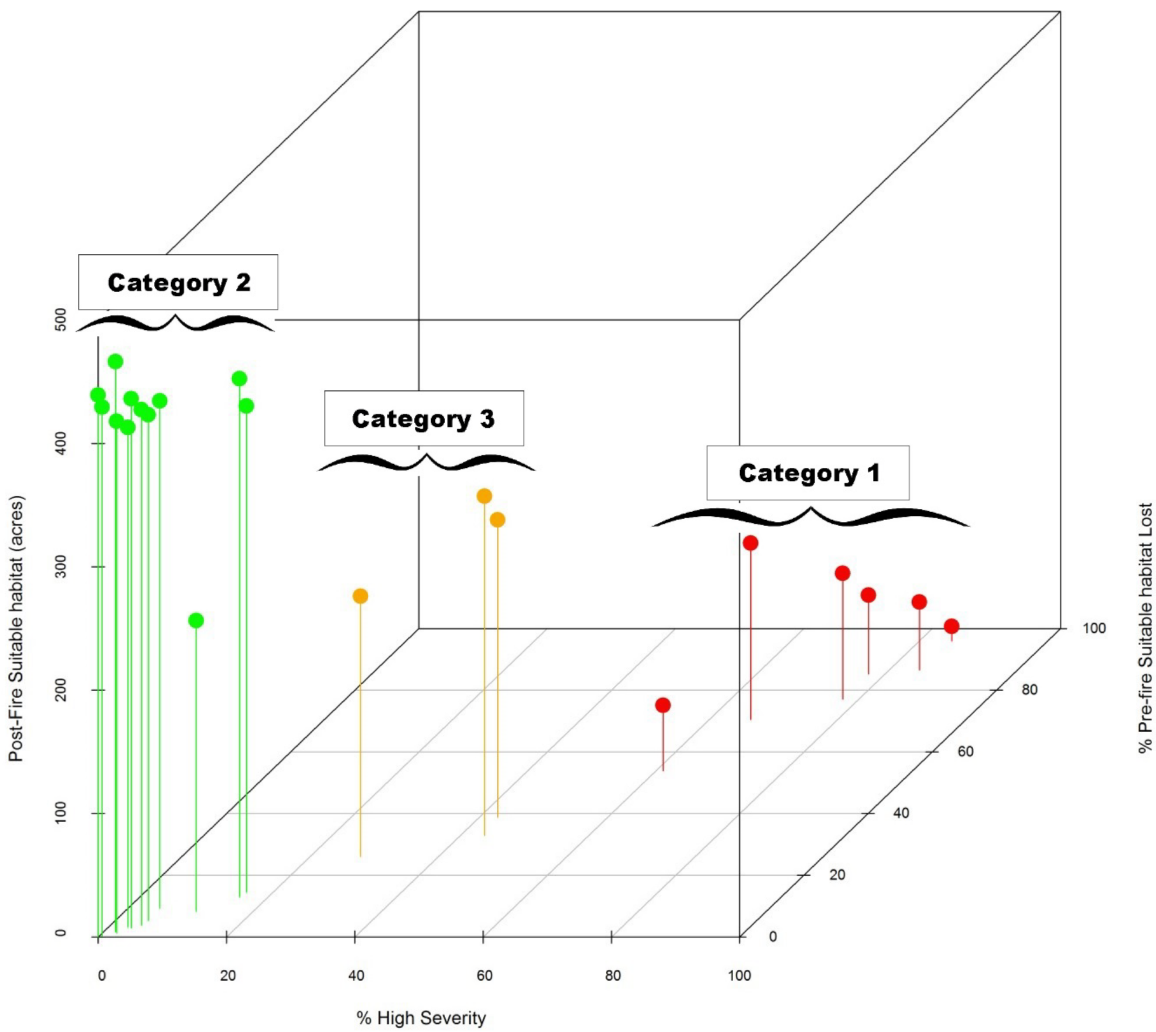

Figure 3.15-3 Pin graph showing post-fire northern goshawk PAC condition

Risk Factors

Risk factors potentially affecting northern goshawk abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements (especially large snags and large down woody material) (USDA 2001, R5 Sensitive species evaluation form 2012).

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The northern goshawk is a Region 5 Sensitive Species associated with old forest ecosystems (USDA 2004). The following land allocations pertain to goshawk and old forest ecosystems: Goshawk PACs, California spotted owl HRCAs, OFEAs, and the FCCC). Although goshawks occupy a broad ecological niche and utilize a variety of habitats, the desired conditions in areas managed for old forest objectives provide suitable habitat for goshawk nesting and post-fledgling use, and are preferentially selected for foraging (USDA 2004).

The desired condition for a goshawk PAC is that stands in each PAC have: 1) at least two tree canopy layers; 2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; 3) at least 60 to70 percent canopy cover; 4) some very large snags (greater than 45 inches dbh); and 5) snag and down woody material levels that are higher than average.

Desired conditions in a Home Range Core Area (HRCA) for California spotted owls also provide suitable habitat conditions for goshawk. The desired condition for HRCA is for large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for an OFEA is to provide habitat conditions for mature forest associates (northern goshawk, California spotted owl, Pacific marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Forest structure and function generally resemble pre-settlement conditions as shown in Figure 3.15-2.

Desired conditions in the FCCC for fisher and marten also provide suitable habitat conditions for goshawk. The desired future condition of the FCCC is to provide habitat connectivity for fisher and marten, linking Yosemite National Park and the North Mountain Inventoried Roadless Area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as described in USDA 2004). Habitat structures that may constitute rest sites as described in Lofroth et al. 2010 (e.g. plate 7.8) are important to retain.

Northern Goshawk: Environmental Consequences

The project alternatives could result in direct and indirect effects to the northern goshawk through the following activities:

- Salvage harvest of fire-killed trees.
- Salvage harvest of roadside hazard trees.
- New permanent road construction, temporary road construction, and road reconstruction.
- Landing construction and use.

- Use of material sources and water sources.
- Biomass and similar fuels treatments.

These actions may have direct and indirect effects on northern goshawks through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quantity and/or quality.

Death, injury or disturbance

Death, injury, and disturbance are potential direct effects to consider for northern goshawk (USDA 2004). Project activities have the potential to cause death or injury by tree falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed. The mobility of the species in question and the management requirement of LOPs, make it highly improbable that death or injury would occur as a result of project activities. Flagging and avoiding current and historic nest trees (a management requirement under Alt. 3 and 4) provides a way to minimize nest tree loss. Additionally, keeping screening vegetation intact within 500 feet of nests (also a management requirement under Alt. 3 and 4) helps to minimize disturbance potential and/or nest abandonment.

Goshawks are highly susceptible to human disturbance (Squires and Reynolds 1997). During courtship and nest building, goshawks have been recorded to abandon nest areas following human intrusion alone (USDA 2000). In addition, incubating or brooding females may interrupt incubation or nestling care for extended periods to defend a nest (Ibid).

Logging activities near nests can cause failure, especially during incubation (Boal and Mannan 1994). Loading and skidding too close to active nests can cause abandonment, even with 20-day-old nestlings present (Squires and Reynolds 1997). Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, along project roads, and at landings, material sources, and water sources. Human presence, particularly loud noise, has the potential to change normal behavior and potentially impair essential behavior patterns of the northern goshawk related to breeding, feeding, or sheltering. The potential for disturbance is minimized by the implementation of Limited Operating Periods (LOPs) as a management requirement.

The location of nest sites or activity centers are more uncertain following large-scale disturbance events (Keane, pers. comm.); conducting surveys to establish or confirm any new locations of nests or activity centers is a way to address this movement uncertainty (USDA 2000). Conducting protocol surveys is a management requirement common to all action alternatives.

Habitat modification

Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees primarily removes snags and existing down woody material. Salvage harvest of roadside hazard trees may also remove existing living trees meeting certain criteria for hazard definition. The removal of snags reduces future recruitment of down woody material. Snags and down logs are important habitat elements for goshawks and their prey (USDA 2001).

Short-term, within the next ten years, snags and down woody material will function as habitat elements important for goshawk prey. Snags also serve as potential hunting perch sites that may be utilized by goshawks. Goshawks feed on a variety of prey present in post-fire habitat mosaics. Primary prey groups include tree and ground squirrels, cottontails, jackrabbits, hares, and medium- and large-sized birds (Squires and Reynolds 1997). In the Sierra Nevada primary prey species are Douglas squirrel, golden-mantled ground squirrel, chipmunks, Steller's jay, northern flicker, and American robin (Keane 1999).

Long term (over several decades), large snags and large down woody material are considered biological legacies in the post-fire environment and play important roles in the structure of the future forest (Lindenmayer et al. 2008). Snag dynamics in the Sierra Nevada are complex and snags fall at different rates depending on many factors (Cluck and Smith 2007). The time elapsed since a fire is closely correlated with habitat elements present and the composition of prey species (Ingles 1965, Quinn and Keeley 2006). Ground squirrels, northern flickers, and the American robin use a variety of open forests and shrub habitats with abundant insects and fruits (USDA 2001). Douglas squirrels use intermediate and mature stands containing large trees capable of providing cones and fungi, and Steller's jays prefer mature forest with open to moderate canopy cover and large, mature trees (Ibid). Thus, snags and down woody material serve different functional roles over time for the goshawk, first providing cover for prey in the complex early seral stage of the forest, and ultimately decaying and playing a critical role in soil development of the future forest (Lindenmayer et al. 2008).

New permanent road construction, temp road construction, road reconstruction, and landing construction also modify habitat. In particular, road construction and continued use can result in increased habitat fragmentation, disturbance, and lower habitat capability for northern goshawk (Pyron et al. 2009). Woodbridge and Detrich (1994) found that northern goshawk territories associated with large contiguous forest patches were more consistently occupied compared to highly fragmented stands. Basic road maintenance such as grading and cleaning culverts is generally not an issue. The use of water sources may reduce water availability for northern goshawks and their prey, especially in drought years. Free water is important to the goshawk and, in California, one study found that permanent water was generally closer to nesting ranges than to the centers of random circles (Hargis et al. 1994). Landing construction results in habitat fragmentation. Helicopter landings are typically between 1 and 3 acres in size and tractor landings are typically 0.25 to 1 acre in size.

The removal of snags and down woody material can be expected to reduce fuel loadings. However, the effectiveness of the various treatments proposed is difficult to predict and there is considerable uncertainty with how salvage logging influences future fire. A review of recent research on this topic and the associated controversy can be found in Long et al. (2014), Ch. 4.3 pp. 195-197.

The effect salvage logging has on reburn fire severity of future mature forest habitat is likely to remain widely variable depending on numerous factors including how future prescribed fire management is planned and implemented. However, as stated in Chapter 3.05 (Fire and Fuels), reducing fuel loads, especially activity fuels and biomass, is likely to be effective in reducing flame lengths and fire line intensities. Piling and burning activity fuels is an effective method for disposal and is expected to promote development of mature forest (Ibid). Also, preventing high fuel loadings along roadsides can reasonably be expected to play an important role in reducing fire severity to developing mature forest habitat, especially where roads are identified as critical fire management features (Crook et al. 2013). Roadside hazard salvage treatments involve the removal of snags and live trees identified as hazards to public safety. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage units because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status.

The management of goshawk habitat is typically thought of in three spatial scales (Reynolds et al. 1992, Reynolds et al. 2008). The first is the nesting habitat scale, or the PAC, which corresponds to 200 acres. The second addresses the post-fledgling area which corresponds to about 420 acres (USDA 2001), and the third addresses the whole foraging area or home range which corresponds to about 5,000 acres (Ibid). Goshawks in the Sierra Nevada are year-round residents, and expand their breeding ranges in the winter (Keane 1999). As northern goshawks focus their breeding activities around roost and nest sites within PACs, habitat modification effects are expected to be most pronounced in PACs.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the northern goshawk and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Number of current and historic nest sites within suitable PACs in treatment units or within 0.25 mile of potentially disturbing activities.
2. Acres of treatment unit overlap within suitable PACs.
3. Acres of areas managed for old forest condition with higher than average levels of large snags and higher than average levels of large down woody material.
4. Miles of new permanent road construction and other project road miles in PACs by road type.
5. Number of material sources, water sources, and landings in PACs.
6. Acres of fuels treatments by type (biomass, pile and burn) including deer forage units and watershed soil cover treatments (mastication, drop and lop).

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1. Potentially ten known goshawk activity center nest trees are within roadside hazard salvage treatment units and 39 known activity center nest trees are within 0.25 mile of potentially disturbing activities. It is expected that the required implementation of LOPs and protocol surveys will minimize disturbance potential to these sites. However, Alternative 1 does not have the requirement to flag and avoid current and historic nest trees and no required trigger of special coordination measures designed to promote nest tree protection. Therefore, it is likely that approximately 56 percent of goshawk territories would be negatively affected by nest tree loss.

Indicator 2. Table 3.15-6 shows, under Alternative 1, 653 acres of roadside hazard salvage treatments occur within post-fire suitable PACs. Site-specifically, northern goshawk sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to overlap of approximately 40 percent of a PAC. There is no provision in this alternative to mitigate treatment overlap by adding equivalent acreage to the PAC. Alternative 1 would result in a potential net loss of 653 acres of goshawk habitat and potentially affect occupancy or reproduction in the majority of goshawk territories. Thresholds of significance for size of individual PACs are unknown.

Indicator 3. Under Alternative 1, Table 3.15-6 shows that salvage units managed for old forest condition would not be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the average management rate of 10 to 20 tons per acre for all units. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include OFEA, HRCA, and FCCC.

The importance to habitat quality of higher than average levels of large conifer snags and large down woody material is described in the “habitat modification” section above. Generally, habitat managed for higher than average levels may be best qualified as developing into highly suitable habitat, while habitat managed at average levels may be best qualified as developing into low to moderate suitability.

Indicator 4. Under Alternative 1, Table 3.15-6 shows 10 road miles intersect goshawk PACs. There are no miles of new permanent road construction, 9.7 miles of road reconstruction, 0.1 miles of “skid zones”, and 0.05 miles of temporary road in PACs. Of the road reconstruction miles, 0.6 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads. The management requirement of re-closing all routes post-project that are currently designated closed is expected to minimize long-term habitat fragmentation and disturbance potential.

Indicator 5. Table 3.15-6 shows Alternative 1 has zero material sources, four water sources, and two landings in suitable PACs. Of the landings in suitable PACs, one is a helicopter landing in PAC R05F16D54T13. The implementation of BMPs at project water sources is expected to minimize potential effects to northern goshawks and their prey related to water availability. There is no provision in this alternative to mitigate habitat loss caused by landing construction by adding acreage to the PAC. This would result in a potential net loss of four acres of goshawk habitat.

Indicator 6. Under Alternative 1, 7,626 acres of fuels would be biomassed. Of the biomass acres, Table 3.15-6 shows 1,064 acres occur in critical winter deer range and have a cover/forage ratio emphasis for deer habitat. Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals. Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development. In particular, for critical winter deer range units located downslope of forest carnivore connectivity corridor units and goshawk PAC R05F16D54T21, breaking up fuel continuity within the deer range units is likely to play a critical role in the development of future old forest, and goshawk nesting habitat, linking Yosemite National Park and the North Mountain Inventoried Roadless Area to the Clavey River watershed. Specifically, fuels management actions in the deer range units, which are located downslope of the old forest corridor, are likely to prevent fire spread into the developing forest upslope, at least in the short term (Terrestrial BE Appendix maps).

CUMULATIVE EFFECTS

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Cumulative Effects.

Relevant risk factors potentially affecting northern goshawk abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements (especially large snags and large down woody material) (USDA 2001, R5 Sensitive species evaluation form 2012).

Based on relevant risk factors, the following present and reasonably foreseeable actions from Appendix B are the most relevant to northern goshawk: green thinning sales, emergency fire salvage on private land, and the Rim HT project.

The green thinning sales are designed to reduce ladder fuels and retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, and hardwoods. As documented in the biological evaluations for each of these projects, desired conditions in goshawk habitat are expected to improve in the long term with implementation of these projects.

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acres on private land are presently being salvage logged. These salvage activities generally remove all fire-killed and dying trees, important habitat elements to goshawk habitat in the short and long-term. There is considerable uncertainty regarding the ecological effects of varying levels of salvage treatments to this species (Appendix D).

The Rim HT project removes snags along high-use, typically paved roads (Maintenance Level 3 to 5 roads). Hazard tree removal along Maintenance Level 3 to 5 roads was considered when remapping Category 3 PACs for Alternatives 1, 3, and 4. For Category 2 PACs, hazard tree removal along Maintenance Level 3 to 5 roads was considered in Alternative 3 and 4, but not Alternative 1 (northern goshawk PAC evaluation/remapping narratives in the Terrestrial BE Appendix).

Alternative 1 may contribute cumulatively to short and long-term effects on northern goshawk. The combination of past Forest Service and private timber harvests has cumulatively reduced the amount of suitable old forest habitat available across the analysis area. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are primarily related to the influence no action may have on future wildfires and how future wildfires may impact northern goshawk habitat.

There is uncertainty predicting the incremental effect no action would have on future wildfires and goshawk habitat given the numerous factors involved over time. Potential fire behavior in the future may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuels, potential fire behavior may be expected to increase (3.05 Fuels). Goshawks occupy forest mosaics with heterogeneous habitat types (Squires and Reynolds 1997) but the optimal mosaic or mix of habitat is largely unknown. Presumably, occupancy rates would be highest under conditions that most closely approximate the environment with which goshawks evolved, such as those described in North et al. 2009 and North 2012.

CUMULATIVE EFFECTS

The cumulative effects discussion under Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, no direct cumulative effect is expected because no active management would occur. At the landscape scale, the cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past, thus increasing the risk of loss of suitable nesting and roosting habitat to wildfire in the long term.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Indicator 1. Potentially nine known activity center nest trees are within with roadside hazard salvage treatment units and 37 known activity center nest trees are within 0.25 mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. Under Alternative 3, the management requirement to flag and avoid current and historic nest trees and screening vegetation is expected to protect nest trees. The risk of nest tree loss is minimized and not expected to occur.

Indicator 2. Table 3.15-6 shows 653 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs. Site-specifically, northern goshawk sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately overlap of 40 percent of a PAC. Under this alternative, overlap with roadside hazard treatments was mitigated by adding acreage to the PAC equivalent to the treatment acres as per Forest Plan Direction (USDA 2010 p. 185). Under Alternative 3, 83 percent of affected PAC acres would be mitigated; two PACs had unmitigated treatment overlap. For unmitigated acres, additional acres of suitable habitat were not available. Nevertheless, in this alternative, unmitigated habitat alteration would be minimized to the greatest extent possible. Although thresholds of significance for size of individual PACs are unknown, Alternative 1 would minimize potential net loss of goshawk habitat to 102 acres and reduce the risk of non-occupancy in the majority of goshawk territories. Information on the PAC evaluation narratives and maps is in the Terrestrial BE Appendix.

Indicator 3. Table 3.15-6 shows under Alternative 3, 12,359 acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the rate of 10 to 20 tons per acre with 20 tons per acre emphasized in units managed for old forest condition. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include OFEA, HRCA, and FCCC. Under Alternative 3, 2,089 acres would receive low intensity salvage treatment as part of a PSW research project. Goshawk occupancy would be monitored and studied in the PSW research project. This research will provide information to better understand the effects of wildfire and salvage-logging on northern goshawk occupancy and use, and serve as an empirical basis for informing future management decisions (Keane, pers.comm.). Thus, the PSW research is expected to address important management questions and benefit northern goshawk conservation. Retaining higher than average levels of large conifer snags and large down woody material in areas managed for old forest condition would be consistent with forest plan direction and improve habitat quality for the majority of territories in this project.

Indicator 4. Under Alternative 3, a total of 8.6 project road miles intersect goshawk PACs. Table 3.15-6 shows no new permanent road construction, 8.3 miles of road reconstruction, 0.1 miles of “skid zones”, and 0.2 miles of temporary roads in suitable PACs. Of the road reconstruction miles, 0.6 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads. The management requirement of re-closing all routes post-project that are currently designated closed pre-project is a mitigation measure that is expected to minimize long-term habitat fragmentation and disturbance potential.

Indicator 5. Table 3.15-6 shows Alternative 3 has zero material sources, four water sources, and one landing in suitable PACs. Of the landings in suitable PACs, none are helicopter landings. The implementation of BMPs at project water sources is expected to minimize potential effects to northern goshawks and their prey related to water availability. Under this alternative, habitat loss caused by landing construction was mitigated by adding equivalent acreage to the PAC. No net habitat loss is expected for this indicator.

Indicator 6. Under Alternative 3, there are 8,379 acres of biomass fuels treatments. Table 3.15-6 shows 1,739 acres of biomass treatment occur in critical winter deer range and have a cover to forage ratio emphasis for deer habitat. Alternative 3 treats 675 more biomass acres than Alternative 1 in critical areas and so is expected to be more effective in managing fuels and future fire behavior downslope of developing goshawk habitat. Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals. Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development. In particular, for critical winter deer range units located downslope of forest carnivore connectivity corridor units and goshawk PAC R05F16D54T21, breaking up fuel continuity within the deer range units is likely to play a critical role in the development of future old forest and goshawk nesting habitat. The 22,036 acres of pile and burn fuels treatments and 3,537 acres of watershed treatments involving mastication or “drop and lop” techniques in watershed-sensitive areas are expected to benefit the establishment of vegetation and, thus, would benefit northern goshawk habitat development.

CUMULATIVE EFFECTS

The cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities relevant to Alternative 3 as well. The cumulative contribution of Alternative 3 would be less than Alternative 1 because management requirements minimize the potential for nest tree loss, habitat loss, and reduction in habitat quality of future old forest. In particular, snag retention would be higher within OFEA, HRCA, and FCCC units, and new permanent road construction would be reduced. Potentially effects are minimized by specific management requirements. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Alternative 4 is the same as Alternative 3 except that it drops all new permanent road construction and the following eighteen units from treatment: A01B, A03, A04, A05A, A05B, D01A, D02, E01A, E01B, E02, O01, O02A, O02B, O04, O05, O12, R01A, and R02.

Indicator 1. Same as Alternative 3.

Indicator 2. Same as Alternative 3.

Indicator 3. Table 3.15-6 shows Alternative 4 has 12,315 acres of salvage units that would be managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the rate of 10 to 20 tons per acre with 20 tons per acre emphasized in units managed for old forest condition. Higher than average levels of large conifer snags and large down woody material is a desired condition in areas managed for old forest condition. Areas managed for old forest condition include OFEA, HRCA, and FCCC. Low intensity salvage treatments would occur on 2,089 acres as part of the PSW research project described in Alternative 3. Under Alternative 4, 2,571 acres would be dropped from salvage treatment specifically for species associated with post-fire environments (refer to black-backed woodpecker section), except for roadside hazard salvage. Goshawks forage over large areas and the proposed retention may provide a greater variety of goshawk prey and perch sites for goshawks. However, little is known about goshawk use of post-fire environments.

Indicator 4. Under Alternative 4, project road miles in PACs by road type would be the same as described in Alternative 3 above except that there would be 0.8 miles less of road reconstruction in Alternative 4.

Indicator 5. Same as Alternative 3.

Indicator 6. As under Alternative 3 above, Alternative 4 treats 675 more biomass acres than Alternative 1 in critical areas and so is expected to be more effective in managing fuels and future fire behavior downslope of developing goshawk habitat. Biomass treatments and pile and burn treatments would not occur within the units dropped from salvage harvest. This totals 404 acres of dropped biomass treatments and 1,716 acres of dropped pile and burn treatments.

CUMULATIVE EFFECTS

The cumulative contribution of Alternative 4 would be similar to Alternative 3. Alternative 4 would have the least habitat alteration with full retention of snags across 2,571 more acres than Alternative 3. Alternative 4 is not expected to incrementally add to other actions and affect the viability of northern goshawk.

Northern Goshawk: Summary of Effects

Indicator 1. Table 3.15-6 shows that the number of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within 0.25 mile of potentially disturbing activities are the same for all alternatives. However, Alternatives 3 and 4 include a management requirement to minimize the potential for an effect on nest trees and Alternative 1 does not.

Indicator 2. Table 3.15-6 shows that acres of treatment unit overlap within suitable PACs is mitigated wherever possible under Alternatives 3 and 4. The acres of overlap are not mitigated under Alternative 1.

Table 3.15-6 Northern Goshawk Summary of Effects

Indicator	Metric	Alternative			
		1	2	3	4
1. Nest sites	Number of nest sites in treatment units	10	0	9	9
	Number of nest sites within 0.25 mile of potentially disturbing activities	39	0	37	37
	Management requirement to flag and avoid historic nest trees	N	N/A	Y	Y
2. Treatment unit overlap within PACs	Roadside hazard tree treatment acres overlapping post-fire PACs	653	N/A	653	653
	Treatment overlap acres replaced	0	N/A	551	551
	Management requirement to add acreage to PAC	N	N/A	Y	Y
3. Snag Retention	Acres of snag retention: 12 square feet basal area per acre[1]	28,326	0	15,955	13,427
	Acres of snag retention: 30 square feet of basal area per acre[2]	0	0	12,359	12,315
	Acres of snag retention: 100-120 square feet of basal area per acre[3]	0	0	2,089	2,089
	Full snag retention[4]	0	30,403	0	2,571
4. Road treatments in PACs	New permanent road construction in PACs (miles)	0	0	0	0
	Road reconstruction in PACs (miles)	9.7	0	8.3	7.5
	Skid zones in PACs (miles)	0.1	0	0.1	0.1
	Temporary road in PACs (miles)	0.1	0	0.2	0.2
	Total miles in PACs	9.9	0	8.6	7.8
5. Water, material sources, and landings in PACs	Water sources in PACs (count)	4	0	4	4
	Material (rock) sources (count)	0	0	0	0
	Tractor landings in PACs (count)	1	0	1	1
	Helicopter landings in PACs (count)	1	0	0	0
6. Acres of fuels treatments by type	Biomass	6,808	0	6,825	6,421
	Biomass deer units	1,064	0	1,739	1,739
	Pile and burn	0	0	22,036	20,320
	Watershed soil cover treatments	0	0	3,537	3,537

PAC=Protected Activity Center
[1] Converted from 4 snags per acre for comparison purposes and assuming retention of 24-inch dbh snags; snag retention considered management average.
[2] Old Forest Emphasis Area, Home Range Core Area, Forest Carnivore Connectivity Corridor; snag retention considered above management average.
[3] Treatment type may change in specific plots based on experimental design needs during implementation; we report total treatment unit acres as a best net estimate across plots based on the overall study design (refer to PSW Research appendix).
[4] Represents the maximum number of proposed treatment acres within potential habitat. Used as a relative measure to compare alternatives.

Indicator 3. Table 3.15-6 that shows the acres of areas managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material are highest in Alternatives 3 and 4. In contrast, Alternative 1 manages no acres for higher than average levels of large snags. For retention of large down woody material, all action alternatives manage to a 10 to 20 tons per acre standard. Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons per acre) while Alternative 1 does not. Alternative 4 additionally manages 2,571 acres under full retention of snags and down woody material (1,414 acres from Alternative 3's 12 square feet BA per acre category and 1,157 acres from Alternative 3's 30 square feet BA per acre category are moved to the full retention category).

Indicator 4. Table 3.15-6 shows miles of project road miles in goshawk PACs is highest in Alternative 1. There is 0.1 mile of additional temporary road in PACs under Alternatives 3 and 4 because the PACs are larger (following the Forest Plan Direction for mitigating treatment overlap) and one incorporates a short piece of temporary road. Of the action alternatives, Alternative 4 has the least overall amount of project road activity overlapping suitable goshawk PAC.

Indicator 5. Table 3.15-6 shows the number of water sources in PACs is the same in all action alternatives. Of the action alternatives, Alternative 1 has a helicopter landing in suitable goshawk PAC and Alternatives 3 and 4 do not.

Indicator 6. Alternatives 3 and 4 best address disposal of activity fuels and the need for soil cover treatments for watershed protection.

DETERMINATION

Alternative 1

Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk. This determination for Alternative 1 is based on the following rationale:

- This alternative includes actions to reduce fuel loading and the long-term risk of high-severity fire effects and habitat loss to this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.

Alternative 2

Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk. The determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.

Alternative 3

Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk. The determination for Alternative 3 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.
- This alternative includes several project requirements to minimize potential effects to individuals and habitat. Specifically, this alternative 1) mitigates for potential nest tree loss in suitable PACs,

2) accounts for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) adds acreage to PACs equivalent to unavoidable treatment acres, and 4) manages appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

Alternative 4

Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk. The determination rationale for Alternative 4 is the same as Alternative 3.

Pacific Marten: Affected Environment

Species and Habitat Account

The marten (*Martes caurina*) is a Region 5 Forest Service Sensitive Species and is also a Sierra Nevada Management Indicator Species (MIS), as described in the Rim Recovery MIS report available in the project record. Marten occur throughout much of their historic range from Trinity and Siskyou Counties east to Mount Shasta, south through the Cascades and Sierra Nevada mountain ranges to Tulare County. They are considered rare when compared to other forest carnivore species (USDA 2001). Their core elevation range is 5,500 to 10,000 feet. Marten have been documented on the Stanislaus National Forest as low as 5,200 feet in elevation.

Population estimates and trends are not available for marten in California. Although classified as a furbearer, there has been no open trapping season for this species since 1954 (USDA 2001). Declines in marten population size in the early twentieth century have been attributed to habitat modifications, trapping, and predator control. Based on surveys conducted from 1989 to 2002, the marten appears to occupy much of its historic range in California (Zielinski et al. 1995, Slauson et al. 2007).

Carnivore camera stations have been employed within suitable habitat in and near the project area in 2005-2013 following the protocol designed by Zielinski and Kucera (1995a). No marten detections were made as a result of these survey efforts (NRIS Wildlife database).

The project is within the current distribution of marten across the Sierra Nevada Bioregion. The nearest documented occurrences of marten were in 2006. One was less than two miles north of the project area near Reynolds Creek and one was south of the project area in Yosemite National Park. Their presence within the analysis area is unknown. However, presence is assumed where suitable habitat exists. Because there are no documented den sites, LOPs for this species are not required for this project.

Marten are considered one of the most habitat-specific mammals in North America. Habitat quality is likened to the structural diversity consistent with late seral, mesic coniferous forests, interspersed with riparian areas and meadows. Preferred forest vegetation types include red fir, red fir/white fir mix, lodgepole pine, and Sierra mixed conifer (Freel 1991). Marten home ranges are very large relative to their body size. Mean home ranges in the central Sierra Nevada are 960 acres for males and 801 acres for females (USDA 2001). The analysis area still contains relatively high quality habitat for marten in areas that burned at low or low-moderate intensity (less than 50 percent basal area mortality) such as Twomile, Bourland, and Reynolds Creeks, Pilot Ridge, and the Crocker Meadow area. Post-fire, the analysis area contains about 17,695 acres of moderate and high capability habitat on NFS lands. Table 3.15-7 displays pre- and post-fire acres by CWHR vegetation type, size class, and density on NFS lands. There are about 46,135 acres of moderate and high capability habitat within the cumulative effects analysis area post-fire, including all ownerships.

Moderate to High Capability habitat is defined as that in which a CWHR suitability rating is greater than or equal to 0.55. Two of three categories (reproduction, cover, food) must have an individual rating of medium to achieve the overall rating of 0.55. See CWHR version 8.2 user's manual for further explanation on suitability ratings.

Table 3.15-7 Pre- and post-fire moderate to high capability habitat for marten

CWHR Habitat Type[1]	Size Class[2] and Density[3]	NFS Lands (acres)	
		Pre-Fire	Post-Fire
LPN, MHC, RFR	4P	22	33
JPN, LPN, MHC, PPN, RFR, SMC, WFR	4M	4,040	2,705
JPN, LPN, MHC, PPN, RFR, SMC, WFR	4D	12,282	8,765
JPN, MHC, SMC, WFR	5M	177	147
JPN, MHC, PPN, RFR, SMC, WFR	5D	7,207	6,045
total		**23,728**	**17,695**

[1] CWHR Habitat Type: **JPN**=Jeffrey Pine; **LPN**=Lodgepole Pine; **MHC**=Montane Hardwood Conifer; **PPN**=Ponderosa Pine; **RFR**=Red Fir; **SMC**=Sierra Mixed Conifer; **WFR**=White Fir
[2] Size Class: **4**=Small Trees (12-24 inches dbh); **5**=Medium/Large Trees (24-40 inches dbh);
[3] Density: **D**=Dense Cover (greater than 60 percent canopy closure); **M**=Moderate Cover (40-59 percent canopy closure); **P**=Open Cover (25-39 percent canopy closure);

A road density of less than 1 mile of road per square mile has been recommended for high quality habitat for marten (USDA 1991). A road density of 1 to 2 miles of road per square mile is recommended for medium capability habitat (Ibid). The road density including all routes open to motor vehicles in the analysis area is 3.0 miles per square mile on NFS lands. This is more than twice the acceptable density found in high quality habitat and more than 1 mile per square mile above that found in moderate capability habitat.

Marten natal dens are typically found in cavities in large trees, snags, stumps, logs, shrubs, burrows, caves, rocks, or crevices in rocky areas (USDA 1991 and Zielinski et al. 1997). Dens are lined with vegetation and are found in structurally complex, late succession forests (Buskirk and Powell 1994). Breeding occurs from late June to early August, followed by embryonic diapause, and birth in March-April (Ibid).

Freel (1991), Slauson (2003) and Spencer et al. (1983) characterized suitable habitat for denning and resting marten as follows:

- Canopy cover greater than or equal to 70 percent.
- Largest live conifers are greater than or equal to 24 inches dbh and occur at a density of at least 9 per acre.
- Live tree basal area ranges from 163 to 326 square feet per acre.
- Snags average 25 square feet basal area per acre and average 30 inches dbh.
- Coarse woody debris is present at 5 to 10 tons per acre in decay classes 1 to 2.

Marten diet varies geographically and seasonally with local prey availability. In the Central Sierra, marten diets are comprised primarily of voles, while in the southern Sierra it is squirrels and voles, insects, hypogeous fungi and secondarily (less than 20 percent of diet) reptiles and birds (Zielinski et al. 1983, Zielinski and Duncan 2004). Zielinski and others (1983) noted Douglas squirrels, snowshoe hare, northern flying squirrels and deer mice were the prey species used almost exclusively during the winter, while ground squirrels formed the largest component of the diet from late spring through fall.

Coarse woody debris is an important component of marten habitat, especially in winter, when it provides structure that intercepts snowfall and creates subnivean (below snow) tunnels, interstitial spaces, and access holes. Zielinski and others (1983) suggested that marten activity varied to take advantage of subnivean dens utilized by their prey. Sherburne and Bissonette (1994) found that when coarse woody debris covered a greater percent of the ground, marten use also increased. Older growth forests appeared to provide accumulated coarse woody debris necessary to enable marten to forage effectively during the winter.

Freel (1991) and Spencer et al. (1983) characterized suitable habitat for traveling and foraging marten as follows:

- Canopy cover greater than or equal to 40 percent.
- Largest live conifers are greater than or equal to 24 inches dbh and occur at a density of at least 6 per acre.
- Largest snags average 2.5 per acre and are greater than or equal to 24 inches dbh (8 square feet per acre).
- Coarse woody debris is present at 5 to 10 tons per acre in decay classes 1 to 3.

Reports of long-distance movements, likely representing dispersal, are largely anecdotal. Movement patterns in marten, dispersal and migration, have not been intensively studied for this species because of the difficulty and high cost of studying long-distance movements in small-bodied mammals (Buskirk and Powell 1994, Ruggiero et al. 1994). Martens exhibit seasonal variation in habitat selection within stable home ranges, with little evidence to suggest shifts in home range boundaries.

Risk Factors

Hargis et al. (1999) and USDA (2001) summarize several risk factors potentially influencing marten abundance and distribution:

- Habitat fragmentation – Fragmentation can limit occupancy and dispersal of marten across the landscape. Marten were negatively associated with low levels of habitat fragmentation. When the average nearest neighbor distance between non-forested patches was less than 100 m. (328 feet), it created more edge and less interior forested habitat preferred by marten.
- Meadow habitat degradation – Grazing can reduce the amount of shrub and herbaceous cover available and can increase soil compaction for prey species such as voles.
- Fire suppression – Fire suppression has contributed to degraded conditions in meadows and riparian habitats by allowing encroachment of trees which reduces the availability of understory vegetation required by prey.
- Lack of or removal of coarse woody debris – Removal of coarse woody debris (piles of several smaller logs, or single large logs) can also reduce access and abundance of prey during the important winter months, and may also reduce resting site availability for marten.

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The marten is a Region 5 Forest Service Sensitive species that is associated with old forest ecosystems (USDA 2004). The following land allocations pertain to marten and old forest ecosystems: PAC, HRCA, OFEA, and FCCC.

The desired condition for PACs is to have 1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

The desired condition for California spotted owl HRCAs is to encompass the best available habitat in the closest proximity to the owl activity center (USFS 2004 ROD pp. 39 to 40). HRCAs consist of large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for OFEAs is to provide habitat conditions for mature forest associates (spotted owl, northern goshawk, Pacific marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape-scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Forest structure and function generally resemble pre-settlement conditions.

The desired future condition of forest carnivore connectivity corridor FCCC is to provide habitat connectivity for forest carnivores, linking Yosemite National Park and the North Mountain inventoried roadless area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as described in USDA 2004). Habitat structures are important to retain that may constitute rest sites as described in Freel 1991 and Lofroth et al. 2010 (plate 7.7).

Pacific Marten: Environmental Consequences

The project alternatives could result in direct and indirect effects to the marten through the following activities:

- Salvage of fire-killed trees.
- Salvage of roadside hazard trees.
- New permanent and temporary road construction and road reconstruction.
- Fuels treatments.
- Use of material sources and water sources.

These activities may have direct and indirect effects on marten through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance

Death or injury from project related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a den or rest tree were felled while being used by martens.

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of the marten related to denning, resting, or foraging. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. The location of marten within the analysis area is uncertain following the Rim Fire, a large-scale disturbance event; conducting surveys to identify areas being used is a way to address this uncertainty. Temporary avoidance of the project site or displacement of individuals is expected during project implementation. Any displacement or avoidance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual marten in these areas during parturition, kit rearing, and subsequent breeding (March-August). The potential risk to individual marten is considered low because of the lack of documented marten occurrence within or near the analysis area and short length of exposure expected given the accelerated timeframe of this project and implementation.

Habitat Modification

Salvage logging and the removal of hazard trees along level 2 roads would modify suitable marten habitat by reducing its quality in both the short-term (10 to 20 years) and in the long-term (20 to 50 years).

Short-term retention of snags within and near suitable marten habitat would provide denning and resting sites, as well as habitat for prey species (Freel 1991). Marten are known to use a wide range of structures for denning and resting including cavities in large trees, snags, stumps, logs, burrows, caves, rocks, or crevices in rocky areas (USDA 1991, Zielinski et al. 1997). The number of snags and downed logs available across a marten's home range affects the quality of that habitat for foraging and breeding. For example, they select sites with at least 25 square feet basal area per acre of large snags (Slauson 2003, Spencer et al. 1983). While Spencer does not report an average dbh of snags, Slauson (2003) reports snags average 30 inches dbh in areas where marten were detected. In moderate and high capability traveling and foraging habitat they use areas with fewer snags, eight to twelve square feet basal area per acre that are 24 inches dbh or greater (Freel 1991). Marten may travel across small open areas, but generally avoid open areas.

Prey species that tolerate disturbance or open conditions, such as mice, rats, chipmunks, and squirrels, are known to be abundant in post fire environments (Amacher et al. 2008 and Diffendorfer et al. 2012). Structural elements such as snags and downed logs, when combined with the flush of shrubs, forbs and grasses expected post-fire, will provide habitat suitable for prey and foraging habitat for marten within a few years post fire.

Long-term, large snags and large downed logs are considered biological legacies in a post fire environment and play important roles in the structure of future forest (Lindenmayer et al. 2008). Large snags and downed logs may take hundreds of years to develop, emphasizing the need to retain these elements across the landscape. Because large snags and large downed logs are important habitat elements found in high capability marten habitat, it is not only important to retain these structural elements during project implementation, but it is imperative that recruitment of snags and downed logs occur over time to maintain habitat suitability in the long-term.

Snags remain standing for decades depending upon the species of tree and other environmental factors (Cluck and Smith 2007 and Ritchie et al. 2013). For example, Ritchie and others (2013) found that snag fall rates and decay rates vary considerably by species. When snags eventually fall, they are incorporated as large downed logs, another critical structural element important for marten and prey species (Freel 1991, Zielinski et al. 2004a).

Roads can modify marten habitat by directly removing it or indirectly reducing its quality, resulting in both short and long-term effects. Gaines and others (2003) studied the response of several focal species, including marten, related to roads and trails. Martens in this study were displaced, shifting use of habitat away from human activities on or near roads or trails. Robitaille and Aubrey (2000), found that marten use of habitat within 984 and 1,312 feet of roads was significantly less than habitat use 2,296 to 2,624 feet distant. However, in a study conducted in northern California, Zielinski et al. (2008) found that marten occupancy or probability of detection did not change in relation to the presence or absence of motorized routes and OHV use when the routes (plus a 164-foot buffer) did not exceed about 20 percent of a 31 square mile area, and traffic did not exceed one vehicle every 2 hours. Zielinski and others (2008) did not study or measure behavioral changes or changes in use patterns. Andren (1994) suggested that, as landscapes become fragmented, the combination of increasing isolation and decreasing patch size of suitable habitat is negatively synergistic, compounding the effects of simple habitat loss. In particular, species associated with old forest habitats may be impacted by such effects. Reductions in interior forest patch size results in loss of habitat and greater distances between suitable interior forest patches for sensitive species like the

Pacific marten. New construction, temporary road construction and reconstruction would result in increased habitat fragmentation as well as a reduction in potential resting and denning structures.

Additional habitat modification occurs as an indirect effect from new road construction, temporary road construction, and reconstruction. Over time, trees posing a potential safety hazard ("hazard trees") would be removed along these new, temporary, and reconstructed roads. These trees are typically snags that are within a tree-height distance from the road. This safety policy results in a "snag free" zone of about 200 feet from a road's edge, also affecting the recruitment of large downed wood within this zone. Habitat quality is reduced within this corridor.

Reducing fuel loads across the analysis area was identified as an essential first step in longer term management within the Rim Fire area (Crook et al. 2013). Removal of smaller material, less than 20 inches dbh, would not directly affect habitat suitability for marten. However, it may indirectly contribute to a more resilient landscape and less risk of further loss of remaining suitable habitat in the face of the next wildfire.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the marten and to determine how well project alternatives comply with Forest Plan Direction.

1. Amount of moderate and high capability habitat altered.
2. Habitat connectivity
3. Acres of areas managed for old forest condition with higher than average levels of large snags and higher than average levels of large down woody material.
4. Road density (miles/square mile) in moderate and high capability and dispersal habitat

These criteria were chosen based on the best available scientific literature which focuses on various aspects of marten ecology and life history requirements. These criteria focus on those life history aspects, or habitat elements, considered most limiting to marten persistence across their range and on where project effects are expected.

Effects Common to All Action Alternatives

Direct and Indirect Effects

Indicator 1. Because there is small difference in the amount of acres proposed for treatment in moderate and high quality suitable habitat under all action alternatives, the effects are expected to be similar and are therefore analyzed together. Under the action alternatives, habitat quality would be reduced across a portion of the remaining moderate and high capability habitat within the analysis area as a result of removing snags and hazard trees. Between 76 percent and 78 percent (depending on the alternative) of the remaining suitable habitat is not proposed for treatment. Proposed treatments would not result in creating barriers to movement based on the configuration of remaining suitable habitat. Snag retention requirements vary by alternative and would serve to mitigate some of the negative effects expected to result from implementation of the action alternatives and is discussed in more detail under each alternative. Table 3.15-8 displays the proposed types of treatments and the proportion of suitable habitat affected under each action alternative for comparison.

Although a reduction in quality is expected, treated areas would continue to offer foraging habitat. Trees that are in decline and not subject for removal under this project would, over time, be incorporated as potential resting or denning structures and habitat for prey species. Marten are known to reuse rest sites slightly more often than fisher. Marten also use downed logs, shrubs, and rocks and are not dependent solely on snags (Zielinski et al. 1997). Effects may result in impacts to an individual's fitness, but because there are no documented occurrences within the analysis area this risk is considered low. Furthermore, because no established populations occur in the analysis area, no population impacts are expected.

Indicator 2. Habitat connectivity across the landscape is important to marten as it provides a means for dispersal, linkages between suitable habitat patches or core habitat areas, and genetic exchange. Spencer and Rustigan-Romsos (2012) provide recommendations for the conservation of rare carnivores such as the marten in California. Marten use higher elevation habitats during the summer and snow-free periods and may use lower-elevation forested habitat during the winter. It is thought that the summer range is more restrictive and limiting for marten and their persistence within a given landscape. Thus, Spencer and Rustigan-Romsos (2012) used the higher-elevation summer range to base their modeling effort. They used spatially explicit, empirical models to identify large areas of suitable habitat and dispersal corridors connecting those areas. Suitable marten habitat cores were identified as a part of this effort and occur in the north, east, southeast portions of the analysis area on the Stanislaus National Forest, at elevations above 7,000 feet. The forest carnivore connectivity corridor described in the analysis for fisher is at an elevation below 5,000 feet and it is unlikely that marten would venture this low during the summer. Since documented occurrences of marten on the Stanislaus National Forest are usually above 5,000 feet, it is unlikely that the corridor would be as critical for marten relative to fisher. Habitat connectivity is still largely intact at the preferred elevation of marten – the approximate elevation band at which the Rim Fire was contained. Thus, implementation of the action alternatives is not expected to create barriers to movement for marten.

Indicator 4. To analyze effects of road density, it is necessary to include more than the current suitable marten habitat because roads can be somewhat permanent features on the landscape and will affect the habitat suitability for marten not only in the short-term, but long-term as well. Thus, land allocations that are managed for old forest associated species (OFEA and HRCA) and suitable habitat at or above 5,000 feet elevation were used to calculate road density for marten within the analysis area. Small disjunct patches of habitat not contributing to this core area or connected to suitable habitat on adjacent ownerships such as Yosemite National Park were omitted. This area is about 44,842 acres and can support marten in part today and into the future based on the desired conditions outlined in the Stanislaus National Forest Plan (USDA 2010). Therefore, this is considered a logical approach to analyze project related road density and effects to marten. This is discussed further under each alternative.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Discussed under effects common to all action alternatives.

Indicator 3. Under Alternative 1, the snag retention rate is considered the management standard or average snag retention. Table 3.15-8 displays the acres affected by the snag retention requirements within potential marten habitat proposed under Alternative 1. Potential marten habitat is defined as land allocations that are managed for old forest associated species (OFEA and HRCA) and potential suitable habitat at or above 5,000-foot elevation.

Retaining snags at a rate of 12 square feet per acre across the 6,060 acres proposed for treatment in moderate and high capability habitat would provide fewer snags than has been documented to occur in occupied marten habitats. Occupied marten habitat contains at least 25 square feet per acre of snags greater than or equal to 30 inches dbh (Slauson 2003, Spencer et al. 1983). Habitat quality would be reduced on 34 percent of moderate and high capability breeding habitat under Alternative 1; however, retained snags would provide some potential resting and denning sites for marten. The proposed retention rate would be adequate for foraging habitat utilized by marten. Although a reduction in breeding habitat quality is expected, the treated areas would continue to offer moderate and high capability foraging and traveling habitat for marten.

Under Alternative 1, retaining snags at 12 square feet per acre would result in the lowest retention of snags under the action alternatives to contribute to the structural complexity and diversity within recovering forested stands. Marten readily move through habitats with understory vegetation, snags, and downed woody debris within 100 meters (328 feet) of forested habitat (Koehler and Hornocker 1977). The units under this alternative would create some openings larger than those known to be traversed by marten. As vegetative cover returns, the edges of these units that occur adjacent to forested stands would provide habitat that marten would readily use for foraging. Minor beneficial effects on habitat quality for marten are expected in the short-term. Because so much of their home range contains older forest conditions, most treated areas aren't expected to offer suitable breeding conditions for many decades (Freel 1991, Koehler and Hornocker 1977, Spencer 1983).

Hardwoods occur irregularly across the analysis area and their locations have not been mapped. Hardwoods are utilized by marten and they provide structure for many prey species sought by them (Freel 1991, Koehler and Hornocker 1977, Spencer 1983). Because all hardwood snags would be retained under Alternative 1, no change in the number of hardwood snags available is expected as a result of implementation.

Considering that marten utilize habitat that contains higher rates of large snags and large downed woody debris, the rate of snag retention proposed under this alternative is not adequate to maintain habitat quality for breeding and resting within the treated areas. Snags retained are expected to contribute and provide suitable habitat, although of lower quality in the short-term. In the long-term these snags would be incorporated as large downed woody material, critical structural elements needed within a recovering forest.

Downed woody debris retention at 10 to 20 tons per acre, in the largest size class available, would provide habitat important for marten and their prey. In most areas, sufficient large downed woody material is lacking, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material may result in a more diverse understory including more herbaceous and shrub vegetation that would benefit marten and their prey.

Indicator 4. Table 3.15-8 displays the miles of each type of road-related treatment and the resulting miles per square mile under Alternative 1. The new road construction and temporary road construction proposed under this alternative would result in an increase of 0.3 miles per square mile of road, increasing the road density from 3.0 miles per square mile to 3.3 miles per square mile during project implementation. Minor negative effects to habitat quality from the increased road density are expected under Alternative 1. This alternative may slightly increase the potential for road related mortality during project implementation while the roads are open and being used regularly. New permanent road construction would be designated as blocked Maintenance Level 1 or 2 gated year round. This would alleviate the risk of road-related mortality after project implementation because the roads would only be used intermittently for management purposes. The new permanent road construction would result in habitat fragmentation in the long-term because habitat would be removed as a result of the road construction and the road would additionally be subject to hazard tree removal within 200 feet of the roads edge in the long-term reducing the quality of habitat adjacent to those new roads. All temporary roads would be obliterated and blocked and over time vegetation would become reestablished and all roads that were non-motorized before project implementation would be returned to the pre-project specifications.

CUMULATIVE EFFECTS

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered (found in Appendix B, Cumulative Effects). Some, but not all, of these actions have or may contribute cumulatively to effects on martens.

Risk factors potentially affecting marten abundance and distribution have been identified and include habitat fragmentation and lack of or removal of coarse woody debris. The following evaluation criterion was used as a relative measure of cumulative effects from this alternative to marten: habitat modification.

Habitat Modification

Federal Lands

Past, present, and foreseeable future timber harvests and hazard tree removal sales on public lands have and will likely affect habitat suitability for marten through the removal of large trees and reduction in canopy cover loss of snags and downed woody debris from prescribed fire operations. Present actions within the analysis area include: The Twomile Ecological Restoration Vegetation Management Groovy and Funky timber sales and the Soldier Creek timber sale are scheduled to treat about 2,045 acres through commercial thinning, biomass removal, mastication, and prescribed fire treatments. GTR 220North et al. management strategy (2009) was used as a guide when designing these projects, including maintaining elements important to marten (large trees, snags, downed wood, areas of dense canopy cover). In addition, Yosemite National Park is currently removing hazard trees on about 816 acres, which would have negligible effects on marten and their habitat.

Foreseeable future actions on federal lands include: Reynolds Creek Ecological Restoration involving meadow and aspen restoration. These types of projects generally include the removal of encroaching trees. They will improve habitat quality for marten by expanding the size of the treated meadows. Meadows are an important component of marten habitat. Twomile-Campy, Looney, and Thommy Timber Sales (part of the Twomile Ecological Restoration Project) and Reynolds Creek Timber Sale are scheduled to occur over the next few years and will result in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. Additionally, the Rim HT removal project proposed to remove hazard trees along 10,262 acres of level 3, 4, and 5 roads and as of this writing is being implemented.

The ecological restoration projects will reduce habitat quality in the short-term for marten, but are designed to have long-term benefits such as improved forest health and reduced future fire intensity. Hazard tree removal will reduce habitat quality in the short and long-term. However, the objective and priority in these areas, especially on Maintenance Level 3, 4, and 5 roads, is public safety.

Roads and trails modify habitat suitability for marten by reducing habitat or degrading quality through fragmentation. Roads and trails also improve human access, and potentially result in the displacement of individuals. Twomile Transportation, a foreseeable future action, will result in a slight reduction in motorized routes, essentially removing 11.4 miles by gating, decommissioning, or closing to Maintenance Level 1 roads used only for administrative purposes. Reynolds Creek Motorized Routes project will decommission 3.5 miles of unauthorized routes in the near future as well. The Mi-Wok OHV Restoration Project proposes to block and restore 11.6 miles of unauthorized OHV routes. This reduction of about 26.5 miles of motorized roads and trails across the analysis area would improve habitat quality by reducing fragmentation and human access while increasing the amount of interior habitat available.

Private Lands

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre on private land are presently being salvage logged. These salvage activities tend to take more and larger snags and reduce more fuels than Forest Service projects. Post salvage, the areas may provide short-term foraging habitat for marten as understory vegetation becomes established; however, these benefits are expected to be limited in space and time as observed on past private-land reforestation efforts.

Wildfire

Wildfires can affect habitat in varying degrees, depending on the intensity of the fire. Wildfires can create snags, which may be used as den, rest, or forage structures by marten. Wildfires that burn at high severity such as within portions of the Rim Fire result in eliminating habitat. Treatments in green forest (past, present, future) are designed to reduce fire intensity and spread, thus reducing the risk of habitat loss. It is expected that wildfire will continue to occur on the landscape.

Alternative 1 Contribution/Summary

Alternative 1 is expected to contribute cumulatively to short- and long-term effects on marten. Disturbance and potential displacement of individuals may occur during project implementation and would likely be temporary. No recent occurrences of marten within the analysis area are documented. However, the analysis area is in close proximity to occupied habitat on both the Stanislaus National Forest and Yosemite National Park. Reduction in the quality of moderate and high capability habitat on about 4,224 acres (9 percent of the remaining suitable habitat within the analysis area) is expected from implementation of this alternative. Snag retention requirements under this alternative are less than under the other action alternatives. Habitat quality would be reduced based on the reduction of denning and resting sites. There are also 2.8 miles of new permanent road construction proposed within potential marten habitat under this alternative, which would have negative effects on marten and their habitat. Treatments would likely occur over the next two to three years and may coincide with other projects, particularly Groovy, Funky, and Soldier Creek Timber Sales. The combination of past Forest Service and private timber harvests and wildfire has cumulatively reduced the amount of late succession habitat available across the analysis area. Forest Service projects were and continue to be designed to prevent additional, large scale loss of mature forest from wildfires such as the Rim. These projects are designed to retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, while focusing on releasing black oaks and pines. Habitat suitability within the analysis area is predicted to improve in the long-term for marten. The cumulative contribution under this alternative is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur.

Under Alternative 2, no indirect effects are expected from road-related treatments as there would be no such treatments. There may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact marten habitat. At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and marten habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuels, potential fire behavior may be expected to increase (Rim EIS Fire and Fuels Report) and ultimately affect the amount of mature forest habitat available for marten denning and resting. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines). The alternative could also result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because, within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre, and, within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Chapter 3.05).

Thus, not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of mature forest conditions. Suitable denning and resting habitat for marten would be delayed under this alternative, resulting in long-term negative effects.

Indicator 1. Under the Alternative 2, habitat quality within currently suitable moderate and high capability habitat would not be altered.

Within the areas that burned at high severity, herbaceous and shrub vegetation is expected to be established within 3 to 5 years (Gray et al. 2005 and Moghaddas et al. 2008) and would be suitable for marten movement and potentially as foraging habitat. These beneficial effects would be expected in the short-term. Because the ability of forests to regenerate after stand replacing fire is highly dependent on seed sources, forested conditions are likely to re-establish only within mixed severity burn patches and the edges of high severity patches (Crotteau et al. 2013). It is likely that areas that burned at high severity would be dominated by herbaceous and shrub vegetation and shade tolerant conifer species such as white fir and incense cedar in the future. A consequence of shrub dominance is the reduced likelihood that forested conditions would return naturally for many decades. Not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of forest conditions. Thus, suitable denning and resting habitat would be delayed under this alternative resulting in long-term negative effects to marten.

When wildfire returns to this landscape, the remaining mature forest adjacent to or near areas that burned at high severity may be at increased risk of loss. As noted above, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons per acre on average) than the desired condition (Rim EIS Fire and Fuels Report). This would significantly increase the risk of fire suppression activities when wildfire occurs in the future. In conclusion, although uncertainty exists, this alternative may result in negative long-term effects on habitat for marten. The negative long-term effects on habitat for marten from this alternative outweigh the short-term beneficial effects.

Indicator 2. Under the no action alternative, no forest carnivore connectivity corridor would be proposed. As discussed above under effects common to all action alternatives, since it is unlikely that the corridor is critical for marten relative to fisher based on preferred elevation range, no effects are expected under this alternative.

Indicator 3. Under the Alternative 2, all snags and downed logs would be retained. In the short-term marten and their prey would benefit from the availability of more snags and downed logs within an adjacent to remaining suitable habitat, as discussed under the action alternatives. Remaining suitable habitat would be at higher risk of loss in the long-term when wildfire returns to this landscape, see Indicator 1 above. The potential for recovery of forested conditions across areas that burned at high severity would also be delayed, see Indicator 1 above.

Indicator 4. Under the no action alternative, no new permanent road construction, temporary road construction, reconstruction, or maintenance would occur. This alternative would provide the greatest benefit to marten because there would be no increase in road density across the analysis area and no potential increase of road related mortality in the short or long-term.

CUMULATIVE EFFECTS

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under the No Action alternative, there would be no direct cumulative effect expected because no active management would occur. At the landscape scale, the cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past, thus increasing the risk of loss of suitable habitat to wildfire in the long term.

No Action Alternative Contribution/Summary: The cumulative contribution under this alternative would not complement the treatments that have occurred in the past, thus increasing the risk of loss of remaining suitable habitat to wildfire in the long-term. The short-term beneficial impacts to marten such as retention of snags for denning and resting sites would be outweighed by the increased risk of additional habitat loss in the next wildfire.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Under Alternative 3 the Stanislaus National Forest Land and Resource Management Plan would be amended to establish the connectivity corridor as a land allocation (old forest emphasis area) prioritizing future management objectives, not just those objectives associated with this project, within this connectivity corridor to benefit old forest associated species, particularly forest carnivores. The effects to marten under this alternative are the same as discussed for Indicator 2 under the effects common to all action alternatives, but would be realized in the long-term because the proposed corridor, approximately 10,000 acres, would be changed from General Forest to Old Forest Emphasis Area. This land allocation change would prioritize management emphasis in this corridor to benefit old forest associated species into the future.

Indicator 3. Under Alternative 3, the snag retention rate in OFEA, HRCA, and FCCC is considered greater than the management standard and above average snag retention, while the snag retention rate in general forest is considered the management standard or average snag retention.

Table 3.15-8 displays the acres affected by the snag retention requirements within potential marten habitat proposed under this alternative. Potential marten habitat is defined as land allocations that are managed for old forest associated species (OFEA and HRCA) and potential suitable habitat at or above 5,000 feet elevation.

Retaining snags at a rate of 12 square feet per acre across the 3,443 acres proposed for treatment in moderate and high capability habitat would provide less than has been documented to occur in occupied marten habitats. Retaining snags at the rate of 30 square feet per acre would provide a supply of snags found in occupied marten habitat. Snags retained at the rate of 100 to 120 square feet per acre would provide several times the snags documented to occur in occupied marten habitat. Occupied marten habitat has at least 25 square feet per acre of snags greater than or equal to 30 inches dbh (Slauson 2003, Spencer et al. 1983). Habitat quality would be reduced on 19 percent of moderate and high capability breeding habitat under this alternative; however, retained snags would provide some potential resting and denning sites for marten. Habitat quality would be maintained on 14 percent of moderate and high capability habitat where snag retention is 30 or 100 to 120 square feet per acre under this alternative. (The other 67 percent of moderate and high capability habitat habitat would not be treated.) Marten readily move through habitats with understory vegetation, snags, and downed woody debris within 328 feet of forested habitat (Koehler and Hornocker 1977). The units under Alternative 3 would create some openings larger than those known to be traversed by marten. Minor beneficial effects on habitat quality for marten are expected in the short-term. Because so much of their home range contains older forest conditions, most treated areas aren’t expected to offer suitable breeding conditions for many decades (Freel 1991, Koehler and Hornocker 1977, Spencer 1983).

Areas with above average snag retention would provide the most snags to contribute to structural complexity and diversity within recovering forested stands. As vegetative cover returns, the edges of these units that occur adjacent to forested stands would provide habitat that marten would readily use for foraging, while providing protection from predators.

Hardwoods occur irregularly across the analysis area and have not been mapped. Hardwoods are utilized by marten and they provide structure for many prey species sought by them (Freel 1991, Koehler and Hornocker 1977, Spencer 1983). Because all hardwood snags would be retained under Alternative 3, no change in the number of hardwood snags available is expected as a result of implementation

Snag retention at the rate of 30 or 100 to 120 square feet per acre proposed under Alternative 3 is adequate to maintain moderate and high capability habitat that marten would likely occupy. These snags are expected to provide denning and resting structure in the short-term and also in the long-term as large downed woody debris.

Downed woody debris retention at 15 to 20 tons per acre, if available in larger size classes, would provide habitat important for marten and their prey. In most areas, sufficient large downed woody material is lacking, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material would have a minor effect on marten.

Indicator 4. Table 3.15-8 displays the miles of each type of road related treatment and the resulting miles per square mile under Alternative 3. These effects would be similar to Alternative 1, although more minor because there are less miles of new permanent road proposed under Alternative 3.

CUMULATIVE EFFECTS

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, refer to this discussion. The cumulative contribution of Alternative 3 would be the same as those described under Alternative 1 because there is only a difference of 14 acres proposed for treatment within moderate and high capability habitat. However, effects under Alternative 3 are less than Alternative 1 regarding the following: snag retention would be higher within OFEA, HRCA, and FCCC units under this alternative and there would only be 1.0 miles of new permanent road construction under this alternative. The cumulative contribution under this alternative would affect marten and their habitat in the short and long-term but is not expected to affect the viability of this species.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Same as Alternative 3.

Indicator 3. Under Alternative 4, the snag retention guidelines are the same as outlined under Alternative 3; however, the spatial extent of proposed treatments is less under this alternative. Table 3.15-8 displays the acres affected by the snag retention requirements within potential marten habitat proposed under this alternative. Potential marten habitat is defined as land allocations that are managed for old forest associated species (OFEA and HRCA) and potential suitable habitat at or above 5,000 feet elevation. Effects are very similar as those discussed under Alternative 3. Alternative 4 is expected to have less severe effects due to the smaller spatial extent of treated area.

Indicator 4. Table 3.15-8 displays the miles of each type of road related treatment and the resulting miles per square mile under Alternative 4. The temporary road construction proposed under this alternative would result in an increase of 0.3 miles per square mile of road, effectively increasing the road density from 3.0 miles per square mile to 3.3 miles per square mile during project implementation. Alternative 4 is similar to Alternative 3; however, because there is no new permanent road construction proposed under this alternative, long-term negative effects from road treatments such as fragmentation and hazard tree removal would not occur.

CUMULATIVE EFFECTS

The cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, refer to this discussion. The cumulative contribution of Alternative 4 would be the least of all the action alternatives as described under Alternatives 1 and 3 because there are the least amount of acres proposed for treatment within moderate and high capability habitat, snag retention would be higher within OFEA, HRCA, and FCCC units, and there would be no new permanent road construction under this alternative. The cumulative contribution under Alternative 4 would affect marten and their habitat in the short and long-term, but is not expected to affect the viability of this species.

Pacific Marten: Summary of Effects

Indicator 1. Table 3.15-8 shows the amount of moderate and high capability marten habitat proposed for treatment is very similar for all alternatives. Alternative 1 would affect the most suitable habitat, while Alternative 4 would affect the least amount of habitat. Alternative 2 would not directly affect suitable habitat.

Indicator 2. None of the alternatives would result in habitat fragmentation within potential marten habitat areas. Alternatives 3 and 4 incorporate a Forest Plan Amendment to designate a FCCC. Under Alternative 2, no connectivity corridor or Forest Plan Amendment would be proposed.

Table 3.15-8 Pacific Marten Summary of Effects

Indicator	Metric	Alternative			
		1	2	3	4
1. Moderate and high capability habitat altered	Salvage acres	1,557	0	1,576	1,215
	Hazard tree removal acres	2,667	0	2,634	2,677
	Total acres	4,224	0	4,210	3,892
	Percent of suitable habitat treated	24	0	24	22
2. Habitat Connectivity	Land allocation acres changed from General Forest to Old Forest Emphasis	0	0	9,900	9,900
3. Snag Retention	Acres of snag retention: 12 square feet basal area per acre[1]	6,060	0	3,443	2,168
	Acres of snag retention: 30 square feet of basal area per acre[2]	0	0	2,103	1,399
	Acres of snag retention: 100-120 square feet of basal area per acre[3]	0	0	262	262
	Full snag retention[4]	0	5,809	0	1,979
4. Road treatments	New permanent road construction (miles)	2.8	0	1.0	0
	Road reconstruction: designated for motor vehicle travel (miles)	57.6	0	52.7	46.1
	Road reconstruction: not designated for motor vehicle travel (miles)	10.3	0	13.2	13.8
	Temporary road construction (miles)	6.7	0	7.9	6.1
	Roads added for project use during implementation (miles per square mile)	0.3	0	0.3	0.3
	Total road density existing plus additional for project (miles per square mile)	3.3	3.0	3.3	3.3

[1] Converted from 4 snags per acre for comparison purposes and assuming retention of 24-inch dbh snags; snag retention considered management average.
[2] Old Forest Emphasis Area, Home Range Core Area, Forest Carnivore Connectivity Corridor; snag retention considered above management average.
[3] Treatment type may change in specific plots based on experimental design needs during implementation; we report total treatment unit acres as a best net estimate across plots based on the overall study design (refer to PSW Research appendix).
[4] Represents the maximum number of proposed treatment acres within potential habitat. Used as a relative measure to compare alternatives.

Indicator 3. As shown in Table 3.15-8, the acres of areas managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material are highest in Alternatives 3 and 4. In contrast, Alternative 1 manages no acres for higher than average levels of large snags. For retention of large down woody material, all action alternatives manage to a 10 to 20 tons per acre standard, but Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons per acre) while Alternative 1 does not. Alternative 4 treats 2,571 acres less than Alternative 3, so fewer acres would have the number of snags and quantity of downed woody material reduced.

Indicator 4. Of the action alternatives, proposed miles of new permanent road construction is highest under Alternative 1 and lowest under Alternative 4. Increases to road density are the same among all action alternatives, but long-term effects related to road density are greatest under Alternative 1 because of the amount of new permanent road construction.

Determinations

Alternative 1

Alternative 1 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten. This determination for Alternative 1 is based on the following rationale:

- Habitat quality would be reduced across 24 percent of currently moderate and high capability habitat on NFS lands and across 9 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain habitat suitability for foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long term risk of further habitat modification or loss from future wildfires.
- 2.8 miles of new road construction would reduce habitat quality and increase fragmentation in localized areas.

Alternative 2

Alternative 2 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten. This determination for Alternative 2 is based on the following rationale:

- With no removal of dead trees, remaining suitable habitat would be at greater risk of modification or loss from future wildfires.
- Quality of currently moderate and high capability habitat would not be affected in the short-term.
- No new permanent road construction would occur.

Alternative 3

Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten. This determination for Alternative 3 is based on the following rationale:

- Habitat quality would be reduced across 24 percent of currently moderate and high capability habitat on NFS lands and across 9 percent of the entire Rim Fire area.
- Snag retention in suitable habitat of greater than or equal to 30 square feet basal area per acre would maintain habitat suitability for denning, resting, and foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long-term risk of further habitat modification or loss from future wildfires.

- 1.0 miles of new road construction would reduce habitat quality and increase fragmentation in 1 localized area.

Alternative 4

Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten. This determination for Alternative 4 is based on the following rationale:

- Habitat quality would be reduced across 22 percent of currently moderate and high capability habitat on NFS lands and across 8 percent of the entire Rim Fire area.
- Snag retention in suitable habitat of greater than or equal to 30 square feet basal area per acre would maintain habitat suitability for denning, resting, and foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long term risk of further habitat modification or loss from future wildfires.
- 0 miles of new road construction are proposed, thus no localized fragmentation would occur.

Fisher: Affected Environment

Species and Habitat Account

The fisher (*Pekania pennanti*, formerly *Martes pennanti*) is a Region 5 Forest Service Sensitive Species and a candidate for listing under the ESA. In 2004, the U.S. Fish and Wildlife Service (FWS) completed a 12-month status review of the fisher and determined that the West Coast Distinct Population Segment (DPS) warranted protection under the Endangered Species Act of 1976 et seq. but was precluded from listing by higher priority actions (Federal Register 2004). Thus, this fisher DPS is a Candidate for listing. The West Coast Fisher DPS (USDI 2004) includes all potential fisher habitats in Washington, Oregon and California from the east side of the Cascade Mountains and Sierra Nevada to the Pacific coast. A status review was initiated as part of a multidistrict litigation settlement agreement under which the Service agreed to submit a proposed rule or a not-warranted finding to the Federal Register for the West Coast DPS of the fisher no later than the end of Fiscal Year 2014 (Federal Register 2013a). If the USFWS pursues listing, they will concurrently designate critical habitat for that DPS. The Forest Service has the option of requesting technical assistance from the USFWS due to Candidate for ESA listing status.

Fishers have been listed with the State of California as a Species of Special Concern since at least 1986 (Williams 1986). In March 2009, the California Fish and Game Commission recommended that the fisher be assessed for listing as Threatened or Endangered under the California State Endangered Species Act. Based on the recommendation CDFW conducted a 12-month review and concluded that the fisher did not merit protection under the State Endangered Species Act in March 2010. Although they accepted additional comments regarding the status of fisher, they did not change their finding.

Fishers historically occurred in the Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, and Sequoia National Forests, and the Lake Tahoe Basin Management Unit. As of 1995, Zielinski et al. determined that fishers remain extant in just two areas comprising less than half of the historic distribution: northwestern California and the southern Sierra Nevada from Yosemite National Park southward, separated by a distance of approximately 250 miles.

A number of southern Sierra Nevada population estimates and simulations have been conducted for fisher populations occurring across the Sequoia and Sierra National Forests, Mountain Home State Park, tribal lands, and Yosemite and Sequoia/Kings Canyon National Parks. These estimates range from 100 to 600 adults (Lamberson et al. 2000, Spencer et al. 2008, and Self et al. 2008).

Status and trend monitoring for fisher and marten was initiated in 2002. The monitoring objective is to be able to detect a 20 percent decline in population abundance and habitat (USDA 2006). This monitoring includes intensive sampling to detect population trends on the Sierra and Sequoia National Forests, where the fisher currently occurs, and is supplemented by less intensive sampling in suitable habitat in the central and northern Sierra Nevada specifically designed to detect population expansion. From 2002 to 2008, 439 sites were surveyed throughout the Sierra Nevada on 1,286 sampling occasions, with the bulk of the sampling effort occurring within the Southern Sierra fisher population monitoring study area (USDA 2009).

Preliminary results indicate that fishers are well-distributed in portions of the Sequoia and Sierra National Forests; annual occupancy rates are consistently higher on the Sequoia (33.3 percent to 41.1 percent) than the Sierra (14.5 percent to 22.7 percent) (USDA 2005). Comparisons to southern Sierra Nevada survey data from the 1990's suggest that the areal extent of occurrence for fisher may have expanded during the past 10 years (USDA 2005). There has been no conspicuous difference in occupancy rates among years, and no seasonal effects on detection probabilities within the June to October sampling periods (Truex et al. 2009).

From 2002 through 2006, 916 primary sample units were completed. These consist of greater than 4,500 individual survey stations for over 45,000 survey nights (USDA 2006). In the seven southern Sierra Nevada monitoring seasons to date (2002 to 2008), fishers were detected at a total of 112 of 251 sample units, or 44.6 percent of sites (USDA 2009). While surveys have been conducted on the Stanislaus, they have not resulted in detections of fishers on the Forest.

Additional carnivore camera stations were employed within suitable habitat in and near the analysis area in 2005 to 2013 following the protocol designed by Zielinski and Kucera (1995). No fisher detections were made as a result of these survey efforts (NRIS Wildlife database).

The project is within the historic distribution of fisher across the Sierra Nevada Bioregion. Fisher have been documented both in Yosemite National Park and south of the Merced River on the Sierra National Forest. Although their presence within the analysis area is undocumented, it is within dispersal distance of the closest known population on the Sierra National Forest and Yosemite National Park. Thus their presence is assumed where suitable habitat exists. Because there are no documented den sites, LOPs for this species are not required for this project.

Habitat Account

In the Sierra Nevada, fishers occur in mid-elevation forests (Grinnell et at. 1937, Zielinski et al. 1997) largely on NFS lands. Most detections are below the elevations of most national parks and wilderness areas. In the southern Sierra Nevada, fishers occur sympatrically with martens at elevations of 5,000 to 8,500 feet in mixed conifer forests (Zielinski et al. 1995). The Sierra Nevada status and trend monitoring project has detected fishers as low as 3,110 feet and as high as 9,000 feet in the southern Sierra Nevada, which are considered to be extremes of the elevation range for this species (USDA 2006).

The following California Wildlife Habitat Relationships (CWHR) types are considered important to fishers: generally structure classes 4M, 4D, 5M, 5D and 6 (stands with trees 11 inches diameter at breast height or greater and greater than 40 percent cover) in ponderosa pine, montane hardwood-conifer, Sierran mixed conifer, montane riparian, aspen, redwood, red fir, Jeffrey pine, lodgepole pine, subalpine conifer, and eastside pine (California Department of Fish and Game, California Interagency Wildlife Task Group. 2008). CWHR assigns habitat values according to expert panel ratings. CWHR2 is a derivative of the CWHR fisher habitat relationship model constructed by Davis et al. (2007). They used best available science to revise the statewide model and eliminate some forest types that appeared to contribute little to fisher habitat: aspen, eastside pine, lodgepole pine, montane riparian, red fir, and subalpine conifer. They also added some canopy closure classes that weren't previously thought to contribute to suitable fisher habitat. As Table 3.15-9 shows, this can be further refined to reflect only those forest types present in the southern Sierra Nevada: Jeffrey pine, montane hardwood-conifer, ponderosa pine, Sierran mixed-conifer and white fir. This refinement is termed CWHR2.1.

Table 3.15-9 High and moderate capability habitat for fisher

Habitats	Canopy Cover and Substrate Classes[1, 2]
Jeffrey pine	4P, 4M, 4D, 5M, 5D
Montane hardwood-conifer	4P, 4M, 4D, 5P, 5M, 5D, 6
Ponderosa pine	4P, 4M, 4D, 5P, 5M, 5D
Sierran mixed conifer	4P, 4M, 4D, 5P, 5M, 5D, 6
White fir	4P, 4M, 4D, 5P, 5M, 5D, 6

[1] Size Class: **4**=Small Trees (12-24 inches dbh); **5**=Medium/Large Trees (24-40 inches dbh);
[2] Density: **D**=Dense Cover (greater than 60 percent canopy closure); **M**=Moderate Cover (40-59 percent canopy closure); **P**=Open Cover (25-39 percent canopy closure);
[3]CWHR 2008 as Modified by Davis et al. 2007 [CWHR2] and Applied to Southern Sierra Nevada Forest Types [CWHR2.1].

In addition to habitat fragmentation within the analysis area resulting from the Rim Fire, habitat connectivity across this landscape was compromised by the 1996 Ackerson and Rogge Fires, and the 2003 Kibbie Fire. Prior to the Rim Fire, the analysis area contained about 73,081 acres of moderate and high capability habitat. The analysis area still contains relatively high quality habitat for fisher in areas that burned at low or low-moderate intensity (less than 50 percent basal area mortality), such as Twomile, Bourland, and Reynold's Creek, and Pilot Ridge and the Crocker Meadow area. Post-fire, the analysis area contains about 44,876 acres of moderate and high capability habitat on NFS lands. Table 3.15-10 displays pre- and post-fire acres on NFS lands by CWHR vegetation type, size class, and density. Suitable habitat has been greatly reduced in the heart of the analysis area and connectivity between large tracts of habitat on the forest and currently occupied areas in Yosemite has been further reduced. This habitat fragmentation has reduced the likelihood of fisher moving through or dispersing into the area until natural vegetation recovery or forest management practices, such as planting, effectively re-establishes connectivity. There are about 84,142 acres of moderate and high capability habitat within the cumulative effects analysis area post-fire, including all ownerships.

Table 3.15-10 Pre- and post-fire high and moderate capability habitat for fisher

CWHR Habitat Type[1]	Size Class[2] and Density[3]	NFS Lands (acres)	
		Pre-Fire	Post-Fire
JPN, MHC, PPN, SMC, WFR	4P	1,107	4,128
	4M	8,035	4,700
	4D	44,872	21,898
	5P	8	827
	5M	200	251
	5D	18,859	13,072
total		**73,081**	**44,876**

[1] CWHR Habitat Type: **JPN**=Jeffrey Pine; **MHC**=Montane Hardwood Conifer; **PPN**=Ponderosa Pine; **SMC**=Sierra Mixed Conifer; **WFR**=White Fir
[2] Size Class: **4**=Small Trees (12-24 inches dbh); **5**=Medium/Large Trees (24-40 inches dbh);
[3] Density: **D**=Dense Cover (greater than 60 percent canopy closure); **M**=Moderate Cover (40-59 percent canopy closure); **P**=Open Cover (25-39 percent canopy closure);

A road density of 0 to 0.5 miles per square mile is associated with high capability habitat for fishers (USDA 1991). A road density of 0.5 to 2.0 miles per square mile is associated with medium capability habitat (Ibid). The road density including all routes open to motor vehicles in the analysis area is 3.0 miles per square mile on NFS lands. This road density is more than six times the acceptable density found in high quality habitat and more than 1 mile per square mile above that found in moderate capability habitat.

Breeding occurs from late February through May, just a few days after parturition. Breeding is followed by embryonic diapause until late winter to early spring. Den site structural elements must exist in the proper juxtaposition within specific habitats in order to provide a secure environment for birth and rearing of fisher kits. Natal dens, where kits are born, are most commonly in tree cavities at heights of greater than 20 feet (Lewis and Stinson 1998). Maternal dens, where kits are raised, may be in cavities closer to the ground so active kits can avoid injury in the event of a fall from the den (Ibid).

Truex et al. (1998), Zielinski et al. (2004), and Purcell et al. (2009) characterize suitable habitat for denning/resting as follows:

- Canopy cover greater than 60 percent.
- Large live and dead conifers and hardwoods 21 to 51 inches dbh; showing preference for largest tree or snag in area.
- Live and snag tree basal area ranging from 100 to 500 square feet per acre.

Fishers are considered prey generalists and their diet varies widely with local prey available in the diverse habitats they occupy (Zielinski et al. 2006). Prey items include squirrels, voles, porcupine, snowshoe hares and reptiles (Zielinski and Duncan 2004a). They also readily consume hypogenous fungi, fruit and deer carrion (Ibid). While information is lacking regarding fishers' use of meadows, they are known to eat meadow voles and it is likely that they forage along meadow edges as marten do.

Freel 1991 characterized highly suitable habitat for foraging as follows:

- Canopy cover greater than 40 percent with a shrub component in the understory.
- Largest snags averaging 4 to 5 per acre and greater than 20 inches dbh.
- Downed logs averaging 4 per acre and greater than 30 inches dbh.

There is no research available regarding fisher use of high severity burn areas in the first few years after a fire. However, male fishers may venture several hundreds of yards into openings while female fishers would be much more cautious (Thompson pers. comm.). Although not similar to the existing condition in the project area (i.e., one year post-fire) Hanson and others (2013) did look at fisher use of un-salvaged burned and unburned forest 10 to 12 years post-fire. Specific vegetative conditions along sampled transects at the time of the study were not presented in their paper. Only the pre-fire CWHR vegetation type, size and density class were used. Thus it is unclear what the existing vegetative conditions were at the time of the study, such as understory vegetation composition. Hanson and others (2013) found that fisher selected mixed-conifer forest in both post-fire habitat and unburned forest 10 to 12 years post-fire. Although fisher did use pre-fire dense, mature forest more than expected, the results were not significant.

Dispersal ability is low in the western population. Arthur and others (1993) suggest that short dispersal distances (up to 6 to 12 miles from natal home range) may be problematic in the maintenance of fisher populations in areas where suitable habitat is fragmented. The current disjunct distribution pattern may also be partially attributed to movement and dispersal constraints imposed by the elongated and peninsular distribution of montane forests in the Pacific states (Wisely et al. 2004). Because of the synergistic effect of road- and rodenticide-related mortalities documented in the southern Sierra populations, the apparent reluctance of fishers to cross open areas, and the more limited mobility of this terrestrial mammal relative to birds, it is more difficult for fishers to locate and occupy distant, but suitable, habitat.

Risk Factors

- Climate Change. Climate change is a concern for fishers because of the widespread ecological effects. There is the potential that climate change could increase habitat quality for this species, but various models and studies appear to support the idea that the core habitat for fisher in the middle elevation would suffer from fires and disease.
- Uncharacteristically Severe Wildfire. High severity wildfires have been increasing in number and intensity over the past several decades and this trend is predicted to continue. For example, the Rim Fire removed 28,205 acres of moderate and high capability fisher habitat, as defined above. Many fires within the current range of the fisher have resulted in the destruction of important denning, resting, and foraging habitat. Spencer et al. (2008) found that the short-term negative localized effects to fisher from active vegetation management designed to reduce high severity wildfire in and near suitable habitat would outweigh the positive long-term effects of protecting suitable fisher habitat.
- Vegetation Manipulation to Reduce Risk of Uncharacteristically Severe Wildfire. Aggressive stand thinning for forest health and reduced fire risk may remove important cover, snags, and vegetative diversity for fisher. These treatments may prevent more adverse effects associated with drought and wildfire, but may nonetheless result in habitat with reduced value for fisher or even render it unsuitable.
- Habitat Fragmentation or Loss of Connectivity. Habitat connectivity is a key to maintaining fishers within a landscape. Activities under Forest Service control that result in habitat fragmentation or population isolation pose a risk to the persistence of fishers. Timber harvest, fuels reduction treatments, road presence and construction, and recreational activities may result in the loss of habitat connectivity resulting in a negative impact on fisher distribution and abundance.

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The fisher is a candidate for listing under the ESA, and is a Region 5 Forest Service Sensitive Species that is associated with old forest ecosystems (USDA 2004). The following land allocations pertain to fisher and old forest ecosystems: PACs, HRCAs, OFEAs, and the FCCC.

The desired condition for a PAC is to have 1) at least two tree canopy layers; 2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; 3) at least 60 to70 percent canopy cover; 4) some very large snags (greater than 45 inches dbh); and 5) snag and down woody material levels that are higher than average.

The desired condition for a Spotted Owl HRCA is to encompass the best available habitat in the closest proximity to the owl activity center (USFS 2004 ROD pp. 39 to 40). HRCAs consist of large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for an OFEA is to provide habitat conditions for mature forest associates (spotted owl, northern goshawk, Pacific marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape-scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Forest structure and function generally resemble pre-settlement conditions.

The desired future condition of the FCCC is to provide habitat connectivity for forest carnivores, linking Yosemite National Park and the North Mountain Inventoried Roadless Area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as described in USDA 2004). Habitat structures are important to retain that may constitute rest sites as described in Freel 1991 and Lofroth et al. 2010 (plate 7.7).

Fisher: Environmental Consequences

The project alternatives could result in direct and indirect effects to the fisher through the following activities:

- Salvage of fire-killed trees.
- Salvage of roadside hazard trees.
- New permanent and temporary road construction, road reconstruction and maintenance
- Fuels treatments.
- Use of material sources and water sources.

These activities may have direct and indirect effects on fisher through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance

Death or injury from project-related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a den or rest tree were felled while being used by fisher.

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of the fisher related to denning, resting, or foraging. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, along project roads, and at landings, material sources, and water sources. The location of fisher within the analysis area is uncertain following the Rim Fire, a large-scale disturbance event. Conducting surveys to identify areas being used is a way to address this uncertainty. Temporary avoidance of the project site or displacement of individuals is expected during project implementation. Any displacement or avoidance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual fisher in those areas where the LOPs were applied during parturition, kit rearing, and subsequent breeding (March-August). The potential risk to individual fisher is considered low because of the lack of documented fisher occurrence within or near the analysis area and length of exposure expected given the accelerated timeframe of project implementation.

Habitat Modification

Salvage logging and the removal of roadside hazard trees in and near suitable fisher habitat would modify suitable fisher habitat by reducing its quality in both the short-term (10 to 20 years) and in the long-term (20 to 50 years).

In the short term, retaining snags within and near suitable fisher habitat would provide denning and resting sites (Freel 1991, Thompson et al. 2011, Zielinski et al. 2004). The number of snags and downed logs available across a fisher's home range affects the quality of that habitat for foraging and breeding. Resting and denning structures are likely the most limiting habitat elements within fisher home ranges (Zielinski et al. 2004). As stated before, while there is no research available regarding fisher use of high-severity burn areas in the first few years after a fire, male fishers may venture several hundreds of yards into openings while female fishers would be much more cautious (Thompson pers. comm.). Hanson et al (2013) looked at fisher use in burned versus unburned habitat in the McNally and Manter Fire footprints 10 to 12 years post-fire in an area that was not salvage logged. They found that fishers were using habitat that burned at moderate and high severity greater than 500 meters (1,640 feet) from the edge of unburned forest habitat 10 to 12 years post-fire (ibid). The vegetative conditions at the time of this research does not mimic the existing condition within the Rim Fire area: the Rim Fire Recovery Project is looking at vegetative conditions up to one year post-fire, not 10 to 12 years post-fire. Snags retained away from forest cover are not likely to benefit fisher until vegetation becomes re-established.

Prey species that tolerate disturbance or open conditions, such as mice, rats, chipmunks, and squirrels, are known to be abundant in post-fire environments (Amacher et al. 2008 and Diffendorfer et al. 2012). Structural elements such as snags and downed logs, when combined with the flush of shrubs, forbs and grasses expected post-fire, will provide habitat suitable for prey and foraging habitat for fisher within a few years post-fire.

In the long term, large snags and large downed logs are considered biological legacies in a post fire environment and play important roles in the structure of future forest (Lindenmayer et al. 2008). Large snags and downed logs may take hundreds of years to develop, emphasizing the need to retain these elements across the landscape. Because large snags and large downed logs are regularly used by fisher, it is not only important to retain these structural elements during project implementation. It is imperative that recruitment of large snags and large downed logs occur over time to maintain habitat suitability in the long-term.

Snags remain standing for decades depending upon the species of tree and other environmental factors (Cluck and Smith 2007 and Ritchie et al. 2013). For example, Ritchie and others (2013) found that snag fall rates and decay rates vary considerably by species. When snags eventually fall, they are incorporated as large downed logs, another critical structural element important for fisher and prey species (Freel 1991, Zielinski et al. 2004a).

Roads modify fisher habitat by directly removing it or indirectly reducing its quality. The result is both short- and long-term effects. Gaines and others (2003) studied the response of several focal species, including fisher, related to roads and trails. Fishers in this study were displaced, shifting use of habitat away from human activities on or near roads or trails. Andren (1994) suggested that, as landscapes become fragmented, the combination of increasing isolation and decreasing patch size of suitable habitat is negatively synergistic. The synergy compounds the effects of simple habitat loss. Species associated with old forest habitats may be particularly impacted by such effects. Reductions in interior forest patch size results in loss of habitat and greater distances between suitable interior forest patches for sensitive species like the fisher. New construction, temporary road construction and reconstruction would result in increased habitat fragmentation as well as a reduction in potential resting and denning structures.

Additional habitat modification occurs as an indirect effect of new road construction, temporary road construction, and reconstruction. Trees posing a potential safety hazard (“hazard trees”) are removed along these new, temporary, and reconstructed roads. These trees are typically snags that are within a tree-height distance from the road. This safety policy results in a “snag free” zone of about 200 feet from each side of a road’s edge, also affecting the recruitment of large downed wood within this zone. Habitat quality is reduced within this corridor.

Reducing fuel loads across the analysis area was identified as an essential first step in longer term fire and fuels management within the Rim Fire area (Crook et al. 2013). Removal of smaller material, less than 20 inches dbh, would not directly affect habitat suitability for fisher. However, it may indirectly contribute to a more resilient landscape and less risk of further loss of remaining suitable habitat in the face of the next wildfire. Because the risk of habitat loss to wildfire is one of the greatest risks facing fishers and other old-forest-associated species today, creating a more resilient landscape in the long term by salvage logging and accepting the associated short-term impacts is an essential first step in protecting the remaining suitable habitat within the Rim Fire area.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the fisher and to determine how well project alternatives comply with Forest Plan Direction and the species' conservation strategies.

1. Amount of moderate and high capability habitat altered.
2. Habitat connectivity
3. Acres of areas managed for old forest condition with higher than average levels of large snags and higher than average levels of large down woody material.
4. Road density (miles/square mile) in moderate and high capability and dispersal habitat

These criteria were chosen based on the best available scientific literature which focuses on various aspects of fisher ecology and life history requirements. These criteria focus on those life history aspects, or habitat elements, considered most limiting to fisher persistence across their range and where project effects are expected.

Effects Common to all Action Alternatives

DIRECT AND INDIRECT EFFECTS

Indicator 1. Because there are small differences in the amount of acres proposed for treatment in moderate and high quality suitable habitat under all action alternatives, the effects are expected to be similar and are therefore analyzed together. Areas of suitable habitat being treated include those areas that burned at less than 50 percent basal area mortality, which contain fire-killed trees. These areas are subject to partial salvage and hazard tree removal and habitat quality would be impacted by proposed treatments.

Under the action alternatives, habitat quality would be reduced across a portion of the remaining moderate and high capability habitat within the analysis area as a result of removing snags and hazard trees. Between 71 percent and 72 percent of the remaining suitable habitat is not proposed for treatment. Proposed treatments would not exacerbate the lack of connectivity between large contiguous blocks of suitable habitat already created by the fire in the analysis area. Snag retention requirements vary by alternative. The requirements would serve to mitigate some of the negative effects expected to result from implementation of the action alternatives. The snag retention requirements are discussed in more detail under each alternative. Table 3.15-11 displays the proposed types of treatments and the proportion of moderate and high capability habitat affected under each action alternative for comparison.

Although a reduction in quality is expected, some treated areas would continue to offer denning, resting, and foraging habitat. Trees that are in decline and not subject for removal under this project would, over time, be incorporated as potential resting or denning structures and habitat for prey species. Effects may result in impacts to an individual's fitness, but because there are no documented occurrences within the analysis area this risk is considered low.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Habitat connectivity across the landscape is important to fisher as it provides a means for dispersal, linkages between suitable habitat patches or core habitat areas, and genetic exchange. Spencer and Rustigan-Romsos (2012) provide recommendations for the conservation of rare carnivores such as the fisher in California. They used spatially explicit, empirical landscape level models to identify large areas of existing suitable habitat and dispersal corridors connecting those areas. Suitable fisher habitat core areas greater than 2,500 acres were identified as a part of this effort and occurred in the north, east, and southeast portions of the analysis area on the Stanislaus National Forest before the Rim Fire in 2013. Finer scale data, including the Stanislaus National Forest vegetation database and CWHR, was used to identify smaller areas that provided suitable fisher habitat pre-fire than were identified in the landscape level modeling that was conducted by Spencer and Rustigan –Ramos (2012). The Rim Fire resulted in the loss of suitable fisher habitat and connectivity between occupied habitat in Yosemite National Park and suitable habitat on the Stanislaus National Forest has been further reduced.

A forest carnivore connectivity corridor (FCCC) is proposed to focus management activities associated with this project on re-establishing that connectivity so that fisher can disperse into and utilize the available suitable habitat on the Stanislaus National Forest. Under this alternative, there would not be a Forest Plan amendment establishing the corridor as a land allocation. Future management objectives of managing the corridor to benefit old forest emphasis species would not necessarily receive priority. Portions of this corridor would also overlap important critical winter deer range. This corridor, shown in Figure 3.15-4, spans from Yosemite National Park and the North Mountain Inventoried Roadless Area. It encompasses the Tuolumne River Canyon west toward the Clavey River Canyon. The proposed corridor includes the following proposed salvage units managed for old forest emphasis: L02, L05, M1 through M10, M12, M13, M15, M16, M18, M19, and N1. This corridor was identified based on the following: landscape level modeling presented in Spencer and Rustigan-Romsos (2012); potential natural vegetation (determined using pre-fire suitable fisher habitat); on-the-ground knowledge of habitat suitable for fisher; ownership; and other management priorities. The FCCC and pre-fire habitat conditions are displayed in Figure 3.15-4 to illustrate the connectivity that was present before the Rim Fire and the potential for this area to provide connectivity in the future.

Objectives for this corridor include salvaging to provide for future management opportunities. These may include re-establishing forested conditions suitable for fisher and other old forest associated species by planting. The return of forested habitat would be accelerated under active management such as planting of conifers. Management objectives in this corridor would complement OFEA and HRCA management objectives at the larger landscape scale. Desired conditions for this area include managing this corridor for a range of vegetative conditions, including a minimum of 50 percent of forested areas having at least 60 percent canopy cover. Before the Rim Fire, other areas within this corridor supported chaparral and montane hardwood communities which were interspersed with patches of higher quality habitat. While the entire corridor is not capable of supporting moderate and high quality fisher habitat, a heterogeneous corridor with chaparral, montane hardwood, and coniferous forest would allow for fisher movement through and use of this habitat in the long-term. Because a portion of this corridor is within a designated fuels SPLAT, it is necessary to manage for heterogeneity, combining some denser forested conditions with less dense vegetation to allow for effective fuels and fire management. Additional biomass removal proposed in critical winter deer range would contribute to breaking up fuel continuity across the analysis area, increasing the defensibility of forest carnivore connectivity units in the long term. This corridor would benefit fisher and other old forest associated species such as the spotted owl and northern goshawk over the long term as forested conditions return, whether by natural recovery or active management practices such as planting.

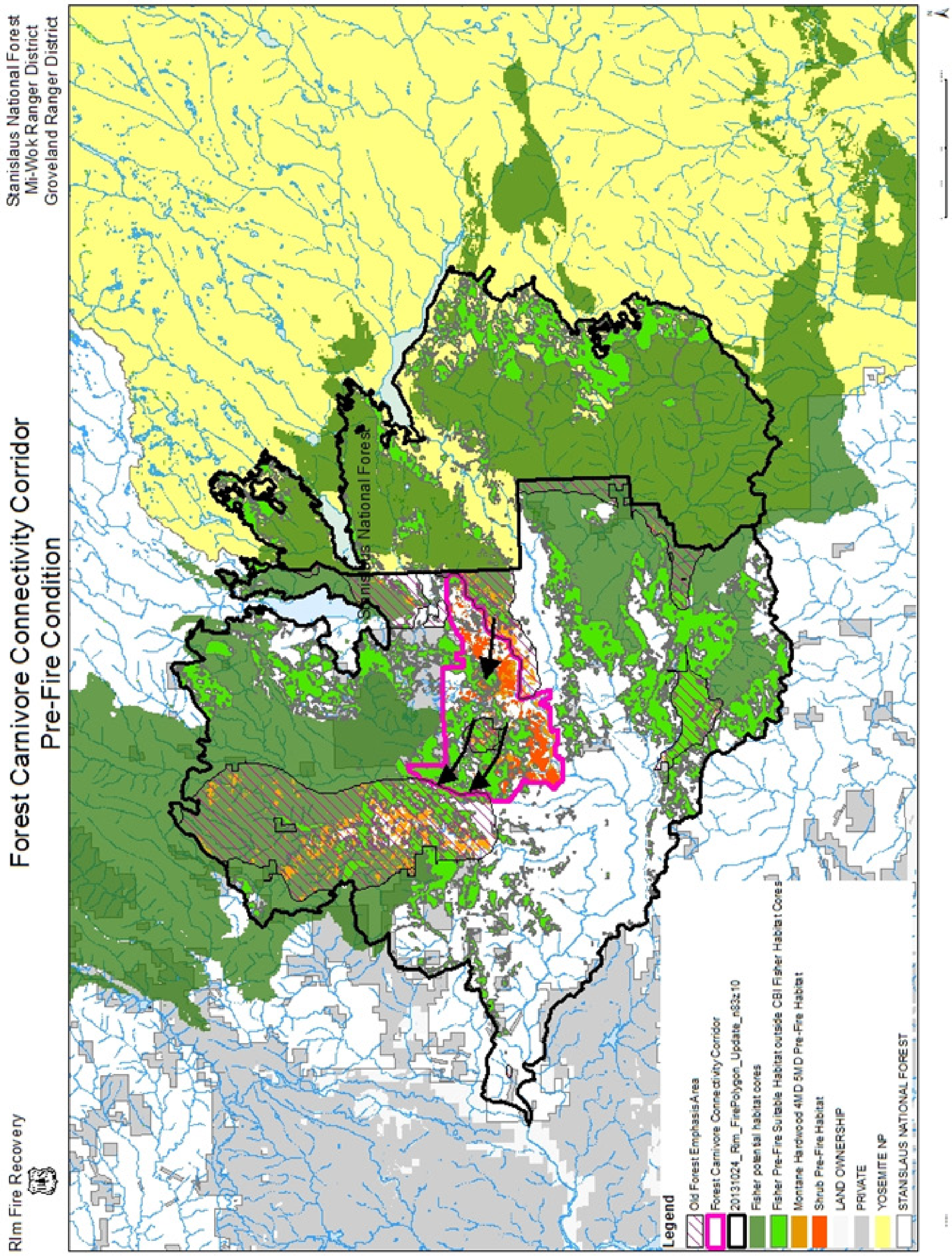

Figure 3.15-4 Proposed Forest Carnivore Connectivity Corridor

Indicator 3. Table 3.15-11 displays the acres affected by the snag retention requirements within potential fisher habitat proposed under this alternative. Potential fisher habitat is defined as land allocations that are managed for old forest associated species (OFEA, HRCA, and FCCC) and potential suitable habitat between 3,000 and 9,000 feet in elevation.

Retaining snags at a rate of 12 square feet per acre across the 28,140 acres proposed for treatment would provide less than half of that documented to occur in occupied fisher habitat. For example, occupied fisher habitat within the Kings River Fisher Project area contains an average of 24 square feet per acre basal area of snags in a variety of size classes (Thompson pers.comm.). Zielinski et al. (2004) reports an average of 44 square feet per acre basal area of snags present in the immediate vicinity of fisher resting sites. Although retaining snags at this level is not optimal for fisher, those retained would provide some potential resting and denning sites as well as habitat for prey sought by fishers.

Retaining snags at 12 square feet per acre would result in low retention of snags to contribute to the structural complexity and diversity within recovering forested stands. As vegetative cover returns, only minor beneficial effects on habitat quality for fisher are expected.

Hardwoods occur irregularly across the analysis area and their locations have not been mapped. Hardwoods are critically important structures and are selected by fisher for resting and denning sites (R. Sweitzer unpublished data; Thompson et al. 2011; Truex et al. 1998). Because all hardwood snags would be retained under Alternative 1, no change in the number of hardwood snags available is expected as a result of implementation.

Over time, retained snags would decay, fall and become incorporated as large downed logs. Large downed woody debris provides important habitat elements utilized by fisher and their prey. Considering fisher utilize habitat that contains higher rates of large snags and large downed woody debris, the rate of snag retention proposed under Alternative 1 is not adequate to maintain the highest habitat capability within the treated areas. However, snags retained are expected to contribute and provide suitable habitat, although the habitat would be of lower quality in the short-term. In the long-term these snags would be incorporated as large downed woody material, critical structural elements needed within a recovering forest.

Downed woody debris retention at 10 to 20 tons per acre, if available in larger size classes, would provide habitat structure important for fisher and their prey. In most areas, there is a lack of sufficient large downed woody material, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material may result in a more diverse understory, including more herbaceous and shrub vegetation that would benefit fisher and their prey.

Indicator 4. To analyze effects of road density, it is necessary to include more than the current suitable fisher habitat because roads can be somewhat permanent features on the landscape. They will affect the habitat suitability for fisher not only in the short term, but in the long term as well. Roads crossing habitat that may become suitable in the future must be included in the analysis. Thus, land allocations that are managed for old forest associated species (OFEA and HRCA), the proposed forest carnivore connectivity corridor, and pre-fire moderate and high capability habitat were used to calculate road density for fisher within the analysis area. Small disjunct patches of habitat not contributing to the core area as defined here were omitted. This potential fisher habitat area is about 88,000 acres and can support fisher, in part today and into the future, based on the desired conditions outlined in the Forest Plan (USDA 2010a). Therefore, this is considered a logical approach to analyze project-related road density and effects to fisher. Under Alternative 1, new permanent road construction, temporary road construction, and road reconstruction are proposed as described in Chapter 2. Table 3.15-11 displays the miles of each type of road-related treatment and the resulting miles per square mile under this alternative.

The new road construction and temporary road construction proposed under this alternative would result in an increase of 0.3 miles per square mile of road, increasing the road density from 1.6 miles per square mile to 1.9 miles per square mile during project implementation. Minor negative effects to habitat quality are expected under Alternative 1. The new and temporary road construction may slightly increase the potential for road-related mortality during project implementation while the roads are open and being used regularly. Because there are no documented occurrences within the analysis area this risk is considered low. The new permanent road designation as blocked Maintenance Level 1 or Level 2 gated year round would alleviate the risk of road-related mortality after project implementation because the roads would only be used intermittently for management purposes. The new permanent road construction would result in habitat fragmentation in the long term due to habitat removal as a result of the road construction and future hazard tree removal within 200 feet of the road's edge. The hazard tree removal would reduce the quality of habitat adjacent to those new roads. All temporary roads would be obliterated and blocked; over time vegetation would become reestablished. All roads that were non-motorized before project implementation would be returned to the pre-project specifications.

CUMULATIVE EFFECTS

In making the determination for Alternative 1, the cumulative impact on the environment resulting from the incremental impact of the action, when added to other past, present and reasonably foreseeable future actions, was considered. A list of the actions considered can be found in Appendix B. Some, but not all, of these foreseeable future actions have or may contribute cumulatively to effects on fishers.

Risk factors potentially affecting fisher abundance and distribution have been identified and include habitat fragmentation and lack of or removal of coarse woody debris. The following evaluation criterion was used as a relative measure of cumulative effects from this alternative to fisher: habitat modification.

Habitat Modification

Federal Land

Past, present, and reasonably foreseeable future timber harvests and hazard tree removal sales on public lands have affected and will likely affect habitat suitability for fisher through the removal of large trees, reduction in canopy cover, and potential loss of snags and downed woody debris from prescribed fire operations. Truex and Zielinski (2005) suggest that a reduction in habitat suitability does not necessarily equate to loss of suitability. Present actions within the analysis area include: Groovy and Funky Timber Sales (part of the Twomile Ecological Restoration Vegetation Management Project), and the Soldier Creek Timber Sale. These sales are scheduled to treat about 2,045 acres through commercial thinning, biomass removal, mastication, and prescribed fire treatments. GTR 220 (North et al. 2009) was used as a guide when designing these projects, including maintaining elements important to fisher (large trees, snags, downed wood, areas of dense canopy cover). Yosemite National Park is currently removing hazard trees on about 816 acres, which would have negligible effects on fisher and their habitat.

Foreseeable future actions on federal lands include: Reynolds Creek Ecological Restoration involving meadow and aspen restoration. This project will improve habitat quality for fisher by expanding the size of the treated meadows by removing encroaching trees. Two mile-Campy, Looney, and Thommy Timber Sales (part of the Twomile Ecological Restoration Project) and Reynolds Creek Timber Sale are scheduled to be implemented over the next few years, resulting in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. As a result of the Rim Fire, the Rim Hazard Tree Removal Project proposed to remove hazard trees along 10,262 acres of Maintenance Level 3, 4, and 5 roads. It is being implemented as of this writing. The ecological restoration projects will reduce habitat quality in the short-term for fisher, but are designed to have long-term benefits. Hazard tree removal will reduce habitat quality in the short and long term. However, the objective and priority on Maintenance Level 3, 4, and 5 roads is public safety.

Roads and trails modify habitat suitability for fishers by reducing habitat or degrading quality through fragmentation. Roads and trails also improve human access, and potentially result in the displacement of individuals. Twomile Transportation, a reasonably foreseeable future action, will result in a slight reduction in motorized routes. The proposal would essentially remove 11.4 miles by gating, decommissioning, or closing of Maintenance Level 1 roads used only for administrative purposes. Reynolds Creek Motorized Routes Project would decommission 3.5 miles of unauthorized routes in the near future as well. The Mi-Wok OHV Restoration Project proposes to block and restore 11.6 miles of unauthorized OHV routes. This reduction of about 26.5 miles of motorized roads and trails across the analysis area would improve habitat quality by reducing fragmentation and human access while increasing the amount of interior habitat available.

Private Lands

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acres on private land are presently being salvage logged. Post salvage, the areas may provide short-term foraging habitat for fisher as understory vegetation becomes established. However, these benefits are expected to be limited in space and time as observed on past private-land reforestation efforts.

Wildfire

Wildfires can affect habitat to varying degrees, depending on the intensity of the fire. Wildfires can create snags, which may be used as den or rest sites by fisher. Wildfires that burn at high severity, such as the Rim Fire, result in eliminating habitat. Treatments in green forest (past, present, future) are designed to reduce fire intensity and spread, thus reducing the risk of habitat loss. It is expected that wildfire will continue to occur on the landscape.

Alternative 1 Contribution/Summary

The proposed action is expected to contribute cumulatively to short- and long-term effects on fisher. Disturbance and potential displacement of individuals may occur during project implementation and would likely be temporary. No recent occurrences of fishers within the analysis area are documented. However, the analysis area is in close proximity to the nearest known populations occurring on the Sierra National Forest and Yosemite National Park. Reduction in the quality of moderate and high capability habitat on about 12,898 acres (15 percent of the remaining suitable habitat within the analysis area) is expected from implementation of Alternative 1. Snag retention requirements under Alternative 1 are less than under the other action alternatives. Habitat quality would be reduced based on the reduction of denning and resting sites. There are also 5.4 miles of new permanent road construction proposed within potential fisher habitat under Alternative 1, which would have negative effects on fisher and their habitat. Treatments would likely occur over the next two to three years and may coincide with other projects, particularly Groovy, Funky, and Soldier Creek Timber Sales. The combination of past Forest Service, private land timber harvests, and wildfire has cumulatively reduced the amount of late-succession habitat available across the analysis area. Forest Service projects were and continue to be designed to prevent additional, large scale loss of mature forest from wildfires such as the Rim Fire. The Forest Service projects are designed to retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, while focusing on releasing black oaks and pines. Habitat suitability within the analysis area is predicted to improve in the long-term for fisher. The cumulative contribution under Alternative 1 is not expected to affect the viability of this species.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur.

Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact fisher habitat. Wildfire has been documented as one of the biggest risks to fisher persistence across their range (USDA 2001). At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and fisher habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuels, potential fire behavior may be expected to increase (Rim EIS Fire and Fuels Report) and ultimately affect the amount of mature forest habitat available for fisher denning and resting. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines). The alternative could also result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre. Within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Rim EIS Fuels Chapter).

Thus, not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of mature forest conditions. Suitable denning and resting habitat for fisher would be delayed under this alternative resulting in long-term negative effects.

Indicator 1. Under Alternative 2, habitat quality within currently suitable moderate and high capability habitat would not be altered.

Within the areas that burned at high severity, herbaceous and shrub vegetation is expected to be established within 3 to 5 years (Gray et al. 2005 and Moghaddas et al. 2008) and would be suitable for fisher movement and potentially as foraging habitat. These beneficial effects would be expected in the short term. Because the ability of forests to regenerate after stand-replacing fire is highly dependent on seed sources, forested conditions are likely to re-establish only within mixed severity burn patches and the edges of high severity patches (Crotteau et al. 2013). It is likely that areas that burned at high severity would be dominated by herbaceous and shrub vegetation and shade tolerant conifer species such as white fir and incense cedar in the future. A consequence of shrub dominance is the reduced likelihood that forested conditions would return naturally for many decades. Not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of forest conditions. Thus, suitable denning and resting habitat would be delayed under this alternative resulting in long-term negative effects to fishers.

When wildfire returns to this landscape, the remaining mature forest adjacent to or near areas that burned at high severity may be at increased risk of loss. As noted above, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons per acre on average) than the desired condition (Rim EIS Fire and Fuels Report). This would significantly increase the risk of fire suppression activities when wildfire occurs in the future. In conclusion, although uncertainty exists, this alternative may result in negative long-term effects on habitat for fisher. The negative long-term effects on habitat for fisher from this alternative outweigh the short-term beneficial effects.

Indicator 2. Under Alternative 2, no forest carnivore connectivity corridor would be proposed. The connectivity would not be re-established between large areas of suitable habitat lacking connectivity after the Rim Fire. Benefits described under the action alternatives would not be realized under this alternative.

Indicator 3. Under Alternative 2, all snags and downed logs would be retained. In the short term fisher and their prey would benefit from the availability of more snags and downed logs within or adjacent to remaining suitable habitat. Long-term effects are described under Indicator 1: remaining suitable habitat would be at higher risk of loss when wildfire returns to this landscape, and the potential for recovery of forested conditions across areas that burned at high severity would be delayed.

Indicator 4. Under Alternative 2, no new permanent road construction, temporary road construction, reconstruction, or maintenance would occur. This alternative would provide the greatest benefit to fisher in terms of road effects because there would be no increase in road density across the analysis area and no potential increase of road-related mortality in the short or long term.

CUMULATIVE EFFECTS

Habitat modification

The Cumulative effects discussion under the Alternative 1 outlines those present and reasonably foreseeable future activities scheduled on public and private lands. Under Alternative 2, there would be no direct cumulative effect expected because no active management would occur. At the landscape scale, the cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past, thus increasing the risk of loss of suitable habitat to wildfire in the long term.

Alternative 2 Contribution/Summary

The cumulative contribution under this alternative would not complement the treatments that have occurred in the past, thus increasing the risk of loss of remaining suitable habitat to wildfire in the long term. The short-term beneficial impacts to fisher such as retention of snags for denning and resting sites would be outweighed by the increased risk of additional habitat loss in the next wildfire.

Alternative 3

DIRECT AND INDIRECT EFFECTS

Under Alternative 3, no cumulative effects are expected.

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Under Alternative 3, the Stanislaus National Forest Land and Resource Management Plan would be amended to establish the connectivity corridor as a land allocation (old forest emphasis area). Priority would be given to future management objectives, not just those objectives associated with this project, that would benefit old forest associated species, particularly forest carnivores. The effects to fishers under Alternative 3 are the same as discussed under Alternative 1, but would continue into the future because the proposed corridor, approximately 9,900 acres, would be changed from General Forest to Old Forest Emphasis Area.

Indicator 3. Under Alternative 3, the snag retention rate in OFEA, HRCA, and FCCC is considered greater than the management standard and above average snag retention, while the snag retention rate in general forest is considered the management standard or average snag retention.

In addition, under this alternative in OFEA, HRCA, FCCC, and in roadside hazard units within Protected Activity Centers (PACs), the largest size classes of down woody material would be retained. Table 3.15-11 displays the acres affected by the snag retention requirements within potential fisher habitat proposed under this alternative. Potential fisher habitat is defined as land allocations that are managed for old forest associated species (OFEA, HRCA, and FCCC) and potential suitable habitat between 3,000 and 9,000 feet in elevation.

Snags retained at a rate of 12 square feet basal area per acre would provide less than half of the snags documented to occur in occupied fisher habitat. Snags retained at the rate of 100 to 120 square feet basal area per acre would provide almost three times the snags documented to occur in occupied fisher habitat. Snag retention at the rate of 30 square feet basal area per acre would provide a supply of snags within the range found in occupied fisher habitat. Occupied fisher habitats within the Kings River Fisher Project area contain an average of 24square feet per acre basal area of snags in a variety of size classes (Thompson pers. comm.). Zielinski et al (2004) reports an average of 44 square feet per acre basal area of snags present in the immediate vicinity of fisher rest sites. Units with snag retention at the rate of 30 square feet basal area per acre or 100 to 120 square feet basal area per acre would provide higher quality habitat for fisher post treatment than those with only 12 square feet per acre.

Areas with above-average snag retention would provide the most snags to contribute to structural complexity and diversity within recovering forested stands. Areas that occur within a few hundred yards from suitable fisher habitat not proposed for treatment are expected to be used by fisher in the near future as vegetative cover returns, providing fisher protection from predators. Areas with average snag retention would provide some elements to contribute to the structural complexity and diversity within recovering forested stands.

As in Alternative 1, all hardwood snags would be retained under Alternative 3 and no change in habitat quality is expected as a result of implementation.

The rate of snag retention proposed under this alternative is adequate to maintain the moderate and high capability habitat or fisher on about 50 percent of the area proposed for treatment under this alternative. The remaining 50 percent would have fewer snags than is documented in occupied fisher habitat. However, the snags retained are expected to provide some habitat elements for resting, denning and prey in the short term, and in the long term as large downed woody debris.

Downed woody debris retention at 15-20 tons per acre, if available in larger size classes, would provide habitat important for fisher and their prey. In most areas, there is a lack of sufficient large downed woody material, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material may result in a more diverse understory, including more herbaceous and shrub vegetation that would benefit fisher and their prey.

Indicator 4. Under Alternative 3, new permanent road construction, temporary road construction, and road reconstruction are described in Chapter 2. Table 3.15-11 displays the miles of each type of road-related treatment and the resulting miles per square mile under this alternative.

The new road construction and temporary road construction proposed under this alternative would result in an increase of 0.4 miles per square mile of road, increasing the road density from 1.6 miles per square mile to 2.0 miles per square mile during project implementation. This would have a slightly greater negative effect on habitat quality in the short term than under Alternative 1, but effects are still expected to be minor. The new and temporary roads may slightly increase the potential for road-related mortality during project implementation while the roads are open and being used regularly. Because there are no documented occurrences within the analysis area this risk is considered low. The new permanent road designation as blocked Maintenance Level 1 or Level 2 gated year round, would alleviate the risk of road-related mortality because the roads would only be used intermittently for management purposes. They would however result in habitat fragmentation in the long term due to habitat removal as a result of the road construction, and future hazard tree removal within 200 feet of the road’s edge. The hazard tree removal would reduce the quality of habitat adjacent to those new roads. All temporary roads would be obliterated and blocked. Over time vegetation would become reestablished. All roads that were non-motorized before project implementation would be returned to the pre-project specifications. These effects would be less than under the proposed action because there are 4.4 fewer miles of new permanent road proposed under this alternative.

CUMULATIVE EFFECTS

The cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities scheduled on public and private lands. The cumulative contribution of Alternative 3 would be less than those described under Alternative 1, due to slightly fewer acres proposed for treatment within moderate and high capability habitat, higher snag retention within OFEA, HRCA, and FCCC units, and 4.4 miles less new permanent road construction. The cumulative contribution under Alternative 3 would affect fishers and their habitat in the short and long term, but is not expected to affect the viability of this species.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Same as Alternative 3.

Indicator 3. Under Alternative 4, the snag retention guidelines are the same as outlined under Alternative 3. However, the amount of area proposed for treatment has changed. Table 3.15-11 displays the acres affected by the snag retention requirements proposed under this alternative. While percentages vary slightly between Alternatives 3 and 4, effects from Alternative 4 are expected to be the same as discussed under Alternative 3.

Indicator 4. Under Alternative 4, temporary road construction, and road reconstruction are described in Chapter 2. Table 3.15-11 displays the miles of each type of road-related treatment and the resulting miles per square mile under this alternative.

The new road construction and temporary road construction proposed under Alternative 4 would result in an increase of 0.4 miles per square mile of road, increasing the road density from 1.6 miles per square mile to 2.0 miles per square mile during project implementation. Although the road density is slightly above Alternative 1, no new permanent road construction is proposed. Thus, no long-term habitat fragmentation is expected under Alternative 4. The new and temporary roads may slightly increase the potential for road-related mortality during project implementation while the roads are open and being used regularly. Because there are no documented occurrences within the analysis area this risk is considered low. All temporary roads would be obliterated and blocked. Over time vegetation would become reestablished. All roads that were non-motorized before project implementation would be returned to the pre-project specifications.

CUMULATIVE EFFECTS

The cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. The cumulative contribution of Alternative 4, while similar to that of Alternatives 1 and 3, would be the least of all the action alternatives. The least amount of acres are proposed for treatment within moderate and high capability habitat,the alternative has the highest snag retention within OFEA, HRCA, and FCCC units, and no new permanent roads would be constructed. The cumulative contribution under Alternative 4 would affect fishers and their habitat in the short and long term but is not expected to affect the viability of this species.

Fisher: Summary of Effects

Indicator 1. Table 3.15-11 shows that the amount of moderate and high capability fisher habitat proposed for treatment is very similar for all alternatives. Alternative 1 would affect the most habitat and Alternative 4 would affect the least amount of habitat. Alternative 2 would not affect suitable habitat.

Indicator 2. All action alternatives incorporate the forest carnivore connectivity corridor. However, a Forest Plan Amendment is proposed only under Alternatives 3 and 4. Under Alternative 2, no connectivity corridor or Forest Plan Amendment is proposed.

Indicator 3. Table 3.15-11 shows that the acres of areas managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material are highest in Alternatives 3 and 4. In contrast, Alternative 1 manages no acres for higher than average levels of large snags. For retention of large down woody material, all action alternatives manage to a standard of 10 to 20 tons per acre. Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons per acre) and Alternative 1 does not. Alternative 4 treats 2,571 acres less than Alternative 3, so fewer acres would have the number of snags and quantity of downed woody material reduced.

Table 3.15-11 Fisher Summary of Effects

Indicator	Metric	Alternative			
		1	2	3	4
1. Moderate and high capability habitat treated	Salvage acres	6,221	0	6,266	5,724
	Hazard tree removal acres	6,677	0	6,562	6,632
	Total acres	12,898	0	12,828	12,356
	Percent of suitable habitat treated	29	0	29	28
2. Habitat Connectivity	Land allocation acres changed from General Forest to Old Forest Emphasis	0	0	9,900	9,900
3. Snag Retention	Acres of snag retention: 12 square feet basal area per acre[1]	28,140	0	14,691	13,278
	Acres of snag retention: 30 square feet of basal area per acre[2]	0	0	13,436	12,279
	Acres of snag retention: 100-120 square feet of basal area per acre[3]	0	0	2,089	2,089
	Full snag retention[4]	0	30,216	0	2,571
4. Road treatments	New permanent road construction (miles)	5.4	0	1.0	0
	Road reconstruction: designated for motor vehicle travel (miles)	215.8	0	216.6	211.2
	Road reconstruction: not designated for motor vehicle travel (miles)	30.9	0	31.0	30.9
	Temporary road (miles)	18.2	0	28.9	27.3
	Roads added for project use during implementation (miles per square mile)	0.3	0	0.4	0.4
	Total road density existing plus additional for project (miles per square mile)	1.9	1.6	2.0	2.0

[1] Converted from 4 snags per acre for comparison purposes and assuming retention of 24-inch dbh snags; snag retention considered management average.
[2] Old Forest Emphasis Area, Home Range Core Area, Forest Carnivore Connectivity Corridor; snag retention considered above management average.
[3] Treatment type may change in specific plots based on experimental design needs during implementation; we report total treatment unit acres as a best net estimate across plots based on the overall study design (refer to PSW Research appendix).
[4] Represents the maximum number of proposed treatment acres within potential habitat. Used as a relative measure to compare alternatives.

Indicator 4. Of the action alternatives, proposed miles of new permanent road construction is highest under Alternative 1 and lowest under Alternative 4. Increases to road density are similar among all action alternatives, but long-term effects related to road density are greatest under Alternative 1 because of the amount of new permanent road construction.

DETERMINATIONS

Alternative 1

Alternative 1 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area. This determination for Alternative 1 is based on the following rationale:

- Habitat quality would be reduced across 29 percent of currently moderate and high capability habitat on NFS lands and across 15 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain low to moderate habitat suitability for foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long-term risk of further habitat modification or loss from future wildfires.
- 5.4 miles of new road construction would reduce habitat quality and increase fragmentation in localized areas.

Alternative 2

Alternative 2 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area. This determination for Alternative 2 is based on the following rationale:

- With no removal of dead trees, remaining suitable habitat would be at greater risk of modification or loss from future wildfires.
- Quality of currently moderate and high capability habitat would not be affected in the short term.
- No new permanent road construction would occur.

Alternative 3

Alternative 3 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area. This determination for Alternative 3 is based on the following rationale:

- Habitat quality would be reduced across 29 percent of currently moderate and high capability habitat on NFS lands and across 15 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain low to moderate habitat suitability for foraging.
- Snag retention in suitable habitat at 30 square feet per acre would fall within the range in occupied fisher habitat.
- Snag retention in suitable habitat at 100 to 120 square feet per acre would provide almost three times the snag level documented in occupied fisher habitat.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long-term risk of further habitat modification or loss from future wildfires.
- 1.0 miles of new road construction would reduce habitat quality and increase fragmentation in localized areas.

Alternative 4

Alternative 4 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area. This determination for Alternative 4 is based on the following rationale:

- Habitat quality would be reduced across 29 percent of currently moderate and high capability habitat on NFS lands and across 15 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain low to moderate habitat suitability for foraging.
- Snag retention in suitable habitat at 30 square feet per acre would fall within the range in occupied fisher habitat.
- Snag retention in suitable habitat at 100 to 120 square feet per acre would provide almost three times the snag level documented in occupied fisher habitat.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long-term risk of further habitat modification or loss from future wildfires.
- 0 miles of new road construction are proposed, thus no localized fragmentation would occur.

Pallid Bat and Fringed Myotis: Affected Environment

Species and Habitat Accounts

The pallid bat (*Antrozous pallidus*) is a Region 5 Forest Service Sensitive species and is designated as a Species of Special Concern by CDFW. They occur in arid regions of western North America from British Columbia to Mexico and east to Wyoming (Hermanson and O'Shea 1983). They are usually found in low to mid elevation habitats below 6,000 feet; however, they have been documented up to 10,000 feet in the Sierra Nevada (USDA 2001). Considered yearlong residents, they inhabit vegetation types such as Blue Oak Woodland, Mixed Chaparral, and coniferous forests (CDFW 2014c).

The fringed myotis bat (*Myotis thysanodes*) is a Region 5 Forest Service Sensitive species and is designated as a Species of Special Concern by CDFW. The fringed myotis bat occurs from southern British Columbia south through the western United States and most of Mexico (O'Shea and Bogan 2003). In California, it occurs from near sea level at the coast to elevations of at least 6,400 feet in the Sierra Nevada and in a variety of habitats from low desert scrub to high-elevation conifer forest (Philpott 1997). The fringed myotis is a widely distributed species, but it is considered rare (Ibid). Although this species occurs in netting and night roost surveys in a number of localities, it is always one of the rarest taxa (Pierson et al. 1996).

North American pallid bat populations have declined over the past 50 years (O'Shea and Bogan 2003), and limited data from California suggest population declines associated with desert and oak woodland habitat loss due to urban expansion (USDA 2001).

Population estimates and trends for fringed myotis are unavailable, but the limited available data suggests the population is declining (Macfarlane and Angerer *draft*). Not only have historic maternity colonies disappeared, but those remaining appear to contain fewer individuals.

Bat surveys have been conducted in and near the analysis area. Pallid bats have been documented on the North Fork Merced River and along Cottonwood Creek (Gellman 1994, Stanislaus National Forest survey records). Fringed myotis have been documented at Fahey Pond and the Hetch Hetchy adit at the end of road 1N45 (Stanislaus National Forest survey records, CNDDB). They have also been documented just outside the analysis area in the lower Tuolumne River and a bridge over the South Fork Tuolumne River. Suitable roosting and foraging habitat is present for both species throughout the project area and their presence is assumed.

Pallid bats are common in open, dry habitats including grasslands, shrublands, woodlands, and coniferous forests. They roost in a variety of locations such as bridges, buildings, caves, rock crevices, mines, and trees (Hermanson and O'Shea 1983). This species can be found singly, but it is gregarious and can often be found roosting in groups. They are sensitive to roost site disturbance which may lead to roost abandonment. Suitable habitat is present throughout the project area. There are no barriers precluding movement (dispersal, seasonal, etc.) of this species both within and in close proximity to the project area.

In California, the fringed myotis occurs in valley foothill hardwood, hardwood conifer, and coniferous forested habitats. In mist netting surveys, they are found on secondary streams and ponds (Stanislaus National Forest survey records). They roost in caves, buildings, mineshafts, rock crevices and bridges (O'Farrell and Studier 1980). Studies conducted in California, Oregon, and Arizona, have documented that fringed myotis roosts in tree hollows, particularly in large conifer snags (Chung-MacCoubrey 1996, Rabe et al. 1998, Weller and Zabel 2001, Pierson et al. 2006). Most of the tree roosts were located within the tallest or second tallest snags in the stand and were surrounded by reduced canopy closure (Ibid). They are gregarious and can be found roosting with other bat species, such as the long eared myotis (M. Baumbach pers. obs.). They exhibit high roost site fidelity, sometimes in different trees but within a small area (O'Farrell and Studier 1980, Weller and Zabel 2001). Fringed myotis are highly sensitive to roost site disturbance (Ibid).

Pallid bats breed in the fall with delayed implantation occurring in the spring. Females form maternity colonies in April that may contain up to 100 individuals (Zeiner et al. 1990b). Males sometimes roost in or near to maternity colonies. Horizontally-oriented rock crevices are preferred diurnal roost sites in the summer, which coincides with maternity colony selection and use (Hermanson and O'Shea 1983).

Fringed myotis also breed in the fall, with delayed implantation occurring in the spring. Females give birth to one young per year typically from May to July (Philpott 1997). Maternity colonies may contain up to several hundred individuals. In California in recent years smaller colonies of 25 to 50 are more typical.

Pallid bats forage in open canopied woodlands, riparian areas, and grassland or meadow habitat. They are maneuverable on the ground and commonly forage between one and five feet above the ground for prey such as Jerusalem crickets, longhorn beetles, scorpions, and occasionally large moths and grasshoppers (USDA 2001, Zeiner et al. 1990). They readily use roads, meadows, oak woodlands and other open areas to hunt.

Individual fringed myotis emerge from roost sites to forage approximately 1 to 2 hours after sunset. They forage in and among vegetation along forest edges and in the overstory canopy. They feed on a variety of insect prey, including small beetles, moths, and fly larvae caught in flight or gleened from vegetation (Ibid). Fringed myotis often forage in meadows and along secondary streams, in fairly cluttered habitat. (Pierson et al. 2001). They are known to fly during colder temperatures and precipitation (Hirshfeld and O'Farrell 1976). Even snow does not appear to affect emergence (O'Farrell and Studier 1975, M. Baumbach pers. obs.). Keinath (2004) found that travel distances from roosting to foraging areas may be up to five miles.

Dispersal patterns in pallid bats aren't known. Pallid bats are not known to migrate long distances. They are relatively inactive and either hibernate or enter extended periods of torpor during the winter (Hermanson and O'Shea 1983).

Dispersal patterns are also unknown for fringed myotis. Although known to migrate, little is known regarding the species movement (O'Farrell and Studier 1980). Fringed myotis are year-round residents in California and are known to hibernate but are also capable of periodic winter activity (Philpott 1997).

Risk Factors

- White Nose Syndrome. The largest emerging threat to all cave-roosting species is the fungal disease white-nose syndrome (WNS). Massive die-offs result once a colony is infected. Because pallid bats and fringed myotis readily uses caves for roosting, they are considered highly susceptible to contracting WNS. Although not yet documented in California, the disease is moving to the west.
- Timber Harvest and loss of snags as roosting sites. The loss of large diameter snags and live trees for roosts due to fire or harvest activities can affect roost availability. In some forested settings, the fringed myotis appears to rely heavily on tree cavities and crevices as roost sites (Weller and Zable 2001), and may be threatened by certain timber harvest practices that result in the removal of snags. Retention of existing large trees and management of forested habitat will provide short and long-term habitat.
- Fire Suppression. Pallid bats are at risk from loss of open foraging habitat from fire suppression and may reduce foraging habitat in the long-term.
- Mining. The resurgence of gold mining in the West potentially threatens mine dwelling bat species such as pallid bats and fringed myotis (Macfarlane and Angerer draft). Mining exploration has resulted in an increase in roost disturbance and abandonment. Closure of old mines for hazard abatement or safety can reduce habitat availability if mines aren’t closed using bat friendly gates.
- Rangeland management. Pallid bats frequently forage in open areas such as oak woodlands. Fringed myotis frequently forage along riparian corridors or over meadows. Overgrazing and trampling may alter meadow hydrology or riparian ecosystems, resulting in reduced insect diversity, productivity, and reducing foraging success (Macfarlane and Angerer draft, Ferguson and Azerrad 2004).

Management Direction

The pallid bat and fringed myotis are both Region 5 Forest Service Sensitive species. The Forest Plan does not contain specific direction for the management of these species; however, it provides general guidance for management of Forest Service Sensitive species. This includes managing to ensure conservation or enhancement of these species’ populations and habitats to prevent a trend towards Federal listing or a loss of viability. In addition, general direction in the Forest Plan to retain dead trees (snags) protects potential roosting and breeding habitat components, particularly for bats.

Pallid Bat and Fringed Myotis: Environmental Consequences

The project action alternatives could result in direct and indirect effects to the pallid bats or fringed myotis through the following activities:

- Salvage of fire-killed trees.
- Salvage of roadside hazard trees.
- Fuels treatments.
- Use of water sources.

These activities may have direct and indirect effects on pallid bats or fringed myotis through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance

Death or injury from project related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a day roost tree were felled while being used by pallid bats or fringed myotis .

Project activities, especially loud noise, could result in disturbance to day roosting pallid bats and fringed myotis. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. Smoke from pile burning may also impact bats that are roosting in close proximity to burning activities. The location of pallid bats and fringed myotis within the analysis area is uncertain. While both species are susceptible to disturbance at roost sites that may lead to roost abandonment, it is unlikely that females would abandon their young due to their ability to carry pups from roost to roost during normal roost-switching behavior. The tendency for bats to switch roosts under normal circumstances would preclude this from causing negative effects to reproduction. If a maternity roost is discovered, an LOP from April 1 through August 1 would be applied within 300 feet surrounding the site. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to bats roosting in these areas during pup rearing in the spring and summer months. Foraging behavior would not be affected due to their nocturnal foraging behavior.

Habitat Modification

Salvage logging and the removal of roadside hazard trees would result in reduced habitat quality for both pallid bats and fringed myotis. There would be a reduction in the number of potential roosting sites for pallid bats and fringed myotis in both the short-term (10 to 20 years) and in the long-term (20 to 50 years). However, many snags including all hardwood snags would be retained across the treatment units and would continue to provide roosting sites.

Indicators

The following indicator was chosen to provide a relative measure of the direct and indirect effects to the pallid bats and fringed myotis and to determine how well project alternatives comply with Forest Plan Direction.

1. Amount of habitat altered.

This criterion was chosen based on the best available scientific literature focusing on various aspects of pallid and fringed myotis ecology and life history requirements. This criterion focuses on those life history aspects, or habitat elements, considered most limiting to pallid bats and fringed myotis persistence across their range and where project effects are expected.

Effects Common to all Action Alternatives

DIRECT AND INDIRECT EFFECTS

Indicator 1. Because there is a small difference in the amount of acres proposed for treatment within suitable habitat for pallid bats and fringed myotis under all action alternatives, the effects are expected to be similar and are therefore analyzed together.

Trees or snags with existing cavities or furrowed bark provide roosting habitat for pallid bats and fringed myotis (Pierson 1996 and Pierson et al. 2006). Trees with existing cavities, that are not deemed hazardous, are less likely to be removed because there is little to no economic value associated with them. The large coniferous snags with deep furrowed bark preferred by fringed myotis may have economic value associated with them. The removal of snag and hazard trees within treatment units and along roads would result in a reduction in roost site availability. An estimated 8 snags per acre greater than or equal to 24 inches dbh are within coniferous habitat that burned at low to moderate severity (less than 50 percent basal area mortality). An estimated 21 snags per acre greater than or equal to 24 inches dbh are within coniferous habitat that burned at moderate to high severity (greater than 50 percent basal area mortality). Most treatment units are within the higher-severity burned areas and these snags would have less value as roosting sites. Hazard tree removal would occur across all burn severities and would have a greater effect on suitable coniferous habitats that burned at lower severities.

Table 3.15-12 displays the estimated number of snags per acre greater than or equal to 24 inches dbh and the minimum number of snags that would be retained within suitable forested conifer habitat under the action alternatives.

Snag densities were estimated using common stand exam data downloaded from the Natural Resources Management Natural Resource Information System (NRM NRIS) Field Sampled Vegetation Database (FSVeg). All data were collected between 2005 and 2013 (prior to the 2013 Rim Fire). A total of 1,183 plots were processed using the Western Sierras variant of the Forest Vegetation Simulator (FVS) (Dixon 2002). Plots are assumed to be representative of the CWHR classes within the Rim Fire perimeter. Post-fire information was achieved by simulating fire with the following basal area mortalities: 0 percent (representing pre-fire conditions and/or post-fire conditions with no mortality), 10 percent, 25 percent, 50 percent, 75 percent, 90 percent, and 100 percent. Though models are never 100 percent accurate, the simulation results are the best available information for this project. Snag densities were averaged for each basal area loss category less than or equal to 50 percent basal area mortality.

Table 3.15-12 Pallid Bat and Fringed Myotis Summary of Effects

Indicator	Metric	Alternative			
		1	2	3[4]	4[4]
1. Amount of habitat altered	Total treatment acres in suitable habitat[1]	10,732	0	10,690	10,346
	Number of snags per acre in moderate burn severity suitable habitat (pre-treatment)[2]	35,624	357,080	35,464	33,344
	Minimum number of snags per acre retained within treatment units within suitable habitat (post-treatment)[2,3]	17,812	357,080	18,232	16,672

[1] Includes both salvage units and hazard tree units; assumes no snag retention within roadside hazard tree areas.
[2] Snags greater than or equal to 24 inches dbh.
[3] Based on the minimum requirement of 4 snags per acre retained across all treatment units.
[4] Would likely have more snags per acre than displayed.

While there would be a short-term reduction in snags available within treated areas, many would be retained and would continue to offer potential roosting sites. Trees that are declining and not subject to removal under this project would provide for long-term snag recruitment, being most pronounced in areas that burned at low to moderate severity. Areas outside treatment units would also continue to offer potential roosting structures. It is unknown how many snags in a given area are used or required by pallid bats and fringed myotis, but it is assumed that the snags retained would maintain habitat quality for use by these species. About 77 percent of mid-to-late seral coniferous forest within the analysis area would remain untreated on NFS land. Because all hardwood snags would be retained under all alternatives unless deemed hazardous, no significant change in the number of hardwood snags available is expected as a result of implementation.

The treatments would result in more open conditions within which herbaceous and shrub vegetation would regrow quickly providing more foraging habitat for pallid bats. Forest edges, where the low to moderate burned forest meets the high severity burned forest, may be modified by treatments but they would still be present throughout the analysis area and would continue to provide suitable foraging conditions for fringed myotis. The action alternatives would have negligible effects on foraging habitat and foraging success for these bats.

CUMULATIVE EFFECTS

In making the determination for the action alternatives, the cumulative effect on the environment, resulting from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B. Some, but not all of these foreseeable future actions have or may contribute cumulatively to effects on pallid bats and fringed myotis.

Risk factors potentially affecting the abundance and distribution of pallid bats and fringed myotis has been identified and include loss of snags as roosting sites and human disturbance at roost sites. The following evaluation criterion was used as a relative measure of cumulative effects from the action alternatives to pallid bats and fringed myotis: Habitat modification resulting in loss of roost sites and Human disturbance at roost sites.

Habitat Modification

FEDERAL LANDS

Past, present, and foreseeable future timber harvests and hazard tree removal sales on public lands have and will result in a decrease in roosting habitat availability. Present actions within the analysis area include: Present actions within the analysis area include: Groovy and Funky Timber Sales (part of the Twomile Ecological Restoration Vegetation Management Project), and the Soldier Creek Timber Sale. These sales are scheduled to treat about 2,045 acres through commercial thinning, biomass removal, mastication, and prescribed fire treatments. While management requirements are in place to retain all or most snags greater than or equal to 15 inches dbh, some inevitably will be removed for safety and operability, reducing available roosting sites for bats. In addition, Yosemite National Park is currently removing hazard trees on 816 acres, which will result in a decrease in roosting sites for bats.

Foreseeable future actions on federal lands include: Reynolds Creek Ecological Restoration involving meadow and aspen restoration. These types of projects generally include the removal of encroaching trees. Twomile-Campy, Looney, and Thommy Timber Sales (part of the Twomile Ecological Restoration Project) and Reynolds Creek Timber Sale are scheduled to occur over the next few years and will result in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. As a result of the Rim Fire, the Rim HT removal project proposed to remove hazard trees along 10,262 acres of level 3, 4, and 5 roads and is scheduled for implementation beginning in the summer of 2014. These foreseeable future projects will reduce roosting site availability.

Private Lands

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre on private land are presently being salvage logged. These salvage activities will reduce roost site availability to bats.

Human Disturbance

Federal Lands

There are several sources of noise disturbance that occur throughout the forest and include activities such as timber harvest, mastication, prescribed fire operations, and recreation. These activities have occurred in the past and will continue into the future (Twomile, Reynolds, Rim HT) whether or not this project is implemented. Mechanized equipment such as feller-bunchers, skidders, and chippers are used to accomplish vegetation treatments, while more manpower in the form of lighters, holders and fire engines with hose lays are used to accomplish prescribed fire operations. Under normal winter weather years, access to a large portion of the project area is restricted until late spring or early summer. This past winter snow has barely restricted access into the Rim Fire area. Vegetation, salvage, hazard tree removal, and prescribed fire treatments could occur during the pup rearing period, potentially affecting maternity colonies. Recreation disturbance likely occurs as soon as access to an area is opened and continues to some degree until access to the area is restricted by snow in the fall or early winter. Recreation disturbance would consist of OHVs, camping, hiking, cycling, wood cutting, and passenger car driving. These effects vary in intensity, duration and scope with weekends typically being a higher use time than weekdays.

Private Lands

Noise disturbance on private lands will primarily consist of salvage logging operations, involving feller bunchers, skidders, chippers, and logging trucks. This past winter, snow barely restricted access

Action Alternatives Contribution/Summary

The action alternatives are expected to contribute cumulatively to effects on pallid bats and fringed myotis. Removal of large fire-killed trees and hazard trees would result in fewer roost sites. Removal of biomass-sized trees is expected to open up the understory. Because pallid bats forage in open areas, the treatments would likely improve foraging opportunities for this species. Disturbance at roost sites is possible and may result in displacement of individuals or groups of roosting bats, including roost abandonment. LOPs in place near day roosts would afford protection to roosting bats, as their pup rearing season overlaps with the breeding seasons for spotted owls, goshawks, great gray owls, and bald eagles. The action alternatives would result in cumulative effects on about 4 percent of the analysis area. Thus, the cumulative contribution to effects on pallid bats and fringed myotis is considered negligible and is not expected to affect the viability of this species.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur.

Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact pallid bat and fringed myotis habitat. At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and fisher habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fire and Fuels Report) and ultimately affect the amount of suitable habitat available for pallid bats and fringed myotis. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines). The alternative could also result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre, and within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Rim EIS Fuels Chapter).

Indicator 1. Under Alternative 2, habitat quality would not be altered. Within the areas that burned at high severity, herbaceous and shrub vegetation is expected to be established within 3 to 5 years and would be suitable as foraging habitat for pallid bats. Edge habitat would also remain in the short-term, providing foraging habitat for fringed myotis.

When wildfire returns to this landscape, the remaining suitable forested habitat adjacent to or near areas that burned at high severity may be at increased risk of loss. One of the greatest risks to these bats is the loss of snags as roosting habitat. As mentioned previously, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons per acre) than the desired condition as described in the Stanislaus National Forest, Forest Plan (Rim EIS Fire and Fuels Report). This would significantly increase the risk of fire suppression activities when the next wildfire occurs. The negative long-term effects on forested habitat for pallid bats and fringed myotis from this alternative outweigh the short-term beneficial effects.

CUMULATIVE EFFECTS

The Cumulative effects discussion under the action alternatives outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, there would be no direct cumulative effect expected because no active management would occur.

Alternative 2 Contribution/Summary

The cumulative contribution under Alternative 2 would not complement the treatments that have occurred in the past, thus increasing the risk of loss of remaining suitable habitat to wildfire in the long-term. The short-term beneficial impacts to pallid bats and fringed myotis such as retention of snags for roosting sites would be outweighed by the increased risk of additional habitat loss in the next wildfire.

Pallid Bat and Fringed Myotis: Summary of Effects:

Indicator 1. Table 3.15-12 shows Alternative 3 would result in the highest level of snag retention within treatment units. While Alternative 1 has the second highest level of snag retention, followed by Alternative 4. Because Alternative 4 has the least amount of suitable habitat acres proposed for treatment it is expected to provide the greatest benefit to pallid bats and fringed myotis.

DETERMINATIONS

Alternative 1

Alternative 1 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or the fringed myotis. This determination for Alternative 1 is based on the following rationale:

- Snag retention would result in maintaining roosting structures throughout the treated areas.
- Foraging habitat would be maintained.

Alternative 2

Alternative 2 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or the fringed myotis. This determination for Alternative 2 is based on the following rationale:

- With no removal of dead trees, the remaining suitable habitat would be at greater risk of modification or loss from future wildfires.
- Quality of currently suitable habitat would not be affected in the short-term.

Alternative 3

Alternative 3 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or the fringed myotis. This determination for Alternative 3 is based on the following rationale:

- Snag retention would result in maintaining roosting structures throughout the treated areas.
- Foraging habitat would be maintained.

Alternative 4

Alternative 4 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or fringed myotis. This determination for Alternative 4 is based on the following rationale:

- Snag retention would result in maintaining roosting structures throughout the treated areas.
- Foraging habitat would be maintained.

Black-backed Woodpecker: Affected Environment

Species and Habitat Account

The black-backed woodpecker (*Picoides arcticus*) is not designated as a Region 5 Forest Service Sensitive Species. They are currently listed as a Management Indicator Species (MIS), representing the ecosystem component of snags in burned forests (as described in the Rim Fire Recovery MIS report available in the administrative record).

Black-backed woodpeckers are distributed in boreal regions from south-central Alaska across Canada to Newfoundland and Nova Scotia. Their range extends south in the western United States in Montana and Washington through east-central California (Region 5 Sensitive Species Evaluation Form for black-backed woodpecker 2012). The black-backed woodpecker is a monotypic species that occurs at elevations of 4,000 to 10,000 feet in the Siskiyou, Warner, Cascade, and Sierra Nevada Mountains of California and Nevada south to the southern limits of Tulare County in Sequoia National Forest (Ibid). Black-backed woodpeckers are still distributed across their historical breeding range in California (Bond et al. 2012), as shown in the figures available in the Terrestrial BE Appendix. They have been documented on the Stanislaus National Forest in burned forest resulting from previous wildfires such as the Kibbie Fire, which is within the analysis area (Siegel et al. 2008, 2010).

In December 2011, the California Fish and Game Commission accepted for consideration a petition submitted by the John Muir Project and the Center for Biological Diversity (Hanson and Cummings 2010) to list the black-backed woodpecker (*Picoides arcticus*) as Threatened or Endangered under the California Endangered Species Act. The Commission's December 15, 2011, action conferred on the species the interim designation of "candidate for listing", effective January 6, 2012, and gave the California Department of Fish and Game (now California Department of Fish and Wildlife or CDFW) 12 months from that date to review the petition, evaluate the available information, and report back to the Commission whether or not the petitioned action is warranted. In May 2013, the Commission found listing the black-backed woodpecker as Threatened or Endangered under California Endangered Species Act was not warranted (Bonham 2013).

The Commission's conclusion that the black-backed woodpecker's listing was not warranted was based on the following summary (Bonham 2013):

- The lack of an apparent range retraction or changes in distribution within the range.
- The episodic cycles of high density occurrences (i.e., prey invasion leading to high woodpecker productivity leading to prey decline leading to woodpecker dispersal) and the lack of current data on the cycle's impact on the long-term viability of California's black-backed woodpecker population.
- The lack of data concerning the role of green forest and its apparent use as habitat.
- The trending increase in fire frequency, size, and severity as compared to the early- and mid-20th century.
- Uncertainty regarding the magnitude of the threat posed to black-backed woodpeckers by post-fire salvage logging.
- Lack of logging on approximately 80 percent of severely burnt USFS forest habitat since 2003 (i.e., 87,200 acres).
- The ongoing long-term monitoring of the species as a MIS.
- Black-backed woodpecker populations in California are not geographically isolated from populations in adjacent states.

Having considered these factors, the Department concluded that the best available scientific information available to the Department does not indicate that the black-backed woodpecker's continued existence is in serious danger or is threatened by any one or any combination of the following factors: present or threatened modification or destruction of black-backed woodpecker habitat, overexploitation, predation, competition, disease, or other natural occurrences or human-related activities. (Cal. Code Regs., tit 14, § 670.1 (i)(1)(A)). Therefore, based upon the best scientific information available to the Department, listing the black-backed woodpecker as threatened or endangered is not warranted.

A consortium of environmental groups including the John Muir Project, the Center for Biological Diversity, the Blue Mountains Biodiversity Project, and the Biodiversity Conservation Alliance filed a petition (Hanson et al. 2012) to list the Oregon/California and Black Hills (South Dakota) populations of the black-backed woodpecker as Threatened or Endangered under the federal Endangered Species Act. The U.S. Fish and Wildlife Service (USFWS) prepared a 90-day finding, indicating that the petitioned action may be warranted based on the information provided by the petitioners. Therefore when funds become available, USFWS will initiate a review of the status of the two populations to determine if listing either or both the Oregon Cascades-California population and the Black Hills population as either subspecies or as Distinct Population Segments is warranted (Federal Register 2013b).

The IUCN Red List of Threatened Species evaluated the black-backed woodpecker as a species of "Least Concern" in 2012 (http://www.iucnredlist.org/details/22681181/0). IUCN provided justification for this evaluation as follows: "This species has an extremely large range, and hence does not approach the thresholds for vulnerable under the range size criterion [Extent of Occurrence less than 20,000 square kilometers combined with a declining or fluctuating range size, habitat extent or quality, or population size, and a small number of locations or severe fragmentation). The population trend appears to be stable, and hence the species does not approach the thresholds for vulnerable under the population trend criterion (less than 30 percent decline over ten years or three generations). The population size is extremely large, and hence does not approach the thresholds for vulnerable under the population size criterion (less than10,000 mature individuals with a continuing decline estimated to be less than10 percent in ten years or three generations, or with a specified population structure). For these reasons the species is evaluated as Least Concern".

NatureServe (NatureServe.org) has ranked this species as G5 (demonstrably secure at the Global level) and N4 (apparently secure at the National level).

Population trends of black-backed woodpeckers are poorly known (Bond et al. 2012). Such analyses are especially difficult for this species due to the ephemeral nature of the woodpecker's burned habitat, its tendency not to re-use nesting cavities in subsequent years, and the low density at which the species occurs in unburned forests (Ibid). Inclusion of black-backed woodpecker monitoring in the Forest Service's MIS program for 10 national forest units in California, as well as additional research, should yield trend information for the species in burned forests of the Sierra Nevada and southern Cascades in the coming years (Siegel et al. 2008, 2010, 2011, 2012, 2014a; Saracco et al. 2011). According to Siegel et al. (2014), "at this time there is no evidence of a temporal trend in occupancy rates during the five years (2009 to 2013) we have been monitoring black-backed woodpeckers on National Forests in California, or of a broad-scale change in the species' distribution in California. Although the distribution of the species appears to change slightly from year to year, black-backed woodpeckers remain present across their historic range in California." MIS surveys on the Stanislaus in the past several years have confirmed black-backed woodpecker occupancy in wildfire areas such as the Kibbie, Knight, and Ramsey Fires.

Trend information from Breeding Bird Surveys (BBS) is available. Trends in black-backed woodpecker populations according to BBS data throughout the species' range were non-significantly positive between 1966 and 2007 but significantly negative (minus 7 percent per year) between 1980 and 2007. Within the Sierra Nevada Physiographic Province, including most of the species' range in Region 5, trends were non-significantly negative during both 1966 to 2006 and 1980 to 2006. Black-backed woodpecker trends are not well-monitored by the BBS methodology, due to its patchy distribution and low detection probability during passive point counts (Region 5 Sensitive Species Evaluation Form for black-backed woodpecker 2012). In addition, these trend estimates were based on observations along only five BBS routes.

The number of black-backed woodpeckers occupying recent fire areas that burned from 2000 to 2010 in the Sierra Nevada appears not to exceed several hundred pairs (Bond et al. 2012). Population estimates in 'green' forests of the Sierra Nevada range from several hundred to several thousand pairs (Ibid).

The analysis area is within the current distribution of black-backed woodpeckers across the Sierra Nevada Bioregion. Prior to the Rim Fire, there were very few acres of burned forest suitable for black-backed woodpeckers within the Rim Fire Recovery analysis area. Exact acres could not be calculated because snag retention from previous fires and the associated projects were based on numbers of snags, not acres of snag patches. However, only low snag densities were retained and many of those snags have likely fallen. Therefore it is reasonable to assume that there were very few acres, if any, of burned forest suitable for black-backed woodpeckers prior to the Rim Fire. The project contains suitable habitat for this species and presence has recently been documented near Ackerson Meadow (NRIS Wildlife database).

The black-backed woodpecker is strongly associated with burned forests, more closely than any other western bird species (Hutto1995, Hutto 2008, Bond et al. 2012). Although the black-backed woodpecker is found in unburned forested stands throughout its range, population densities in recently burned forest stands are substantially higher (Hutto 1995, Hoyt and Hannon 2002, Smucker et al. 2005, Hutto 2008, Fogg et al. 2012). During broadcast surveys for black-backed woodpeckers in burned forests throughout the Sierra Nevada, southern Cascades, and Warner Mountains in 2009 and 2010, 95 percent of detections were between 4,793 to 8,517 feet above sea level (R. Siegel unpublished data). Survey stations above 9,186 feet have not been established, so the upper boundary of the range of detection may be higher than currently documented. Black-backed woodpecker home-ranges are highly variable and are shown to range from 59 to 751 acres (Siegel pers. comm.; Siegel et al. 2013, 2014b, Tingley et al. 2014b). Snag basal area alone best predicted home-range size, explaining 54 to 62 percent of observed variation (Ibid). As snag basal area increased, home-ranges exponentially decreased in size, strongly suggesting increased habitat quality.

Suitable black-backed woodpecker habitat is defined specifically for this project and includes the following CWHR habitat types, size classes, and densities: Douglas-fir (DFR), Jeffrey pine (JPN), lodgepole pine (LPN), ponderosa pine (PPN), red fir (RFR), subalpine conifer (SCN), Sierran mixed conifer (SMC), and white fir (WFR); size classes greater than or equal to 3; pre-fire canopy closures M and D; and basal area loss greater than or equal to 50 percent. Habitat criteria used in this analysis were determined from CWHR (CDFW 2008), scientific literature (e.g., Russell et al. 2007, Hanson and North 2008, Vierling et al. 2008, Bond et al. 2012, Siegel et al. 2013, Siegel et al. 2014b), and Forest Service Region 5 Regional Office guidance.

Burned forest habitat is most productive for black-backed woodpeckers during the first eight years following a fire. Burned habitat on private lands is assumed to be completely removed through salvage logging. Treatments are limited on National Park Service lands, typically consisting of minimal removal of hazardous trees along roadways. NFS lands are treated to varying degrees following a fire, typically harvesting only a small proportion of fire-killed trees in burned forest.

Suitable habitat exists outside the Rim Fire perimeter within California on NFS lands and is distributed throughout the Sierra Nevada and California, as shown in the Terrestrial BE Appendix, Binder 8. For example, in 2012, the Chips and Reading Fires on the Lassen and Plumas National Forests burned about 75,000 acres of NFS lands, of which about 67,000 acres of burned NFS lands remain untreated. In 2013, the American and Aspen Fires burned about 44,000 acres on NFS lands, of which about 32,000 acres of burned NFS lands will remain untreated. On the Stanislaus National Forest wildfires have occurred in the past several years and include the:

1. Knight Fire in 2009 burned about 6,000 acres, of which zero acres were salvaged;
2. Ramsey Fire in 2012 burned about 1,000 acres, of which 250 acres were salvaged; and
3. Power Fire in 2013 burned about 1,000 acres, of which zero acres were salvaged.

In California from 2006 to 2013, approximately 21 percent of NFS lands classified as burned forest have been treated or are proposed for salvage logging or hazard tree removal. This percentage includes the treatments proposed for the 2013 American, Aspen, and Rim Fires. When combined with suitable burned forest habitat on National Park Service and private lands within California for the same timeframe (2006 to 2013), approximately 31 percent of burned forest has been or is proposed for salvage logging or hazard tree removal. Conversely, approximately 69 percent (168,000 acres) of suitable habitat in burned forest remains or would remain untreated and available to black-backed woodpeckers throughout California. According to Miller and Safford (2012) and Westerling et al. (2006), large, high-severity wildfires have been increasing in frequency and duration over the past few decades and are expected to continue into the future. Based on these reported trends, it is reasonable to assume that the availability of burned forest habitat will continue increasing into the future.

The Rim Fire burned primarily on public land in two administrative units: Stanislaus National Forest and Yosemite National Park. Most of the suitable black-backed woodpecker habitat within the Rim Fire perimeter occurs on Stanislaus National Forest. Table 3.15-13 shows the amount of suitable black-backed woodpecker habitat on both public and private lands.

Table 3.15-13 Suitable Black-backed Woodpecker Habitat in Rim Fire Area

Land Manager - Owner	Suitable Habitat (acres)	Proportion of Habitat (percent)
Stanislaus National Forest	27,617	54
Yosemite National Park	17,461	34
Bureau of Land Management	17	less than 1
Private	6,061	12
total	**51,182**	**100**

Black-backed woodpeckers are primary cavity excavators, creating holes in trees in which to lay their eggs and raise their young (Dixon and Saab 2000). The breeding season typically occurs from April through July and both sexes incubate, brood, and feed young (Ibid). Nest cavities are usually excavated in snags but can be found in dead portions of live trees and in unburned forests. Nests are excavated in conifer trees and typically average 13 to 14 inches, which corresponds to CWHR size classes 4 to 5. Nest trees have occasionally been documented as small as 7 inches, which corresponds with CWHR size class 3 (Bond et al. 2012 and Seavy et al. 2012).

Black-backed woodpeckers readily forage on larvae of wood-boring beetles, engraver beetles, and mountain pine beetles found in the trunks of burned conifers (Dixon and Saab 2000). Hanson and North (2008) found preferential foraging on large snags greater than 20 inches dbh in a study of 3 fire areas in the Sierra Nevada, which corresponds to CWHR size classes 4 to 6. Preliminary data from an ongoing study at two recent fire areas on the Lassen National Forest suggests that black-backed woodpeckers forage on all available size classes of snags, but they forage on snags less than 10 centimeters (4 inches) less than was predicted (R. Siegel unpub. data).

Black-backed woodpeckers in western North America are not known to be migratory, although limited down-slope dispersal in winter has been reported (Dixon and Saab 2000). Reliance on recently burned areas of coniferous forest for breeding necessitates some post-breeding and post-natal dispersal to colonize new burns, but dynamics of dispersal in this species are not well studied (Ibid). Occasional irruptions of 100s of kilometers (100s of miles) or more have been documented in eastern North America in response to food-resource and breeding dynamics. Similar irruptions in western North America have not been recorded. In the Sierra Nevada, black-backed woodpeckers frequently colonize burned forest patches and breed in them less than one year after fire. No information is available indicating how far such individuals would disperse (Dixon and Saab 2000, Siegel et al. 2008).

Risks factors to black-backed woodpeckers have been summarized in "A Conservation Strategy for the Black-backed Woodpecker (*Picoides arcticus*) in California – Version 1.0":

- Salvage logging and other management involving post-fire snag removal. Management activities commonly employed following wildfire, including salvage logging and hazard tree removal, have resulted in negative impacts such as reduced abundance and reproductive success in black-backed woodpeckers (Saab and Dudley 1998, Hutto and Gallo 2006, Saab et al. 2007, Koivula and Schmiegelow 2007, Hutto 2008, Cahall and Hayes 2009, Saab et al. 2009). Saab and Dudley (1998) and Hutto and Gallo (2006) found that nest densities were much higher in unlogged post-fire stands when compared with salvaged stands.
- Thinning of unburned forests. Pre-fire forest thinning can decrease post-fire occupancy rates and nest densities of black-backed woodpeckers, and thinning or removal of medium and large snags may decrease habitat suitability in unburned forests. For example, black-backed woodpecker abundance in forests that were commercially thinned and then later burned in wildfire was lower than in burned forests that were not thinned before fire in the Rocky Mountains (Hutto 2008).
- Firewood cutting for personal use in recent fire areas. Although systematic data on the effects of fuelwood cutting on nesting black-backed woodpeckers are not available, small scale harvesting of fuelwood by the public for personal use, from recent fire areas as well as unburned lodgepole pine forests, can destroy active black-backed woodpecker nests.
- Time since fire. Probability of occupancy and nesting by black-backed woodpeckers in burned forest is negatively correlated with years since fire during the decade after the fire.
- Fire Suppression. If fire suppression reduces the amount of mid- and high-severity post-fire habitat available for black-backed woodpecker, it may be considered a threat to the species.
- Climate change. Although uncertain, climate change may affect the black-backed woodpecker through altered fire regimes and adjustments in distribution (e.g., occupying higher elevations and more northern latitudes).

Management Direction

The Forest Plan does not contain management direction for black-backed woodpeckers (USDA 2010). With regards to salvage, the Forest Plan does require the following:

- In post-fire restoration projects for large catastrophic fires (contiguous blocks of moderate to high fire lethality of 1,000 acres or more), generally do not conduct salvage harvest in at least 10 percent of the total area affected by fire (USDA 2010 p. 36 to 37).

Management direction for black-backed woodpecker populations and habitat, snags in burned forest, can be found in the Wildlife MIS Report. Management recommendations for black-backed woodpeckers can be found in the Conservation Strategy for the Black-backed Woodpecker (*Picoides arcticus*) in California. Version 1.0. The Conservation Strategy for black-backed woodpecker includes the following recommendations:

Recommendation 1.1. Within the range of the black-backed woodpecker, ensure that post-fire management occurring in new fires that burn 123 acres or more of conifer forest at moderate- to high-severity consider snag retention and other burned-forest habitat needs of the species. Where feasible, black-backed woodpeckers will likely benefit most from large patches of burned forest being retained in unharvested condition.

Recommendation 1.4. Retain high tree density in the unburned forest periphery around fire areas, to provide foraging habitat in the later post-fire years (Saab et al. 2011).

Recommendation 1.5. Avoid harvesting fire-killed forest stands during the nesting season (generally May 1 through July 31).

It is important to note, the Conservation Strategy for Black-backed Woodpecker (*Picoides arcticus*) in California (Bond et al. 2012) is not a legally binding or regulatory document or agency policy. Moreover it was not designed to constrain the FS in its actions and activities. It seeks to summarize known information about the species, recommends management approaches for conservation, and suggests future research priorities (Bond et al. 2012). By its very nature, the Black-backed Woodpecker Conservation Strategy only considers one species. The FS has to balance multiple priorities, objectives, uses, and species in its activities as a multiple use agency. And, at times, certain management objectives are in tension, if not direct conflict, with one another. For example, through this Project, the Forest seeks to reduce fire hazard by removing burned trees. Yet the Forest also wishes to conserve burned forest habitat for the black-backed woodpecker and other species. The Forest has tried to strike a reasonable balance between these two goals at the landscape level, realizing it is not possible to fully achieve both of these goals on each and every acre.

Black-backed Woodpecker: Environmental Consequences

This analysis is focused on the project effects related to management of burned forest, areas with documented basal area mortality greater than 50 percent. The project alternatives could result in direct and indirect effects to the black-backed woodpecker through the following activities:

- Salvage of fire-killed trees.
- Salvage of roadside hazard trees.

These activities may have direct and indirect effects on black-backed woodpeckers through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance

Death or injury from project related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a nest tree were felled while being used by black-backed woodpeckers. These potential direct effects are considered to be short term and will only affect treated areas. Harvesting of fire-killed trees would occur throughout the year, including the months that are outside the black-backed woodpecker breeding season. Retained snags in treated areas would continue to provide cavity and foraging substrates. Untreated areas that burned at high severity and are suitable black-backed woodpecker habitat would be left intact, providing nesting and foraging habitat for black-backed woodpeckers, as shown in the Terrestrial BE Appendix, Binder 8.

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of the black-backed woodpeckers related to breeding or foraging. Loud noise from equipment such as chainsaws or tractors is expected to occur in salvage units, along project roads, and at landings, material sources, and water sources. The location of black-backed woodpeckers within the analysis area is uncertain but expected given the increase in available suitable habitat following the Rim Fire. Temporary avoidance of the project site or displacement of individuals is expected during project implementation. Any displacement or avoidance related to noise disturbance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual black-backed woodpeckers in the areas subject to LOPs during the breeding season. The potential risk to individual black-backed woodpeckers is uncertain because the presence of suitable habitat is a recent development and surveys have not been conducted. The length of exposure to these disturbances would primarily occur for two to three years, given the accelerated timeframe of this project and implementation.

Habitat Modification

Salvage logging and the removal of roadside hazard trees would degrade suitable black-backed woodpecker habitat by removing the majority of burned snags the species require for breeding and foraging. Home ranges are known to average about 220 acres based on recent research (Tingley et al. 2014b). The basal area of burned snags is correlated with the home range size of black-backed woodpeckers (Ibid). Retaining large patches of burned snags, preferably greater than 220 acres and at elevations above 4,793 feet would provide high quality habitat for black-backed woodpeckers. Retention of these patches would potentially increase the predicted bird density across the analysis area (Bond et al. 2012, Tingley et al. 2014b). Although treated areas are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, snags retained within treated areas could provide foraging and possibly nesting structures. In addition, trees that survived the fire and don't qualify for removal (i.e., they have green needles or don't qualify for removal based on the hazard tree guidelines) would remain on the landscape. Some of these trees will likely die and contribute to snag recruitment over the next several years, providing additional habitat structure for black-backed woodpeckers.

In order to compare alternatives and potential effects to black-backed woodpeckers, a model developed by Tingley and others (2014a) that was designed specifically for the Rim Fire area was used. This model presents a method for predicting black-backed woodpecker pair density that combines model-based estimates of occupancy with expected bird density given occupancy (Ibid). Some of the covariates used in the model include pre-fire canopy cover, burn severity, CWHR size class greater than 3, and CWHR forest class. This model allows us to compare alternatives, accounting for the expected effects to black-backed woodpeckers. The model predicts the probability that a single cell (98 feet by 98 feet) is occupied by a black-backed woodpecker. The developer's intent for use of this model includes using density estimates to examine the relative effects of proposed alternatives to black-backed woodpeckers. Values are relative and should scale proportionally (Ibid).

Tingley and others (2014a) report a total of 42 predicted pairs of black-backed woodpeckers within the Rim Fire area on the Stanislaus National Forest, which includes the Rim Recovery Project and the Rim HT Project. For analysis of direct and indirect effects associated with the Rim Recovery project only, 39 was used as the maximum predicted pair density possible. The cumulative effects analysis includes the predicted pairs associated with the Rim HT Project and Yosemite National Park.

Indicators

The following indicators provide a relative measure of the direct and indirect effects to the black-backed woodpecker and a relative measure to determine how consistent the project alternatives are with this species' conservation strategy recommendations.

1. Amount of suitable habitat modified.
2. Predicted pair density retained as a proportion of modeled pairs (Tingley et al. 2014a).

These criteria were chosen to supplement information provided in the MIS Report by identifying and analyzing potential effects to the black-backed woodpecker related to expected densities within the project area. The Rim Recovery MIS Report focuses on the relationship of project-level habitat impacts to bioregional scale trend. The following effects analysis focuses on the relative value of different proposed management units by alternative within the Rim Fire area based on habitat quantity and quality (Tingley et al. 2014a). Acres in this analysis may vary slightly from those presented in the MIS Report due to rounding error or to minor corrections made to continuously revised, dynamic database sources.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Indicator 1. Under Alternative 1, Table 3.15-15 shows 17,461 acres of suitable habitat would be modified. Snags would be retained at a rate of about 12 square feet of basal area per acre, averaged on a unit basis. While snags retained at this density are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would provide foraging and possibly nesting structures.

Indicator 2. Table 3.15-15 shows the proportion of modeled pairs retained is 41 percent under Alternative 1. Under Alternative 1, 10,156 acres (37 percent) of suitable habitat would be retained, as displayed in the Terrestrial BE Appendix, Binder 8. The remaining suitable habitat is predicted to support a density of 16 pairs of black-backed woodpeckers. Of the action alternatives, Alternative 1 results in the least amount of habitat retention for black-backed woodpeckers and the lowest predicted pair density.

Cumulative Effects

The impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered (found in Appendix B, Cumulative Effects). Some, but not all, of these actions have or may contribute cumulatively to effects on black-backed woodpeckers.

Risk factors potentially affecting black-backed woodpecker abundance and distribution have been identified and include habitat removal through salvage logging and other management involving post-fire snag removal, such as hazard tree removal. The following evaluation criterion was used as a relative measure of cumulative effects of this alternative to black-backed woodpeckers: habitat modification.

Habitat Modification

Federal Lands

Present and foreseeable future salvage and hazard tree removal projects on federal lands include: the Rim Fire Hazard Tree Project, which would modify 2,370 acres of suitable habitat, and Yosemite National Park hazard tree removal, which modified about 43 acres of suitable habitat.

Private Lands

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 6,061 acres of suitable black-backed woodpecker habitat on private land is presently being salvage logged. These salvage activities generally result in the complete removal of suitable habitat.

Alternative 1 Contribution/Summary

Alternative 1 is expected to contribute cumulatively to effects on black-backed woodpeckers. Modification of 17,461 acres (or 34 percent) of the remaining suitable habitat within the analysis area is expected from implementation of this alternative. Snags would be retained at a rate of about 12 square feet of basal area per acre, averaged on a unit basis. While snags retained at this density are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, the snags would provide foraging and possibly nesting structures. The predicted pair density within the remaining suitable habitat on Stanislaus NFS lands within the fire perimeter is 16 pairs of black-backed woodpeckers. When added to other private and federal salvage and hazard tree removal projects, a total of 51 percent of suitable black-backed woodpecker habitat would be modified within the analysis area. The remaining suitable habitat across the analysis area, displayed in the Terrestrial BE Appendix, is predicted to support a total of 86 pairs of black-backed woodpeckers. Table 3.15-16 displays proposed treatments and the resulting predicted black-backed woodpecker pair density across the cumulative analysis area under this alternative.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur.

The indirect effects of No Action are related to the amount of habitat retained across the Rim Fire area. Under this alternative, 27,617 acres of suitable habitat would be available to black-backed woodpeckers, and is displayed in the Terrestrial BE Appendix, Binder 8. The predicted pair density associated with this alternative is 39. This alternative provides the most habitat and the highest predicted pair density when compared to the action alternatives. Black-backed woodpeckers would be expected to occupy the available suitable habitat for 8 to 10 years, which is typically the period of time burned habitat remains suitable for this species.

Cumulative Effects

The Cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities scheduled on public and private lands. Under the No Action alternative, there would be no direct cumulative effect expected because no active management would occur.

No Action Alternative Contribution/Summary: The cumulative contribution under this alternative would result in the highest retention of suitable habitat available for black-backed woodpeckers. Retention of about 27,617 acres (or 54 percent) of the suitable habitat on NFS lands and within the analysis area is expected from implementation of this alternative. The predicted pair density within the remaining suitable habitat on NFS lands is 39 pairs of black-backed woodpeckers. When added to other private and federal salvage and hazard tree removal projects, a total of 42,751 acres (84 percent) of suitable black-backed woodpecker habitat would be retained across the analysis area and is displayed in the Terrestrial BE Appendix, Binder 8. This habitat is predicted to support a total of 109 pairs of black-backed woodpeckers. Table 3.15-16 displays proposed treatments and the resulting predicted black-backed woodpecker pair density across the cumulative analysis area under this alternative.

Alternative 3

Direct and Indirect Effects

Indicator 1. Under Alternative 3, Table 3.15-15 shows 16,633 acres of suitable habitat would be modified. Snags would be retained at a rate of about 12 square feet of basal area per acre in General Forest and about 30 square feet of basal area per acre in OFEA, FCCC, and HRCA, averaged on a unit basis. While snags retained at these densities are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would offer foraging and possibly nesting structures.

Indicator 2. Under Alternative 3, the proportion of modeled pairs retained is 46 percent (Table 3.15-15).

Under Alternative 3, 10,984 acres (40 percent) of suitable habitat would be retained, and is displayed in the Terrestrial BE Appendix, Binder 8. The remaining suitable habitat is predicted to support a density of 18 pairs of black-backed woodpeckers. Alternative 3 results in retention of an additional 800 acres of suitable habitat compared to Alternative 1 and is predicted to support an additional two pairs of black-backed woodpeckers.

CUMULATIVE EFFECTS

Alternative 3 cumulative effects are similar to Alternative 1 discussed previously and which outlines those present and foreseeable future activities scheduled on public and private lands.

Habitat Modification

Alternative 3 Contribution/Summary

Alternative 3 is expected to contribute cumulatively to effects on black-backed woodpeckers. Modification of 16,633 acres (or 32 percent) of the suitable habitat within the analysis area is expected from implementation of this alternative. Snags would be retained at a rate of about 12 square feet of basal area per acre in General Forest and about 30 square feet of basal area per acre in OFEA, FCCC, and HRCA, averaged on a unit basis. While snags retained at these densities are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would offer foraging and possibly nesting structures. The predicted pair density within the remaining suitable habitat on Stanislaus NFS lands within the fire perimeter is 18 pairs of black-backed woodpeckers. When added to other private and federal salvage and hazard tree removal projects, a total of 49 percent of suitable black-backed woodpecker habitat would be modified within the analysis area. The remaining suitable habitat across the analysis area, displayed in the Terrestrial BE Appendix, is predicted to support a total of 88 pairs of black-backed woodpeckers. Table 3.15-16 displays proposed treatments and the resulting predicted black-backed woodpecker pair density across the cumulative analysis area under this alternative.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Indicator 1. Under Alternative 4, Table 3.15-15 shows 15,261 acres of suitable habitat would be modified. Snags would be retained at a rate of about 12 square feet of basal area per acre in General Forest and about 30 square feet of basal area per acre in OFEA, FCCC, and HRCA, averaged on a unit basis. While snags retained at these basal area densities are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would offer foraging and possibly nesting structures.

Indicator 2. Under Alternative 4, Table 3.15-15 shows the proportion of modeled pairs retained is 54 percent. Table 3.15-14 shows the proposed specific black-backed woodpecker habitat retention units.

Table 3.15-14 Retention units for black-backed woodpecker habitat, Alternative 4

Units Retained for Black-backed Woodpecker Habitat	Alternative 4 (acres)
A01B, A03, A04, A05A, A05B	538
D01A, D02, E01A, E01B, E02	1,229
O01, O02A, O02B, O04, O05, O12	670
R01A, R02	136
total	**2,571**

Under Alternative 4, 45 percent of suitable habitat would be retained, and is displayed in the Terrestrial BE Appendix. The remaining suitable habitat is predicted to support a density of 21 pairs of black-backed woodpeckers. Of the action alternatives, Alternative 4 results in the greatest amount of habitat retained for black-backed woodpeckers and the highest predicted pair density. Alternative 4 predicted pair density is 21, which is three more than Alternative 3 and five more than Alternative 1. Alternative 4 is the only action alternative retaining at least half of modeled pairs on NFS lands.

Using the model created by Tingley and others (2014a), patches of retention were selected that ranked among the highest predicted values per cell and associated predicted pair occupancy, shown in Figure

3.15-5. Units overlapping with these patches were dropped from Alternative 4. These units are termed retention units, for the retention of black-backed woodpecker habitat. The Terrestrial BE Appendix has more details.

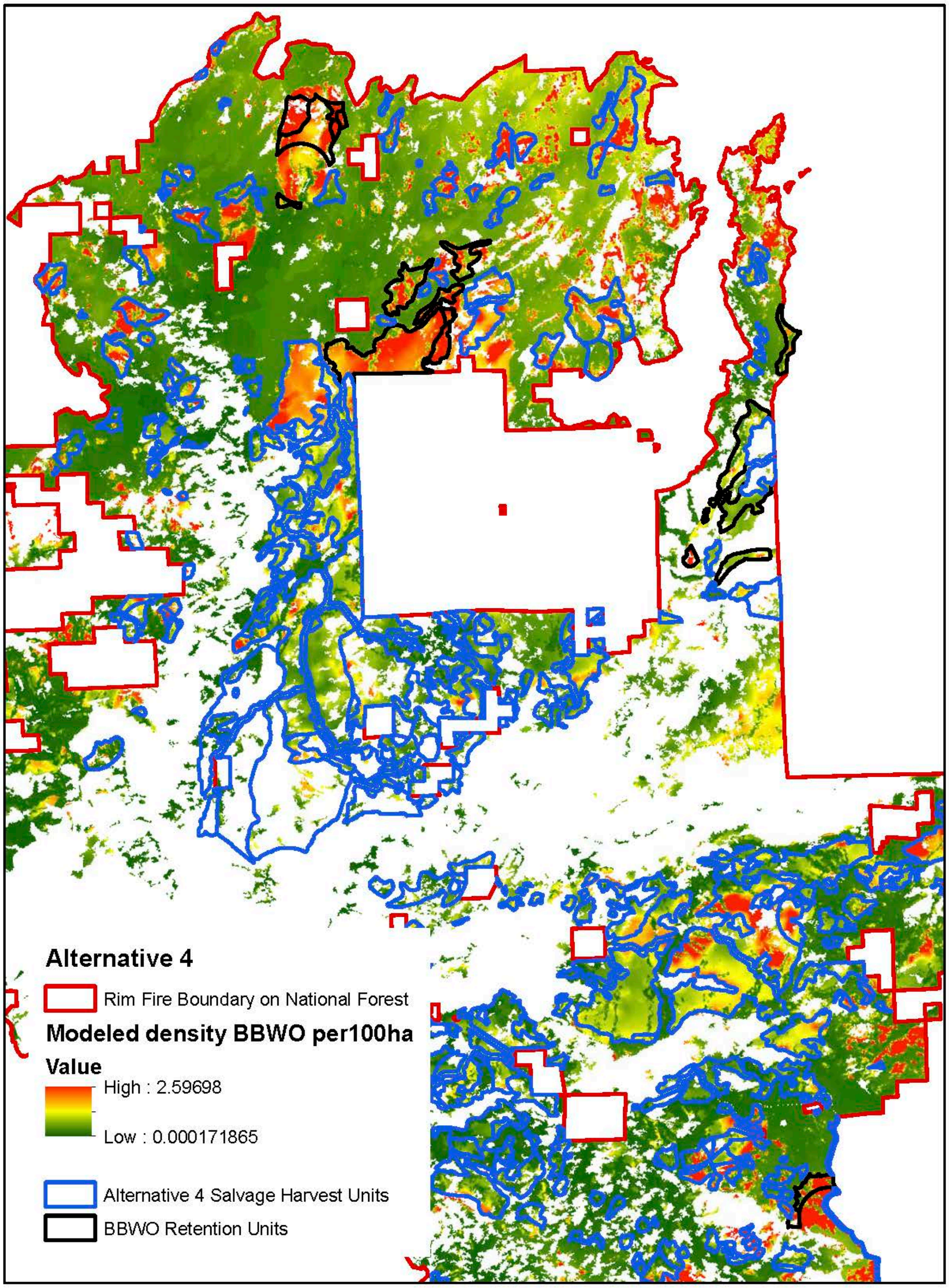

Figure 3.15-5 Modeled black-backed woodpecker density

CUMULATIVE EFFECTS

Alternative 4 cumulative effects are similar to Alternative 1 discussed previously and which outlines those present and foreseeable future activities scheduled on public and private lands.

Habitat Modification

Alternative 4 Contribution/Summary

Alternative 4 is expected to contribute cumulatively to effects on black-backed woodpeckers. Modification of 15,261 acres (or 30 percent) of the suitable habitat within the analysis area is expected from implementation of this alternative. Snags would be retained at a rate of about 12 square feet of basal area per acre in General Forest and about 30 square feet of basal area per acre in OFEA, FCCC, and HRCA, averaged on a unit basis. While snags retained at these densities are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would offer foraging and possibly nesting structures. The predicted pair density within the remaining suitable habitat on Stanislaus NFS lands within the fire perimeter is 21 pairs of black-backed woodpeckers, the highest of the action alternatives. When added to other private and federal salvage and hazard tree removal projects, a total of 46 percent of suitable black-backed woodpecker habitat would be modified from the analysis area. The remaining suitable habitat across the analysis area, displayed in the Terrestrial BE Appendix, is predicted to support a total of 91 pairs of black-backed woodpeckers. Table 3.15-16 displays proposed treatments and the resulting predicted black-backed woodpecker pair density across the cumulative analysis area under this alternative.

Black-backed Woodpecker: Summary of Effects

Indicator 1. The amount of suitable habitat modified varies among the action alternatives, shown in Table 3.15-15. Alternative 1 would result in the greatest amount of suitable habitat modified when compared with Alternatives 3 and 4. Alternative 4 would result in the least

Table 3.15-15 Blacked-backed Woodpecker Summary of Direct and Indirect Effects

Indicator	Metric	Alternative			
		1	2	3	4
1. Amount of suitable habitat modified	Salvage acres in suitable habitat	16,099	0	15,311	13,640
	Hazard tree removal acres in suitable habitat	1,362	0	1,322	1,621
	Total treatment acres in suitable habitat	17,461	0	16,633	15,261
	Percent of suitable habitat modified[1]	63	0	60	55
2. Predicted pair density retained as a proportion of modeled pairs	Modeled pairs retained	16	39	18	21
	Percent of modeled pairs retained	41	100	46	54

[1] Based on acres of suitable habitat on Stanislaus National Forest.

Indicator 2. The predicted pair density varies among the action alternatives, shown in Table 3.15-15. Alternative 1 would result in the lowest predicted pair density when compared with Alternatives 3 and 4. Alternative 3 would result in the second lowest predicted pair density and Alternative 4 would result in the highest predicted pair density among the action alternatives. Alternative 4 would retain over half of modeled pairs on National Forest System land. Table 3.15-16 shows the summary of the cumulative effects of the treatments.

Table 3.15-16 Blacked-backed Woodpecker Summary of Cumulative Effects

Indicator	Metric	Alternative			
		1	2	3	4
1. Amount of suitable habitat modified	Suitable habitat modified on Stanislaus National Forest (acres)1	19,831	2,370	19,003	17,631
	Suitable habitat modified on Private lands	6,061	6,061	6,061	6,061
	Total suitable habitat modified within the Rim Fire perimeter (acres)	25,892	8,431	25,064	23,692
	Percent of suitable habitat modified within Rim Fire perimeter	51	16	49	46
2. Predicted pair density retained as a proportion of modeled pairs	Modeled pairs retained	86	109	88	91
	Percent of modeled pairs retained	77	97	79	81

[1] Calculated based on total treatment acres from Table 3.15-15 as well as the Rim HT project which would modify 2,370 acres of suitable habitat.

Black-backed Woodpecker: Consistency with Conservation Strategy

As discussed above, the Conservation Strategy is not a legally binding or regulatory document or agency policy. Moreover it was not designed to constrain the FS in its actions and activities. It seeks to summarize known information about the species, recommends management approaches for conservation, and suggests future research priorities (Bond et al. 2012). By its very nature, the Black-backed Woodpecker Conservation Strategy only considers one species. The FS has to balance multiple priorities, objectives, uses, and species in its activities as a multiple-use agency. At times, certain management objectives are in tension, if not direct conflict, with one another. For example, through this project, the Forest seeks to reduce fire hazard by removing burned trees. Yet, the Forest also wishes to conserve burned forest habitat for the black-backed woodpecker and other species. The Forest has tried to strike a reasonable balance between these two goals at the landscape level, realizing it is not possible to fully achieve both of these goals on each and every acre.

The Conservation Strategy for the Black-backed Woodpecker (*Picoides arcticus*) in California version 1.0 includes the following recommendations:

- Recommendation 1.1. Within the range of the black-backed woodpecker, ensure that post-fire management occurring in new fires that burn 123 or more acres of conifer forest at moderate- to high-severity consider snag retention and other burned-forest habitat needs of the species. Where feasible, Black-backed Woodpeckers will likely benefit most from large patches of burned forest being retained in unharvested condition.
- Recommendation 1.4. Retain high tree density in the unburned forest periphery around fire areas, to provide foraging habitat in the later post-fire years (Saab et al. 2011).
- Recommendation 1.5. Avoid harvesting fire-killed forest stands during the nesting season (generally May 1 through July 31).

The action alternatives do not specifically incorporate a limited operating period for this species to prohibit salvage harvest during the black-backed woodpecker nesting season. However, the action alternatives do incorporate limited operating periods for Sensitive Species within potential black-backed woodpecker habitat, and do not propose to remove trees in unburned forest unless deemed as hazardous along Maintenance Level 2 roads. Additionally, 37 to 45 percent of existing suitable habitat would be retained under all action alternatives. Alternative 4 would drop units totaling 2,571 acres of high quality habitat specifically for retention of that habitat.

Mule Deer: Affected Environment

Species and Habitat Account

The mule deer (*Odocoileus hemionus*) is an MIS species representing oak-associated hardwood and hardwood/conifer in the Sierra Nevada. The mule deer is also a species of conservation concern on the Stanislaus National Forest and is considered common to abundant with a wide distribution throughout the Sierra Nevada. They occur at elevations of 1,800 feet to 11,800 feet on the west slope of the Sierra Nevada. Summer range typically occurs above 6,500 feet elevation, transition range occurs between 4,500 feet to 6,500 feet elevation and winter range from 1,800 feet to 4,500 feet elevation. Mule deer are an important game species that is hunted throughout its range in California.

Trends in the migratory deer populations on the Stanislaus National Forest have been declining since the 1970’s (Maddox 1980). The Tuolumne and Yosemite herds have experienced downward population trends over the past several decades (Graveline pers. comm.).

Deer composition counts are conducted by California Department of Fish and Wildlife (CDFW) in the spring and fall of each year in order to assess population trends. In 2009, Greg Gerstenberg, Senior Environmental Scientist with CDFW, initiated a study of the Tuolumne Mule Deer Herd to investigate exotic louse infestation, and its effects on individuals, potential spread, and the resulting influence on deer populations. Very High Frequency (VHF) ear tag transmitters and GPS collars are being used to monitor deer and gather data on over-winter survival, habitat relationships such as migration routes, summer range extent, and winter range use (Gerstenberg 2012, unpub. report). Collared deer were monitored shortly after the Rim Fire burned through the critical winter range for the Tuolumne Deer herd. Several collared individuals were lost, which indicates loss of many deer during the fire (Gerstenberg pers. comm.). Because the fire hit prior to the winter migration, most migratory deer were still on their summer ranges at higher elevations. There is a resident herd that remains in the lower country year round and these deer were much more susceptible to mortality from the Rim Fire. Eighty percent of collared deer (with a sample size of 5) are thought to have perished in the fire (Graveline pers. comm.).

The Tuolumne and Yosemite deer herds have summer, transition, and winter range within the analysis area. The Jawbone Ridge area on the Stanislaus National Forest currently supports the highest concentration of wintering California mule deer from the Tuolumne Deer Herd and much of this area burned at high severity in the Rim Fire.

Mule deer utilize a variety of vegetation types including oak woodlands, coniferous forest, meadows and grasslands, chaparral and riparian corridors. Favorable habitat conditions for deer include vegetation communities that occur in a mosaic pattern with multiple age classes represented, and where cover and forage are in close proximity to free water (Ahlborn 2006).

During project development, CDFW was consulted. New telemetry data identified changes to the deer critical winter range in the Jawbone Ridge area. During the winter months, deer were using additional critical areas.

Mule deer are polygynous, bucks mate with multiple does. Rutting begins in the fall and dominant bucks mate with multiple does as they come into estrous. Bucks fight and displace each other establishing and re-establishing dominance throughout the season. Gestation is about six to seven months, with fawns born typically between the months of May and July.

Mule deer browse or graze, showing preferences for forbs and grasses, as well as tender new shoots on various shrub species including manzanita, ceanothus, mountain mahogany, and bitterbrush (Kufeld 1973). Forage patterns vary with season, forage quality, and availability. Acorns are a critically important fall and winter food. Fawns from the Tuolumne Herd have an average weight that is 10 to 15 percent greater with a heavy black oak acorn crop (Gerstenberg 2012, unpub. report).

Mule deer are either resident or migratory. Migratory deer travel downslope in the winter where conditions are milder and snow pack is minimal. The deer then migrate upslope in the spring and early summer after the snow melts to birth fawns and gain access to high elevation meadows and grasslands that offer herbaceous forage high in nutrients.

Risk Factors

Risks to mule deer on the Stanislaus National Forest have been summarized by CDFW (Maddox 1980) and include:

- Range decadence. Areas where shrub communities become decadent from the lack of fire or active management results in forage providing less nutrients to deer, becoming inaccessible or unavailable and may impact individual fitness.
- Grazing. On the summer range, cattle and deer compete for limited forage found in meadows and grasslands. Conflicts between cattle and deer on the winter range is not known as a limiting factor for deer.
- Oak and shrub removal in type conversions. Establishment of plantations in areas that would otherwise be dominated by shrub and oaks can reduce the amount of forage available to deer in a given area.
- Poaching. Poaching occurs most often on the winter range and has affected not only the number of deer, but the age distribution of bucks. Poachers typically target older bucks presumably for the extensive antlers sought by many hunters; however, does are taken as well.
- Loss of Acorn Producing Oaks due to Catastrophic or Stand Replacing Wildfire. Oaks take several decades to develop the capacity to produce acorns. Oaks that are lost to wildfire effectively reduce the amount of forage available and this is a critical food source in both transition and winter ranges.
- Loss of Meadow Habitat. Meadows are an important component of deer habitat. Conifer encroachment threatens the viability and availability of meadows in the long-term.

Management Direction

Mule deer are a MIS species representing oak woodland and are also a species of conservation concern on the Stanislaus National Forest generally associated with early seral ecosystems (Damarais and Krausman 2000). Identifying areas within critical winter deer range for salvage and nonmerchantable material removal to achieve the desired forage/cover ratios was identified as one of the purpose and needs for the Rim Recovery project.

The desired condition for units identified within critical winter range is to have forage to cover ratios of about 70 to 30 and to promote the protection and retention of hardwood (individual trees and aggregations), meadow, seep, and spring vegetation.

Mule Deer: Environmental Consequences

The project alternatives could result in direct and indirect effects to the mule deer through the following activities:

- Salvage of fire-killed trees.
- Fuels Treatments.
- New permanent and temporary road construction, road reconstruction, and maintenance.

These activities may have direct and indirect effects on mule deer through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance

Death or injury from project related activities would be unlikely to occur given the mobility of this species.

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of deer primarily on the winter range and transition or intermediate zones present within the analysis area. Loud noise from equipment such as chainsaws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. The location of deer within the analysis area is uncertain following the Rim Fire, a large-scale disturbance event. Temporary avoidance of the project site or displacement of individuals is expected during project implementation. Any displacement or avoidance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual deer in these areas. The potential risk to individual deer is considered low because of their natural avoidance behavior and length of exposure expected given the accelerated timeframe of this project and implementation.

Habitat Modification

Salvage logging and the removal of roadside hazard trees would result in short and long-term benefits to mule deer.

Short-term (10 to 20 years), removal of merchantable and nonmerchantable material would open up areas for vegetation to reclaim the understory. Early seral vegetation, shrubs, grasses, and forbs are expected to be established within a few years and would benefit deer. Retaining large structural elements available such as snags and down woody material at small scales would provide cover for travelling or resting deer. Removing nonmerchantable material within migration corridor pinch points would allow deer to continue to use traditional migration routes without obstruction. Deer would benefit by more easily traversing through the winter range due to removal of nonmerchantable material. Lyon and Jensen (1980) found that elk habitat use was altered when down woody debris occurred at depths greater than two feet. Because deer are smaller than elk, they may respond at depths less than those that affect elk. For example, Salwasser and others (1982) have suggested that optimal habitat structure for deer in areas of cover includes dense vegetation, but any vegetation under four feet should be sufficiently open to allow for deer movement. Removal of nonmerchantable material would also improve their ability to evade predators while on the winter range or while transitioning between summer and winter ranges with young fawns (Graveline pers. comm.). Nonmerchantable material next to or near surviving or sprouting oaks would be removed to provide growing space and greater sunlight penetration to re-sprouting oaks that have been burned severely by in the fire.

Long-term benefits include: the ability to manage for the appropriate ratio of forage to cover, providing a more navigable landscape, and potentially reducing deer susceptibility to predation.

Roads modify deer habitat by directly removing it or indirectly reducing its quality, resulting in both short and long-term effects. Gaines et al. (2003) studied the response of several focal species, including ungulates related to roads and trails. Ungulates in this study were displaced, shifting use of habitat away from human activities on or near roads or trails. In addition, increased heart rate has been documented, which may decrease survivorship or productivity (Ibid). Rost and Bailey (1979) found deer avoid areas within 656 feet of a roads edge. New construction, temporary road construction, and reconstruction would result in increased habitat fragmentation and disturbance to deer. The potential for road related mortality may increase during project implementation because of the increase in the amount of motorized use, particularly logging trucks.

Indicators

The following indicators provide a relative measure of the direct and indirect effects to mule deer.

1. Amount of critical winter deer range with target forage/cover ratio of 70 to 30.
2. Road density (miles per square mile) in critical winter range.
3. Retention of hardwoods and hardwood aggregations, meadow and seep vegetation.

These criteria were chosen based on the best available scientific literature which focuses on various aspects of deer ecology and life history requirements. These criteria focus on those life history aspects, or habitat elements, considered most limiting to deer persistence across their range and where project effects are expected.

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Indicator 1. Under Alternative 1, 1,064 acres were identified for removal of nonmerchantable material. Table 3.15-17 displays units identified or created and associated nonmerchantable material removal acres.

Deer are expected to benefit in the short and long-term from the removal of nonmerchantable material. Under Alternative 1, habitat quality would be improved on about 19 percent of the critical winter range as shown in the Terrestrial BE Appendix. Nonmerchantable material would be removed in a mosaic pattern such that patches of surviving shrubs and small patches of surviving trees would be retained to provide forage and cover. Nonmerchantable material next to or near surviving or sprouting oaks would be removed to provide growing space and greater sunlight penetration to oaks. In addition, the removal of this material would allow for the uninhibited re-establishment of herbaceous vegetation important to deer in the fall and spring on the winter range. Treatments are designed to achieve optimal forage to cover ratios.

Deer would be able to navigate the winter range more effectively if this material were removed. With the dense vegetation conditions that currently exist, deer have limited movement corridors within the winter range and are more susceptible to predation; therefore by removing this material, habitat conditions would be improved. Proposed treatments would result in beneficial impacts on individual fitness through increased forage availability and quality, as well as the potential reduction in susceptibility to predation. Indicator 2. Table 3.15-18 displays the miles of each type of road related treatment in Alternative 1 and the resulting miles per square mile.

The road treatments under Alternative 1 would result in an increase of 0.8 miles per square mile of road utilized for motor vehicle traffic, effectively increasing the road density from 3.6 miles per square mile to 4.4 miles per square mile during implementation. This may increase the potential for road related mortality during implementation while the roads are open and regularly used. Most project activity would be accomplished during the non-winter season, and any road improved for project related activities would be blocked before the winter season. Therefore, negative effects to non-migratory deer are expected to be higher because these deer would be displaced. The effects are expected to be minor and of short duration. The new permanent road, designated as blocked Maintenance Level 1 or gated year round Level 2, would alleviate the risk of disturbance during the critical winter period due to intermittent management use. Obliterated temporary roads would provide deer browse over time.

Indicator 3. Alternative 1 has no requirements for retention and protection of hardwood aggregates. This could result in the removal of newly sprouting hardwood aggregations of 1/10 to ½ acre if the trees are not large enough to be protected under the retention of all hardwoods greater than or equal to 12 inches dbh management requirement. Although aggregations are not mapped, a few have been observed after the fire. Under Alternative 1, they would not be retained.

Hardwood aggregations are important in holding areas, areas where deer “hole up” for a few days to several weeks until conditions (such as weather) cause them to continue on with their migration (Bertram 1977). Holding areas are often areas with a dominant hardwood component. Deer often put on significant fat reserves in these holding areas essential to help get them through the tough winter months. Hardwood aggregations on the winter range are important because the acorns provide the greatest potential to maintain fat reserves. The removal of any potential aggregations of hardwoods under this alternative would have a negative effect on deer. Because it is not known how many aggregations may be affected, the extent of adverse impacts is unknown.

CUMULATIVE EFFECTS

The impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered (found in Appendix B, Cumulative Effects). Some, but not all of these actions have or may contribute cumulatively to effects on mule deer. Risk factors potentially affecting mule deer abundance and distribution has been identified and include range decadence, degradation, and loss of acorn producing oaks. The following evaluation criterion was used as a relative measure of cumulative effects from this alternative to mule deer: Habitat Modification.

Habitat Modification

Federal Lands

Past, present, and foreseeable future timber harvests and hazard tree removal sales on public lands have and will result in habitat modification to deer. Present actions within the analysis area include: Groovy and Funky Timber Sales (part of the Twomile Ecological Restoration Vegetation Management Project), and the Soldier Creek Timber Sale. These sales are scheduled to treat about 2,045 acres through commercial thinning, biomass removal, mastication, and prescribed fire treatments. These types of treatments can benefit deer through opening up the understory reestablishing herbaceous and shrub vegetation and providing new and more palatable forage. These projects are located in general habitat areas and not critical winter or summer range. In addition, the Yosemite National Park hazard tree removal on 816 acres is expected to have a negligible effect on deer habitat and use.

Foreseeable future actions on federal lands includes Reynolds Creek Ecological Restoration involving meadow and aspen restoration. These types of projects generally include the removal of encroaching trees. These treatments are occurring in potential transition areas and would benefit deer by providing important forage during migration between summer and winter ranges. In addition, Twomile Ecological Restoration Vegetation Management Project (Campy, Looney, and Thommy Timber Sales) and Reynolds Creek Timber Sale are scheduled to be implemented over the next few years and will result in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. These treatments will benefit deer as described under present actions above. As a result of the Rim Fire, the Rim HT project, scheduled for implementation beginning in the summer of 2014, is expected to have negligible effects on deer habitat and use.

Thirteen grazing allotments are either wholly or partially within the analysis area, resulting in a maximum number of 1,632 cow/calf pairs across the landscape. Cattle are speculated to exclude deer from important critical summer foraging areas, but this conflict does not occur on the winter range (Gerstenberg pers. comm.). Grazing practices may influence meadow hydrology and the quality of forage available for deer year round and throughout the analysis area.

Road density is known to affect deer through changes in behavior and habitat modification as discussed in this analysis. Twomile Transportation, a foreseeable future action, will result in a slight reduction in motorized routes, essentially removing 11.4 miles by gating, decommissioning, or closing to Maintenance Level 1. Reynolds Creek Motorized Routes project will decommission 3.5 miles of unauthorized routes in the near future as well. The Mi-Wok OHV Restoration project proposes to block and restore 11.6 miles of unauthorized OHV routes. While these route segments are not in critical winter or summer range, there are year round resident deer and deer that travel through these areas that are expected to benefit from a reduction in about 26.5 miles of motorized roads and trails across the landscape.

Private Lands

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acres on private land are presently being salvage logged and are expected to have herbicide applied and to be replanted. While this may benefit deer with a flush of new and more palatable forage, benefits on private lands are expected to be limited in space and time based on typical reforestation efforts.

Alternative 1 Contribution/Summary

Alternative 1 is expected to contribute cumulatively to effects on mule deer. Removal of nonmerchantable material is expected to open up the understory and provide new and more palatable forage for deer. The proposed 1,064 acres of biomass removal on the Tuolumne Deer Herds critical winter range and migration pinch points would improve habitat conditions on about 12 percent of the critical winter range. Biomass removal is expected to benefit deer in year round and transition habitat areas in the short-term. Alternative 1 would result in an increase in road density within critical winter range, including the addition of 0.5 miles of new permanent road construction. These effects are expected to impact deer in the short-term during project implementation. The cumulative contribution under Alternative 1 would provide minor benefits to deer in general habitat areas and would provide substantial benefits on the critical winter range near Jawbone Ridge.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under Alternative 2, death, injury, or disturbance would not be an issue because no active management would occur.

The indirect effects of No Action are related to the influence no action may have on future wildfires and how future wildfires may impact deer habitat. Predicting the effect no action would have on future wildfires and deer habitat is largely speculative given the numerous factors involved over time. As fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Chapter 3.05). However, potential fire behavior in the future may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013).

Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact deer habitat. At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and deer habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fire and Fuels Report) and ultimately affect the amount of suitable habitat available for deer. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines). The alternative could also result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre, and within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Chapter 3.05).

Indicator 1. Under Alternative 2, no removal of nonmerchantable material would occur. Within areas that burned at high severity, herbaceous vegetation is expected to be established within 3 to 5 years (Gray et al. 2005 and Moghaddas et al. 2008) which would benefit deer in the short-term. When the smaller plantation trees fall, they would likely fall together creating several jackstraw piles over hundreds of acres covering a good portion of the ground and shading out herbaceous vegetation. Not only would there be a reduction in forage availability in these areas, the jackstraw trees on the ground would be difficult for deer to navigate, further reducing the effective habitat area available to them and potentially increasing their susceptibility to predation.

Deer take the same migratory path every year (Bertram 1977). Because of this, migration pinch points that burned at high severity are at risk of becoming un-navigable by the deer that use them if the nonmerchantable material were left on site. Navigation of migration corridors and pinch points would be more difficult under this alternative, especially for does travelling with young fawns. They would be forced to find a new route through unfamiliar territory and may be more susceptible to predation.

When wildfire returns to this landscape, the remaining habitat adjacent to or near areas that burned at high severity may be at increased risk of loss. As mentioned previously, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons per acre) than the desired condition as described in the Stanislaus National Forest, Forest Plan (Rim EIS Fire and Fuels Report). This would significantly increase the risk of fire suppression activities when wildfire occurs in the future. Oaks that survived the Rim Fire or those that are re-sprouting would be at increased risk of loss under these conditions. The synergistic effects over time to the forage and habitat availability to deer on the winter range in particular could be devastating to the population. The negative long-term effects on habitat for deer of this alternative outweigh the short-term beneficial effects.

Indicator 2. Under Alternative 2, no new permanent road construction, temporary road construction, reconstruction, or maintenance would occur. This alternative would provide the greatest benefit to deer because there would be no increase in road density across the analysis area and no potential increase of road related mortality in the short or long-term.

Indicator 3. Under Alternative 2, all hardwood aggregations, meadow and seep vegetation would be retained which may have short-term beneficial effects. As discussed under Indicator 1 under this alternative, the increased susceptibility to future wildfire would put these aggregations at higher risk than any of the action alternatives.

CUMULATIVE EFFECTS

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, there would be no direct cumulative effect expected because no active management would occur.

Alternative 2 Contribution/Summary: The cumulative contribution under Alternative 2 include: New understory vegetation would be expected to become established and provide new and more palatable forage that would benefit deer in the short-term. Existing conditions consisting of dense standing dead conifers throughout the critical winter range would remain. Over time, these snags will fall and contribute to fuel loads that would potentially increase fire behavior in the future. The remaining suitable habitat would be at greater risk of loss to the next wildfire under these conditions. The short-term beneficial impacts to deer such as increased early successional habitat would be outweighed by the long-term negative impacts.

Alternative 3

DIRECT AND INDIRECT EFFECT

Indicator 1. Under Alternative 3, 1,739 acres were identified for removal of nonmerchantable material. Table 3.15-17 displays units identified and associated nonmerchantable material removal acres. Under Alternative 3, additional units within the critical winter range were identified for biomass removal. Deer are expected to benefit in the short and long-term from the removal of nonmerchantable material. Under Alternative 3, habitat quality would be improved on 63 percent of the critical winter range as shown in the Terrestrial BE Appendix.

Nonmerchantable material would be removed in a mosaic pattern such that patches of surviving shrubs and small patches of surviving trees would be retained to provide forage and cover. Nonmerchantable material next to or near surviving or sprouting oaks would be removed to provide growing space and greater sunlight penetration to the oaks. In addition, the removal of this material would allow for the uninhibited re-establishment of herbaceous vegetation important to deer in the fall and spring on the winter range. Treatments are designed to achieve optimal forage to cover ratios.

Deer would be able to traverse the winter range more effectively if this material were removed. With the dense vegetation conditions that currently exist, deer have limited movement corridors within the winter range and are more susceptible to predation. Therefore, by removing this material, habitat conditions would be improved. These treatments would result in beneficial impacts on individual fitness through increased forage availability and quality, as well as the potential reduction in susceptibility to predation.

Indicator 2. Table 3.15-18 displays the miles of each type of road related treatment in Alternative 3 and the resulting miles per square mile. Under Alternative 3, no new permanent road construction is proposed. The temporary road construction, reconstruction and maintenance proposed under these alternatives would result in an increase of 0.9 miles per square mile of road utilized for motor vehicle traffic, effectively increasing the road density from 3.6 miles per square mile to 4.5 miles per square mile during implementation. This may increase the potential for road related mortality project implementation while the roads are open and regularly used. Most project activity would be accomplished during the non-winter season, and any road improved for project related activities would be blocked before the winter season. Therefore, adverse effects to non-migratory deer are expected to be higher because these deer would be displaced. The effects are expected to be minor and of short duration.

Indicator 3. Under Alternative 3, all hardwood aggregations, meadow and seep vegetation within units would be flagged, avoided, and retained. Aggregations are 0.1 to 0.5 acre groups of sprouting hardwood or of meadow or seep vegetation. Although aggregations aren't mapped, a few have been observed after the fire. Hardwood aggregations are important in holding areas, areas where deer "hold up" for a few days to several weeks until conditions (such as weather) cause them to continue on with their migration (Bertram 1977). Holding areas are often areas with a dominant hardwood component. Deer often put on significant fat reserves in these holding areas essential to help get them through the tough winter months. Hardwood aggregations on the winter range are important because the acorns provide the greatest potential to maintain fat reserves. Retaining the aggregations of hardwoods under these alternatives would benefit deer. Because it is not known how many aggregations may be affected, the extent of beneficial impacts is unknown.

CUMULATIVE EFFECTS

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands and are considered in Alternative 3. The cumulative contribution of Alternatives 3 would be greater than those described under Alternative 1 because the Tuolumne Deer Herd critical winter range would have an additional 675 acres of nonmerchantable material removed, improving habitat conditions across 63 percent of the critical winter range. Fuels treatments, including biomass removal and pile and burning outside the critical winter range, would affect 6,640 acres within treatment units and are expected to benefit deer in year-round and transition habitat areas in the short-term. There would be no new permanent road construction under Alternative 3. The cumulative contribution under Alternatives 3 would provide minor benefits to deer in general habitat areas and would provide substantial benefits on the critical winter range near Jawbone Ridge.

Alternative 4

DIRECT AND INDIRECT EFFECTS

Same as Alternative 3.

CUMULATIVE EFFECTS

Same as Alternative 3.

Mule Deer: Summary of Effects

Indicator 1. Table 3.15-17 shows Alternatives 3 and 4 would improve the greatest amount of habitat by removing nonmerchantable material. Of the action alternatives, Alternative 1 would improve the least amount of habitat.

Table 3.15-17 Summary of nonmerchantable material removal

Alternative	Units with Nonmerchantable Material Removal	Total Acres
1	L03, L06, L07, L202-206, M201, O201, P201	1,064
2	N/A	0
3	L03, L04, L07, L201-206, M201-204, O201, P201	1,739
4	L03, L04, L07, L201-206, M201-204, O201, P201	1,739

Indicator 2. Table 3.15-18 shows the amount of new permanent road construction is highest under Alternative 1. There is no new permanent road construction proposed under Alternatives 3 and 4. Increases to road density are similar among all action alternatives, but long-term effects related to road density are greatest under Alternative 1 because of the new permanent road construction.

Table 3.15-18 Mule Deer Summary of Effects

Indicator	Metric	Alternative			
		1	2	3	4
Amount of critical winter deer range with target forage/cover ratio of 70 to 30	Nonmerchantable material removal (acres)	1,064	0	1,739	1,739
	Total acres on trajectory toward desired forage/cover ratio	1,352	0	4,416	4,416
Road density in critical winter deer range	New permanent road construction (miles)	0.5	0	0	0
	Road reconstruction: designated for motor vehicle travel (miles)	15.8	0	22.6	22.6
	Road reconstruction: not designated for motor vehicle travel (miles)	5.4	0	4.0	4.0
	Temporary road (miles)	3.3	0	6.4	6.4
	Roads added for project use during implementation (miles per square mile)	0.8	0	0.9	0.9
	Total road density existing plus additional for project (miles per square mile)	4.4	3.6	4.5	4.5
Retention of hardwoods and hardwood aggregations, meadow and seep vegetation	Hardwood aggregates, meadows and seep vegetation retained	No	Yes	Yes	Yes

Indicator 3. Hardwood aggregations, meadow and seep vegetation would be retained under Alternatives 3 and 4 and would provide the greatest beneficial effects to deer. No retention would occur under Alternative 1.

3.16 Short-Term Uses And Long-Term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Short-term uses are those that occur within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project is complete. Harvesting or salvaging of standing trees can be considered a short-term use of a renewable resource. Trees can be reestablished and grow if the long-term productivity of the land is maintained. Long-term productivity is maintained through application of management requirements described in Chapter 2, in particular those applicable to soil and water resources.

The action alternatives (1, 3 and 4) all would provide for the long-term productivity of the project area through removal of biomass and other fuel reduction actions creating a resilient forest where areas can recover from future fire effects naturally. Harvesting or salvaging standing trees will generate short-term economic returns through the sale of salvage timber, as well as providing for worker and public safety in the most critical areas within a short timeframe.

3.17 Unavoidable Adverse Effects

Implementation of any of the alternatives would result in some unavoidable adverse environmental effects. Although formation of the alternatives included avoidance of some effects, other adverse effects could occur that cannot be completely mitigated. The environmental consequences section for each resource area discusses these effects.

3.18 Irreversible And Irretrievable Commitments

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of a mined ore. No irreversible commitments of resources would result from implementation of any of the alternatives because no permanent, irreversible resource loss would occur.

Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road. Irretrievable losses can be regained over time. Implementation of all action alternatives would not irretrievably commit resources, but help in the long-term recovery of the landscape.

3.19 Other Required Disclosures

The Rim Recovery project was prepared in accordance with the following laws and regulations.

National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) requires that all major federal actions significantly affecting the human environment be analyzed to determine the magnitude and intensity of those impacts and that the results be shared with the public and the public given opportunity to comment. The regulations implementing NEPA further require that to the fullest extent possible, agencies shall prepare EISs concurrently with and integrated with environmental analyses and related surveys and studies required by the Endangered Species Act of 1973, the National Historic Preservation Act of 1966, and other environmental review laws and executive orders. Other laws and regulations that apply to this project are described below.

Clean Air Act

The Clean Air Act of 1970 provides for the protection and enhancement of the nation's air resources. No exceeding of the federal and state ambient air quality standards is expected to result from any of the alternatives. The Clean Air Act makes it the primary responsibility of States and local governments to prevent air pollution and control air pollution at its source.

California has a plan that provides for implementation, maintenance, and enforcement of the primary ambient air quality standards. This project is located in an area designated as non-attainment for Ozone. The burn treatments under Modified Alternative 4 will be conducted under an EPA approved California Smoke Management Program (SMP). Under the revised Conformity Rules the EPA has included a Presumption of Conformity for prescribed fires that are conducted in compliance with a SMP; therefore, the federal actions conform and no separate conformity determination is indicated (EIS Chapter 3.02).

Clean Water Act

The Clean Water Act of 1948 (as amended in 1972 and 1987) establishes federal policy for the control of point and non-point pollution, and assigns the states the primary responsibility for control of water pollution. The Clean Water Act regulates the dredging and filling of freshwater and coastal wetlands. Section 404 (33 USC 1344) prohibits the discharge of dredged or fill material into waters (including wetlands) of the United States without first obtaining a permit from the U.S. Army Corps of Engineers. Wetlands are regulated in accordance with federal Non-Tidal Wetlands Regulations (Sections 401 and 404). No dredging or filling is part of this project and no permits are required.

Compliance with the Clean Water Act by national forests in California is achieved under state law. The California Water Code consists of a comprehensive body of law that incorporates all state laws related to water, including water rights, water developments, and water quality. The laws related to water quality (sections 13000 to 13485) apply to waters on the national forests and are directed at protecting the beneficial uses of water. Of particular relevance for the Rim Recovery project is section 13369, which deals with non-point-source pollution and best management practices. As described in the EIS (Chapter 3.14), all actions in Alternative 4 (hence Modified Alternative 4 also) result in the maintenance of the applicable beneficial uses of water in the Water Quality Control Plan for the California Central Valley Water Quality Control Board.

Endangered Species Act

Section 7 (d) of the Endangered Species Act (ESA) of 1973 requires that after initiation of consultation required under section 7(a)(2), a Federal agency "shall not make any irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative which would not violate subsection (a)(2)."

The Rim Fire started on August 17, 2013. Several days later, it became clear the Rim Fire was a large incident, the forest initiated contact with the USFWS to alert them of potential impacts from the fire or fire suppression activities to listed species, including valley elderberry longhorn beetle and listed or candidate amphibian species. Forest service biologists conducted a field trip with a USFWS biologist in the Rim Fire burn area on November 4, 2013 to discuss conditions and concerns for listed species.

The Forest Service then prepared a Biological Assessment (BA) and a subsequent addendum following a meeting with USFWS, considering the effects to three federally listed species: California red-legged frog (Threatened), Sierra Nevada yellow-legged frog (Endangered), and valley elderberry longhorn beetle (Threatened) are found within the project analysis area in Tuolumne County, California (USFWS 2014). That BA requested concurrence with the determination that the overall project 'may affect, not likely to adversely affect" the valley elderberry longhorn beetle, and "may affect, likely to adversely affect" California red-legged frog and Sierra Nevada yellow-legged frog. As such, the Forest Service engaged with the USFWS in formal consultation and requested a Biological Opinion (BO) in support of these determinations with the acknowledgement that effects to individuals or habitat are not discountable.

The determination of "may affect, likely to adversely affect" for California red-legged frog and Sierra Nevada yellow-legged frog was limited to 7 locales. Section 7(a)(2) of the ESA requires Federal agencies, in consultation with USFWS and the National Marine Fisheries Service (NMFS), to insure that their actions are "not likely to jeopardize the continued existence of any" listed species (or destroy or adversely modify its designated critical habitat; 16 U.S.C. § 1536(a)(2)). As such, my decision is that no operational implementation activities will occur in those 7 locales as part of this decision until such time as formal consultation with USFWS results in issuance of a BO.

Approval and operational implementation of Rim Recovery project activities outside of the 7 very limited locales referred to above during consultation and prior to completion of formal consultation with USFWS and issuance of a BO is consistent with the requirements of ESA Section 7(d) because approval and/or conduct of these activities will not foreclose the formulation or implementation of any Reasonable and Prudent Alternative (RPA) measures that may be necessary to avoid jeopardy (or the likely destruction or adverse modification of critical habitat). The project does not lie within a critical habitat unit for the California red legged frog per the Federal Register (March 17, 2010; Volume 75, Number 51) and is not within a proposed critical habitat unit for the Sierra Nevada yellow legged frog per the Federal Register (April 25, 2013; Volume 78, Number 80).

Consistent with such, the Rim Recovery project unit specific treatments detailed in Table B.02-1 (Appendix B) reflect project management requirements and the content of the BA and subsequent addendum including minimization measures. No operational implementation activities or treatments associated with the 7 very limited locales related to California red-legged frog and Sierra Nevada yellow-legged frog will be undertaken prior to completion of formal consultation with USFWS and issuance of a BO.

Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Population" requires that federal agencies make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority populations and low-income populations. As described in the EIS (Chapter 3.10), Alternative 4 (hence Modified Alternative 4 also) will not disproportionally impact minority or disadvantaged groups.

Floodplain Management

Executive Order 11988 applies to Floodplain Management. Floodplains are found along stream channels throughout the project area. Implementation of this decision would maintain or improve the existing condition of these floodplains by maintaining or improving meadow conditions. The intent of Executive Order 11988 would be met since this project would not affect floodplains in the Rim Recovery analysis area and thereby would not increase flood hazard. As described in the EIS

(Chapter 3.14) no measurable changes in stream flow are anticipated from treatment actions under Alternative 4 (hence Modified Alternative 4 also).

Migratory Bird Treaty Act

The Migratory Bird Treaty Act decreed that all migratory birds and their parts (including eggs, nests, and feathers) were fully protected. Under the Act, taking, killing or possessing migratory birds is unlawful. The original intent was to put an end to the commercial trade in birds and their feathers that had wreaked havoc on the populations of many native bird species. On January 17, 2001, President Clinton signed an executive order (Executive Order 13186) directing executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act (FR Vol. 66, No.11, January 17, 2001).

The Forest Service and USFWS entered into a memorandum of understanding (MOU) to promote the conservation of migratory birds as a direct response to the executive order (USDA and USFWS 2008). One of the steps outlined for the Forest Service is applicable to this analysis: "Within the NEPA process, evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors." The Forest Service additionally agreed, to the extent practicable, to evaluate and balance benefits against adverse effects, to pursue opportunities to restore or enhance migratory bird habitat, and to consider approaches for minimizing take that is incidental to otherwise lawful activities.

This decision complies with the Migratory Bird Treaty Act but may result in an "unintentional take" of individuals during proposed activities. However the project complies with the USFWS Director's Order #131 related to the applicability of the Migratory Bird Treaty Act to Federal agencies and requirements for permits for "take". In addition, this project complies with Executive Order 13186 because the analysis meets agency obligations as defined under the January 16,2001 Memorandum of Understanding between the Forest Service and USFWS designed to complement Executive Order 13186 (Migratory and Landbird Conservation Report 2014). If new requirements or direction result from subsequent interagency memorandums of understanding pursuant to Executive Order 13186, this project would be reevaluated to ensure that it is consistent.

National Forest Management Act

The National Forest Management Act (NFMA) of 1976 amends the Forest and Rangeland Renewable Resources Planning Act of 1974 and sets forth the requirements for Land and Resource Management Plans for the National Forest System.

The Forest Service completed the Stanislaus National Forest Land and Resource Management Plan (Forest Plan) on October 28, 1991. The "Forest Plan Direction" (USDA 2010a) presents the current Forest Plan management direction, based on the original Forest Plan, as amended. The Forest Plan identifies land allocations and management areas within the project area including: Wild and Scenic Rivers, Proposed Wild and Scenic Rivers, Critical Aquatic Refuge (CAR), Riparian Conservation Areas (RCAs), Near Natural, Scenic Corridor, Special Interest Areas, Wildland Urban Intermix, Protected Activity Centers (PACs), Old Forest Emphasis Areas, and Developed Recreation Sites.

The Forest Plan and its amendments were prepared pursuant to the 1982 version of the National Forest Management Act (NFMA) planning regulations (36 C.F.R. § 219 (1983)). The current regulations, adopted in 2012 supersede those regulations, as well as other versions of the NFMA planning regulations (36 C.F.R. § 219.17(c) "This part supersedes any prior planning regulation."). The current NFMA planning regulations do not apply to this project (36 C.F.R. § 219.7(c) "None of the requirements of this part apply to projects or activities on units with plans developed or revised under a prior planning rule …”). Therefore, the sole NFMA duty applicable to this project is for the project to be consistent with the governing Forest Plan[9].

The Forest Plan Compliance document (project record) identifies the Forest Plan S&Gs applicable to this project and provides related information about compliance with the Forest Plan. Based on my review of that document and other information in the project record, I determined that Modified Alternative 4 is consistent with the Forest Plan and all other requirements of the National Forest Management Act.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966 is the principal, guiding statute for the management of cultural resources on NFS lands. Section 106 of NHPA requires federal agencies to consider the potential effects of a Preferred Alternative on historic, architectural, or archaeological resources that are eligible for inclusion on the National Register of Historic Places and to afford the President’s Advisory Council on Historic Preservation an opportunity to comment. The criteria for National Register eligibility and procedures for implementing Section 106 of NHPA are outlined in the U.S. Code of Federal Regulations (36 CFR Parts 60 and 800, respectively). Section 110 requires federal agencies to identify, evaluate, inventory, and protect National Register of Historic Places resources on properties they control.

The Stanislaus National Forest developed a specialized agreement: “Programmatic Agreement Among United States Department of Agriculture, Forest Service, Stanislaus National Forest, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Program of Rim Fire Emergency Recovery Undertakings, Tuolumne County, California” (Rim PA 2014). This agreement defines the Area of Potential Effects (APE) (36 CFR 800.4(a)(1)) and includes a strategy outlining the requirements for cultural resource inventory, evaluation of cultural resources, and effect determinations; it also includes protection and resource management measures that may be used where effects may occur. Additionally, this agreement provides opportunities to remove both commercially valuable timber and hazard trees from within site boundaries utilizing a variety of harvest methods.

Protection of Wetlands

Executive Order 11990 requires protection of wetlands. Wetlands within the project area include meadows, stream channels, springs, fens, and shorelines. The EIS (Chapter 3.03 and Chapter 3.14) and the Watershed Report (project record) address wetlands and riparian vegetation. This project is consistent with Executive Order 11990 since this project would maintain or improve the condition of wetlands in the Rim Recovery project area (EIS Chapter 3.14).

[9] The Forest Plan, although developed pursuant to the 1982 planning regulations, did not incorporate any specific aspects of those planning regulations. For example, the Forest Plan includes Management Indicator Species (MIS) and was designed to maintain the viability of wildlife species, as required by the former 36 C.F.R. § 219.19 regulations, the Forest Plan did not incorporate any of the particular legal requirements from the 1982 regulations related to MIS or viability. Therefore, the 1982 regulations are not directly applicable to this project.

4. Consultation and Coordination

This Chapter includes a section for Preparers and Contributors followed by a section for Distribution of the EIS.

4.01 Preparers and Contributors

The Forest Service worked with the following individuals; federal, state and local agencies; organizations; and, tribes during the development of this EIS.

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Team Responsibility: Aquatic Biologist

Federal, State and Local Agencies

Advisory Council on Historic Preservation
California Department of Fish and Wildlife
California Department of Transportation
USDI Fish and Wildlife Service
Yosemite National Park

Organizations

American Forest Resource Council
American Motorcyclist Association, District 36
Blue Mountain Minerals
California Forestry Association
Central Sierra Audubon Society
Central Sierra Environmental Resource Center
CT Bioenergy Consulting
Gold Rush News
James R. Dambacher Construction
Merced Dirt Riders/4x4 in Motion
Mule Deer Foundation
Rim Fire Technical Workshop
Sierra Pacific Industries
Stanislaus Trail Bike Association
Tuolumne County
Tuolumne County Alliance for Resources and the Environment (TuCARE)
Tuolumne County Farm Bureau
Tuolumne County Sportsmen
Tuolumne Group Sierra Club
Tuolumne River Trust
Yosemite Deer Herd Advisory Council
Yosemite Stanislaus Solutions (YSS)

Tribes

Tuolumne Band of Me-Wuk Indians

4.02 Distribution of the EIS

The Forest Service is circulating either the EIS or a notice of the availability of the EIS to the following agencies, elected officials, tribes, organizations and individuals.

Federal, State and Local Agencies

Federal Agencies

Advisory Council on Historic Preservation, Director, Planning and Review
Army Corp of Engineers
Environmental Protection Agency, Region 9 EIS Review Coordinator
Federal Aviation Administration, Western-Pacific Region Regional Administrator
Federal Highway Administration
National Marine Fisheries Service Habitat Conservationists Division Southwest Region
Rural Utilities Service
USDA APHIS PPD/EAD
USDA National Agricultural Library Head Acquisitions and Serials Branch
USDA Natural Resources Conservation Service, National Environmental Coordinator
USDA Office of Civil Rights
US Coast Guard, Environmental Management
US Department of Energy, Director, Office of NEPA Policy and Compliance
USDI Bureau of Land Management
USDI Fish and Wildlife Service
USDI Office of Environmental Policy and Compliance
Yosemite National Park

California State Agencies

California Department of Fish and Wildlife
California Department of Transportation
California Water Resources Control Board
State of California Sierra Nevada Conservancy
State Clearing House (California)

Local Agencies

Modesto Irrigation District
Tuolumne County Fish and Game
San Francisco, Hetch Hetchy Water and Power
San Francisco Public Utilities Commission
Turlock Irrigation District

Elected Officials

Federal Officials

Congressman Jeff Denham
Congressman Tom McClintock
Senator Barbara Boxer
Senator Diane Feinstein

California State Officials

Kristen Olsen, California Assembly
Tom Berryhill, California Assembly

Local Officials

Connie Williams, City of Sonora Council
Mariposa County Board of Supervisors
Tuolumne County Board of Supervisors

Tribes

Tuolumne Band of Me-Wuk Indians

Organizations

Associated California Loggers
American Forest Resource Council
California Forestry Association
California Native Plant Society
Center for Biological Diversity
Central Sierra Audubon Society
Central Sierra Environmental Resource Center
CT Bioenergy Consulting
John Muir Project of Earth Island Institute
Mule Deer Foundation
North Coast Rivers Alliance
Sierra Forest Legacy
Sierra Pacific Industries
TuCARE
Tuolumne County Sportsman, Inc.
Tuolumne Group of the Sierra Club
Tuolumne River Trust

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Arnold, Loren
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Catherine, John
Charles, Cindy
Chavez, Christa
Claunch, Alan
Clayton, Ronald
Cobb, Sandra
Corzo, Martha
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Dahring, Karen
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Jacobs, Shannon
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Keitelman, Mary
Kesich, John
Knightly, Nickolas
Koch, Walter
Kramarz, Ken
Lackey, Mercedes
Litehiser, Joe
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Long, Marcie
Martelli, Arnold
Martin, Joe
Maykel, Ron
McGinnis, Margaret
McKenzie, Leonard
McMullin, William
Miller, Susan
Montgomery, F.
Morem, Judith
Morris, Sharon
Nena, Amber
Nettles., Michael
Nitz, Jennifer
Ohlenkamp, Kris
Parker, Debby
Phelan, James L
Pierson, James
Poehner, Mark
Ramos, Sigrid
Re, Patricia
Reinertsen, Mary
Rhodes, Jon
Richardson, Matt
Richmond, Lonna
Riddle, Carolyn
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Rougle, Wolfgang
Ruby, Kenneth
Ryther, David
Salazar, Veronica
Sayers, Lois
Scheuermann, Karen
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Scott, Ingrid
Selter, Carol
Shirley, Aida
Shubert, Lois E.
Silvers, Rod
Simpson, Sheila
Smernoff, David
Sondgeroth, Casey
Sperling, Ruth
Stanley, Sandra
Sugars, Marc
Tallal, Jimy
Tearson, P
Tek, Leon
Thompson, Arnie
Thompson, Jeffrey
Thompson, Larry
Toepke-Floyd, Marty
Toner, William
Tornieporth, Nadia
Trips, Arta
Vest, Lori
Vielma, Stacey
Wagner, Lara
Wallerstein, Beatrice
Walters, Patty
Wayland, Brian
Weberg, Melanie
Weinstein, Elyette
Weinstein, Joseph
Westbrook, Janet
Winks, Matthew
Wulff, Deanna
Ycasas, Joyce
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References

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A. Abbreviations and Acronyms

ACHP	Advisory Council on Historic Preservation
AMS	Aquatic Management Strategy
APCD	Air Pollution Control District
APE	Area of Potential Effects
ATV	All-Terrain Vehicle
BA	Biological Assessment
BACM	Best Available Control Measure
BAER	Burned Area Emergency Response
BARC	Burned Area Reflectance Classification
BE	Biological Evaluation
BF	Board Feet
BLM	Bureau of Land Management
BMI	Benthic Macro Invertebrate
BMP	Best Management Practices
BST	Bituminous Surface Treatment
BTU	British Thermal Units
CAA	Clean Air Act
CAR	Critical Aquatic Refuge
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CRMR	Cultural Resources Management Report
CSO	California Spotted Owl
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
CSERC	Central Sierra Environmental Resource Center
CWD	Coarse Woody Debris
CWE	Cumulative Watershed Effects
CWHR	California Wildlife Habitat Relationships
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EHR	Erosion Hazard Rating
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERA	Equivalent Roaded Acres
ESA	Endangered Species Act of 1973
ESD	Emergency Situation Determination
FCCC	Forest Carnivore Connectivity Corridor
FFE	Fire and Fuels Extension

FOFEM	First Order Fire Effects Model
FS	Forest Service
FSEIS	Final Supplemental Environmental Impact Statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSS	Forest Service Sensitive
FTS	Forest Transportation System
FYLF	Foothill yellow-legged frog
GIS	Geographic Information System
GTR	General technical Report
HCRA	Home Range Core Area
HFC	Hydrologic Function Class
HFRA	Healthy Forests Restoration Act
HR	Heritage Resources
HSA	Hydrologically Sensitive Area
HT	Hazard Trees
HUC	Hydrologic Unit Code
ID	Interdisciplinary
IDT	Interdisciplinary Team
INFRA	Infrastructure Database
IRA	Inventoried Roadless Area
JPB	Jackpot Burning
LOP	Limited Operating Period
EHR	Erosion Hazard Rating
MBF	Thousand Board Feet
MMBF	Million Board Feet
MBTA	Migratory Bird Treaty Act
MIS	Management Indicator Species
ML1	Maintenance Level 1 Road
ML2	Maintenance Level 2 Road
MOI	Memorandum of Intent
MYLF	Mountain yellow-legged frog
NEPA	National Environmental Policy Act
NF	National Forest
NFMA	National Forest Management Act
NFS	National Forest System
NFSR	National Forest System Road
NFST	National Forest System Trail
NHPA	National Historic Preservation Act
NMFPA	Non-motorized Forest Plan Amendment
NOI	Notice of Intent
NRHP	National Register of Historic Places
NRIS	Natural Resource Information System
NVUM	National Visitor Use Monitoring
OFEA	Old Forest Emphasis Area

OHV	Off-Highway Vehicle
PA	Programmatic Agreement
PAC	Protected Activity Center
PM	Particulate Matter
PSW	Pacific Southwest Research Station
R5	Forest Service Region 5
RAVG	Rapid Assessment of Vegetation Condition after Wildfire
RCA	Riparian Conservation Area
RCO	Riparian Conservation Objective
RD	Ranger District
RNA	Research Natural Area
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
SAF	Special Aquatic Feature
SFMF	Strategic Fire Management Features
SHPO	State Historic Preservation Officer
SIA	Special Interest Area
S&G	Standard and Guideline
SMP	Smoke Management Program
SNFPA	Sierra Nevada Forest Plan Amendment
SNYLF	Sierra Nevada Yellow-Legged Frog
SOPA	Schedule of Proposed Actions
SPI	Sierra Pacific Industries
SPLAT	Strategically Placed Landscape Area Treatment
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized
SSI	StreamScape Inventory
STF	Stanislaus National Forest
TE	Threatened and Endangered
TES	Threatened, Endangered and Sensitive
TOC	Threshold of Concern
TuCARE	Tuolumne County Alliance for Resources and Environment
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VELB	Valley Elderberry Longhorn Beetle
VQO	Visual Quality Objective
WSA	Watershed Sensitive Area
YNP	Yosemite National Park
YSS	Yosemite Stanislaus Solutions

B. Cumulative Effects Analysis

According to the CEQ NEPA regulations, “cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7). The Forest queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands. This appendix lists the specific findings and information used for the cumulative effects analysis presented for each resource in Chapter 3.

Past Actions

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects. This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis for three reasons.

First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Innumerable actions over the last century (and beyond) impacted current conditions and trying to isolate the individual actions with residual impacts would be nearly impossible.

Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because information on the environmental impacts of individual past actions is limited, and one cannot reasonably identify each and every action over the last century that contributed to current conditions. Additionally, focusing on the impacts of past human actions ignores the important residual effects of past natural events which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects.

Finally, the CEQ issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions” (CEQ 2005).

The cumulative effects analysis in this EIS is also consistent with the Forest Service’s NEPA Regulations on cumulative effects analysis (36 C.F.R. § 220.4(f) (“Cumulative effects considerations of past actions”), which state:

> Cumulative effects analysis shall be carried out in accordance with 40 CFR 1508.7 and in accordance with “The Council on Environmental Quality Guidance Memorandum on Consideration of Past Actions in Cumulative Effects Analysis” dated June 24, 2005. The analysis of cumulative effects begins with consideration of the direct and indirect effects on the environment that are expected or likely to result from the alternative proposals for agency action. Agencies then look for present effects of past actions that are, in the judgment of the agency, relevant and useful because they have a significant cause-and-effect relationship with the direct and indirect effects of the proposal for agency action and its alternatives. CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects

> of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonably foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7).

For these reasons, the analysis of past actions in this section is based on current environmental conditions described in Chapters 1 and 2.

Present Actions

For the purposes of cumulative effects analysis, present actions include: ongoing activities; Forest Service and other Federal land disturbance actions with completed NEPA decisions that are not yet fully implemented on the ground; and private land activities.

Ongoing Activities

Ongoing activities on NFS lands within the Rim Fire perimeter include:

Livestock Grazing: 13 grazing allotments are either wholly or partially within the cumulative analysis area as defined previously. The maximum number of cattle run across all the allotments is about 1,632 cow/calf pairs in any given season. Grazing is subject to utilization standards in the SNFPA (2004) that protect resources such as meadow habitat.

Recreation: recreation is abundant in the area and consists of activities including, but not limited to, Off Highway Vehicle (OHV) use, passenger car driving, wood cutting, camping (dispersed and developed), hiking, cycling (mountain and road), fishing, backpacking, horseback riding, and winter sports. These recreation activities provide increased human access to the forest.

Forest Service

Table B.01-1 displays present NFS land disturbance actions, followed by a brief description of each.

Table B.01-1 Present National Forest System land disturbance actions

Project	Purpose	Decision	Acres
Twomile Ecological Restoration Vegetation: Groovy Timber Sale	Green Thinning	2012	839
Twomile Ecological Restoration Vegetation: Funky Timber Sale	Green Thinning	2012	1,031
Soldier Creek Timber Sale	Green Thinning	2008	175
		total	**2,045**

Groovy Timber Sale: thinning to increase structural diversity, improve wildlife habitat, and encourage pine and hardwoods. Treatments proposed on 839 acres include thinning (mechanical and hand) and biomass removal. These acres have dropped by almost half due to the fire. The high severity burn units are analyzed as part of this EIS.

Funky Timber Sale: thinning to increase structural diversity, improve wildlife habitat, and encourage pine and hardwoods. Treatments proposed on 1,031 acres include thinning (mechanical and hand) and biomass removal. These acres dropped slightly from the original proposal, two units are now a part of this EIS.

Soldier Creek Timber Sale: thinning to increase structural diversity, improve wildlife habitat, and encourage pine and hardwoods. Treatments proposed on 175 acres include thinning (mechanical and hand) and biomass removal.

National Park Service

Yosemite National Park Roadside Hazard Tree Removal: removal of hazard tree on 28.8 miles (816 acres) of high use roads within on Yosemite National Park.

Private Land

Table B.01-2 lists the present land disturbance actions on private lands that are on file with California Department of Forestry and Fire Protection (Cal Fire).

Table B.01-2 Present private lands disturbance actions

Landowner	Proposed Prescription	Acres
Choppers's Choice Emergency Notice Map	Emergency Fire Salvage	2,004
Rim Hansen Peak Emergency Overview Map	Emergency Fire Salvage	1,004
Cherry Emergency	Emergency Fire Salvage	47
Rim Northwest Emergency Overview Map	Emergency Fire Salvage	2,342
Duckwall Fireline Emergency Map	Emergency Fire Salvage	137
Schaezlein Emergency	Emergency Fire Salvage	326
Crook Property	Emergency Fire Salvage	484
Seastrom Fire Salvage/Jones Tract	Emergency Fire Salvage	168
Stone Meadow (Erickson) Emergency Notice	Emergency Fire Salvage	321
Lee Price Camp 24 Tract	Emergency Fire Salvage	200
Packard Canyon Emergency	Emergency Fire Salvage	64
Parson's Emergency	Emergency Fire Salvage	162
Quesnoy Emergency	Emergency Fire Salvage	44
Manly Emergency	Emergency Fire Salvage	141
Sawmill Emergency Notice	Emergency Fire Salvage	48
Filiberti Fire Salvage	Emergency Fire Salvage	83
Spinning Wheel EM	Emergency Fire Salvage	11
Looney-Reynolds Emergency Notice	Emergency Fire Salvage	779
Rim Woods Ridge Emergency Notice	Emergency Fire Salvage	4,531
Skunkjaw Emergency Notice	Emergency Fire Salvage	1,371
Duckwall Emergency	Emergency Fire Salvage	4,140
total		**18,407**

Reasonably Foreseeable Future Actions

The Forest Service's NEPA regulations define reasonably foreseeable future actions as: "Those Federal or non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals." 36 C.F.R. § 220.3. The regulations go on to describe an "identified proposal" as a situation in which "[t]he Forest Service has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated (see 40 CFR 1508.23)." 36 C.F.R. § 220.4(a)(1). In practice, an action becomes reasonably foreseeable and subject to meaningful evaluation when the agency has written a proposal and has circulated that proposal for public scoping. *See* 40 C.F.R. §1501.7.

For the purposes of cumulative effects analysis, the following are the reasonably foreseeable future actions within the Project's cumulative effects analysis area:

Reynolds Creek Ecological Restoration Aspen Release: aspen stand improvement/expansion involving the removal of encroaching conifers. Treatments proposed in 2 stands for 2 acres include thinning (mechanical and hand), biomass removal, removal of encroaching conifers, repairing gullies and stabilizing streambeds.

Reynolds Creek Ecological Restoration Meadow Restoration: meadow treatments including headcut repair, fencing, removal of encroaching conifers, and planting of riparian vegetation. Treatments proposed in 8 meadows for 14 acres include thinning (mechanical and hand), biomass removal, removal of encroaching conifers, repairing gullies and stabilizing streambeds.

Twomile Ecological Restoration Meadow Restoration: improve meadow function in five meadows and associated streams by raising water tables nearer to natural levels. Treatments include stabilizing banks and headcuts, revegetation with native species and subsoiling compacted areas.

Twomile Ecological Restoration Noxious Weeds: control of 2 noxious weeds: the only known population of Dyers Woad on the Stanislaus National Forest and perennial sweetpea, on 8 acres near Reed Creek. The herbicide glyphosate is proposed for treatment since 12 years of hand pulling has not eradicated the weeds.

Twomile Ecological Restoration Soil Improvement: push apart windrowed materials to restore soil productivity on 23 acres of volcanic soils in a ponderosa pine plantation established after the 1950 Wrights Creek Burn.

Rim Fire Hazard Trees: remove hazard trees and suppression felled trees within and adjacent to facilities including: 194 miles of high use roads; private property; developed sites; recreation use areas; and, powerlines. Treatments proposed on 10,315 acres.

Reynolds Ecological Restoration Timber Sale: thinning to increase structural diversity, improve wildlife habitat, and encourage pine and hardwoods. Treatments proposed on 844 acres include thinning (mechanical and hand) and biomass removal.

Campy Timber Sale: thinning to increase structural diversity, improve wildlife habitat, and encourage pine and hardwoods. Treatments proposed on 995 acres include thinning (mechanical and hand), biomass removal.

Looney Timber Sale: thinning to increase structural diversity, improve wildlife habitat, and encourage pine and hardwoods. Treatments proposed on 1,445 acres include thinning (mechanical and hand), biomass removal.

Thommy Timber Sale: thinning to increase structural diversity, improve wildlife habitat, and encourage pine and hardwoods. Treatments proposed on 514 acres include thinning (mechanical and hand), biomass removal.

Miwok OHV Restoration: authorize physical road actions and access designation changes to minimize resource damage and move the road system toward one that can be efficiently maintained while also maintaining access for management and public use. Includes block and restore 11.6 miles of unauthorized OHV routes and restore 4 acres of impact areas; install barriers at beginning of blocked routes; designate rock barrier source at Bourland and Coffin Quarries.

Reynolds Creek Ecological Restoration Culvert and Road Work: replace and maintain 3 culverts to improve aquatic passage and hydrologic function. Decommission, close, reconstruct and complete watershed rehabilitation.

Twomile Ecological Restoration Motorized Trails: improve motorized trail system in the Twomile area to improve public safety and minimize resource damage. Treatments include closure and restoration actions on 72 segments of unauthorized routes, reconstruct and/or reroute 5 existing segments, and construction of 3 new segments.

Twomile Ecological Restoration Transportation: authorize physical road actions and access designation changes to minimize resource damage and move the road system toward one that can be efficiently maintained while also maintaining access for management and public use. Physical actions are those actions on the ground that involve moving earth and vegetation, and change the physical condition and drivability of the route. The proposed physical actions are oriented toward improving drivability and access and "storm-proofing" routes to minimize future erosion. Physical actions would occur on a total of 61 segments including: installation of 4 gates, close (ML1) 11 segments, decommission 14 segments, maintain 23 segments, construct one new segment, and reconstruct 9 segments.

Reynolds Creek Motorized Routes: decommissioning of 3.5 miles of unauthorized motorized routes in the Reynolds Creek area.

Lower Cherry Aqueduct Emergency Rehabilitation: The Forest would issue special use authorizations for use of National Forest Lands as required for the rehabilitation work along 3.6 miles of the Lower Cherry Aqueduct operated by Hetch Hetchy Water and Power, a division of the San Francisco Public Utilities Commission. This includes the use of and work along National Forest System roads, particularly Cherry Lake Road (1N07) which is accessed via State Highway 120.

Table B.01-3 lists the reasonably foreseeable future NFS land disturbance actions described above.

Table B.01-3 Reasonably Foreseeable Future NFS land disturbance actions

Project	Purpose	Decision	Miles	Acres
Reynolds Creek Ecological Restoration	Aspen Release	2012	0	2
Reynolds Creek Ecological Restoration	Meadow Restoration	2012	0	14
Twomile Ecological Restoration: Meadow Restoration	Restore Meadow Condition and Function	2012	0	11
Twomile Ecological Restoration: Noxious Weeds	Weed Eradication	pending	0	8
Twomile Ecological Restoration: Soil Improvement	Restore Soil Productivity	2012	0	23
subtotal Ecological Restoration			**0**	**58**
Rim Fire Hazard Trees	Hazard Tree Removal	pending	0	10,262
Reynolds Creek Ecological Restoration	Green Thinning	2012	0	844
Two Mile Ecological Restoration Vegetation: Campy Timber Sale	Green Thinning	2012	0	995
Two Mile Ecological Restoration Vegetation: Looney Timber Sale	Green Thinning	2012	0	1,445
Two Mile Ecological Restoration Vegetation: Thommy Timber Sale	Green Thinning	2012	0	514
subtotal Timber Harvesting			**0**	**14,060**
Mi-Wok OHV Restoration	Recreation Management	2012	11.6	4
Reynolds Creek Ecological Restoration	Culvert and Road Work	2012	27.6	0
Twomile Ecological Restoration: Motorized Trails	NFST Management	2012	24.5	0
Twomile Ecological Restoration: Transportation	NFSR Management	pending	29.2	0
Reynolds Creek Motorized Routes	Decommission unauthorized routes	2013	3.5	0
subtotal Transportation Restoration			**96.4**	**9**
Lower Cherry Aqueduct Emergency Rehabilitation	Aqueduct Construction and Repair	pending	3.6	5
subtotal Special Use Permits			**3.6**	**5**
total			**100.0**	**14,127**

C. Glossary

90th Percentile Weather Conditions	High air temperature, low relative humidity, strong wind conditions and low fuel moisture content levels that historically that are met or exceeded on 10 percent of days during the fire season. It defines potential fire behavior as a result of these conditions: a 90th percentile weather day has the potential for severe wildfire behavior.
Activity Generated Fuel	Fuel resulting from, or altered by, management practices such as timber harvesting, thinning, or road construction.
Adaptive Management	A system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or re-evaluated. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain (36 CFR 220.3).
Administrative Unit	A National Forest, a National Grassland, a purchase unit, a land utilization project, Columbia River Gorge National Scenic Area, Land Between the Lakes, Lake Tahoe Basin Management Unit, Midewin National Tallgrass Prairie, or other comparable unit of the National Forest System.
Alluvial	Pertaining to processes or materials associated with transportation or deposition by running water.
Aquatic	Growing or living in or frequenting water; taking place in or on water.
Aquatic Ecosystem	A stream channel, lake or estuary bed, the water itself, and the biotic (living) communities that occur therein.
ARC/INFO	The name of a Geographic Information System software program.
Area of Potential Effects (APE)	This is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.
Aspect	The direction a slope faces. For example, a hillside facing east has an eastern aspect.
Basal Area	The total cross-sectional area of all stems, including the bark, in a given area, measured at breast height (4.5 feet above the ground). Usually given in units of square feet per acre.
Beneficial Uses of Water	Uses of water that are protected against degradation as described in the Basin Plan of the California Central Valley Regional Water Quality Control Board. These uses include municipal, agriculture, industry, recreation and aquatic and wildlife habitat categories.
Best Management Practices (BMPs)	Water Quality Best Management Practices, a codified series of about 100 practices for protecting water quality when conducting forest management activities. BMPs are referenced in R5 FSH 2509.22, Soil and Water Conservation Handbook; Chapter 10, Water Quality Management Handbook.
Biological Diversity (Biodiversity)	The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems, and the ecological processes that connect everything in a common environment.
Biomass	Trees less than 10 inches dbh not used as sawlogs. This material is usually chipped and/or removed from the project area and hauled to a mill to be used for cogeneration of energy or as fiber for wood products.
Biota	The plant and animal life of a particular region.

Biotic Potential	Factors that influence the ability of an animal to utilize its environment, including: reproductive rates, dispersal ability, habitat and life requisite specificity, and adaptability. Combine, these factors assign biotic potential of the animal.
Blue Oak Woodlands	An ecosystem dominated by blue oak, valley oak, interior live oak (tree form), or Oregon white oak.
Board feet	A unit of measure of sawlog volume, equivalent to 12 inches by 12 inches by 1 inch. One thousand board feet is denoted as mbf.
Buffer	Used in the context of GIS; a buffer is a zone of a specified distance around a feature in a coverage.
Burned Area Emergency Response (BAER)	BAER is a Forest Service activity of immediate post-wildfire response to assess and reduce the risk of loss of human life, property damage, and adverse effects to critical natural and cultural resources from threats caused by the fire.
California Wildlife Habitat Relationships (CWHR)	A system of classifying vegetation in relation to its function as wildlife habitat. Tree-dominated habitat is classified according to tree size and canopy closure.
Canopy	The part of any stand of trees represented by the tree crowns. It usually refers to the uppermost layer of foliage, but it can be used to describe lower layers in a multi-storied forest.
Canopy cover	The degree to which the canopy (forest layers above one's head) blocks sunlight or obscures the sky. Same as crown closure.
Chief	The Chief, Forest Service, Department of Agriculture (36 CFR 212).
Code of Federal Regulations (CFR)	A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.
Collaboration	Managers, scientists and citizens working together to plan, implement and monitor National Forest management. The intention is to engage people who have information, knowledge, expertise and an interest in the health of National Forest ecosystems and nearby communities.
Connected Actions	Actions that: (i) automatically trigger other actions which may require environmental impact statements; (ii) cannot or will not proceed unless other actions are taken previously or simultaneously; or, (iii) are interdependent parts of a larger action and depend on the larger action for their justification (40 CFR 1508.25).
Connectivity (of Habitats)	The linkage of similar but separated vegetation stands by patches, corridors, or "stepping stones" of like vegetation. This term can also refer to the degree to which similar habitats are linked.
Coverage	A digital map or layer of data in the ARC/INFO software program.
Council on Environmental Quality (CEQ)	The Council on Environmental Quality established by Title II of NEPA (40 CFR 1508.6).
Critical Aquatic Refuge (CAR)	A relatively small watershed, ranging in size from about 3,000 to 85,000 acres, that is sometimes nested within an emphasis watershed and has localized populations of rare and/or at-risk populations of native fish and/or amphibians.
Critical Deer Winter Range	Areas of deer winter range that are of highest priority for protection.
Critical Habitat	Areas designated for the survival and recovery of federally listed threatened or endangered species.
Crown closure	Refer to canopy cover.
Cryptogamic Soil Crusts	Biological soil crust composed of living cyanobacteria, green algae, brown algae, fungi, lichens, and/or mosses.

Cumulative Impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).
Coarse Woody Debris (CWD)	Coarse woody debris is 1,000 hour dead fuel, with a minimum diameter (or an equivalent cross section) of 3 inches at the widest point and includes sound and rotting logs, standing snags, stumps, and large branches (located above the soil).
Danger Tree	Refer to Hazard Tree
Decommission	Activities that result in the stabilization and restoration of unneeded roads or trails to a more natural state (FSM 7703.2(1)).
Designated Road, Trail or Area	A National Forest System road, trail or area that is designated for motor vehicle on a motor vehicle use map (36 CFR 212).
Desired Future Conditions	Land or resource conditions that are expected to result based on goals and objectives.
Diameter at Breast Height (DBH)	The diameter of a tree trunk 4.5 feet above the ground.
Digital Elevation Model (DEM)	A digital GIS file typically used to represent terrain relief.
Disjunct	A population of plants or animals which are separated by a large distance from the typical distribution of the species.
Draft Environmental Impact Statement (DEIS)	A detailed written statement as required by section 102(2) (C) of the NEPA (40 CFR 1508.11) that is released to governmental agencies and the general public for review and comment.
Drop and Lop	A treatment that involves felling non-merchantable trees less than about 10 inches dbh and lopping them into pieces small enough to ensure the material is not stacked and has as much ground contact as practical.
Early Forest Succession	The biotic (or life) community that develops immediately following the removal or destruction of vegetation in an area. For example, grasses may be the first plants to grow in an area that was burned.
Ecology	The interrelationships of living things to one another and to their environment, or the study of these interrelationships.
Ecosystem	An arrangement of living and non-living things and the forces that move them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildfire are two of the forces that act within ecosystems.
Endangered Species	Those plant or animal species that are in danger of extinction throughout all or a significant portion of their range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.
Endemic	An organism that evolved in and is restricted to a particular locality. The Little Kern golden trout found only in the Sierra Nevada region is an example.
Endlining	Moving logs using cables where the log is in full or partial contact with the ground.
Environmental Justice	The state (or condition) which all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment.
Environmental Impact Statement (EIS)	A detailed written statement as required by section 102(2) (C) of NEPA (CFR 1508.11).

Environmentally Preferable Alternative	The alternative that will best promote the national environmental policy as expressed in NEPA section 101 (42 USC 4321). Ordinarily, the environmentally preferable alternative is that which causes the least harm to the biological and physical environment; it also is the alternative which best protects and preserves historic, cultural, and natural resources. In some situations, there may be more than one environmentally preferable alternative (36 CFR 220.3).
Ephemeral Stream	Streams that flow only as the direct result of rainfall or snowmelt. They have no permanent flow since their streambeds are not connected to groundwater below.
Equivalent Roaded Acres	A standardized unit of measure for land disturbance. A road prism is considered the reference to which other types of land disturbing activities are measured. A road is given an ERA coefficient of 1.0 (1 acre of road is equal to 1.0 ERA). Other disturbances such as logging, site preparation and wildfires are equated to a road surface by ERA coefficients that reflect their relative level of contribution to changes in runoff and sediment regimes in the watershed.
Erosion Hazard Rating (EHR)	A rating system used to classify the relative vulnerability of soil to erosion.
Escarpment	A long, more or less continuous cliff or relatively steep slope produced by erosion or by faulting.
Fauna	The animal life of an area.
Fireline	A corridor, which has been cleared of organic material to expose mineral soil. Firelines may be constructed by hand or by mechanical equipment (e.g., dozers).
Fire Return Interval	Number of years between 2 successive fires in a specified area.
Flag and Avoid	The hanging of flagging in order to identify for the purpose of avoidance of a special feature in an area.
Flame Length	The length of flame measured in feet. Increased flame lengths increase resistance to control and likelihood of torching events and crown fires.
Flora	The plant life of an area.
Focal Species	A species of concern.
Forest Road or Trail	A road or trail wholly or partly within or adjacent to and serving the National Forest system that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources (36 CFR 212).
Forest Transportation Atlas	A display of the system of roads, trails, and airfields of an administrative unit.
Forest Transportation Facility	A forest road or trail or an airfield that is displayed in a forest transportation atlas, including bridges, culverts, parking lots, marine access facilities, safety devices, and other improvements appurtenant to the forest transportation system (36 CFR 212).
Forest Transportation System	The system of National Forest System roads, National Forest System trails, and airfields on National Forest System lands (36 CFR 212).
Free Flowing River	Existing or flowing in a natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway.
Fuelbreak	A system of linear or mosaic patch treatments of forest or shrub vegetation designed and treated to reduce fire spread, intensity, and create barriers to fire spread.
Fuel Loading	The weight per unit area of fuel, often expressed in tons per acre.
Fuel Moisture	Fuel models are described by the volume of 1-hour, 10-hour, 100-hour, and 1000-hour dead fuels; herbaceous and woody live fuels; and fuel bed depth and moisture of extinction (the fuel moisture content, weighed over all fuel classes at which a fire will cease spreading).
Fuels	Plants and woody vegetation, living and dead that are capable of burning.
Fuels Management	The planned manipulation and/or reduction of living and dead forest fuels for forest management and other land use objectives.

Fuels Treatment	The treatment of fuels that left untreated would otherwise interfere with effective fire management or control. For example, prescribed fire can reduce the amount of fuels that accumulate on the forest floor.
Fuelwood	Wood cut into short lengths for burning in a fireplace, woodstove or fire pit.
Geographic Information Systems (GIS)	A computer system capable of storing, manipulating, analyzing, and displaying geographic information.
Ground Cover	Natural organic and inorganic material that covers the watershed ground surface in sufficient quantity to allow a satisfactory rate of water infiltration to replenish ground water and limit erosion to natural rates. Ground cover usually consists of perennial vegetation, forest floor litter and duff, rock, downed wood, or similar erosion resistant material. Sufficient ground cover is usually 50% or greater, and cover of many forested ground surface areas is 80% or higher.
Habitat	The area where a plant or animal lives and grows under natural conditions.
Habitat Connectivity	The degree to which the landscape facilitates animal movement and other ecological flows.
Habitat Fragmentation	The degree to which a habitat type, specific to a plant or animal species, is interrupted by different, incompatible habitat characteristics or types.
Hand Piling	Piling by hand branches and limbs from tree harvests or thinnings by hand, for burning at a later time.
Hazard Tree	A standing tree that presents a hazard to people due to conditions such as deterioration of or damage to the root system, trunk, stem, or limbs or the direction or lean of the tree. Synonymous with danger tree for purposes of this project.
Herbaceous	A vascular plant having little or no woody tissue. This commonly refers to grass and grasslike plants.
Heritage Program	The comprehensive Forest Service program of responsibilities with regard to historic preservation. A pro-active program to manage prehistoric and historic cultural resources and cultural traditions for the benefit of the public through preservation, public use, and research.
High Clearance Vehicle	All sport utility vehicles (SUVs), light trucks, motorcycles, and other highway-legal vehicles designed for operation on rough terrain. These vehicles are also OHVs.
Highway	Highway is a way or a place of whatever nature publicly maintained and open to the use of the public for purposes of vehicular travel (CA Vehicle Code Section 360). However, the 38000 Division of the California Vehicle Code (the Off Highway Motor Vehicle section) states that for purposes of this division (38000) the term "highway" does not include fire trails, logging roads, service roads regardless of surface composition, or other roughly graded trails and roads upon which vehicular travel by the public is permitted (CA Vehicle Code 38001).
Home Range Core Area	An area designed to encompass the best available spotted owl habitat, and is in the closest proximity to owl protected activity centers where the most concentrated owl foraging activity is likely to occur.
Hydrologically Connected Segment (HCS)	Locations where drainage off a road or trail is likely to enter a watercourse.
Hydrophobic Soils	Soils that repel water, causing water to collect on the soil surface rather than infiltrate into the ground. Wild fires generally cause soils to be hydrophobic temporarily, which increases water repellency, surface runoff and erosion in post-burn sites.
Image	A graphic representation of a person or thing, typically produced by an electronic device. Common examples include remotely sensed data and photographs.
Indigenous	Any species of plant or animals native to a given land or water area by natural occurrence.

Interdisciplinary Team	A diverse group of professional resource specialists who analyze the effects of alternatives on natural and other resources. Through interaction, participants bring different points of view and a broader range of expertise.
Intermittent Stream	A stream that flows during the wet season due to precipitation runoff and has streamflow extending partially through the dry season due to at least some groundwater contribution.
Invasive Species	Refer to Noxious Weeds for the purposes of this project.
Inventoried Roadless Area	Areas identified in a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000, which are held at the National headquarters office of the Forest Service, or any subsequent update or revision of those maps.
Irretrievable	A term that applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.
Irreversible	A term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time
Jackpot Burning	The prescribed burning of heavy concentrations of down woody fuels.
Lahars	Landslide or mudflow material of pyroclastic (hot ash or tephra) on the flank of a volcano or the deposit formed by such a landslide or mudflow.
Landing	A forested opening, cleared of vegetation, leveled and graded, and used to stockpile sawlogs for eventual loading of load log trucks for haul to a sawmill.
Landscape	A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human impacts.
Large Woody Debris	Large Woody Debris (LWD) is typically greater than 12 inches in diameter at the midpoint and at least 10 feet in length and refers to large logs on the forest floor or in stream areas. LWD provides wildlife habitat and soil building processes on land, and can provide aquatic habitat complexity and stream stability. Large woody debris is important habitat for a variety of wildlife species and their prey.
Late Forest Succession	The stage of forest succession in which most of the trees are mature or over mature.
Legacy Watershed Effects	Impacts to natural features in a watershed that originated in the distant past but presently remain evident. Impacts may have occurred from land uses prior to establishment of the national forest, forest management activities or natural events such as fires, floods and landslides.
Level 1 Road	Roads that have been placed in storage between intermittent uses. Level 1 roads are closed to vehicular traffic but may be available and suitable for non-motorized uses.
Level 2 Road	Roads open for use by high clearance vehicles. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Passenger cars are discouraged or prohibited.
Level 3 Road	Roads open and maintained for travel by a prudent driver in a standard passenger car. Roads in this maintenance level are typically low speed with single lanes and turnouts.
Level 4 Road	Roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most level 4 roads are double lane and aggregate surfaced, but may single lane, paved and/or dust abated.
Level 5 Road	Roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated.

Limited Operating Period (LOP)	A specified period of time during which certain land management activities are prohibited.
Long-Term Risk	A risk to be experienced within the next 50 to 100 years.
Machine Piling	The use of mechanical equipment to push brush skeletons, small dead trees and excess downed fuels into piles for burning.
Maintenance	The upkeep of the entire forest transportation facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization (36 CFR 212).
Maintenance Level	Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria.
Management Action	Any activity undertaken as part of the administration of the National Forest.
Management Requirements	Mandatory components of each alternative designed to implement the Forest Plan and to minimize or avoid potential adverse impacts.
Mastication	Shredding of brush skeletons and small dead trees (generally under 10 inches dbh).
Meadow	Meadows are an ecosystem type dominated by herbaceous plants due to support of shallow groundwater that limits establishment of shrubs or trees. Meadows are usually comparatively flat in relation to their surrounding landscape.
Mesic	Moderately moist climates or environments. Mesic Vegetation generally refers to vegetation found in moist environments. Mesic Soil refers specifically to soils with mean annual temperatures of 8 to 15 degrees centigrade.
Metasedimentary Rock	Rock formed over a long period of time from marine sediments under heat and great pressure.
Mitigation	Avoiding an impact by not taking a certain action or parts of an action. Minimizing impacts by limiting the degree or magnitude of the action. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
Mixed Severity Fire	A wildfire that has a wide range of burn severity. Usually includes high, moderate and low soil burn severity and multiple classes of vegetation burn severity.
Montane Hardwood Forests	Vegetation communities dominated by California black oak, canyon live oak, Pacific madrone or tanoak, for the purposes of this project.
Mosaic	Areas with a variety of plant communities over a landscape. For example, areas with trees and areas without trees occurring over a landscape.
Motor Vehicle	Any vehicle which is self-propelled, other than: (1) a vehicle operated on rails; and (2) any wheelchair or mobility device, including one that is battery-operated, that is designed solely for use by a mobility-impaired person for locomotion, and that is suitable for use in an indoor pedestrian area (36 CFR 212).
Multiple Use	The management of all the various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output. (Multiple-Use Sustained-Yield Act; Public Law 86–517)

Multiplier	The concept in regional economic analysis describing how economic impacts that are directly caused by an action generally create additional economic impacts through indirect or induced mechanisms. The multiplier is the ratio of all economic impacts combined (through direct, indirect and induced mechanisms) divided by just the direct economic impacts.
Mycorrhizal Fungi	A type of fungi which forms a symbiotic relationship with vascular plants for the purpose of exchanging nutrients and moisture by growing amongst the roots of the plants.
National Environmental Policy Act (NEPA)	Codifies the national policy of encouraging harmony between humans and the environment by promoting efforts to prevent or eliminate damage to the environment, thereby enriching our understanding of ecological systems and natural resources. It declares the federal government to be responsible for: (a) coordinating programs and plans regarding environmental protection; (b) using an interdisciplinary approach to decision-making; (c) developing methods to ensure that non-quantifiable amenity values are included economic analyses; and (d) including in every recommendation, report on proposals for legislation, or other major federal actions significantly affecting the quality of the environment a detailed environmental impact statement (EIS).
National Forest System	As defined in the Forest Rangeland Renewable Resources Planning Act, the "National Forest System" includes all National Forest lands reserved or withdrawn from the public domain of the United States, all National Forest lands acquired through purchase, exchange, donation, or other means, the National Grasslands, and land utilization projects administered under title III of the Bankhead-Jones Farm Tennant Act (50 Stat. 525, 7 U.S.C. 1010-1012), and other lands, waters or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system (36 CFR 212).
National Forest System Road	A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).
National Forest System Trail	A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).
Natural Resource	A feature of the natural environment that is of value in serving human needs.
Natural Succession	The natural replacement, in time, of one plant community with another. Conditions of the prior plant community (or successional stage) create conditions that are favorable for the establishment of the next stage.
Noxious Weeds	Any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.
Old Forest (Old Growth)	Areas that contain large, old trees relative to the species-specific, environmentally-constrained growth capacity of the site.
Operability	The ability to conduct vegetation management operations, which include construction of access roads and log landings, use of cable logging systems, clearing of central skid trails for tractor logging, and removal of trees that pose hazards to forest workers. Trees to be removed for operability would be designated by a Forest Service representative.
Outstanding Remarkable Value	A river-related value must be a unique, rare, or exemplary feature that is significant at a comparative regional or national scale.
Paleoecological	The study of ancient or prehistoric ecosystems.
Passenger Vehicle	All passenger vehicles such as sedans and other typical low clearance vehicles less than 10,000 GVW licensed to operate on public roads.
Patch	An area of vegetation, similar in structure and composition.

Perennial Stream	A stream that typically has running water on a year-round basis due to precipitation runoff in the wet season and continual contribution of groundwater to support streamflow throughout the dry season except in smaller streams during droughts.
Plantation	A group of trees that have been planted together.
Polygon	Used in a GIS to represent an area, a polygon is a digital feature class defined by arcs, or lines, that make up its boundary. A polygon would be used to represent areas such as lakes and land parcels on a map.
Preferred Alternative	The alternative(s) which the Agency believes would best fulfill the purpose and need for the proposal, consistent with the Agency's statutory mission and responsibilities, giving consideration to environmental, social, economic, and other factors and disclosed in an EIS.
Prescribed Fire or Burn	A type of fuel treatment whereby fire is intentionally set in wildland fuels under prescribed conditions and circumstances.
Proposed Action	A proposal made by the Forest Service to authorize, recommend, or implement an action to meet a specific purpose and need.
Protected Activity Centers (PACs)	Designated areas that are afforded protection to specific species by restricting certain management activities. For example, California spotted owl PACs protect owl habitat and breeding areas by restricting timber harvest.
Public Involvement	The use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision-making.
Public Land	Land for which title and control rests with a federal, state, regional, county, or municipal government.
Public Road	Roads under the jurisdiction of and maintained by a public authority that are open to public travel (23 U.S.C 101(a)).
Radio Telemetry	The science and technology of automatic measurement and transmission of data by radio from remote sources to receiving stations for recording and analysis. Radio telemetry is used to track the movements of wild animals that have been tagged with radio transmitters.
Reasonably Foreseeable Future Actions	Those Federal or non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals. Identified proposals for Forest Service actions are described in 220.4(a) (1) (36 CFR 220.3).
Record of Decision (ROD)	A concise public record of the responsible official's decision to implement an action when an environmental impact statement (EIS) has been prepared.
Reforestation	The natural or intentional restocking of existing forests and woodlands that have been depleted.
Regeneration	Tree seedlings and saplings that have the potential to develop into mature forest trees.
Remote Sensing	Acquiring information about a geographic feature without contacting it physically. Methods include aerial photography and satellite imaging.
Resilience	The ability of an ecosystem to maintain diversity, integrity, and ecological processes following a disturbance.
Responsible Official	The Agency employee who has the authority to make and implement a decision on a proposed action (36 CFR 220.3).
Riparian Area	The area along a watercourse, around a lake or pond, or in other wetlands.
Riparian Conservation Area (RCA)	Identified areas within a certain distance from streams, special aquatic features or riparian vegetation. RCA width and protection measures are determined through project level analysis.
Riparian Ecosystem	The ecosystem around or next to water or in wetlands that support unique vegetation and animal communities as a result of a high water table.

Riparian Obligate Vegetation	Trees, shrubs and herbaceous plants that are sustained by wetland conditions along stream courses and in and around meadows and other wetlands. Trees and shrubs are usually deciduous species such as alder, aspen, big leaf maple, and cottonwoods. Shrubs include willows and dogwoods. Herbaceous plants include sedges, rushes and other grasslike plants.
Road	A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212).
Road Density	The length of roads within a given area, most often calculated as miles of road per square mile of land area. Road density is often used as an indicator of watershed disturbance.
Roadless Area	Refer to Inventoried Roadless Area for the purposes of this project.
Road Construction	Development of a new road, designed to engineering standards according to assigned management standards. Actions may include vegetation clearing, excavation and embankment, blading and shaping, installation of drainage structures, and importing of armoring and surfacing rock material as needed.
Road Reconstruction	Improvement, restoration, and/or realignment of a road. Actions may include surface improvement; construction of drainage dips, culverts, riprap fills or other drainage or stabilization features with potential disturbance outside the established roadway (toe of fill to top of cut); realignment; and widening of curves as needed for log trucks and chip van passage.
Salvage Logging	Dead conifer trees will be cut down and transported to a mill for processing. Logging systems may include ground based equipment such as harvesters and rubber tired skidders, or helicopter logging or skyline systems on steeper slopes and where necessary to meet resource objectives.
Schedule of Proposed Actions (SOPA)	A Forest Service document that informs the public about those proposed and ongoing Forest Service actions for which a record of decision, decision notice or decision memo would be or has been prepared. The SOPA also identifies a contact for additional information on any proposed actions (36 CFR 220.3).
Scope	The range of actions, alternatives and impacts to be considered in an environmental impact statement (40 CFR 1508.25).
Scoping	An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1501.7).
Sensitive Species	Plant or animal species which are susceptible to habitat changes or impacts from management activities. The official designation is made by the USDA Forest Service at the regional level and is not part of the designation of threatened or endangered species made by the U.S. Fish And Wildlife Service.
Seral Stage	The stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession.
Shaded Fuel Break	A defensible location where fuels have been modified, that can be used by fire suppression resources to suppress oncoming wildfires.
Short-Term Risk	A risk to be experienced within the next 10 to 15 years. For example, prescribed burns can disturb habitat in the short-term, but in the long-term the fire resiliency of the habitat may be improved.
Silvicultural System	The cultivation of forests; the result is a forest of a distinct form. Silvicultural systems are classified according to harvest and regeneration methods and the type of forest that results.
Silviculture	The art and science that promotes the growth of single trees and the forest as a biological unit.
Skidding	Dragging a log with a tractor to a landing for loading onto a logging truck.
Skid Zone	Areas where landings for units harvested using ground based equipment are not located either within or adjacent to the units.

Slash	Tree tops and branches left on the ground after logging or accumulating as a result of natural processes.
Snag	A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.
Soil Burn Severity	The effect of a fire on ground surface characteristics, described in terms of char depth, organic matter loss, altered color and structure of soil, and reduced infiltration. Soil burn severity is measured in high, moderate and low classes based upon the degree of effects.
Soil Compaction	An increase in soil density resulting from repeated tracking by mechanized equipment. Compaction reduces infiltration of water and can cause subsequent erosion, and can adversely affect forest vegetation in compacted areas.
Soil Displacement	A lateral relocation of topsoil and often subsoil by movement of mechanized equipment or from sawlog yarding practices. Displacement can result in soil berms or ditches that divert water and lead to erosion.
Spatial Data	A GIS contains spatial data. The spatial data represents geographic features associated with real-world locations.
Special Aquatic Features	Lakes, ponds, vernal pools, meadows, bogs, fens, springs, and other wetlands.
Species	A class of individuals having common attributes and designated by a common name; a category of biological classification ranking immediately below the genus or subgenus; comprising related organisms or populations potentially capable of interbreeding.
Strategic Fire Management Feature (SFMF)	Over the last few decades, SFMFs had been identified along roads and ridgelines to take advantage of natural or topographic features and established roadways. In addition to fire behavior modification, SFMFs create safe travel route options for emergency access and egress.
Strategically Placed Landscape Area Treatment (SPLAT)	Fuel reduction treatments placed in a pattern to interrupt fire progression such that the fire reduces in intensity and becomes a surface fire in these areas. The overall pattern impedes fire spread. SPLATs serve to break up the continuity of the vegetation across the landscape and create mosaic patterns. They also provide a network of opportunities for wildfire management objectives that allow for equal weight of natural resource and ecosystem benefits and protection of private property.
Stand	A group of trees that occupies a specific area and is similar in species, age and condition.
Standards and Guidelines (S&Gs)	The primary instructions for land managers. Standards address mandatory actions, while guidelines are recommended actions necessary to a land management decision.
Stand-Replacing Fire	A fire that burns with sufficient intensity to kill the majority of living vegetation over a given area (grass and brush fires are stand replacement fires for that vegetation type, in forest vegetation types when 75-80% of the stand is killed by fire are also considered stand replacement fires).
Stewardship	Caring for the land and its resources in order to pass healthy ecosystems on to future generations.
Subsoiling	Mechanical lifting and shattering of the layer of soil beneath the topsoil in order to reduce soil density and strength, improve moisture infiltration and retention, and increase root penetration in the soil.
Suitability	The appropriateness of certain resource management to an area of land. Suitability can be determined by environmental and economic analysis of management practices.
Sustainability	The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

Sustainable	The yield of a natural resource that can be produced continually at a given intensity of management is said to be sustainable. Recreation activities are sustainable if the human activity does not reduce ecologic sustainability.
Taxa	Name applied to any one group or entity in the scientific classification system.
Temporary Road	A road necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or a forest trail and that is not included in a forest transportation atlas.
Thermic	A soil with a mean annual soil temperature of greater than or equal to 15 degrees centigrade, but less than 22 degrees centigrade and a difference between the mean summer and winter soil temperatures of greater than 5 degrees centigrade measured at 50 cm below the surface.
Threatened Species	Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.
Threshold of Concern	The level of watershed disturbance which, if exceeded, could create adverse watershed or water quality effects, in spite of application of best management practices and project design criteria.
Understory	The trees and woody shrubs growing beneath branches and foliage formed collectively by the upper portions of adjacent trees.
Unroaded Area	Any area, without the presence of a classified road, of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition. Unroaded areas do not overlap with inventoried roadless areas.
Variety Class A	A landscape that includes a deep, V-shaped, river-cut canyon through metasedimentary rock providing a variety of rapids, cascades and pools.
Vegetation Burn Severity	The effect of a fire on vegetation, often described by the degree of scorch, consumption, and mortality of vegetation. Vegetation burn severity is measured by classes of canopy mortality or basal area loss.
Visual Quality	The forest visual resources; terrain, geological features, or vegetation.
Water Quality Objectives	Water quality objectives, as listed in the Basin Plan of the California Central Valley Regional Water Quality Control Board, are the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water.
Watershed	An area of land above a given point on a stream that contributes water to the streamflow at that point.
Watershed Sensitive Areas (WSAs)	Portions of watersheds determined to be at high risk of soil erosion and sedimentation due to the combined effects of fire and proposed activities. Criteria for evaluating WSAs include: proposed recovery activities, burn severity, percent slope, slope shape, slope length, existing and potential soil cover, proximity to intermittent and perennial drainages, and proximity to high runoff response soils.
Wetlands	Areas that are inundated by surface or ground water with a frequency sufficient to support (and that under normal circumstances do or would support) a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.
Wild and Scenic River	A river that is either already designated or proposed for designation because of its free flowing condition and outstanding remarkable values.
Wildland	An area in which development is essentially non-existent, except for roads, railroads, powerlines and similar transportation facilities.
Xeric	A soil moisture regime common to Mediterranean climates that have moist cool winters and warm dry summers. A limited amount of water is present but does not occur at optimum periods for plant growth.
Yarding	Bring sawlogs or biomass to a central location for removal from a treated area.

D. Research

The Rim fire presents a rare and compelling opportunity to investigate a number of key management questions that have challenged land managers for decades. The response of the ecosystem after such a large and intense fire raises many critical questions: how do different wildlife species respond, how do riparian systems recover, what are the ecological effects of varying levels of salvage treatments, what sort of fuels hazards remain, what management strategies can effectively control hillslope erosion, and how can restoration efforts today meet present-day restoration needs while setting the course for desired forest conditions decades into the future. By the same token the Forest Service also has the opportunity to evaluate the efficacy of various prior forest management strategies that were intended to reduce the risk of just such a fire. Some areas within the footprint of the fire had plots where extensive data were collected prior to the fire. Records of treatments exist that also can be used in follow up research. Collaborating with the staff in Yosemite National Park provides expanded opportunities to examine pre and post-fire conditions and attending management strategies.

Following is an integrated package of proposed studies and activities that will investigate key questions related to fireshed management and landscape restoration after a mega-fire. Scientists at the Pacific Southwest Research Station (PSW) developed this research agenda in collaboration with the the Stanislaus National Forest and research partners at multiple universities and other government agencies. They can be implemented as stand-alone projects, but they were designed as an integrated research approach, including integrated sampling design, treatment, data collection, and analysis elements.

Research scientists from the Forest Service's Pacific Southwest Research Station will collaborate with research partners to undertake the following integrated package of 7 studies and activities to investigate key questions related to fireshed management and landscape restoration after a mega-fire.

The following research projects are proposed to be implemented for Alternatives 3 and 4:

1. Addressing Levels of Post-Fire Snag Removal on Black-Backed Woodpecker Nesting and Foraging Behavior.
2. Ecological Restoration Following the Rim Fire - Potential Learning Opportunities Regarding Replanting.
3. Effects of Postfire Salvage Logging and Mitigation Measures on Soils, Vegetation, and Erosion
4. Effect of Varying Levels of Salvage on Snag Retention Rates, Rates at Which Snags Become Fuels, Rates of Natural Tree Regeneration and Understory Development, and Effects on Non-Native Species Abundance over Time.
5. Landscape Fuel Treatment Effectiveness in the 2013 Rim Fire: A Spatially Explicit Assessment of Treatment Impacts on Fire Severity Patterns.
6. Effects of Salvage Logging, Resulting Snag Density and Distribution, and Green Tree Proximity on Wildlife Habitat and Use, Forest Recovery, and Forest Ecosystem Function.
7. Assessing the Response of California Spotted Owls to Wildfire and Salvage Logging on the Rim Fire.

The following descriptions provide information about each research proposal including:

- Research objectives
- Anticipated management implications

1. Addressing Levels of Post-Fire Snag Removal on Black-Backed Woodpecker Nesting and Foraging Behavior

Research Objectives

The value of dead and dying trees to cavity nesting birds in recently burned forests is well-documented. In the Sierra Nevada, over 30 species of cavity users across several taxa provide services that are essential for ecosystem function, including seed dispersal and control of insect populations. Although several animal species are dependent on a high density of dead wood characteristic of burned forest, concerns over the dependence of the black-backed woodpecker (Picoides arcticus) on burned forests has fueled much of the debate surrounding post-fire snag removal in high severity burn areas.

The recently compiled Conservation Strategy for the Black-backed Woodpecker made several recommendations that would be of the greatest benefit in advancing efforts to ensure this species' persistence. In particular, the strategy stated that "Data are not yet available to provide specific guidelines on the density of retained snags necessary to support black-backed woodpecker occupancy and reproduction." By using an experimental design that will be implemented in the SNF, this data deficiency will be addressed by monitoring nesting and foraging behavior of black-backed woodpeckers at varying levels of salvage. The research will compare how the abundance of nesting and foraging birds differs across densities of standing dead trees and salvaged areas to determine if these factors are limited by the volume of tree retention. In addition, by collecting data of tree and habitat characteristics this project will be able to address whether it is the quantity or quality of the remaining standing trees that increases habitat suitability.

Anticipated Management Implications

One of the most controversial issues surrounding post-fire forest management is the treatment of standing dead trees. Dead or dying trees can contribute fuel to future fires and can pose a risk to human life or property when they fall. In many areas, post-fire harvest of dead and dying trees is conducted to reduce these risks and to realize economic benefits. This research will address important management questions related to the levels and types of snag retention that can provide suitable habitat for black-backed woodpeckers.

2. Ecological Restoration Following the Rim Fire: Potential Learning Opportunities Regarding Replanting

Research Objectives

After any large-scale fire event, there is a need for ecological restoration, which will include the planting of forest tree species. The major question when planting tree seeds is the choice of species and seed sources within species. Traditionally, ecological restoration projects will try, to the extent possible, to recreate the species mix that was present before the fire. The Seed Zone map of California guides the decision of what sources within a species to plant. However, the Seed zone map was constructed under an assumption of a static climate- an assumption that no longer holds true, given predictions of climate change. It may be that the best adapted seed for an area does NOT come from the same seed zone or elevation band for that area. Data are available to address this question, but they are limited, and additional tests on the ground would help to support decisions in future ecological restoration projects.

The Rim fire impacted thousands of acres of forests in seed zone 531, along a range of elevation bands. Here this project focuses on two primary species that will be involved in out-planting efforts on the Rim Fire- Ponderosa and Sugar pine (Pinus ponderosa and P. lambertiana). This proposed project will address the following questions:

- What seed source has the greatest success within each elevation band in the Rim Fire area?

- Do trees from lower elevations (hence adapted to warmer climates) perform better?
- Do trees from more southern seed zones perform better?
- How important are seed zone and elevation band in terms of early tree survival and growth?

Anticipated Management Implications

Future ecological restoration efforts will be able to take advantage of the information gained through this research to inform the decision of what seed sources to use for tree outplanting efforts. Choosing the best seed source is important for increasing the chances of success for any outplanting effort. These results will be unique in that they will be based on operational planting approaches- the same ones used during ecological restoration projects.

3. Effects of Salvage and Erosion Mitigation on Small Watershed Response

Large, severe wildfires generally remove a significant percentage of the organic forest floor leaving the soils susceptible to runoff and erosion. The risk of elevated sediment yields are generally the greatest in the first few years after the fire until the natural vegetation has an opportunity to reestablish. During this immediate post-fire period logging may increase surface runoff and erosion rates because compaction and surface disturbance can alter soil porosity and infiltration properties as well as reduce and retard the vegetative regrowth. Salvage logging after the 2013 Rim Fire is particularly controversial because of the potential adverse effects on reservoirs and domestic water supplies. As surface cover is a primary control on post-fire erosion, the proposed salvage logging after the Rim Fire will include two mitigation treatments to increase the amount of surface cover: 1) mastication; and 2) drop and lop. To the best of our knowledge, the effectiveness of these treatments has never been tested for post-fire salvage logging. The extensive salvage logging and associated treatments being planned after the Rim Fire provides a unique opportunity to compare and understand the effects of fires, salvage logging, and the two mitigation treatments on physical soil properties, surface cover and vegetative regrowth, and runoff and erosion at the hillslope and swale scale.

Research Objectives

- Quantify the effects of post-fire salvage logging and two associated erosion mitigation treatments on soil properties, including bulk density, compaction, water repellency, and infiltration;
- Quantify the impacts of these management practices on surface cover and disturbance, including the degree and areal extent of mechanical traffic, the additional cover provided by the mitigation treatments, and vegetation regrowth;
- Quantify runoff and erosion on logged, treated, and control areas using simulated surface flow to measure disturbed and undisturbed site erodibility and to ascertain the erosion control effectiveness of the treatments;
- Quantify runoff and erosion on logged, treated, and control areas at both the hillslope plot and swale scale.

Anticipated Management Implications

There is high interest and constant debate on efficacy of salvage logging as well as mitigation treatments to reduce the erosion risk. With few rigorous studies on how salvage logging affects runoff and erosion, forest managers do not have adequate information for planning and conducting project-level assessments. This research will improve our understanding of the effects of salvage logging on soil and water resources, and also evaluate the ability of two untested post-salvage mitigation treatments to reduce runoff and erosion compared to untreated and unlogged areas.

This research would help answer the questions on salvage and erosion mitigation at the most critical scale for forest managers, hillslopes and small swales (0.5-2 acres) which are similar in size to the salvage sale units. If there is no measureable effect at this scale, it is unlikely to translate to sediment increases in water reservoirs or affect downstream water quality. These results would provide guidelines on the effects of salvage logging and two mitigation measures on hillslope erosion rates, sediment yields from small watersheds, and peak flow. The results anticipated from the hillslopes and swales can be scaled up using process-based models, empirical relationships, and remotely sensed data to allow for a broader interpretation of landscape-level responses.

4. Effect of Varying Levels of Salvage on Snag Retention Rates, Rates at Which Snags Become Fuels, Rates of Natural Tree Regeneration and Understory Development, and Effects on Non-Native Species Abundance over Time

Research Objectives

Salvage harvesting trees after high severity wildfire is highly controversial, in part because so little is known about short- and long-term effects. Much of the current understanding about snag, fuel, and understory dynamics in relation to salvage comes from observational and un-replicated studies and/or is based on short-term observations. The only replicated study of different levels of salvage is one described in Ritchie et al. (2013), within the Cone Fire in ponderosa pine dominated forests of the southern Cascades. Because rates of snag fall and fuel development varies with tree species, understory species, and site-specific factors such as climate that influence rates of decay, additional studies in different forest types are needed.

Snags provide food and shelter for cavity nesting birds, including various woodpecker species. Snags are some of the only vertical structure left in stands killed by fire. However, the snag phase is also transient, and within four to ten years, many snags fall to the ground and become fuel. Once on the ground, the dead woody fuel along with a developing shrub layer makes any young trees that establish susceptible to mortality in the event of another wildfire. Salvaging some of the wood may help increase chances that young trees will survive subsequent wildfires. The challenge is balancing short- and long-term objectives, providing some snags for wildlife without generating excess future fuels and potentially reducing the resilience of young stands. Salvage is also an additional soil disturbance in an already fire-disturbed system, thereby increasing the probability of invasion by exotic weedy species, potentially setting back the native re-sprouting species, and killing newly germinating tree seedlings. The Cone Fire salvage study found no effect of salvage treatment on exotic weedy species or tree seedlings, but this was only one site, with one suite of understory plants.

In the past, replanting after high-severity fire has frequently been done at a relatively even spacing. Such spacing differs from the documented structure of historical frequent-fire forests, consisting of individual trees, clumps of trees and openings - a structure which may enhance resilience to drought and fire. Dense brush and high fuel continuity contributed to the loss of many such plantations in the Rim Fire. Given that budgets for treating fuels in planted stands are likely to remain limited, new planting strategies that reduce the cost of maintaining resilience need to be tested. Because of the suppressing effect of shade on shrubs, a variable planting might also lead to a variable shrub understory, breaking up the fuel complex and reducing fire hazard with less intensive management.

Research proposes to evaluate treatments of varying levels of salvage within the Rim Fire, in order address the following questions:

- How long do fire-killed trees remain upright as snags?
- How does the rate at which snags become fuel vary with tree species, tree size, and other local factors?
- Do salvage operations affect overall understory biodiversity and does logging disturbance facilitate invasion by non-native species?
- Do salvage operations positively or negatively affect rates of natural tree regeneration?
- How does different spacing of planted tree regeneration affect tree survival, growth and resilience of the stand to future fire?

Anticipated management implications

Results of this study will improve our understanding of the longevity of snags, and the effect of salvage on fuel loading and understory development. Results will also provide information about replanting patterns that could reduce maintenance costs while simultaneously improving stand resilience.

5. Landscape Fuel Treatment Effectiveness in the 2013 Rim Fire: A Spatially Explicit Assessment of Treatment Impacts on Fire Severity Patterns

Research objectives

The 255,000 acre 2013 Rim Fire in the Sierra Nevada created a unique opportunity to study fuels treatment effects across a large landscape. Nearly two-thirds of the total burned area was in mixed-conifer forest, which was relatively evenly divided between Yosemite National Park and the Stanislaus National Forest. A considerable portion of the mixed-conifer dominated area was treated for fuels reduction/restoration (about 18,863 acres within Yosemite and 17,222 acres within STF). This includes prescribed fire and managed wildfire, mechanical thinning (including mastication), and combinations thereof. These treatments have been applied in various sizes, shapes, spatial arrangements, and conditions resulting in a range of severities (proportions of fuels removed), frequencies, and time since last treatments. This project leverages several existing datasets and on-going research for a comprehensive investigation on how fuel treatments affect fire severity and resulting forest structure. This proposed project will the following questions:

- How does the amount and configuration of fuels treatments across landscapes influence severity for subsequent large wildfires?
- How does the answer to the question above vary with characteristics of fuels treatments (i.e., type, intensity, age, spatial pattern), climatic variables (i.e., fire danger rating), or environmental (i.e., terrain, fuel type) conditions?
- How can landscape fuels treatment strategies maintain effectiveness over time?

Anticipated Management Implications

Modeling studies suggest that certain arrangements of fuels treatment across landscapes can affect the spread and/or severity patterns of wildfires. However, the effects of location, size, type, and configuration of fuels treatments on the patterns of real wildfires at landscape scales remains poorly documented and understood. It is also largely unknown if and how fuels treatments retain effectiveness under the influence of extreme fire weather, and to what extent effectiveness is influenced by suppression operations, antecedent climate conditions, previous wildfires, land use, and existing vegetation. This information is needed to prioritize fuel treatments that have the highest probability of minimizing undesirable fire behavior and effects, and to implement strategically placed treatments where their effects can extend beyond their physical footprint. This project will provide critical information on mitigating effects of large wildfires that will compliment much of the previous work which has been based primarily on fire modeling. This information will be particularly valuable for informing the design of fuels treatment projects, which are being called for at greater pace and scale in dry forest types throughout the western United States.

6. Effects of Salvage Logging, Resulting Snag Density and Distribution, and Green Tree Proximity on Wildlife Habitat and Use, Forest Recovery, and Forest Ecosystem Function.

Research Objectives

Salvage logging is one of the most contentious issues in Forest Service management, yet there is scant research to help inform these debates from the fire-dependent forests where it is most needed. Our research will examine how salvage logging and the size of high-severity patches effects key components of the recovering ecosystem. In a large part, burn area recovery will depend on dispersal of plants and wildlife from remnant islands of green forest. Does salvage hinder or help these processes? How do the size of dead tree patches and their proximity to live trees effect the abundance and diversity of plants and animals recolonizing high-severity landscapes?

This project will examine how salvage, and distance and orientation (aspect and prevailing wind direction) from green forest affect plant abundance and diversity, fuel conditions, and bird and small mammal communities. This project will coordinate sampling and use an integrated approach because of the strong linkage between vegetation, fuels and habitat conditions for facilitating or limiting plant and wildlife dispersal, and fire spread. This project will address the following questions:

- How does use of high severity patches by wildlife change as distance to green forest increases? Does this relationship change in areas that have been harvested for salvage?
- How does the density of dead tree patches and proximity to live trees effect the abundance and diversity of plants and animals recolonizing high-severity landscapes? Does this relationship change in areas that have been harvested for salvage?
- How does understory plant and tree regeneration decrease as the distance to green forest edge increases? Does this relationship change in areas that have been harvested for salvage and/or dead tree abundance and distribution?
- To what degree do physical features affect dispersal success, including aspect, slope, and prevailing wind direction
- To what degree do site conditions affect use/establishment, including snag densities and characteristics, fine and coarse woody debris, soil quality, aspect, slope, microclimate, and other substrates
- How do surface fuel loads vary as a function of salvage treatment and distance to green forest edge? Is there a relationship between surface fuel loads and understory plant/tree regeneration? How does variation in surface fuel loads influence use of burned habitat by wildlife?

Management Implications

The primary focus of this research project is to determine how the distribution and density of dead trees across severely burned areas affects the ability of the burned landscape to support core functions. In other words, does salvage logging impact the ability of landscapes to support core functions, and if so, what densities of dead trees are required to support core functions of greatest interest. One of the challenges of leaving snags in salvaging a high severity post-burn landscape is the potential danger and difficulty in working around snags. Dead trees are often left in clumps to reduce risks and facilitate freedom of movement within units.

This research will address important management questions about ecological recovery in high-severity patches and the influence of proximity to green trees. For example, plant and animal establishment and diversity is expected to decrease with distance from green edge, and dead tree densities may or may not affect the decay rate of these core functions. This information can be used to identify priority locations and prescriptions to maximize the range of core functions and outputs of interest for post-fire landscapes. Further, use and occupancy of burned landscapes by habitat specialists of concern, such as the California spotted owl and black-backed woodpecker, will be a function of a complex of habitat conditions over large areas, including nesting habitat, food availability, predation risks, and microclimatic conditions. In summary, this project will quantify vegetation recovery patterns across a large spatial extent, which will ultimately inform landscape-scale restoration efforts for this and other large fires in similar forest types.

7. Assessing the Response of California Spotted Owls to Wildfire and Salvage Logging on the Rim Fire.

Research Objectives

Increasing research indicates that California spotted owls (*Strix occidentalis occidentalis*) can occupy landscapes that experience low-moderate severity and mixed-severity wildfire. However, uncertainty persists regarding thresholds where the amounts and patch sizes of high severity wildfire affect CSO occupancy within the post-fire landscape. Further, post-fire salvage-logging introduces additional effects that are poorly understood and can interact with amounts of post-fire habitat to affect CSO occupancy and habitat use patterns. The objective of our proposal is to address the effects of wildfire, particularly high severity wildfire, and salvage-logging on CSO site occupancy.

Management Implications

Uncertainty regarding the effects of high-severity wildfire and post-fire management (salvage-logging) is certain to drive increasing challenges for forest managers in the Sierra Nevada given increasing trends in the amounts and patch sizes of high severity wildfire, coupled with evidence indicating declining CSO populations across the Sierra Nevada. Our research will provide information to better understand the effects of wildfire and salvage-logging that can serve as an empirical basis to inform future management decisions.

Scientists from PSW and managers from the Stanislaus National Forest worked collaboratively on the study design. Sample units consist of 200 ha circular core areas around the centroid (nest/main roost). Sample units were arrayed across gradients of amount of post-fire suitable habitat and proposed salvage/road hazard tree treatment acres and then allocated to either control or treatment groups. Both controls and treatment units would have some level of road hazard tree removal while treatments units would receive salvage treatments. Salvage treatments would be implemented using the Old Forest guidelines typically used by Forest Service management.

Occupancy surveys will be conducted annually for 5 years beginning in 2014. Salvage treatments will be initiated in late Fall 2014 and continue thru at least 2016. Two years of post-treatment surveys are needed to assess the effects of both wildfire and salvage-logging.

E. Treatments

This Appendix provides detailed information about the treatments described in Chapter 2.01 and proposed in the action alternatives 1, 3 and 4 (Chapter 2.02). Appendix E.01 provides detailed information about the application of the primary objectives described in Chapter 2.01 and Table 2.01-1. Appendix E.02 provides detailed information about salvage and biomass treatments. Appendix E.03 provides detailed information about the additional fuels treatments proposed in Alternative 3 and Alternative 4. Appendix E.04 provides detailed information about the additional watershed treatments proposed in Alternative 3 and Alternative 4. Appendix E.05 provides detailed information about the road treatments.

E.01 Primary Objectives

Treatment units and unit primary objectives vary between the action alternatives. Chapter 2.01 and Table 2.01-1 provide more details for the primary objectives listed below.

1. **Economic Value**: Capture the economic value of hazard trees and dead trees which pays for their removal from the forest and potentially for other future restoration treatments.
2. **Public and Worker Safety**: Remove dead and dying hazard trees adjacent to Forest Roads and project access areas. This primary objective also includes the health and safety of workers and permittees during range fence installation and maintenance.
3. **Fuel Reduction**: Reduce fuels to provide for future forest resiliency and firefighting safety and success. Additional treatments in SPLATS and Defense Zones.
4. **Enhance Hydrologic Function**: Improve road infrastructure to enhance hydrologic function of roads. This only applies to roads so it will not be displayed in Table E.01-1 which displays unit acres.
5. **Enhance Wildlife Habitat**: Retain specific old forest components (large snags and down logs) and/or remove material to improve wildlife habitat.
    a. **Deer Habitat Improvement**: Removal of merchantable and non-merchantable material for movement and access, and to achieve desired forage/cover ratios
    b. **Snag Retention**
6. **Research**: Utilize the unique scale and intensity of the Rim Fire to answer questions and provide more information on a wide range of research topics.

Table E.01-1 displays the unit number, acres and primary objectives for each harvest unit as proposed in the action alternatives.

Table E.01-1 Primary Objectives for Treatment Units in Alternatives 1, 3 and 4

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
A01A	7	1						
A01B	143	1,2	A01B	143	1,2,5b			
A02	8	1,2						
A03	86	1,2	A03	55	1,2,5b			
A04	21	1	A04	21	1,5b			
A05	672	1,2						
			A05A	293	1,2,5b			
			A05B	25	1,5b			
			A05C	85	1,2,5b	A05C	85	1,2,5b
A08A	155	1,2	A08A	111	1,2,5b	A08A	111	1,2,5b
A08B	14	1,2						
A08C	33	1,2	A08C	18	1,5b	A08C	18	1,5b
A08D	28	1						
A09	53	1	A09	81	1,5b	A09	81	1,5b
A10	112	1,2						
A14	7	1	A14	8	1,3,5b	A14	8	1,3,5b
			A14X	2	1,3,5b,6	A14X	2	1,3,5b,6
A15	22	1	A15	22	1,3,5b,6	A15	22	1,3,5b,6
B01A	3	1						
B01B	9	1						
B02	60	1,2	B02	63	1,2	B02	63	1,2
B03	18	1	B03	18	1	B03	18	1
B21	4	1	B21	4	1	B21	4	1
B22	27	1	B22	8	1	B22	8	1
			B22X	19	1,5b,6	B22X	19	1,5b,6
B23	100	1,2	B23	100	1,2	B23	100	1,2
B24	87	1						
			B24X	87	1,5b,6	B24X	87	1,5b,6
B25	21	1,2						
			B25X	21	1,2,5b,6	B25X	21	1,2,5b,6
B32	62	1,2	B32	62	1,2	B32	62	1,2
B33	16	1						
C02	132	1,2	C02	86	1,5b	C02	86	1,5b
C03	39	1,2	C03	39	1,2,3,5b	C03	39	1,2,3,5b
C04	14	1,2						
			C04X	14	1,2,3,5b,6	C04X	14	1,2,3,5b,6
C05	10	1	C05	10	1,3,5b	C05	10	1,3,5b
C06	4	1,2	C06	4	1,2,3,5b	C06	4	1,2,3,5b
D01A	200	1,2	D01A	200	1,2,5b			
D01B	1	1	D01B	1	1,5b	D01B	1	1,5b
D01C	23	1,2	D01C	23	1,2	D01C	23	1,2
D01D	13	1,2	D01D	13	1,2	D01D	13	1,2
D01E	18	1	D01E	18	1	D01E	18	1
D02	108	1,2	D02	123	1,2,5b			
D03	26	1	D03	26	1,5b	D03	26	1,5b
D04A	32	1	D04A	32	1,5b	D04A	32	1,5b
D04B	345	1,2	D04B	345	1,2,5b	D04B	345	1,2,5b
D05	43	1	D05	22	1,5b	D05	22	1,5b
D06	16	1,2	D06	16	1,2,5b	D06	16	1,2,5b
D08	42	1,2	D08	42	1,2,5b	D08	42	1,2,5b
D09	63	1,2	D09	37	1,2,5b	D09	37	1,2,5b
D11	107	1,2	D11	107	1,2,3	D11	107	1,2,3

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
D12	408	1,2	D12	408	1,2,3	D12	408	1,2,3
D13	60	1,2	D13	150	2,3	D13	150	2,3
E01A	75	1	E01A	75	1			
E01B	719	1,2	E01B	719	1,2,3			
E02	112	1,2	E02	112	1,2			
E03A	174	1,2	E03A	174	1,2	E03A	174	1,2
E03B	157	1,2	E03B	190	1,2	E03B	190	1,2
E04	72	1,2	E04	72	1,2,3	E04	72	1,2,3
E05	10	1	E05	10	1	E05	10	1
E06	44	1,2						
F01	135	1	F01	196	1,5b,6	F01	196	1,5b,6
F02A	526	1,2	F02A	604	1,2,5b,6	F02A	604	1,2,5b,6
F02B	34	1,2	F02B	34	1,2,5b	F02B	34	1,2,5b
F03	58	1	F03	58	1,5b	F03	58	1,5b
F11	551	1,2	F11	551	2,3,5b	F11	551	2,3,5b
F12	157	1,2	F12	121	1,2,5b	F12	121	1,2,5b
F13	142	1	F13	177	1,5b	F13	177	1,5b
F14	158	1,2	F14	135	1,2,5b	F14	135	1,2,5b
F15	33	1,2	F15	33	1,2,5b	F15	33	1,2,5b
F16	69	1,2	F16	69	1,2,5b	F16	69	1,2,5b
F17	12	1,2	F17	12	1,2,5b	F17	12	1,2,5b
F18	51	1,2	F18	51	1,2,5b	F18	51	1,2,5b
F19	12	1,2	F19	12	1,2,5b	F19	12	1,2,5b
F20	127	1,2	F20	145	1,2,5b	F20	145	1,2,5b
F21	22	1	F21	22	1,5b	F21	22	1,5b
F22A	7	1	F22A	7	1,5b	F22A	7	1,5b
F22B	6	1	F22B	6	1,5b	F22B	6	1,5b
F23A	16	1	F23A	16	1,5b,6	F23A	16	1,5b,6
F23B	10	1,2	F23B	10	1,2,5b,6	F23B	10	1,2,5b,6
F23C	1	1	F23C	1	1,5b	F23C	1	1,5b
F23D	30	1	F23D	30	1,5b	F23D	30	1,5b
G01	106	1,2	G01	66	1,2,5b	G01	66	1,2,5b
			G01X	40	1,2,5b,6	G01X	40	1,2,5b,6
G02	5	1,2						
			G02X	5	1,2,5b,6	G02X	5	1,2,5b,6
G03A	131	1,2	G03A	131	1,2,5b	G03A	131	1,2,5b
G03B	119	1,2	G03B	119	1,2,5b	G03B	119	1,2,5b
G04	24	1,2	G04	24	1,2,5b	G04	24	1,2,5b
G05	23	1,2	G05	23	1,2,5b	G05	23	1,2,5b
G06	23	1,2	G06	23	1,2,5b,6	G06	23	1,2,5b,6
G07	2	1	G07	2	1,5b,6	G07	2	1,5b,6
G08	52	1,2	G08	24	1,2,5b	G08	24	1,2,5b
			G08X	29	1,5b,6	G08X	29	1,5b,6
G09	43	1,2	G09	43	1,2,5b,6	G09	43	1,2,5b,6
G10	6	1	G10	6	1,5b,6	G10	6	1,5b,6
G11	28	1,2						
			G11A	5	1,2,5b,6	G11A	5	1,2,5b,6
			G11B	7	1,2,5b,6	G11B	7	1,2,5b,6
			G11C	15	1,2,5b,6	G11C	15	1,2,5b,6
G12	10	1,2	G12	10	1,2,5b,6	G12	10	1,2,5b,6
G13	19	1,2						
			G13A	16	1,2,5b	G13A	16	1,2,5b
			G13B	5	1,2,5b	G13B	5	1,2,5b
G14A	6	1	G14A	6	1,5b,6	G14A	6	1,5b,6

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
G14B	6	1,2	G14B	6	1,2,5b,6	G14B	6	1,2,5b,6
G15	58	1,2	G15	95	1,2,5b	G15	95	1,2,5b
G25	60	1,2	G25	60	1,2,5b,6	G25	60	1,2,5b,6
G26	24	1,2	G26	24	1,2,5b,6	G26	24	1,2,5b,6
G35	3	1,2	G35	3	1,2	G35	3	1,2
H01	4	1,2	H01	4	1,2,3,5b	H01	4	1,2,3,5b
H02	9	1	H02	9	1,3,5b	H02	9	1,3,5b
H03	3	1,2						
H04	13	1						
H05	28	1						
H06	6	1,2	H06	34	1,2,5b	H06	34	1,2,5b
H07	2	1,2						
H08	26	1						
H09	6	1,2	H09	21	1,2,5b	H09	21	1,2,5b
H11	44	1,2	H11	27	1,2,5b	H11	27	1,2,5b
			H11X	17	1,2,5b,6	H11X	17	1,2,5b,6
H12	37	1,2	H12	6	1,2,5b	H12	6	1,2,5b
			H12X	31	1,2,5b,6	H12X	31	1,2,5b,6
H13A	103	1,2	H13A	54	1,2,5b	H13A	54	1,2,5b
			H13AX	52	1,2,5b,6	H13AX	52	1,2,5b,6
H13B	65	1,2	H13B	13	1,2,5b	H13B	13	1,2,5b
			H13BX	52	1,2,5b,6	H13BX	52	1,2,5b,6
K01	11	1,2	K01	11	1,2	K01	11	1,2
K02	132	1,2	K02	132	1,2	K02	132	1,2
L01	61	1,2	L01	39	1,2,5b	L01	39	1,2,5b
L02A	374	1,2	L02A	369	1,2,3,5b	L02A	369	1,2,3,5b
			L02AX	5	1,2,3,5b,6	L02AX	5	1,2,3,5b,6
L02B	715	1,2	L02B	275	1,2,3,5b	L02B	275	1,2,3,5b
			L02BX	215	1,2,3,5b,6	L02BX	215	1,2,3,5b,6
L02C	796	1,2	L02C	610	1,2,5b	L02C	610	1,2,5b
			L02CX	185	1,2,5b,6	L02CX	185	1,2,5b,6
L02D	257	1,2	L02D	257	1,2,5b	L02D	257	1,2,5b
			L02E	62	1,2,5b	L02E	62	1,2,5b
			L02F	185	1,2,3,5b	L02F	185	1,2,3,5b
L03	31	1,2,5a	L03	31	1,2,5a,5b	L03	31	1,2,5a,5b
L04	79	1,2	L04	79	1,2,5b	L04	79	1,2,5b
L05A	9	1,2						
			L05AX	9	1,2,5b,6	L05AX	9	1,2,5b,6
L05B	17	1						
			L05BX	17	1,5b,6	L05BX	17	1,5b,6
L06	10	1,5a						
L07	5	1,2,5a	L07	5	1,2,5a,5b	L07	5	1,2,5a,5b
			L201	92	5a,5b	L201	92	5a,5b
L202	142	2,5a	L202	142	2,5a,5b	L202	142	2,5a,5b
			L203	695	2,5a,5b	L203	695	2,5a,5b
L203A	152	2,5a						
L203B	113	2,5a						
			L204	1519	2,5a,5b	L204	1519	2,5a,5b
L204A	55	2,5a						
L204B	32	2,5a						
L205	140	2,5a	L205	756	2,3,5a,5b	L205	756	2,3,5a,5b
L206	138	2,5a	L206	81	2,5a,5b	L206	81	2,5a,5b
M01	701	1,2	M01	701	1,2,5b,6	M01	701	1,2,5b,6
M02A	110	1,2	M02A	141	1,2,3,5b,6	M02A	141	1,2,3,5b,6

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
M02B	3	1,2						
M02C	10	1	M02C	30	1,5b,6	M02C	30	1,5b,6
M04A	254	1,2	M04A	260	1,2,5b	M04A	260	1,2,5b
M04B	4	1,2	M04B	13	1,2,5b	M04B	13	1,2,5b
M04C	10	1	M04C	15	2,5b	M04C	15	2,5b
M05A	34	1	M05A	34	1,3,5b	M05A	34	1,3,5b
M05B	245	1,2	M05B	120	1,2,3,5b	M05B	120	1,2,3,5b
			M05C	24	2,3,5b	M05C	24	2,3,5b
			M05D	76	1,2,3,5b	M05D	76	1,2,3,5b
			M05E	21	1,2,3,5b	M05E	21	1,2,3,5b
			M05F	39	1,3,5b	M05F	39	1,3,5b
			M05G	11	1,3,5b	M05G	11	1,3,5b
M06	97	1,2	M06	97	1,2,5b	M06	97	1,2,5b
M07	21	1,2	M07	21	1,2,5b	M07	21	1,2,5b
M08A	98	1,2	M08A	98	1,2,5b	M08A	98	1,2,5b
M08B	33	1,2	M08B	29	1,2,5b	M08B	29	1,2,5b
M08C	11	1,2	M08C	11	1,2,5b	M08C	11	1,2,5b
M08D	27	1,2	M08D	27	1,2,5b	M08D	27	1,2,5b
M08E	3	1	M08E	8	1,5b	M08E	8	1,5b
M09	211	1,2	M09	224	1,2,5b,6	M09	224	1,2,5b,6
M10	71	1,2	M10	71	1,2,5b	M10	71	1,2,5b
M12	15	1	M12	12	1,2,5b	M12	12	1,2,5b
M13	10	1,2	M13	10	1,2,5b	M13	10	1,2,5b
M15	28	1	M15	28	1,2,5b	M15	28	1,2,5b
M16A	10	1	M16A	10	1,2,5b	M16A	10	1,2,5b
M16B	86	1,2	M16B	86	1,2,3,5b	M16B	86	1,2,3,5b
M18	58	1,2	M18	58	1,2,3,5b	M18	58	1,2,3,5b
M19	27	1,2	M19	27	1,2,5b	M19	27	1,2,5b
			M20	15	1,2	M20	15	1,2
M201	50	2,5a	M201	74	2,5a,5b	M201	74	2,5a,5b
			M202A	117	1,2,5a,5b	M202A	117	1,2,5a,5b
			M202B	21	1,2,5a,5b	M202B	21	1,2,5a,5b
			M203	63	1,2,5a,5b	M203	63	1,2,5a,5b
			M204	282	1,2,5a,5b	M204	282	1,2,5a,5b
N01	732	1,2						
			N01A	37	1,2,5b	N01A	37	1,2,5b
			N01B	13	1	N01B	13	1
			N01C	225	1,2,5b	N01C	225	1,2,5b
			N01D	14	1,5b	N01D	14	1,5b
			N01E	71	1,5b	N01E	71	1,5b
			N01F	2	1,5b	N01F	2	1,5b
			N01G	5	1,5b	N01G	5	1,5b
			N01H	49	1,5b	N01H	49	1,5b
			N01I	28	1,5b	N01I	28	1,5b
			N01J	21	1,2,5b	N01J	21	1,2,5b
N02	42	1,2						
			N02A	24	1,2	N02A	24	1,2
			N02B	5	1,2	N02B	5	1,2
N03	26	1,2	N03	26	1,2,5b	N03	26	1,2,5b
O01	11	1,2	O01	8	1,2,3,5b			
O02	472	1,2						
			O02A	262	1,2,3,5b			
			O02B	173	1,2,5b			
O03	46	1	O03	46	1,5b	O03	46	1,5b

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
O04	19	1	O04	32	1,5b			
O05	100	1,2	O05	100	1,2,5b			
O06	33	1	O06	33	1,5b	O06	33	1,5b
O07	48	1	O07	48	1	O07	48	1
O08	27	1	O08	27	1	O08	27	1
O09	10	1	O09	10	1	O09	10	1
O10A	14	1	O10A	14	1,3	O10A	14	1,3
O10B	6	1	O10B	6	1	O10B	6	1
O11A	27	1	O11A	27	1	O11A	27	1
O11B	39	1,2	O11B	39	1,2	O11B	39	1,2
O11C	15	1	O11C	15	1,3	O11C	15	1,3
O12	96	1	O12	96	1,3,5b			
O201	299	2,5a						
			O201A	156	2,5a,5b	O201A	156	2,5a,5b
			O201B	121	2,5a,5b	O201B	121	2,5a,5b
P201	185	1,5a	P201	185	1,5a,5b	P201	185	1,5a,5b
Q06	19	1,2	Q06	19	1,2,5b	Q06	19	1,2,5b
Q07	13	1,2	Q07	13	1,2,5b	Q07	13	1,2,5b
Q08	42	1,2	Q08	42	1,2,5b	Q08	42	1,2,5b
Q09	18	1,2	Q09	18	1,2,5b	Q09	18	1,2,5b
Q13	81	1	Q13	81	1,5b	Q13	81	1,5b
Q14A	397	1,2	Q14A	395	1,2,5b,6	Q14A	395	1,2,5b,6
Q14B	146	1	Q14B	146	1,5b,6	Q14B	146	1,5b,6
Q15	14	1,2	Q15	17	1,2,5b	Q15	17	1,2,5b
Q16	8	1	Q16	8	1,5b,6	Q16	8	1,5b,6
R01A	325	1,2	R01A	106	1,2,3,5b			
R01B	11	1,2	R01B	11	1,2,3,5b	R01B	11	1,2,3,5b
R02	36	1,2	R02	30	1,2,3			
R03	32	1,2						
R04A	52	1,2	R04A	52	1,2,3,5b,6	R04A	52	1,2,3,5b,6
R04B	41	1,2	R04B	41	1,2,3	R04B	41	1,2,3
R06A	9	1	R06A	12	1,3	R06A	12	1,3
R06B	24	1	R06B	21	1	R06B	21	1
R07	83	1,2						
			R07A	98	1,2	R07A	98	1,2
			R07B	19	1,2	R07B	19	1,2
R08	2	1						
R12	64	1	R12	8	1,5b	R12	8	1,5b
			R12X	56	1,5b,6	R12X	56	1,5b,6
R14	5	1,2						
R15	25	1	R15	66	1,3,5b	R15	66	1,3,5b
R16	98	1,2	R16	98	1,2,5b	R16	98	1,2,5b
R17	72	1,2						
			R17X	72	1,2,5b,6	R17X	72	1,2,5b,6
R18	100	1,2	R18	83	1,2,5b	R18	83	1,2,5b
			R18X	17	1,5b,6	R18X	17	1,5b,6
R19A	52	1	R19A	52	1,3,5b,6	R19A	52	1,3,5b,6
R19B	12	1,2	R19B	12	1,2,3,5b,6	R19B	12	1,2,3,5b,6
R19D	70	1,2	R19D	91	1,2,3,5b,6	R19D	91	1,2,3,5b,6
			R19DX	24	1,2,5b,6	R19DX	24	1,2,5b,6
R19E	4	1,2	R19E	4	1,2,5b,6	R19E	4	1,2,5b,6
R19F	5	1	R19F	11	1,2,5b,6	R19F	11	1,2,5b,6
R20	37	1	R20	50	1,5b,6	R20	50	1,5b,6
R22	28	1,2	R22	28	1,2,3,5b	R22	28	1,2,3,5b

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
R23	13	1,2	R23	13	1,2	R23	13	1,2
R24A	41	1,2	R24A	41	1,2,5b	R24A	41	1,2,5b
R24B	5	1,2						
R25	34	1,2						
			R25X	34	1,2,5b,6	R25X	34	1,2,5b,6
R31	140	1,2	R31	120	1,2,3,5b	R31	120	1,2,3,5b
			R31X	67	1,2,3,5b,6	R31X	67	1,2,3,5b,6
R32	30	1,2	R32	31	1,2,6	R32	31	1,2,6
R33	12	1,2						
			R33X	12	1,2,3,5b,6	R33X	12	1,2,3,5b,6
R35	26	1,2						
			R35A	10	1,2,3,5b	R35A	10	1,2,3,5b
			R35B	16	1,2,3,5b	R35B	16	1,2,3,5b
R36	15	1,2	R36	12	1,2,3,5b	R36	12	1,2,3,5b
R37	25	1,2	R37	25	1,2,5b	R37	25	1,2,5b
R38	20	1,2	R38	20	1,2,3	R38	20	1,2,3
R39	3	1	R39	3	1,2,3,5b	R39	3	1,2,3,5b
			R40A	32	2,3,5b	R40A	32	2,3,5b
			R40B	52	2,3,5b	R40B	52	2,3,5b
S01	34	1	S01	53	1,5b	S01	53	1,5b
S02	135	1,2	S02	135	1,2,5b	S02	135	1,2,5b
S03	168	1,2	S03	168	1,2,5b	S03	168	1,2,5b
S04	284	1,2	S04	284	1,2,5b	S04	284	1,2,5b
S05A	46	1,2						
S05B	28	1,2	S05B	7	1,2,5b	S05B	7	1,2,5b
S05C	27	1						
S06	28	1	S06	28	1,3,5b	S06	28	1,3,5b
S08	81	1,2	S08	81	1,2,5b	S08	81	1,2,5b
S10	9	1	S10	9	1,3,5b	S10	9	1,3,5b
S11	25	1	S11	25	1,3	S11	25	1,3
T01	19	1	T01	19	1,3	T01	19	1,3
T02	33	1,2	T02	33	1,2,3	T02	33	1,2,3
T03	29	1,2	T03	29	1,2	T03	29	1,2
T04A	266	1,2	T04A	266	1,2,3	T04A	266	1,2,3
T04B	904	1,2	T04B	904	1,2,3	T04B	904	1,2,3
T04C	77	1	T04C	101	1,3	T04C	101	1,3
T04D	9	1	T04D	9	1,3	T04D	9	1,3
T04E	2	1	T04E	2	1,3	T04E	2	1,3
T20	9	1	T20	9	1,3	T20	9	1,3
T21A	3	1,2						
T21B	18	1	T21B	18	1,3,5b	T21B	18	1,3,5b
T22	16	1,2	T22	18	1,2,5b	T22	18	1,2,5b
T23	82	1,2	T23	28	1,2,5b	T23	28	1,2,5b
			T23X	54	1,2,5b,6	T23X	54	1,2,5b,6
T24	151	1,2	T24	154	1,2,3,5b	T24	154	1,2,3,5b
T25	32	1,2	T25	6	1,2	T25	6	1,2
			T25X	26	1,2,5b,6	T25X	26	1,2,5b,6
T26	15	1,2	T26	15	1,2	T26	15	1,2
T27A	1075	1,2	T27A	926	1,2,3,5b	T27A	926	1,2,3,5b
			T27AX	150	1,2,3,5b,6	T27AX	150	1,2,3,5b,6
T27B	953	1,2	T27B	573	1,2,3	T27B	573	1,2,3
			T27BX	360	1,2,3,6	T27BX	360	1,2,3,6
			T27C	97	1,2,3	T27C	97	1,2,3
T28	44	1,2						

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
U01	775	1,2						
			U01A	3	1,2	U01A	3	1,2
			U01B	26	1,2	U01B	26	1,2
			U01C	12	1	U01C	12	1
			U01D	617	1,2,3,5b,6	U01D	617	1,2,3,5b,6
			U01DX	33	1,2,5b,6	U01DX	33	1,2,5b,6
U02	65	1,2	U02	56	1,2	U02	56	1,2
U03	347	1,2	U03	320	1,2,3	U03	320	1,2,3
V01	20	1	V01	20	1	V01	20	1
V02	17	1,2	V02	16	1,2	V02	16	1,2
V03	35	1,2	V03	25	1,2	V03	25	1,2
V04	15	1,2						
			V04A	2	1,2	V04A	2	1,2
			V04B	3	1,2	V04B	3	1,2
V05A	3	1,2						
V05B	7	1	V05B	6	1	V05B	6	1
V06	9	1	V06	4	1	V06	4	1
V10	50	1,2	V10	50	1,2,3	V10	50	1,2,3
V12A	9	1	V12A	9	1,3	V12A	9	1,3
V12B	16	1	V12B	16	1,2,3	V12B	16	1,2,3
V13	160	1,2	V13	119	1,2,3	V13	119	1,2,3
			V13X	69	1,2,3,5b,6	V13X	69	1,2,3,5b,6
V14A	15	1,2	V14A	15	1,2,3	V14A	15	1,2,3
V14B	382	1,2	V14B	382	1,2,3	V14B	382	1,2,3
V14C	70	1,2	V14C	70	1,2,3,5b	V14C	70	1,2,3,5b
V15	61	1,2	V15	61	1,2	V15	61	1,2
W01	51	1,2	W01	51	1,2	W01	51	1,2
W02	226	1,2	W02	226	1,2	W02	226	1,2
W03	21	1,2	W03	21	1,2,3	W03	21	1,2,3
W04	85	1,2	W04	74	1,2	W04	74	1,2
W05	51	1						
			W05A	3	1	W05A	3	1
			W05B	5	1	W05B	5	1
W06	63	1						
			W06A	13	1	W06A	13	1
			W06B	7	1	W06B	7	1
X01	21	1						
			X01A	8	1,3	X01A	8	1,3
			X01B	3	1,3	X01B	3	1,3
X02	43	1,2	X02	43	1,2,3	X02	43	1,2,3
X03	58	1,2	X03	58	1,2,3,5b	X03	58	1,2,3,5b
X04	7	1,2	X04	7	1,2,3	X04	7	1,2,3
X05	33	1,2	X05	33	1,2,3	X05	33	1,2,3
X06	56	1,2	X06	60	1,2,3	X06	60	1,2,3
X07	43	1,2	X07	43	1,2	X07	43	1,2
X08	20	1	X08	20	1	X08	20	1
X09	5	1	X09	5	1,3	X09	5	1,3
X10	10	1,2	X10	8	1,2,3,5b	X10	8	1,2,3,5b
X11	19	1,2						
X12	23	1,2	X12	23	1,2,3,5b	X12	23	1,2,3,5b
X13	19	1,2	X13	19	1,2,3,5b	X13	19	1,2,3,5b
X14	12	1,2						
X15	76	1,2	X15	116	1,2,3,5b	X15	116	1,2,3,5b
X16	16	1,2	X16	16	1,2,5b	X16	16	1,2,5b

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
X17	51	1,2	X17	51	1,2,3,5b,6	X17	51	1,2,3,5b,6
X18	19	1,2	X18	19	1,2,3,5b,6	X18	19	1,2,3,5b,6
X19	4	1,2	X19	4	1,2,3,5b,6	X19	4	1,2,3,5b,6
X22	52	1,2	X22	52	1,2,3,5b	X22	52	1,2,3,5b
X23	353	1,2	X23	353	1,2,3,5b	X23	353	1,2,3,5b
X24	76	1,2	X24	76	1,2,5b	X24	76	1,2,5b
X25	253	1,2	X25	253	1,2,5b,6	X25	253	1,2,5b,6
X26	75	1,2	X26	75	1,2,3,5b	X26	75	1,2,3,5b
X27	34	1,2	X27	34	1,2,5b	X27	34	1,2,5b
X40	8	1,2	X40	8	1,2	X40	8	1,2
X41	21	1,2	X41	21	1,2,3	X41	21	1,2,3
X100	22	1,2	X100	22	1,2,5b	X100	22	1,2,5b
X101	21	1,2	X101	31	1,2	X101	31	1,2
X102	23	1,2	X102	23	1,2	X102	23	1,2
X103	28	1,2	X103	28	1,2,3	X103	28	1,2,3
X104	76	1,2	X104	72	1,2,3,5b	X104	72	1,2,3,5b
X105	14	1,2	X105	14	1,2	X105	14	1,2
X106	18	1,2	X106	18	1,2	X106	18	1,2
X107	142	1,2	X107	70	1,2,3	X107	70	1,2,3
X108	183	1,2	X108	183	1,2,3,5b	X108	183	1,2,3,5b
X109A	28	1,2	X109A	28	1,2,5b	X109A	28	1,2,5b
X109B	8	1,2	X109B	8	1,2,5b	X109B	8	1,2,5b
X109C	12	1,2	X109C	18	1,2,3,5b	X109C	18	1,2,3,5b
X109D	13	1,2	X109D	13	1,2,3,5b	X109D	13	1,2,3,5b
X109E	9	1,2	X109E	9	1,2,5b	X109E	9	1,2,5b
X110	18	1	X110	18	1	X110	18	1
X111	32	1,2						
			X111X	32	1,2,5b,6	X111X	32	1,2,5b,6
X112	15	1,2	X112	14	1,2	X112	14	1,2
X114	13	1,2						
			X114X	18	1,2,5b,6	X114X	18	1,2,5b,6
X115	150	1,2	X115	150	1,2,3,5b	X115	150	1,2,3,5b
X116	109	1,2	X116	110	1,2,3,5b	X116	110	1,2,3,5b
X117	14	1,2	X117	9	1,2,5b	X117	9	1,2,5b
X118	162	1,2	X118	7	1,2	X118	7	1,2
			X118X	156	1,2,5b,6	X118X	156	1,2,5b,6
X119	114	1,2						
			X119X	113	1,2,5b,6	X119X	113	1,2,5b,6
X120	19	1	X120	24	1,3,5b	X120	24	1,3,5b
Y01	132	1,2						
			Y01A	36	1,3	Y01A	36	1,3
			Y01B	18	1,2,3	Y01B	18	1,2,3
			Y01C	3	1	Y01C	3	1
			Y01D	22	1,2,3	Y01D	22	1,2,3
Y02	19	1,2	Y02	15	1,2	Y02	15	1,2
Y03	17	1,2						
			Y03A	10	1	Y03A	10	1
			Y03B	2	1,3	Y03B	2	1,3
AA01	34	1,2	AA01	34	1,2,3,5b	AA01	34	1,2,3,5b
AA02	10	1						
AA03	28	1,2	AA03	28	1,2,3,5b	AA03	28	1,2,3,5b
AA04	25	1	AA04	28	1,3,5b	AA04	28	1,3,5b
AA05	11	1,2						
AA07	14	1,2	AA07	10	1,2,3,5b	AA07	10	1,2,3,5b

Alternative 1			Alternative 3			Alternative 4		
Unit	Acres	Objectives	Unit	Acres	Objectives	Unit	Acres	Objectives
AA08	19	1,2	AA08	19	1,2,3,5b	AA08	19	1,2,3,5b
AA09	66	1	AA09	66	1,3,5b	AA09	66	1,3,5b
AA11	12	1,2	AA11	12	1,2	AA11	12	1,2
AA12	4	1,2	AA12	4	1,2,3	AA12	4	1,2,3
AA13	12	1,2	AA13	12	1,2	AA13	12	1,2
Total	**28,326**		**Total**	**30,399**		**Total**	**27,826**	

Blank entries indicate the item does not apply.

E.02 SALVAGE AND BIOMASS TREATMENTS

Table E.02-1 displays the unit number, harvest system[10], salvage acres and biomass acres for each salvage and biomass treatment unit as proposed in the action alternatives.

Table E.02-1 Salvage and Biomass Treatment Units in Alternatives 1, 3 and 4

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
A01A	G	7									
A01B	G	143		A01B	G	143					
A02	S	8									
A03	G	86		A03	G	55					
A04	H	21		A04	H	21					
A05	H	672									
				A05A	H	293					
				A05B	H	25					
				A05C	H	85		A05C	H	85	
A08A	G	155		A08A	G	111		A08A	G	111	
A08B	G	14									
A08C	G	33		A08C	H	18		A08C	H	18	
A08D	G	28									
A09	H	53		A09	H	81		A09	H	81	
A10	G	112									
A14	G	7	7	A14	G	8	8	A14	G	8	8
				A14X	G	2	2	A14X	G	2	2
A15	G	22	22	A15	H	22		A15	H	22	
B01A	G	3									
B01B	G	9									
B02	G	60		B02	G	63		B02	G	63	
B03	G	18		B03	G	18		B03	G	18	
B21	G	4		B21	G	4		B21	G	4	
B22	G	27		B22	G	8		B22	G	8	
				B22X	G	19		B22X	G	19	
B23	G	100		B23	G	100		B23	G	100	
B24	H	87									
				B24X	H	87		B24X	H	87	
B25	G	21									
				B25X	G	21		B25X	G	21	
B32	G	62		B32	G	62		B32	G	62	
B33	G	16									
C02	S	132		C02	H	86		C02	H	86	

[10] Harvest System: **G**=Ground based equipment; **H**=Helicopter; **S**=Skyline

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
C03	G	39	39	C03	G	39	39	C03	G	39	39
C04	G	14	14								
				C04X	G	14	14	C04X	G	14	14
C05	G	10	10	C05	G	10	10	C05	G	10	10
C06	G	4	4	C06	G	4	4	C06	G	4	4
D01A	G	200		D01A	G	200					
D01B	G	1		D01B	G	1		D01B	G	1	
D01C	G	23		D01C	G	23		D01C	G	23	
D01D	G	13		D01D	G	13		D01D	G	13	
D01E	G	18		D01E	G	18		D01E	G	18	
D02	G	108		D02	G	123					
D03	G	26		D03	G	26		D03	G	26	
D04A	G	32		D04A	G	32		D04A	G	32	
D04B	G	345		D04B	G	345		D04B	G	345	
D05	G	43		D05	G	22		D05	G	22	
D06	G	16		D06	G	16		D06	G	16	
D08	G	42		D08	G	42		D08	G	42	
D09	G	63		D09	G	37		D09	G	37	
D11	G	107	40	D11	G	107	40	D11	G	107	40
D12	G	408	291	D12	G	408	291	D12	G	408	291
D13	G	60	58	D13	G	150	147	D13	G	150	147
E01A	G	75		E01A	G	75					
E01B	G	719	97	E01B	G	719	97				
E02	G	112		E02	G	112					
E03A	G	174		E03A	G	174		E03A	G	174	
E03B	G	157		E03B	G	190		E03B	G	190	
E04	G	72	71	E04	G	72	71	E04	G	72	71
E05	G	10		E05	G	10		E05	G	10	
E06	H	44									
F01	H	135		F01	H	196		F01	H	196	
F02A	G	526		F02A	G	604		F02A	G	604	
F02B	G	34		F02B	G	34		F02B	G	34	
F03	H	58		F03	H	58		F03	H	58	
F11	G	551	551	F11	G	551	551	F11	G	551	551
F12	G	157		F12	G	121		F12	G	121	
F13	H	142		F13	H	177		F13	H	177	
F14	G	158		F14	G	135		F14	G	135	
F15	H	33		F15	H	33		F15	H	33	
F16	G	69		F16	G	69		F16	G	69	
F17	S	12		F17	S	12		F17	S	12	
F18	G	51		F18	G	51		F18	G	51	
F19	G	12		F19	G	12		F19	G	12	
F20	H	127		F20	H	145		F20	H	145	
F21	G	22		F21	G	22		F21	G	22	
F22A	G	7		F22A	G	7		F22A	G	7	
F22B	G	6		F22B	G	6		F22B	G	6	
F23A	G	16		F23A	G	16		F23A	G	16	
F23B	G	10		F23B	G	10		F23B	G	10	
F23C	G	1		F23C	G	1		F23C	G	1	
F23D	G	30		F23D	G	30		F23D	G	30	
G01	G	106		G01	G	66		G01	G	66	
				G01X	G	40		G01X	G	40	
G02	G	5									
				G02X	G	5		G02X	G	5	

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
G03A	G	131		G03A	G	131		G03A	G	131	
G03B	G	119		G03B	G	119		G03B	G	119	
G04	G	24		G04	G	24		G04	G	24	
G05	G	23		G05	G	23		G05	G	23	
G06	G	23		G06	G	23		G06	G	23	
G07	G	2		G07	G	2		G07	G	2	
G08	G	52		G08	G	24		G08	G	24	
				G08X	G	29		G08X	G	29	
G09	G	43		G09	G	43		G09	G	43	
G10	S	6		G10	S	6		G10	S	6	
G11	S	28									
				G11A	S	5		G11A	S	5	
				G11B	S	7		G11B	S	7	
				G11C	G	15		G11C	G	15	
G12	S	10		G12	S	10		G12	S	10	
G13	S	19									
				G13A	S	16		G13A	S	16	
				G13B	G	5		G13B	G	5	
G14A	H	6		G14A	H	6		G14A	H	6	
G14B	H	6		G14B	H	6		G14B	H	6	
G15	G	58		G15	G	95		G15	G	95	
G25	G	60		G25	G	60		G25	G	60	
G26	G	24		G26	G	24		G26	G	24	
G35	G	3		G35	G	3		G35	G	3	
H01	G	4	3	H01	G	4	3	H01	G	4	3
H02	G	9		H02	G	9		H02	G	9	
H03	G	3									
H04	H	13									
H05	H	28									
H06	G	6		H06	G	34		H06	G	34	
H07	G	2									
H08	H	26									
H09	G	6		H09	G	21		H09	G	21	
H11	G	44		H11	G	27		H11	G	27	
				H11X	G	17		H11X	G	17	
H12	G	37		H12	G	6		H12	G	6	
				H12X	G	31		H12X	G	31	
H13A	G	103		H13A	G	54		H13A	G	54	
				H13AX	G	52		H13AX	G	52	
H13B	G	65		H13B	G	13		H13B	G	13	
				H13BX	G	52		H13BX	G	52	
K01	G	11		K01	G	11		K01	G	11	
K02	G	132		K02	G	132		K02	G	132	
L01	S	61		L01	S	39		L01	S	39	
L02A	G	374	373	L02A	G	369	368	L02A	G	369	368
				L02AX	G	5	5	L02AX	G	5	5
L02B	G	715		L02B	G	275		L02B	G	275	
				L02BX	G	215		L02BX	G	215	
L02C	G	796		L02C	G	610		L02C	G	610	
				L02CX	G	185		L02CX	G	185	
L02D	G	257		L02D	G	257		L02D	G	257	
				L02E	H	62		L02E	H	62	
				L02F	G	185		L02F	G	185	
L03	G	31	31	L03	G	31	31	L03	G	31	31

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
L04	G	79		L04	G	79	25	L04	G	79	25
L05A	S	9									
				L05AX	H	9		L05X	H	9	
L05B	S	17									
				L05BX	H	17		L05BX	H	17	
L06	S	10	10								
L07	G	5	5	L07	G	5	5	L07	G	5	5
				L201	G	92	92	L201	G	92	92
L202	G	142	28	L202	G	142	28	L202	G	142	28
				L203	G	695	250	L203	G	695	250
L203A	G	152	152								
L203B	G	113	113								
				L204	G	1519	340	L204	G	1519	340
L204A	G	55	55								
L204B	G	32	32								
L205	G	140	140	L205	G	756	756	L205	G	756	756
L206	G	138	138	L206	G	81	15	L206	G	81	15
M01	G	701		M01	G	701		M01	G	701	
M02A	G	110	110	M02A	G	141	141	M02A	G	141	141
M02B	G	3	3								
M02C	G	10		M02C	G	30		M02C	G	30	
M04A	G	254		M04A	G	260		M04A	G	260	
M04B	G	4		M04B	G	13		M04B	G	13	
M04C	G	10		M04C	G	15		M04C	G	15	
M05A	G	34	34	M05A	H	34		M05A	H	34	
M05B	G	245	245	M05B	H	120		M05B	H	120	
				M05C	G	24	24	M05C	G	24	24
				M05D	G	76	76	M05D	G	76	76
				M05E	G	21	21	M05E	G	21	21
				M05F	G	39	39	M05F	G	39	39
				M05G	G	11	11	M05G	G	11	11
M06	G	97		M06	G	97		M06	G	97	
M07	G	21		M07	G	21		M07	G	21	
M08A	G	98		M08A	G	98		M08A	G	98	
M08B	G	33		M08B	G	29		M08B	G	29	
M08C	G	11		M08C	G	11		M08C	G	11	
M08D	G	27		M08D	G	27		M08D	G	27	
M08E	G	3		M08E	G	8		M08E	G	8	
M09	H	211		M09	H	224		M09	H	224	
M10	G	71		M10	G	71		M10	G	71	
M12	G	15		M12	G	12		M12	G	12	
M13	H	10		M13	H	10		M13	H	10	
M15	G	28		M15	G	28		M15	G	28	
M16A	G	10		M16A	G	10		M16A	G	10	
M16B	G	86	18	M16B	G	86	18	M16B	G	86	18
M18	G	58	34	M18	G	58	34	M18	G	58	34
M19	G	27		M19	G	27		M19	G	27	
				M20	G	15		M20	G	15	
M201	G	50	35	M201	G	74	35	M201	G	74	35
				M202A	G	117	17	M202A	G	117	17
				M202B	G	21	3	M202B	G	21	3
				M203	G	63	20	M203	G	63	20
				M204	G	282	79	M204	G	282	79
N01	G	732									

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
				N01A	G	37		N01A	G	37	
				N01B	G	13		N01B	G	13	
				N01C	G	225		N01C	G	225	
				N01D	G	14		N01D	G	14	
				N01E	G	71		N01E	G	71	
				N01F	G	2		N01F	G	2	
				N01G	G	5		N01G	G	5	
				N01H	G	49		N01H	G	49	
				N01I	G	28		N01I	G	28	
				N01J	G	21		N01J	G	21	
N02	G	42									
				N02A	G	24		N02A	G	24	
				N02B	G	5		N02B	G	5	
N03	G	26		N03	G	26		N03	G	26	
O01	G	11	10	O01	G	8	8				
O02	G	472	202								
				O02A	G	262	193				
				O02B	G	173					
O03	H	46		O03	H	46		O03	H	46	
O04	H	19		O04	H	32					
O05	G	100		O05	G	100					
O06	H	33		O06	H	33		O06	H	33	
O07	H	48		O07	H	48		O07	H	48	
O08	G	27		O08	G	27		O08	G	27	
O09	G	10		O09	G	10		O09	G	10	
O10A	G	14	14	O10A	G	14	14	O10A	G	14	14
O10B	G	6		O10B	G	6		O10B	G	6	
O11A	G	27		O11A	G	27		O11A	G	27	
O11B	G	39		O11B	G	39		O11B	G	39	
O11C	G	15	15	O11C	G	15	15	O11C	G	15	15
O12	H	96		O12	H	96					
O201	G	299	140								
				O201A	G	156	80	O201A	G	156	80
				O201B	G	121	60	O201B	G	121	60
P201	H	185		P201	H	185		P201	H	185	
Q06	G	19		Q06	G	19		Q06	G	19	
Q07	G	13		Q07	G	13		Q07	G	13	
Q08	G	42		Q08	G	42		Q08	G	42	
Q09	S	18		Q09	S	18		Q09	S	18	
Q13	G	81		Q13	G	81		Q13	G	81	
Q14A	G	397	10	Q14A	G	395	10	Q14A	G	395	10
Q14B	G	146		Q14B	G	146		Q14B	G	146	
Q15	S	14		Q15	S	17		Q15	S	17	
Q16	G	8		Q16	G	8		Q16	G	8	
R01A	G	325	325	R01A	G	106	106				
R01B	G	11	11	R01B	G	11	11	R01B	G	11	11
R02	S	36		R02	S	30					
R03	G	32	32								
R04A	G	52	52	R04A	G	52	52	R04A	G	52	52
R04B	G	41	41	R04B	G	41	41	R04B	G	41	41
R06A	G	9	9	R06A	G	12	12	R06A	G	12	12
R06B	G	24		R06B	G	21		R06B	G	21	
R07	H	83									
				R07A	S	98		R07A	S	98	

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
				R07B	G	19		R07B	G	19	
R08	G	2	2								
R12	G	64		R12	G	8		R12	G	8	
				R12X	G	56		R12X	G	56	
R14	G	5									
R15	G	25	25	R15	G	66	26	R15	G	66	26
R16	G	98		R16	G	98		R16	G	98	
R17	G	72									
				R17X	G	72		R17X	G	72	
R18	S	100		R18	S	83		R18	S	83	
				R18X	S	17		R18X	S	17	
R19A	G	52	38	R19A	G	52	38	R19A	G	52	38
R19B	G	12	7	R19B	G	12	7	R19B	G	12	7
R19D	G	70	11	R19D	G	91	11	R19D	G	91	11
				R19DX	G	24		R19DX	G	24	
R19E	G	4		R19E	G	4		R19E	G	4	
R19F	G	5		R19F	G	11		R19F	G	11	
R20	H	37		R20	H	50		R20	H	50	
R22	G	28	11	R22	G	28	11	R22	G	28	11
R23	H	13		R23	H	13		R23	H	13	
R24A	G	41		R24A	G	41		R24A	G	41	
R24B	G	5									
R25	G	34									
				R25X	G	34		R25X	G	34	
R31	G	140	140	R31	G	120	120	R31	G	120	120
				R31X	G	67	67	R31X	G	67	67
R32	G	30		R32	G	31		R32	G	31	
R33	H	12									
				R33X	H	12		R33X	H	12	
R35	S	26									
				R35A	S	10		R35A	S	10	
				R35B	G	16	16	R35B	G	16	16
R36	G	15	15	R36	G	12	12	R36	G	12	12
R37	G	25		R37	G	25		R37	G	25	
R38	G	20	20	R38	G	20	20	R38	G	20	20
R39	G	3	3	R39	G	3	3	R39	G	3	3
				R40A	G	32	32	R40A	G	32	32
				R40B	G	52	52	R40B	G	52	52
S01	G	34		S01	G	53		S01	G	53	
S02	G	135		S02	G	135		S02	G	135	
S03	G	168		S03	G	168		S03	G	168	
S04	G	284		S04	G	284		S04	G	284	
S05A	G	46									
S05B	G	28		S05B	G	7		S05B	G	7	
S05C	G	27									
S06	G	28	28	S06	G	28	28	S06	G	28	28
S08	S	81		S08	S	81		S08	S	81	
S10	H	9		S10	H	9		S10	H	9	
S11	G	25	11	S11	G	25	11	S11	G	25	11
T01	G	19	5	T01	G	19	5	T01	G	19	5
T02	G	33	24	T02	G	33	24	T02	G	33	24
T03	S	29		T03	S	29		T03	S	29	
T04A	G	266	2	T04A	G	266	2	T04A	G	266	2
T04B	G	904	744	T04B	G	904	744	T04B	G	904	744

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
T04C	G	77	77	T04C	G	101	101	T04C	G	101	101
T04D	G	9	9	T04D	G	9	9	T04D	G	9	9
T04E	G	2	2	T04E	G	2	2	T04E	G	2	2
T20	G	9	9	T20	G	9	9	T20	G	9	9
T21A	G	3	3								
T21B	G	18	18	T21B	G	18	18	T21B	G	18	18
T22	G	16		T22	G	18		T22	G	18	
T23	G	82		T23	G	28		T23	G	28	
				T23X	G	54		T23X	G	54	
T24	G	151	87	T24	G	154	90	T24	G	154	90
T25	S	32		T25	S	6		T25	S	6	
				T25X	S	26		T25X	S	26	
T26	S	15		T26	S	15		T26	S	15	
T27A	G	1075	531	T27A	G	926	427	T27A	G	926	427
				T27AX	G	150	104	T27AX	G	150	104
T27B	G	953	784	T27B	G	573	540	T27B	G	573	540
				T27BX	G	360	227	T27BX	G	360	227
				T27C	G	97	64	T27C	G	97	64
T28	G	44	14								
U01	G	775	117								
				U01A	G	3		U01A	G	3	
				U01B	G	26		U01B	G	26	
				U01C	G	12		U01C	G	12	
				U01D	G	617	105	U01D	G	617	105
				U01DX	G	33		U01DX	G	33	
U02	G	65	3	U02	G	56	3	U02	G	56	3
U03	G	347	80	U03	G	320	75	U03	G	320	75
V01	G	20		V01	G	20		V01	G	20	
V02	G	17		V02	G	16		V02	G	16	
V03	G	35		V03	G	25		V03	G	25	
V04	G	15									
				V04A	G	2		V04A	G	2	
				V04B	G	3		V04B	G	3	
V05A	G	3									
V05B	G	7		V05B	G	6		V05B	G	6	
V06	G	9		V06	G	4		V06	G	4	
V10	G	50	46	V10	G	50	46	V10	G	50	46
V12A	G	9	9	V12A	G	9	9	V12A	G	9	9
V12B	G	16	13	V12B	G	16	13	V12B	G	16	13
V13	G	160	110	V13	G	119	96	V13	G	119	96
				V13X	G	69	21	V13X	G	69	21
V14A	G	15	8	V14A	G	15	8	V14A	G	15	8
V14B	G	382	90	V14B	G	382	90	V14B	G	382	90
V14C	G	70	7	V14C	G	70	7	V14C	G	70	7
V15	H	61		V15	H	61		V15	H	61	
W01	G	51		W01	G	51		W01	G	51	
W02	G	226		W02	G	226		W02	G	226	
W03	G	21	20	W03	G	21	20	W03	G	21	20
W04	G	85		W04	G	74		W04	G	74	
W05	G	51									
				W05A	G	3		W05A	G	3	
				W05B	G	5		W05B	G	5	
W06	G	63									
				W06A	G	13		W06A	G	13	

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
				W06B	G	7		W06B	G	7	
X01	G	21	21								
				X01A	G	8	8	X01A	G	8	8
				X01B	G	3	3	X01B	G	3	3
X02	H	43		X02	H	43		X02	H	43	
X03	S	58		X03	S	58		X03	S	58	
X04	G	7	7	X04	G	7	7	X04	G	7	7
X05	H	33		X05	H	33		X05	H	33	
X06	H	56		X06	H	60		X06	H	60	
X07	G	43		X07	G	43		X07	G	43	
X08	H	20		X08	H	20		X08	H	20	
X09	G	5	5	X09	G	5	5	X09	G	5	5
X10	H	10		X10	H	8		X10	H	8	
X11	G	19	19								
X12	S	23		X12	S	23		X12	S	23	
X13	G	19	19	X13	G	19	19	X13	G	19	19
X14	G	12	12								
X15	G	76	47	X15	G	116	87	X15	G	116	87
X16	G/S	16		X16	G/S	16		X16	G/S	16	
X17	S	51		X17	S	51		X17	S	51	
X18	G	19	19	X18	G	19	19	X18	G	19	19
X19	G	4	4	X19	G	4	4	X19	G	4	4
X22	S	52		X22	S	52		X22	S	52	
X23	H	353		X23	H	353		X23	H	353	
X24	S	76		X24	S	76		X24	S	76	
X25	S	253		X25	S	253		X25	S	253	
X26	G	75	52	X26	G	75	52	X26	G	75	52
X27	S	34		X27	S	34		X27	S	34	
X40	G	8		X40	G	8		X40	G	8	
X41	G	21	21	X41	G	21	21	X41	G	21	21
X100	G	22		X100	G	22		X100	G	22	
X101	G	21		X101	G	31		X101	G	31	
X102	G	23		X102	G	23		X102	G	23	
X103	G	28	6	X103	G	28	6	X103	G	28	6
X104	G	76	5	X104	G	72	4	X104	G	72	4
X105	G	14		X105	G	14		X105	G	14	
X106	G	18		X106	G	18		X106	G	18	
X107	G	142	142	X107	G	70	70	X107	G	70	70
X108	G	183	183	X108	G	183	183	X108	G	183	183
X109A	G	28		X109A	G	28		X109A	G	28	
X109B	G	8		X109B	G	8		X109B	G	8	
X109C	G	12		X109C	G	18	1	X109C	G	18	1
X109D	G	13	13	X109D	G	13	13	X109D	G	13	13
X109E	G	9		X109E	G	9		X109E	G	9	
X110	G	18		X110	G	18		X110	G	18	
X111	G	32									
				X111X	G	32		X111X	G	32	
X112	G	15		X112	G	14		X112	G	14	
X114	G	13									
				X114X	G	18		X114X	G	18	
X115	G	150	91	X115	G	150	91	X115	G	150	91
X116	G	109	27	X116	G	110	27	X116	G	110	27
X117	G	14		X117	G	9		X117	G	9	
X118	G	162		X118	G	7		X118	G	7	

Alternative 1				Alternative 3				Alternative 4			
Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)	Unit	System	Salvage (acres)	Biomass (acres)
				X118X	G	156		X118X	G	156	
X119	G	114									
				X119X	G	113		X119X	G	113	
X120	S	19		X120	H	24		X120	H	24	
Y01	G	132	69								
				Y01A	G	36	11	Y01A	G	36	11
				Y01B	G	18	18	Y01B	G	18	18
				Y01C	G	3		Y01C	G	3	
				Y01D	G	22	8	Y01D	G	22	8
Y02	G	19	1	Y02	G	15		Y02	G	15	
Y03	G	17	6								
				Y03A	G	10		Y03A	G	10	
				Y03B	G	2	2	Y03B	G	2	2
AA01	G	34	34	AA01	G	34	34	AA01	G	34	34
AA02	H	10									
AA03	G	28	28	AA03	G	28	28	AA03	G	28	28
AA04	H	25		AA04	H	28		AA04	H	28	
AA05	G	11	11								
AA07	G	14	14	AA07	G	10	10	AA07	G	10	10
AA08	G	19	19	AA08	G	19	19	AA08	G	19	19
AA09	H	66		AA09	H	66		AA09	H	66	
AA11	S	12		AA11	S	12		AA11	S	12	
AA12	G	4	4	AA12	G	4	4	AA12	G	4	4
AA13	S	12		AA13	S	12		AA13	S	12	
	total	**28,326**	**7,626**		**total**	**30,399**	**8,379**		**total**	**27,826**	**7,975**

Harvest System: **G**=Ground based equipment; **H**=Helicopter; **S**=Skyline
Blank entries indicate the item does not apply.

E.03 FUELS TREATMENTS

Alternative 3 and Alternative 4 include fuels treatments that are not included in Alternative 1. These fuels treatments are Strategically Placed Landscape Treatments (SPLAT), non-SPLAT fuels treatments, and fuels ground pile treatments including the following.

1. Lop and scatter to 12 inch fuel depth in SPLAT areas.
2. Lop and scatter to 18 inch fuel depth in non-SPLAT areas.

Table E.03-1 displays the unit number, SPLAT acres, non-SPLAT acres and ground pile acres for each fuels treatment unit as proposed in Alternative 3 and Alternative 4.

Table E.03-1 Fuels Treatment Units in Alternatives 3 and 4 for SPLAT and Non-SPLAT Areas

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
A01B		143	38				
A03		55	55				
A04		21					
A05A		293					
A05B		25					
A05C		85		A05C		85	
A08A		111	102	A08A		111	102
A08C		18		A08C		18	

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
A09		81		A09		81	
A14	8		8	A14	8		8
A14X	2		2	A14X	2		2
A15	22			A15	22		
B02		63	63	B02		63	63
B03		18	18	B03		18	18
B21		4	4	B21		4	4
B22		8	8	B22		8	8
B22X		19	19	B22X		19	19
B23		100	100	B23		100	100
B24X		87		B24X		87	
B25X		21	21	B25X		21	21
B32		62	62	B32		62	62
C02		86		C02		86	
C03	39		39	C03	39		39
C04X	14		14	C04X	14		14
C05	10		10	C05	10		10
C06	4		4	C06	4		4
D01A		200	200				0
D01B		1	1	D01B		1	1
D01C		23	23	D01C		23	23
D01D		13	13	D01D		13	13
D01E		18	18	D01E		18	18
D02		123	123				0
D03		26	26	D03		26	26
D04A		32	32	D04A		32	32
D04B		345	345	D04B		345	345
D05		22	22	D05		22	22
D06		16	16	D06		16	16
D08		42	42	D08		42	42
D09		37	37	D09		37	37
D11	40	67	107	D11	40	67	107
D12	291	117	408	D12	291	117	408
D13	147	3	150	D13	147	3	150
E01A		75	75				0
E01B	97	622	492				0
E02		112	112				0
E03A		174	103	E03A		174	103
E03B		190	98	E03B		190	98
E04	71	1	72	E04	71	1	72
E05		10	10	E05		10	10
F01		196		F01		196	
F02A		604	280	F02A		604	280
F02B		34	15	F02B		34	15
F03		58		F03		58	
F11	551		426	F11	551		426
F12		121	3	F12		121	3
F13		177		F13		177	
F14		135	98	F14		135	98
F15		33		F15		33	
F16		69	69	F16		69	69
F17		12		F17		12	
F18		51	34	F18		51	34
F19		12	6	F19		12	6

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
F20		145		F20		145	
F21		22	22	F21		22	22
F22A		7	7	F22A		7	7
F22B		6	6	F22B		6	6
F23A		16	16	F23A		16	16
F23B		10	10	F23B		10	10
F23C		1	1	F23C		1	1
F23D		30	30	F23D		30	30
G01		66	66	G01		66	66
G01X		40	40	G01X		40	40
G02X		5	5	G02X		5	5
G03A		131	131	G03A		131	131
G03B		119	114	G03B		119	114
G04		24	24	G04		24	24
G05		23	23	G05		23	23
G06		23	23	G06		23	23
G07		2	2	G07		2	2
G08		24	24	G08		24	24
G08X		29	29	G08X		29	29
G09		43	43	G09		43	43
G10		6		G10		6	
G11A		5		G11A		5	
G11B		7		G11B		7	
G11C		15	15	G11C		15	15
G12		10		G12		10	
G13A		16		G13A		16	
G13B		5	5	G13B		5	5
G14A		6		G14A		6	
G14B		6		G14B		6	
G15		95	95	G15		95	95
G25		60	60	G25		60	60
G26		24	24	G26		24	24
G35		3	3	G35		3	3
H01	3	1	4	H01	3	1	4
H02		9	9	H02		9	9
H06		34	34	H06		34	34
H09		21	21	H09		21	21
H11		27	15	H11		27	15
H11X		17	11	H11X		17	11
H12		6	6	H12		6	6
H12X		31	31	H12X		31	31
H13A		54	40	H13A		54	40
H13AX		52	13	H13AX		52	13
H13B		13	13	H13B		13	13
H13BX		52	52	H13BX		52	52
K01		11	11	K01		11	11
K02		132	132	K02		132	132
L01		39		L01		39	
L02A	368	1	369	L02A	368	1	369
L02AX	5		5	L02AX	5		5
L02B		275	275	L02B		275	275
L02BX		215	182	L02BX		215	182
L02C		610	138	L02C		610	138
L02CX		185	111	L02CX		185	111

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
L02D		257	218	L02D		257	218
L02E		62		L02E		62	
L02F		185	119	L02F		185	119
L03		31	31	L03		31	31
L04		79	54	L04		79	54
L05AX		9		L05X		9	
L05BX		17		L05BX		17	
L07		5	5	L07		5	5
L201		92	92	L201		92	92
L202		142	93	L202		142	93
L203		695	445	L203		695	445
L204		1519	1179	L204		1519	1179
L205	692	64	756	L205	692	64	756
L206		81	66	L206		81	66
M01		701	663	M01		701	663
M02A	141		141	M02A	141		141
M02C		30	30	M02C		30	30
M04A		260	260	M04A		260	260
M04B		13	13	M04B		13	13
M04C		15	15	M04C		15	15
M05A	34			M05A	34		
M05B	120			M05B	120		
M05C	24		24	M05C	24		24
M05D	76		53	M05D	76		53
M05E	21		21	M05E	21		21
M05F	39		39	M05F	39		39
M05G	11		11	M05G	11		11
M06		97	68	M06		97	68
M07		21	21	M07		21	21
M08A		98	62	M08A		98	62
M08B		29	29	M08B		29	29
M08C		11	11	M08C		11	11
M08D		27	27	M08D		27	27
M08E		8	8	M08E		8	8
M09		224		M09		224	
M10		71	71	M10		71	71
M12		12	12	M12		12	12
M13		10		M13		10	
M15		28	28	M15		28	28
M16A		10	10	M16A		10	10
M16B	18	68	57	M16B	18	68	57
M18	34	24	58	M18	34	24	58
M19		27	27	M19		27	27
M20		15		M20		15	
M201		74	39	M201		74	39
M202A		117	100	M202A		117	100
M202B		21	18	M202B		21	18
M203		63	43	M203		63	43
M204		282	203	M204		282	203
N01A		37	14	N01A		37	14
N01B		13	13	N01B		13	13
N01C		225	122	N01C		225	122
N01D		14	1	N01D		14	1
N01E		71	27	N01E		71	27

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
N01F		2	2	N01F		2	2
N01G		5	5	N01G		5	5
N01H		49	21	N01H		49	21
N01I		28	2	N01I		28	2
N01J		21	12	N01J		21	12
N02A		24	7	N02A		24	7
N02B		5	5	N02B		5	5
N03		26	26	N03		26	26
O01	8		8				0
O02A	193	69	262				0
O02B		173	173				0
O03		46		O03		46	
O04		32					
O05		100	100				0
O06		33		O06		33	
O07		48		O07		48	
O08		27	27	O08		27	27
O09		10	10	O09		10	10
O10A	14		14	O10A	14		14
O10B		6	6	O10B		6	6
O11A		27	27	O11A		27	27
O11B		39	39	O11B		39	39
O11C	15		15	O11C	15		15
O12	95	1					
O201A		156	76	O201A		156	76
O201B		121	61	O201B		121	61
P201		185		P201		185	
Q06		19	19	Q06		19	19
Q07		13	13	Q07		13	13
Q08		42	42	Q08		42	42
Q09		18		Q09		18	
Q13		81	81	Q13		81	81
Q14A	10	385	309	Q14A	10	385	309
Q14B		146	146	Q14B		146	146
Q15		17		Q15		17	
Q16		8	8	Q16		8	8
R01A	106		78				0
R01B	11		11	R01B	11		11
R02	30						
R04A	52		52	R04A	52		52
R04B	41		33	R04B	41		33
R06A	12		12	R06A	12		12
R06B		21	21	R06B		21	21
R07A		98		R07A		98	
R07B		19	19	R07B		19	19
R12		8	8	R12		8	8
R12X		56	56	R12X		56	56
R15	26	40	66	R15	26	40	66
R16		98	98	R16		98	98
R17X		72	72	R17X		72	72
R18		83		R18		83	
R18X		17		R18X		17	
R19A	38	14	52	R19A	38	14	52
R19B	7	5	12	R19B	7	5	12

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
R19D	11	80	91	R19D	11	80	91
R19DX		24	24	R19DX		24	24
R19E		4	4	R19E		4	4
R19F		11	11	R19F		11	11
R20		50		R20		50	
R22	11	17	28	R22	11	17	28
R23		13		R23		13	
R24A		41	41	R24A		41	41
R25X		34	34	R25X		34	34
R31	120		120	R31	120		120
R31X	67		67	R31X	67		67
R32		31	31	R32		31	31
R33X	11	1		R33X	11	1	
R35A	10			R35A	10		
R35B	16		16	R35B	16		16
R36	12		12	R36	12		12
R37		25	25	R37		25	25
R38	20		20	R38	20		20
R39	3		3	R39	3		3
R40A	32		32	R40A	32		32
R40B	52		52	R40B	52		52
S01		53	53	S01		53	53
S02		135	135	S02		135	135
S03		168	168	S03		168	168
S04		284	255	S04		284	255
S05B		7	7	S05B		7	7
S06	28		28	S06	28		28
S08		81		S08		81	
S10	9			S10	9		
S11	11	14	25	S11	11	14	25
T01	5	14	19	T01	5	14	19
T02	24	9	33	T02	24	9	33
T03		29		T03		29	
T04A	2	264	266	T04A	2	264	266
T04B	744	160	670	T04B	744	160	670
T04C	101		101	T04C	101		101
T04D	9		9	T04D	9		9
T04E	2		2	T04E	2		2
T20	9		9	T20	9		9
T21B	18		18	T21B	18		18
T22		18	18	T22		18	18
T23		28	28	T23		28	28
T23X		54	54	T23X		54	54
T24	90	64	154	T24	90	64	154
T25		6		T25		6	
T25X		26		T25X		26	
T26		15		T26		15	
T27A	427	499	778	T27A	427	499	778
T27AX	104	46	103	T27AX	104	46	103
T27B	540	33	472	T27B	540	33	472
T27BX	227	133	267	T27BX	227	133	267
T27C	64	33	97	T27C	64	33	97
U01A		3	3	U01A		3	3
U01B		26	26	U01B		26	26

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
U01C		12	12	U01C		12	12
U01D	105	512	545	U01D	105	512	545
U01DX		33	33	U01DX		33	33
U02	3	53	56	U02	3	53	56
U03	75	245	320	U03	75	245	320
V01		20	20	V01		20	20
V02		16	16	V02		16	16
V03		25	14	V03		25	14
V04A		2	2	V04A		2	2
V04B		3	3	V04B		3	3
V05B		6	6	V05B		6	6
V06		4	4	V06		4	4
V10	46	4	50	V10	46	4	50
V12A	9		9	V12A	9		9
V12B	13	3	16	V12B	13	3	16
V13	96	23	119	V13	96	23	119
V13X	21	48	69	V13X	21	48	69
V14A	8	7	15	V14A	8	7	15
V14B	90	292	340	V14B	90	292	340
V14C	7	63	70	V14C	7	63	70
V15	3	58		V15	3	58	
W01		51	51	W01		51	51
W02		226	226	W02		226	226
W03	20	1	21	W03	20	1	21
W04		74	74	W04		74	74
W05A		3	3	W05A		3	3
W05B		5		W05B		5	
W06A		13	13	W06A		13	13
W06B		7	7	W06B		7	7
X01A	8		8	X01A	8		8
X01B	3		3	X01B	3		3
X02	43			X02	43		
X03	58			X03	58		
X04	7		7	X04	7		7
X05	33			X05	33		
X06	58	2		X06	58	2	
X07		43	43	X07		43	43
X08		20		X08		20	
X09	5		5	X09	5		5
X10	8			X10	8		
X12	13	10		X12	13	10	
X13	19		19	X13	19		19
X15	87	29	116	X15	87	29	116
X16		16	16	X16		16	16
X17	40	11		X17	40	11	
X18	19		19	X18	19		19
X19	4		4	X19	4		4
X22		52		X22		52	
X23	353			X23	353		
X24		76		X24		76	
X25		253		X25		253	
X26	52	23	75	X26	52	23	75
X27		34		X27		34	
X40		8	2	X40		8	2

Alternative 3				Alternative 4			
Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)	Unit	SPLAT (acres)	Non-SPLAT (acres)	Ground Pile (acres)
X41	21		21	X41	21		21
X100		22	22	X100		22	22
X101		31	31	X101		31	31
X102		23	23	X102		23	23
X103	6	22	28	X103	6	22	28
X104	4	68	72	X104	4	68	72
X105		14	14	X105		14	14
X106		18	18	X106		18	18
X107	70		70	X107	70		70
X108	183		183	X108	183		183
X109A		28	22	X109A		28	22
X109B		8	8	X109B		8	8
X109C	1	17	18	X109C	1	17	18
X109D	13		13	X109D	13		13
X109E		9	9	X109E		9	9
X110		18	18	X110		18	18
X111X		32	32	X111X		32	32
X112		14	14	X112		14	14
X114X		18	18	X114X		18	18
X115	91	59	150	X115	91	59	150
X116	27	83	110	X116	27	83	110
X117		9	9	X117		9	9
X118		7	7	X118		7	7
X118X		156	156	X118X		156	156
X119X		113	113	X119X		113	113
X120	5	19		X120	5	19	
Y01A	11	25	36	Y01A	11	25	36
Y01B	18		18	Y01B	18		18
Y01C		3	3	Y01C		3	3
Y01D	8	14	22	Y01D	8	14	22
Y02		15	15	Y02		15	15
Y03A		10	10	Y03A		10	10
Y03B	2		2	Y03B	2		2
AA01	34		34	AA01	34		34
AA03	28		28	AA03	28		28
AA04	28			AA04	28		
AA07	10		10	AA07	10		10
AA08	19		19	AA08	19		19
AA09	66			AA09	66		
AA11		12		AA11		12	
AA12	4		4	AA12	4		4
AA13		12		AA13		12	
Total	**8,274**	**22,125**	**22,036**	**Total**	**7,745**	**20,081**	**20,320**

E.04 WATERSHED TREATMENTS

Alternative 3 and Alternative 4 include watershed treatments that are not included in Alternative 1. As described in Chapter 2.01, these watershed treatments proposed in areas identified as watershed sensitive areas include mastication and, drop and lop.

Table E.04-1 displays the unit number, mastication acres, and drop and lop acres for each watershed treatment unit as proposed in Alternative 3 and Alternative 4.

Table E.04-1 Watershed Treatments for Alternatives 3 and 4

Alternative 3			Alternative 4		
Unit	Mastication (acres)	Drop and Lop (acres)	Unit	Mastication (acres)	Drop and Lop (acres)
A01B		105			
A05A		70			
A05C		1	A05C		1
A08A		9	A08A		9
E01B		227			
E03A	71		E03A	71	
E03B		92	E03B		92
F01	32		F01	32	
F02A	323	1	F02A	323	1
F02B		19	F02B		19
F11		125	F11		125
F12		118	F12		118
F13		49	F13		49
F14		37	F14		37
F15		10	F15		10
F18		17	F18		17
F19		6	F19		6
F20		25	F20		25
G03B		5	G03B		5
H11		12	H11		12
H11X		6	H11X		6
H13A	14		H13A	14	
H13AX	39		H13AX	39	
L02BX	33		L02BX	33	
L02C	418	54	L02C	418	54
L02CX	47	27	L02CX	47	27
L02D		39	L02D		39
L02F	66		L02F	66	
L202		21	L202		21
M01	35	3	M01	35	3
M05D	23		M05D	23	
M06		29	M06		29
M08A		36	M08A		36
M09		41	M09		41
M16B		29	M16B		29
M20		15	M20		15
N01A		23	N01A		23
N01C		103	N01C		103
N01D		13	N01D		13
N01E	32	12	N01E	32	12
N01H	28		N01H	28	
N01I	26		N01I	26	
N01J	9		N01J	9	
N02A		17	N02A		17
Q14A		86	Q14A		86
R01A		28			
R04B		8	R04B		8
S04	20	9	S04	20	9
T04B		234	T04B		234
T27A		148	T27A		148
T27AX		47	T27AX		47

Alternative 3			Alternative 4		
Unit	Mastication (acres)	Drop and Lop (acres)	Unit	Mastication (acres)	Drop and Lop (acres)
T27B	90	11	T27B	90	11
T27BX	3	90	T27BX	3	90
U01D		72	U01D		72
V03		11	V03		11
V14B		42	V14B		42
W05B		5	W05B		5
X25		29	X25		29
X40		6	X40		6
X109A		6	X109A		6
Total	**1,309**	**2,228**	**Total**	**1,309**	**1,798**

E.05 ROAD TREATMENTS

Road treatments, as described in Chapter 2.01, vary between the action alternatives. These treatments include maintenance and reconstruction of existing roads, new construction and development of new temporary roads

Table E.05-1 displays the route number, status, miles, MVUM[11] and road treatments as proposed in the action alternatives.

Table E.05-1 Road Treatments in Alternatives 1, 3 and 4

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
01N01	Existing	8.530	ALL, year round	Maintain	Maintain	Maintain
01N01	Existing	0.824	ALL, year round	Reconstruct	Reconstruct	Reconstruct
01N01A	Existing	0.503	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N01E	Existing	0.449	Closed	Reconstruct	Reconstruct	Reconstruct
01N01H	Existing	0.659	ALL, year round	Maintain	Maintain	Maintain
01N01K	Existing	0.597	ALL, year round	Maintain	Maintain	Maintain
01N01L	Existing	0.120	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N02	Existing	1.466	ALL, year round	Maintain	Maintain	Maintain
01N02	Existing	2.666	Closed	Maintain	Maintain	Maintain
01N02B	Existing	0.636	Closed	Maintain	Maintain	Maintain
01N02Y	Existing	1.485	ALL, seasonal	Reconstruct	Maintain	Maintain
01N04	Existing	0.382	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N04B	Existing	0.630	ALL, seasonal	Maintain	Maintain	Maintain
01N04D	Existing	0.525	Closed	Reconstruct	Reconstruct	Reconstruct
01N04Y	Existing	0.504	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N04Y	Existing	0.247	Closed	Reconstruct	Reconstruct	Reconstruct
01N05	Existing	0.142	ALL, seasonal	Reconstruct	Maintain	Maintain
01N05	Existing	2.209	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N07C	Existing	0.595	ALL, seasonal	Maintain	Maintain	Maintain
01N07Y	Existing	1.567	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N09	Existing	0.830	Closed	Maintain	Maintain	Maintain
01N09	Existing	0.569	Closed	Maintain	Reconstruct	Reconstruct
01N09	Existing	2.438	Closed	Reconstruct	Reconstruct	Reconstruct
01N09Y	Existing	0.356	ALL, seasonal	Maintain	Maintain	Maintain
01N10	Existing	3.677	HLO, seasonal	Maintain		
01N10	Existing	6.274	HLO, year round	Maintain		
01N10A	Existing	0.528	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct

[11] The MVUM (Motor Vehicle Use Map) identifies public motor vehicle use by Vehicle Class (4 wheel drive, All Vehicles, Highway Legal Only, etc.) and whether the season of use is closed, open year round or seasonal (open April 15 through December 15).

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
01N10C	Existing	0.140	HLO, year round	Maintain		
01N10E	Existing	0.161	HLO, year round	Maintain		
01N11	Existing	2.060	ALL, year round	Maintain	Maintain	Maintain
01N11Y	Existing	0.125	HLO, seasonal	Reconstruct	Maintain	Maintain
01N11Y	Existing	2.303	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N12	Existing	0.539	ALL, seasonal	Maintain	Maintain	Maintain
01N12	Existing	0.491	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N12Y	Existing	0.279	Closed	Reconstruct	Reconstruct	Reconstruct
01N13	Existing	2.048	ALL, year round	Maintain	Maintain	Maintain
01N13A	Existing	0.378	ALL, year round	Maintain	Maintain	Maintain
01N13B	Existing	0.965	ALL, year round	Maintain	Maintain	Maintain
01N14	Existing	3.758	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N14A	Existing	0.823	HLO, seasonal	Maintain	Maintain	Maintain
01N14F	Existing	0.444	HLO, seasonal	Reconstruct	Maintain	Maintain
01N14G	Existing	0.127	Closed	Reconstruct	Reconstruct	Maintain
01N15	Existing	1.233	Closed	Reconstruct	Reconstruct	Reconstruct
01N15Y	Existing	0.532	Closed	Maintain	Maintain	Maintain
01N16	Existing	0.030	ALL, year round	Maintain	Maintain	Maintain
01N17	Existing	0.212	ALL, year round	Maintain	Maintain	Maintain
01N17	Existing	2.154	ALL, year round	Maintain	Maintain	Maintain
01N17A	Existing	0.104	ALL, year round	Maintain	Maintain	Maintain
01N18	Existing	1.366	ALL, year round	Maintain	Maintain	Maintain
01N18A	Existing	0.170	ALL, year round	Maintain	Maintain	Maintain
01N19	Existing	1.331	ALL, year round	Maintain	Maintain	Maintain
01N19	Existing	0.120	Closed	Maintain	Maintain	Maintain
01N24	Existing	2.243	ALL, year round	Maintain	Maintain	Maintain
01N24	Existing	1.465	ALL, year round	Reconstruct	Reconstruct	Reconstruct
01N24A	Existing	0.099	ALL, year round	Maintain	Maintain	Maintain
01N24B	Existing	0.344	ALL, year round	Maintain	Maintain	Maintain
01N24C	Existing	1.184	ALL, year round	Maintain	Maintain	Maintain
01N25	Existing	0.344	ALL, year round	Maintain	Maintain	Maintain
01N25A	Existing	0.105	ALL, seasonal	Maintain	Maintain	Maintain
01N25B	Existing	0.328	ALL, seasonal	Maintain	Maintain	Maintain
01N25Y	Existing	0.729	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N26	Existing	2.792	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N26	Existing	1.068	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N26A	Existing	0.261	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N26B	Existing	0.412	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N26C	Existing	0.305	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N26D	Existing	0.248	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N26YA	Existing	0.354	Closed	Maintain	Maintain	Maintain
01N27	Existing	0.823	ALL, year round	Maintain	Maintain	Maintain
01N27B	Existing	0.445	ALL, year round	Maintain	Maintain	Maintain
01N28	Existing	0.386	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N28A	Existing	0.119	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N30	Existing	0.713	ALL, seasonal	Reconstruct	Maintain	Maintain
01N30	Existing	2.096	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N30A	Existing	0.053	Closed	Reconstruct	Reconstruct	Reconstruct
01N31Y	Existing	0.388	ALL, seasonal	Maintain	Maintain	Maintain
01N31Y	Existing	0.544	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N31YA	Existing	0.335	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N31YB	Existing	0.391	Closed	Maintain	Reconstruct	Reconstruct
01N32	Existing	0.274	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N32	Existing	0.647	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N32A	Existing	0.124	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N32Y	Existing	0.116	Closed	Temp Road	Temp Road	Temp Road
01N34	Existing	0.399	Closed	Reconstruct	Reconstruct	Maintain

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
01N34C	Existing	0.224	Closed	Reconstruct	Reconstruct	Maintain
01N34Y	Existing	1.076	ALL, year round	Maintain	Maintain	Maintain
01N35	Existing	0.933	ALL, year round	Maintain	Maintain	Maintain
01N36	Existing	0.713	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N36A	Existing	0.210	ALL, seasonal	Maintain	Maintain	Maintain
01N37	Existing	1.425	Closed (mitigation)	Reconstruct	Reconstruct	Reconstruct
01N38	Existing	0.255	ALL, year round	Maintain	Maintain	Maintain
01N38	Existing	0.191	Closed	Maintain	Maintain	Maintain
01N38A	Existing	0.028	Closed	Maintain	Maintain	Maintain
01N39	Existing	0.886	ALL, year round	Maintain	Maintain	Maintain
01N39Y	Existing	0.115	Closed	Reconstruct	Reconstruct	Reconstruct
01N39Y	Existing	0.560	Closed	Reconstruct	Reconstruct	Reconstruct
01N40	Existing	0.220	ALL, year round	Maintain	Maintain	Maintain
01N40Y	Existing	1.501	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N40Y	Existing	0.409	HLO, seasonal	Reconstruct	Reconstruct	Maintain
01N40YA	Existing	0.474	Closed		Temp Use - Revert	Temp Use - Revert
01N41	Existing	0.269	ALL, seasonal	Maintain	Maintain	Maintain
01N42Y	Existing	1.143	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N42YC	Existing	0.281	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N43	Existing	5.941	ALL, year round	Maintain	Maintain	Maintain
01N43A	Existing	0.820	ALL, year round	Maintain	Maintain	Maintain
01N43B	Existing	0.628	ALL, year round	Maintain	Maintain	Maintain
01N43C	Existing	0.526	ALL, year round	Maintain	Maintain	Maintain
01N43D	Existing	0.205	ALL, year round	Maintain	Maintain	Maintain
01N43D	Existing	0.052	Closed	Maintain	Maintain	Maintain
01N44	Existing	0.524	ALL, year round	Maintain	Maintain	Maintain
01N46	Existing	0.908	ALL, year round	Reconstruct	Reconstruct	Reconstruct
01N48	Existing	0.831	ALL, year round	Maintain	Maintain	Maintain
01N48A	Existing	0.566	ALL, year round	Maintain	Maintain	Maintain
01N48B	Existing	0.189	ALL, year round	Maintain	Maintain	Maintain
01N49	Existing	1.306	ALL, seasonal	Maintain	Maintain	Maintain
01N49	Existing	0.847	ALL, year round	Maintain	Maintain	Maintain
01N49	Existing	0.145	ALL, year round	Reconstruct	Reconstruct	Reconstruct
01N49A	Existing	0.219	ALL, year round	Maintain	Maintain	Maintain
01N49B	Existing	0.377	ALL, seasonal	Maintain	Maintain	Maintain
01N50	Existing	0.026	ALL, seasonal	Reconstruct	Maintain	Maintain
01N50	Existing	2.945	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N50A	Existing	0.441	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N50C	Existing	1.181	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N51	Existing	0.651	ALL, year round	Maintain	Maintain	Maintain
01N56	Existing	0.145	ALL, seasonal	Maintain	Maintain	Maintain
01N56	Existing	3.087	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N56A	Existing	0.654	ALL, seasonal	Reconstruct	Maintain	Maintain
01N56A	Existing	0.523	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N57	Existing	2.178	ALL, seasonal	Maintain	Maintain	Maintain
01N58	Existing	1.587	ALL, seasonal	Maintain	Maintain	Maintain
01N58	Existing	0.291	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N58A	Existing	0.393	Closed	Maintain	Maintain	Maintain
01N58B	Existing	0.221	ALL, seasonal	Maintain	Maintain	Maintain
01N59	Existing	0.186	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N60	Existing	0.758	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N60A	Existing	0.346	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N61	Existing	1.776	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N67	Existing	1.055	ALL, seasonal	Maintain	Maintain	Maintain
01N70	Existing	0.459	Closed		Temp Use - Revert	Temp Use - Revert
01N70A	Existing	0.235	Closed		Temp Use - Revert	Temp Use - Revert
01N72	Existing	0.684	Closed	Maintain	Reconstruct	Reconstruct

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
01N72	Existing	0.428	Closed	Reconstruct	Reconstruct	Reconstruct
01N74	Existing	4.315	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N74A	Existing	0.460	Closed	Reconstruct	Reconstruct	Reconstruct
01N74C	Existing	0.326	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N75	Existing	0.266	Closed	Reconstruct	Reconstruct	Reconstruct
01N76	Existing	2.378	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N77	Existing	0.118	ALL, seasonal	Maintain	Maintain	Maintain
01N78	Existing	0.383	ALL, seasonal	Maintain	Maintain	Maintain
01N79	Existing	3.346	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N79A	Existing	0.513	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N79B	Existing	0.379	ALL, seasonal	Maintain	Maintain	Maintain
01N79B	Existing	0.353	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01N80	Existing	1.449	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N80A	Existing	0.335	Closed	Reconstruct	Reconstruct	Reconstruct
01N82	Existing	0.300	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N83	Existing	0.021	ALL, seasonal	Maintain	Maintain	Maintain
01N83	Existing	1.934	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N83	Existing	0.105	Closed	Reconstruct	Reconstruct	Reconstruct
01N86	Existing	1.072	Closed	Reconstruct	Reconstruct	Reconstruct
01N88	Existing	0.631	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N89	Existing	0.522	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N91	Existing	0.280	Closed	Reconstruct	Reconstruct	Reconstruct
01N94	Existing	0.259	ALL, seasonal	Maintain	Maintain	Maintain
01N94	Existing	0.294	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N94A	Existing	0.403	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N96	Existing	4.940	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N96E	Existing	0.525	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01N97	Existing	5.012	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01N97C	Existing	0.113	Closed	Reconstruct	Reconstruct	Reconstruct
01N97D	Existing	0.064	Closed		Temp Use - Revert	Temp Use - Revert
01S01	Existing	0.138	4WD, seasonal	Reconstruct	Reconstruct	Reconstruct
01S01	Existing	0.619	Closed	Reconstruct	Reconstruct	Reconstruct
01S01Y	Existing	0.066	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S01Y	Existing	0.587	Closed	Reconstruct	Reconstruct	Reconstruct
01S01YA	Existing	0.167	Closed	Reconstruct	Reconstruct	Reconstruct
01S01YB	Existing	0.585	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S02Y	Existing	0.151	Closed	Reconstruct	Reconstruct	Reconstruct
01S03	Existing	0.445	HLO, year round	Maintain	Reconstruct	Reconstruct
01S03B	Existing	1.025	Closed	Reconstruct	Reconstruct	Reconstruct
01S04	Existing	2.964	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S04A	Existing	0.851	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S05	Existing	4.003	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S05A	Existing	0.651	Closed	Reconstruct	Reconstruct	Reconstruct
01S06	Existing	2.688	Closed	Maintain	Maintain	Maintain
01S06B	Existing	0.104	HLO, year round	Maintain	Maintain	Maintain
01S08	Existing	1.460	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S08Y	Existing	0.949	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S08YA	Existing	0.105	Closed	Reconstruct	Reconstruct	Reconstruct
01S09	Existing	2.029	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S11	Existing	0.286	ALL, seasonal	Maintain	Maintain	Maintain
01S11	Existing	0.711	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01S11	Existing	2.118	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S11A	Existing	0.555	ALL, seasonal	Maintain	Maintain	Maintain
01S11A	Existing	0.311	ALL, seasonal	Reconstruct	Reconstruct	Maintain
01S11F	Existing	0.575	ALL, seasonal	Maintain	Maintain	Maintain
01S11Y	Existing	1.449	Closed	Reconstruct	Reconstruct	Reconstruct
01S12G	Existing	0.363	ALL, seasonal	Maintain	Maintain	Maintain

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
01S12G	Existing	0.413	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S12H	Existing	0.581	ALL, seasonal	Maintain	Maintain	Maintain
01S12H	Existing	0.185	ALL, seasonal	Reconstruct	Maintain	Maintain
01S13	Existing	15.934	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S13C	Existing	2.001	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S13Y	Existing	1.223	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S14	Existing	5.912	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S14M	Existing	0.428	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01S15Y	Existing	3.059	Closed	Reconstruct	Reconstruct	Reconstruct
01S15YA	Existing	1.357	Closed	Reconstruct	Reconstruct	Reconstruct
01S15YB	Existing	0.181	Closed	Reconstruct	Reconstruct	Reconstruct
01S16Y	Existing	0.699	HLO, seasonal	Maintain	Maintain	Maintain
01S16Y	Existing	1.169	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S18Y	Existing	0.669	Closed	Reconstruct	Reconstruct	Reconstruct
01S19	Existing	0.544	ALL, seasonal	Maintain	Maintain	Maintain
01S19	Existing	2.149	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S19A	Existing	0.987	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S19B	Existing	0.011	Closed	Maintain	Reconstruct	Reconstruct
01S19B	Existing	0.523	Closed	Reconstruct	Reconstruct	Reconstruct
01S19C	Existing	0.238	ALL, seasonal	Maintain	Maintain	Maintain
01S19Y	Existing	0.208	HLO, seasonal	Maintain	Maintain	Maintain
01S19Y	Existing	0.263	HLO, seasonal	Reconstruct	Maintain	Maintain
01S20Y	Existing	0.220	HLO, seasonal	Maintain	Maintain	Maintain
01S20Y	Existing	0.433	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S21Y	Existing	0.878	ALL, seasonal	Maintain	Maintain	Maintain
01S23	Existing	3.029	ALL, seasonal	Maintain	Maintain	Maintain
01S23D	Existing	0.351	ALL, seasonal	Maintain	Maintain	Maintain
01S23E	Existing	0.228	Closed	Maintain	Maintain	Maintain
01S23H	Existing	0.078	Closed	Maintain	Maintain	Maintain
01S23X	Existing	0.571	Closed	Maintain	Maintain	Maintain
01S23Y	Existing	0.661	HLO, year round	Maintain	Maintain	Maintain
01S24	Existing	0.514	ALL, seasonal	Maintain	Reconstruct	Reconstruct
01S24	Existing	2.846	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S24	Existing	0.032	Closed	Maintain	Reconstruct	Reconstruct
01S24A	Existing	1.075	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S25	Existing	0.630	ALL, seasonal	Maintain	Maintain	Maintain
01S25	Existing	2.256	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S25A	Existing	2.369	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S25C	Existing	0.145	ALL, seasonal	Maintain	Maintain	Maintain
01S25C	Existing	0.476	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S25D	Existing	0.518	ALL, seasonal	Maintain	Maintain	Maintain
01S25E	Existing	0.238	ALL, seasonal	Maintain	Maintain	Maintain
01S25F	Existing	0.519	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S25Y	Existing	0.469	ALL, seasonal	Maintain	Maintain	Maintain
01S25Y	Existing	0.465	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S25YA	Existing	0.255	Closed	Reconstruct	Reconstruct	Reconstruct
01S26	Existing	1.945	HLO, seasonal	Maintain	Maintain	Maintain
01S26	Existing	2.924	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S26B	Existing	0.409	Closed	Reconstruct	Reconstruct	Reconstruct
01S26C	Existing	0.684	HLO, seasonal	Maintain	Maintain	Maintain
01S26E	Existing	0.205	HLO, seasonal	Maintain	Maintain	Maintain
01S28Y	Existing	0.320	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S30	Existing	1.243	HLO, seasonal	Maintain	Maintain	Maintain
01S30B	Existing	0.554	Closed	Maintain	Maintain	Maintain
01S32	Existing	0.176	ALL, seasonal	Maintain	Maintain	Maintain
01S32	Existing	0.257	ALL, seasonal	Reconstruct	Maintain	Maintain
01S32	Existing	1.651	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
01S36	Existing	1.366	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S36B	Existing	0.198	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S39Y	Existing	0.889	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S39YA	Existing	0.102	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S41	Existing	1.435	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S41A	Existing	0.517	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S48	Existing	0.520	ALL, year round	Maintain	Maintain	Maintain
01S48Y	Existing	0.716	ALL, seasonal	Maintain	Maintain	Maintain
01S49	Existing	2.379	ALL, year round	Maintain	Maintain	Maintain
01S49Y	Existing	0.111	Closed	Reconstruct	Reconstruct	Reconstruct
01S51	Existing	2.236	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S51B	Existing	0.711	Closed	Reconstruct	Reconstruct	Reconstruct
01S52	Existing	0.149	HLO, year round	Maintain		
01S53	Existing	0.313	HLO, seasonal	Maintain	Maintain	Maintain
01S53	Existing	0.763	HLO, seasonal	Maintain	Reconstruct	Reconstruct
01S54	Existing	2.085	Closed	Reconstruct	Reconstruct	Reconstruct
01S57	Existing	1.960	HLO, seasonal	Maintain	Maintain	Maintain
01S58	Existing	2.472	Closed	Maintain	Maintain	Maintain
01S58B	Existing	0.521	Closed	Maintain	Maintain	Maintain
01S58D	Existing	0.082	Closed	Maintain	Maintain	Maintain
01S58F	Existing	0.700	Closed	Maintain	Maintain	Maintain
01S58G	Existing	0.073	Closed	Maintain	Maintain	Maintain
01S60	Existing	1.925	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S62	Existing	0.096	Closed	Reconstruct	Maintain	Maintain
01S62	Existing	1.326	Closed	Reconstruct	Reconstruct	Reconstruct
01S62A	Existing	0.388	Closed	Reconstruct	Reconstruct	Reconstruct
01S62Y	Existing	0.715	Closed	Maintain	Reconstruct	Reconstruct
01S62YA	Existing	0.296	Closed	Maintain	Reconstruct	Reconstruct
01S63Y	Existing	0.134	Closed	Maintain	Reconstruct	Reconstruct
01S63Y	Existing	2.250	Closed	Reconstruct	Reconstruct	Reconstruct
01S63YA	Existing	0.138	Closed	Reconstruct	Reconstruct	Reconstruct
01S64	Existing	1.595	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S66	Existing	1.796	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S66A	Existing	0.340	ALL, seasonal	Maintain	Maintain	Maintain
01S68	Existing	0.403	Closed	Reconstruct	Reconstruct	Reconstruct
01S68Y	Existing	0.634	Closed	Reconstruct	Reconstruct	Reconstruct
01S69	Existing	1.260	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S70	Existing	1.097	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S70	Existing	1.636	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S70A	Existing	0.339	Closed	Reconstruct	Reconstruct	Reconstruct
01S70B	Existing	0.416	ALL, seasonal	Maintain	Maintain	Maintain
01S71	Existing	1.649	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S72Y	Existing	1.158	ALL, seasonal	Maintain	Maintain	Maintain
01S73Y	Existing	0.845	Closed (mitigation)	Maintain	Maintain	Maintain
01S74	Existing	0.311	Closed	Maintain	Maintain	Maintain
01S74	Existing	0.729	Closed	Reconstruct	Reconstruct	Reconstruct
01S75	Existing	1.098	ALL, seasonal	Maintain	Maintain	Maintain
01S75A	Existing	0.365	ALL, seasonal	Maintain	Maintain	Maintain
01S75Y	Existing	1.559	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S75YA	Existing	0.688	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S75YB	Existing	0.324	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S76	Existing	1.654	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S77	Existing	1.122	Closed	Reconstruct	Reconstruct	Reconstruct
01S77A	Existing	0.205	Closed	Reconstruct	Reconstruct	Reconstruct
01S77B	Existing	0.266	Closed	Reconstruct	Reconstruct	Reconstruct
01S78	Existing	4.045	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S78A	Existing	0.806	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
01S79	Existing	0.088	Closed	Maintain	Reconstruct	Reconstruct
01S79	Existing	1.833	Closed	Reconstruct	Reconstruct	Reconstruct
01S79A	Existing	0.188	Closed	Reconstruct	Reconstruct	Reconstruct
01S80	Existing	1.935	ALL, seasonal	Maintain	Maintain	Maintain
01S80	Existing	0.874	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S80A	Existing	0.545	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S81	Existing	1.904	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S81A	Existing	0.577	Closed	Reconstruct	Reconstruct	Reconstruct
01S82	Existing	0.127	HLO, seasonal	Maintain	Maintain	Maintain
01S82	Existing	1.264	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S84	Existing	0.198	Closed	Reconstruct	Reconstruct	Reconstruct
01S85	Existing	1.680	ALL, seasonal	Maintain	Maintain	Maintain
01S88	Existing	0.278	Closed	Maintain	Maintain	Maintain
01S89	Existing	2.130	ALL, seasonal	Maintain	Maintain	Maintain
01S94	Existing	0.757	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
01S96	Existing	1.517	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S96A	Existing	0.223	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
01S98Y	Existing	0.104	Closed	Maintain	Maintain	Maintain
01S98YA	Existing	0.067	Closed	Maintain	Maintain	Maintain
01S98YA	Existing	0.033	Closed	Maintain	Maintain	Maintain
01S99Y	Existing	0.105	Closed	Maintain	Maintain	Maintain
02N03	Existing	0.544	ALL, seasonal	Maintain	Maintain	Maintain
02N04	Existing	1.078	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
02N04Y	Existing	0.432	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N05	Existing	1.660	ALL, seasonal	Maintain	Maintain	Maintain
02N05	Existing	2.131	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N05A	Existing	0.302	ALL, seasonal	Reconstruct	Maintain	Maintain
02N05A	Existing	2.266	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N05C	Existing	1.032	Closed	Reconstruct	Reconstruct	Reconstruct
02N05X	Existing	0.030	Closed	Maintain	Maintain	Maintain
02N06	Existing	4.489	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N06Y	Existing	0.776	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N06Y	Existing	0.386	Closed	Temp Road	Temp Road	Temp Road
02N08Y	Existing	1.621	ALL, seasonal	Maintain	Maintain	Maintain
02N08Y	Existing	2.671	ALL, seasonal	Maintain	Reconstruct	Reconstruct
02N08YA	Existing	0.354	ALL, seasonal	Reconstruct	Reconstruct	Maintain
02N08YB	Existing	0.416	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N08YB	Existing	0.739	Closed	Reconstruct	Reconstruct	Reconstruct
02N08YB	Existing	0.048	Closed	Reconstruct		
02N08YD	Existing	1.218	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N10B	Existing	0.757	Closed	Maintain	Maintain	Maintain
02N10Y	Existing	0.025	HLO, seasonal	Maintain	Maintain	Reconstruct
02N10Y	Existing	4.168	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
02N10YA	Existing	0.280	Closed	Reconstruct	Reconstruct	Reconstruct
02N11	Existing	4.757	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N11	Existing	4.076	ALL, year round	Maintain	Maintain	Maintain
02N11	Existing	0.917	ALL, year round	Reconstruct	Reconstruct	Reconstruct
02N11B	Existing	0.097	Closed	Maintain	Maintain	Maintain
02N11C	Existing	0.451	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N11D	Existing	0.196	ALL, year round	Maintain	Maintain	Maintain
02N11E	Existing	0.758	Closed	Maintain	Maintain	Maintain
02N11F	Existing	0.595	ALL, year round	Maintain	Maintain	Maintain
02N11F	Existing	0.410	Closed	Maintain	Maintain	Maintain
02N12	Existing	0.746	ALL, seasonal	Reconstruct	Maintain	Maintain
02N12	Existing	0.100	ALL, seasonal	Reconstruct		
02N13	Existing	1.132	ALL, seasonal	Maintain	Maintain	Maintain
02N13	Existing	1.113	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
02N13	Existing	0.309	Closed	Maintain	Maintain	Maintain
02N15	Existing	1.251	ALL, seasonal	Maintain	Maintain	Maintain
02N16	Existing	1.260	ALL, seasonal	Maintain	Maintain	Maintain
02N16A	Existing	0.425	ALL, seasonal	Maintain	Maintain	Maintain
02N18	Existing	1.471	HLO, seasonal	Reconstruct	Reconstruct	Maintain
02N20	Existing	1.438	ALL, seasonal	Maintain	Maintain	Maintain
02N20A	Existing	0.259	ALL, seasonal	Maintain	Maintain	Maintain
02N22	Existing	1.282	HLO, year round	Reconstruct	Reconstruct	Reconstruct
02N22A	Existing	0.756	ALL, seasonal	Maintain	Maintain	Maintain
02N23	Existing	0.972	ALL, seasonal	Maintain	Maintain	Maintain
02N23A	Existing	0.331	Closed	Maintain	Maintain	Maintain
02N24	Existing	1.623	ALL, seasonal	Reconstruct	Maintain	Maintain
02N24	Existing	1.661	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N24A	Existing	0.758	Closed		Temp Use - Revert	Temp Use - Revert
02N29	Existing	2.259	ALL, seasonal	Maintain	Maintain	Maintain
02N29	Existing	2.123	ALL, seasonal	Reconstruct	Maintain	Maintain
02N29	Existing	1.493	ALL, seasonal	Reconstruct	Reconstruct	Maintain
02N29A	Existing	0.567	ALL, seasonal	Reconstruct	Reconstruct	Maintain
02N29Y	Existing	0.953	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N30	Existing	0.397	Closed	Reconstruct	Maintain	Maintain
02N30	Existing	0.471	Closed	Reconstruct	Reconstruct	Reconstruct
02N31	Existing	0.945	Closed	Maintain	Maintain	Maintain
02N31Y	Existing	0.663	ALL, seasonal	Maintain	Maintain	Maintain
02N31YA	Existing	0.514	ALL, seasonal	Maintain	Maintain	Maintain
02N31YB	Existing	0.068	ALL, seasonal	Maintain	Maintain	Maintain
02N32	Existing	2.792	ALL, seasonal	Maintain	Maintain	Maintain
02N33	Existing	1.145	ALL, seasonal	Maintain	Maintain	Maintain
02N40	Existing	2.526	ALL, seasonal	Maintain	Maintain	Maintain
02N40	Existing	0.359	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N41	Existing	0.356	ALL, seasonal	Reconstruct	Reconstruct	Maintain
02N43	Existing	0.327	ALL, seasonal	Maintain	Maintain	Maintain
02N43	Existing	0.231	ALL, seasonal	Reconstruct	Maintain	Maintain
02N43	Existing	1.501	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N44	Existing	1.430	HLO, year round	Maintain	Maintain	Maintain
02N44A	Existing	0.151	HLO, seasonal	Maintain	Maintain	Maintain
02N45	Existing	0.354	ALL, seasonal	Maintain	Maintain	Maintain
02N46	Existing	0.081	Closed	Maintain	Maintain	Maintain
02N46	Existing	1.320	Closed	Reconstruct	Reconstruct	Reconstruct
02N46A	Existing	0.097	Closed	Maintain	Maintain	Maintain
02N48	Existing	1.512	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N48A	Existing	0.490	ALL, seasonal	Reconstruct	Maintain	Maintain
02N52	Existing	1.692	ALL, seasonal	Maintain	Maintain	Maintain
02N52	Existing	0.332	Closed	Maintain	Maintain	Maintain
02N52A	Existing	0.109	Closed	Maintain	Maintain	Maintain
02N52A	Existing	0.427	Closed	Maintain	Maintain	Maintain
02N53	Existing	1.211	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N53A	Existing	0.343	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N54	Existing	0.482	ALL, seasonal	Maintain	Maintain	Maintain
02N54	Existing	0.154	ALL, seasonal	Reconstruct	Maintain	Maintain
02N54	Existing	2.793	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N56	Existing	3.438	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N56	Existing	0.289	Closed	Reconstruct	Reconstruct	Reconstruct
02N57	Existing	0.294	ALL, seasonal	Maintain	Reconstruct	Reconstruct
02N57A	Existing	0.070	ALL, seasonal	Maintain	Reconstruct	Reconstruct
02N58	Existing	0.695	Closed	Maintain	Maintain	Maintain
02N59	Existing	1.775	ALL, seasonal	Maintain	Maintain	Maintain
02N60	Existing	1.034	ALL, seasonal	Maintain	Reconstruct	Reconstruct

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
02N60	Existing	0.293	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N61	Existing	0.876	Closed	Reconstruct	Reconstruct	Maintain
02N62	Existing	2.769	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N66	Existing	0.307	ALL, seasonal	Maintain	Maintain	Maintain
02N66	Existing	2.669	ALL, seasonal	Maintain	Maintain	Maintain
02N69	Existing	0.077	ALL, seasonal	Maintain	Maintain	Maintain
02N76	Existing	0.631	ALL, seasonal	Reconstruct	Reconstruct	Maintain
02N76	Existing	0.861	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N77	Existing	0.202	Closed	Reconstruct	Reconstruct	Reconstruct
02N77Y	Existing	0.500	ALL, seasonal	Maintain	Maintain	Maintain
02N78	Existing	0.596	ALL, seasonal	Maintain	Reconstruct	Reconstruct
02N81	Existing	0.315	ALL, seasonal	Reconstruct	Maintain	Maintain
02N81	Existing	1.758	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N81A	Existing	0.161	Closed	Reconstruct	Reconstruct	Reconstruct
02N82	Existing	1.421	ALL, seasonal	Maintain	Maintain	Maintain
02N84	Existing	0.618	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N85	Existing	1.354	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N87	Existing	0.130	Closed	Maintain	Maintain	Maintain
02N94	Existing	0.158	ALL, seasonal	Reconstruct	Maintain	Maintain
02N94	Existing	1.873	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02N98	Existing	0.102	Closed	Maintain	Maintain	Maintain
02N98A	Existing	0.259	Closed	Maintain	Maintain	Maintain
02S01	Existing	1.512	HLO, seasonal	Maintain	Maintain	Maintain
02S01	Existing	3.596	HLO, seasonal	Maintain	Reconstruct	Reconstruct
02S01A	Existing	0.916	HLO, seasonal	Maintain	Maintain	Maintain
02S01C	Existing	0.309	HLO, seasonal	Maintain	Maintain	Maintain
02S01D	Existing	0.507	Closed	Reconstruct	Reconstruct	Reconstruct
02S07	Existing	2.881	Closed (mitigation)	Maintain	Maintain	Maintain
02S07A	Existing	0.665	Closed	Maintain	Maintain	Maintain
02S15Y	Existing	1.007	ALL, seasonal	Maintain	Maintain	Maintain
02S19Y	Existing	0.334	ALL, seasonal	Maintain	Maintain	Maintain
02S19Y	Existing	1.367	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S19YA	Existing	0.506	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S19YB	Existing	0.309	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S25	Existing	2.068	ALL, seasonal	Maintain	Maintain	Maintain
02S25	Existing	1.362	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S25B	Existing	0.390	Closed	Reconstruct	Reconstruct	Reconstruct
02S30	Existing	0.259	other public road	Reconstruct	Reconstruct	Reconstruct
02S30A	Existing	0.179	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
02S30C	Existing	0.568	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S30E	Existing	0.463	ALL, seasonal	Maintain	Maintain	Maintain
02S35Y	Existing	0.334	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
02S35YA	Existing	0.064	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
02S38Y	Existing	0.383	ALL, seasonal	Maintain	Maintain	Maintain
02S40	Existing	1.359	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S50Y	Existing	0.727	HLO, seasonal	Maintain	Maintain	Maintain
02S51Y	Existing	1.901	ALL, seasonal	Maintain	Maintain	Maintain
02S51YA	Existing	0.554	ALL, seasonal	Maintain	Maintain	Maintain
02S60	Existing	1.934	ALL, seasonal	Maintain	Maintain	Maintain
02S60B	Existing	0.506	ALL, seasonal	Maintain	Maintain	Maintain
02S60C	Existing	0.214	ALL, seasonal	Maintain	Maintain	Maintain
02S62	Existing	5.598	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S62B	Existing	0.661	ALL, seasonal	Maintain	Maintain	Maintain
02S64	Existing	1.612	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S65	Existing	0.864	ALL, seasonal	Maintain	Maintain	Maintain
02S65	Existing	1.261	ALL, seasonal	Reconstruct	Maintain	Maintain
02S65	Existing	1.247	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
02S65A	Existing	0.356	Closed	Reconstruct	Reconstruct	Reconstruct
02S65D	Existing	0.216	Closed	Maintain	Maintain	Maintain
02S66Y	Existing	1.823	ALL, seasonal	Maintain	Maintain	Maintain
02S66YA	Existing	0.085	ALL, seasonal	Maintain	Maintain	Maintain
02S68	Existing	1.814	Closed (mitigation)	Reconstruct	Reconstruct	Reconstruct
02S68A	Existing	0.254	Closed	Reconstruct	Reconstruct	Reconstruct
02S68B	Existing	0.176	Closed	Reconstruct	Maintain	Maintain
02S68B	Existing	0.128	Closed	Reconstruct	Reconstruct	Reconstruct
02S72	Existing	0.465	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S87	Existing	0.009	Closed	Maintain	Reconstruct	Reconstruct
02S87	Existing	1.077	Closed	Reconstruct	Reconstruct	Reconstruct
02S88	Existing	0.783	ALL, seasonal	Maintain	Maintain	Maintain
02S88	Existing	0.287	ALL, seasonal	Reconstruct	Maintain	Maintain
02S88	Existing	1.308	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S89	Existing	4.948	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
02S93	Existing	2.518	ALL, seasonal	Maintain	Maintain	Maintain
03N01A	Existing	0.292	Closed	Reconstruct	Reconstruct	Maintain
03N01C	Existing	0.110	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
03N01C	Existing	0.472	Closed	Reconstruct	Reconstruct	Reconstruct
03N01G	Existing	1.004	ALL, seasonal	Maintain	Maintain	Maintain
03N01K	Existing	0.668	Closed	Reconstruct	Reconstruct	Reconstruct
03N01M	Existing	0.709	ALL, seasonal	Maintain	Maintain	Maintain
03N01N	Existing	0.372	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
03N01N	Existing	0.415	Closed	Reconstruct	Reconstruct	Reconstruct
03N01P	Existing	0.440	HLO, seasonal	Reconstruct	Reconstruct	Reconstruct
03N01Q	Existing	0.198	HLO, seasonal	Maintain	Maintain	Maintain
03N01R	Existing	0.558	Closed	Reconstruct	Reconstruct	Reconstruct
03N01S	Existing	0.360	Closed	Reconstruct	Reconstruct	Reconstruct
03N01T	Existing	0.171	Closed	Reconstruct	Reconstruct	Maintain
03N04Y	Existing	0.497	Closed	Reconstruct	Reconstruct	Reconstruct
03N07	Existing	0.253	ALL, seasonal	Maintain	Maintain	Maintain
03N21	Existing	1.534	ALL, seasonal	Maintain	Maintain	Maintain
03N22	Existing	1.895	ALL, seasonal	Maintain	Maintain	Maintain
03N22A	Existing	1.322	ALL, seasonal	Maintain	Maintain	Maintain
03N45Y	Existing	0.851	ALL, seasonal	Maintain	Maintain	Maintain
03N56Y	Existing	0.134	ALL, seasonal	Maintain	Maintain	Maintain
03N56Y	Existing	0.857	ALL, seasonal	Reconstruct	Maintain	Maintain
03N56Y	Existing	0.275	ALL, seasonal	Reconstruct	Reconstruct	Maintain
03N56Y	Existing	0.155	ALL, seasonal	Reconstruct		
03N56YA	Existing	0.622	ALL, seasonal	Reconstruct	Reconstruct	Maintain
03N83	Existing	5.116	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
03N83	Existing	0.285	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
03N83A	Existing	1.016	ALL, seasonal	Maintain	Maintain	Maintain
03N83B	Existing	0.586	ALL, seasonal	Reconstruct	Maintain	Maintain
03N83C	Existing	1.439	Closed	Temp Use - Revert	Reconstruct	Reconstruct
03N83C	Existing	0.548	Closed	Temp Use - Revert		
03N86	Existing	2.138	ALL, seasonal	Maintain	Maintain	Maintain
11705B	Existing	0.306	Closed	Maintain	Maintain	Maintain
11805A	Existing	0.085	Closed	Temp Road	Temp Road	Temp Road
11806A	Existing	0.473	Closed	Temp Road	Temp Road	Temp Road
11807A	Existing	0.077	Closed	Temp Road	Temp Road	Temp Road
11819F	Existing	0.109	Closed		Temp Road	Temp Road
11821B	Existing	0.304	Closed		Temp Road	Temp Road
11821J2	Existing	0.692	Closed	Reconstruct	Temp Road	Temp Road
11824P2	Existing	0.098	Closed	Reconstruct	Temp Use - Revert	Temp Use - Revert
11833A	Existing	0.228	Closed	Reconstruct	Temp Road	Temp Road
11833D	Existing	0.286	Closed	Temp Use - Revert	Temp Use - Revert	Temp Use - Revert

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
11833D	Existing	0.174	Closed	Temp Use - Revert		
11833F	Existing	0.087	Closed	Temp Road	Temp Road	Temp Road
11833F	Existing	0.142	Closed		Temp Road	Temp Road
11906G1	Existing	0.029	Closed	Maintain	Maintain	Maintain
11906G2	Existing	0.037	Closed	Maintain	Maintain	Maintain
11906G3	Existing	0.056	Closed	Maintain	Maintain	Maintain
17EV11	Existing	0.906	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
17EV11	Existing	0.331	Closed (mitigation)	Reconstruct	Reconstruct	Reconstruct
17EV11	Existing	0.066	Closed (mitigation)	Reconstruct		
17EV34	Existing	0.265	ALL, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
17EV438	Existing	0.168	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18DC429	Existing	0.077	Closed		Temp Use - Revert	Temp Use - Revert
18DC431	Existing	0.084	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18DC434	Existing	0.039	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18EV274	Existing	0.795	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
18EV274	Existing	0.711	ALL, seasonal	Reconstruct		
18EV277	Existing	0.094	ALL, seasonal	Temp Use - Revert	Reconstruct	Maintain
18EV400	Existing	0.571	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18EV402	Existing	0.613	4WD, seasonal	Reconstruct	Reconstruct	Reconstruct
18EV407	Existing	0.224	ALL, seasonal		Temp Use - Revert	Temp Use - Revert
18EV409	Existing	0.525	Closed (mitigation)	Temp Use - Revert	Reconstruct	Reconstruct
18EV409	Existing	0.091	Closed (mitigation)	Temp Use - Revert	Reconstruct	Reconstruct
18EV410	Existing	0.295	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18EV411	Existing	0.193	ALL, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18EV420	Existing	0.587	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18EV422	Existing	0.121	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
18EV422	Existing	0.123	4WD, seasonal	Temp Use - Revert		
18EV427	Existing	0.150	Closed (mitigation)	Temp Use - Revert	Reconstruct	Reconstruct
18EV433	Existing	0.073	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
18EV435	Existing	0.511	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
18EV440	Existing	1.420	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
19DC124	Existing	0.125	4WD, seasonal	Reconstruct	Reconstruct	Reconstruct
19EV117	Existing	0.503	4WD, seasonal	Reconstruct	Reconstruct	Reconstruct
19EV129	Existing	0.229	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
19EV129	Existing	0.671	4WD, seasonal	Temp Use - Revert		
19EV130	Existing	0.392	4WD, seasonal		Temp Use - Revert	Temp Use - Revert
19EV135	Existing	0.550	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
19EV142	Existing	0.171	ALL, seasonal	Reconstruct	Reconstruct	Reconstruct
19EV142	Existing	0.099	ALL, seasonal	Reconstruct		
19EV148	Existing	0.443	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
19EV154	Existing	0.685	Closed		Temp Road	Temp Road
19EV155	Existing	0.517	Closed		Temp Road	Temp Road
19EV213	Existing	0.771	4WD, seasonal	Temp Use - Revert	Reconstruct	Reconstruct
19EV214	Existing	1.263	4WD, seasonal	Reconstruct	Reconstruct	Reconstruct
19EV215	Existing	0.600	4WD, seasonal	Reconstruct	Reconstruct	Reconstruct
1S1806A	Existing	0.152	Closed	Maintain	Reconstruct	Reconstruct
1S1824	Existing	0.361	Closed	Temp Road	Temp Road	Temp Road
1S1907A	Existing	0.388	Closed	Temp Road	Temp Road	Temp Road
1S1920	Existing	0.806	Closed	Temp Road	Temp Road	Temp Road
1S1922D	Existing	0.364	Closed	Temp Road	Temp Road	Temp Road
1S1928A	Existing	0.115	Closed		Temp Road	Temp Road
1S25YB	Existing	0.337	Closed	Reconstruct	Reconstruct	Reconstruct
21709O	Existing	0.284	Closed	Maintain	Maintain	Maintain
21712B	Existing	0.059	Closed	Reconstruct		
21713B	Existing	0.056	Closed	Temp Road		
21721B	Existing	0.176	Closed	Reconstruct	Temp Road	Temp Road
21734D	Decommissioned	0.449	Closed	Reconstruct		

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
21734D	Existing	0.163	Closed	Reconstruct		
21801E	Existing	0.052	Closed	Maintain	Maintain	Maintain
21802N	Existing	0.199	Closed	Maintain	Maintain	Maintain
21812C	Existing	0.067	Closed	Maintain	Maintain	Maintain
21823M	Existing	0.038	Closed	Reconstruct	Temp Road	Temp Road
21831A	Existing	0.066	Closed	Reconstruct	Temp Road	Temp Road
21907B	Existing	0.237	Closed	Maintain	Maintain	Maintain
21907B	Existing	0.201	Closed		Temp Road	Temp Road
2S1815	Existing	0.510	Closed	Maintain	Maintain	Maintain
A1A	New	0.926	Closed	New Construction	New Construction	
A1B	New	0.111	Closed	New Construction	New Construction	
FR10142	Existing	0.030	Closed	Maintain	Maintain	Maintain
FR11091	Existing	0.073	Closed	Maintain	Maintain	Maintain
FR14878	Existing	0.561	Closed	Reconstruct	Temp Road	Temp Road
FR15090	Existing	0.071	Closed	Maintain	Maintain	Maintain
FR15120	Existing	0.119	Closed	Maintain	Maintain	Maintain
FR15120	Existing	0.035	Closed	Maintain	Maintain	Maintain
FR1981	Existing	0.268	Closed	Maintain	Maintain	Maintain
FR36710	Existing	0.602	Closed	Maintain	Maintain	Maintain
FR3993	Existing	0.065	Closed	Maintain	Maintain	Maintain
FR4100	Existing	0.128	Closed	Temp Road	Temp Road	Temp Road
FR4875	Existing	0.076	Closed	Maintain	Maintain	Maintain
FR5016	Existing	0.124	Closed	Reconstruct	Temp Road	Temp Road
FR5230	Existing	0.678	Closed	Temp Road	Temp Road	Temp Road
FR5310	Existing	0.089	Closed	Reconstruct	Temp Use - Revert	Temp Use - Revert
FR5318	Existing	0.049	Closed	Maintain	Maintain	Maintain
FR5473	Existing	0.231	Closed	Temp Road	Temp Road	Temp Road
FR5474	Existing	0.280	Closed	Temp Road	Temp Road	Temp Road
FR5606	Existing	0.552	Closed	Maintain	Maintain	Maintain
FR5766	Existing	0.151	Closed	Reconstruct	Temp Road	Temp Road
FR5817	Existing	0.469	Closed	Maintain	Maintain	Maintain
FR5818	Existing	0.270	Closed	Reconstruct	Temp Road	Temp Road
FR5819	Existing	0.025	Closed	Reconstruct	Temp Road	Temp Road
FR6469	Existing	0.246	Closed	Maintain	Maintain	Maintain
FR7208	Existing	0.025	Closed	Maintain	Maintain	Maintain
FR7209	Existing	0.039	Closed	Maintain	Maintain	Maintain
FR7209	Existing	0.295	other public road	Reconstruct	Reconstruct	Reconstruct
FR7858	Existing	0.462	Closed	Maintain	Maintain	Maintain
FR7955	Existing	0.050	Closed	Reconstruct	Temp Road	Temp Road
FR7965	Existing	0.205	Closed	Maintain	Maintain	Maintain
FR8430	Existing	0.007	Closed		Maintain	Maintain
FR8449	Existing	0.041	Closed	Reconstruct		
FR8473	Existing	0.171	Closed	Temp Road	Temp Road	
FR8591	Existing	0.048	Closed	Maintain	Maintain	Maintain
FR8592	Existing	0.245	Closed	Temp Road	Temp Road	Temp Road
FR8593	Existing	0.341	Closed	Temp Road	Temp Road	Temp Road
FR8594	Existing	0.246	Closed	Maintain	Maintain	Maintain
FR8597	Existing	0.087	Closed	Temp Road	Temp Road	Temp Road
FR8609	Existing	0.372	Closed	Temp Road		
FR8611	Existing	0.355	Closed	Temp Road	Temp Road	Temp Road
FR8770	Existing	0.102	Closed	Reconstruct	Temp Use - Revert	Temp Use - Revert
FR8781	Existing	0.170	Closed	Temp Road	Temp Road	Temp Road
FR8799	Existing	0.241	Closed	Maintain	Maintain	Maintain
FR8988	Existing	0.222	Closed	Maintain	Maintain	Maintain
FR8990	Existing	0.305	Closed	Temp Road	Temp Road	Temp Road
FR8990	Existing	0.074	Closed	Temp Road		
FR8992	Existing	0.105	Closed	Temp Road	Temp Road	Temp Road

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
FR9175	Existing	0.476	Closed	Reconstruct	Temp Road	Temp Road
FR9357	Existing	0.154	Closed	Temp Road	Temp Road	Temp Road
FR9377	Existing	0.449	Closed		Temp Road	Temp Road
FR9573	Existing	0.192	Closed	Reconstruct	Temp Road	Temp Road
FR9582	Existing	0.230	Closed	Maintain	Maintain	Maintain
FR9712	Existing	0.014	Closed		Temp Road	Temp Road
FR9713	Existing	0.254	Closed		Temp Road	Temp Road
FR9723	Existing	0.121	Closed	Reconstruct	Temp Road	Temp Road
FR9723	Existing	0.125	Closed		Temp Road	Temp Road
FR9724	Existing	0.165	Closed	Reconstruct	Temp Road	Temp Road
FR9725	Existing	0.135	Closed	Temp Road	Temp Road	Temp Road
FR9726	Existing	0.158	Closed	Temp Road	Temp Road	Temp Road
FR9727	Existing	0.386	Closed	Temp Road	Temp Road	Temp Road
FR9734A	Existing	0.029	Closed	Reconstruct	Temp Road	Temp Road
FR9771	Existing	0.065	Closed	Maintain	Maintain	Maintain
FR9773	Existing	0.801	Closed	Reconstruct	Temp Road	Temp Road
FR9777	Existing	0.123	Closed	Reconstruct	Temp Road	Temp Road
FR9787	Existing	0.052	Closed	Maintain	Maintain	Maintain
FR98493	Existing	0.023	Closed	Temp Road	Temp Road	Temp Road
FR98541	Existing	0.068	Closed	Temp Road	Temp Road	Temp Road
FR98671	Existing	0.218	Closed	Reconstruct	Temp Road	Temp Road
FR99001	Existing	0.361	Closed	Maintain	Maintain	Maintain
FR99002	Existing	0.481	Closed	Maintain	Maintain	Maintain
FR99003	Existing	0.045	Closed	Maintain	Maintain	Maintain
FR99004	Existing	0.114	Closed	Maintain	Maintain	Maintain
FR99005	Existing	0.315	Closed	Maintain	Maintain	Maintain
P11807A-1	Existing	0.088	Closed	New Construction	Temp Road	Temp Road
P17EV11-1	New	1.620	Closed	New Construction		
P1N01-1	Existing	0.406	Closed	Reconstruct	Temp Road	Temp Road
P1N01A-1	Existing	0.400	Closed	Reconstruct	Temp Road	Temp Road
P1N11Y-1	Existing	0.205	Closed	New Construction	Temp Road	Temp Road
P1N60-1	New	0.464	Closed	New Construction		
P1S11-1	New	1.111	Closed	New Construction		
P1S11-2	New	0.465	Closed	New Construction		
P2S30-1	New	0.035	Closed	New Construction		
P3N01-3	Existing	0.112	Closed	New Construction	Temp Road	Temp Road
P3N56Y-1	New	0.194	Closed	New Construction		
PFR8592-1	New	0.073	Closed	New Construction		
PFR8592-1	Existing	0.131	Closed		Temp Road	Temp Road
Temp 1	New	0.658	Closed	Temp Road	Temp Road	Temp Road
Temp 10	New	0.073	Closed	Temp Road	Temp Road	Temp Road
Temp 14	New	0.206	Closed	Temp Road	Temp Road	Temp Road
Temp 14	New	0.188	Closed		Temp Road	Temp Road
Temp 15	New	0.249	Closed	Temp Road		
Temp 16	Existing	0.615	Closed	Temp Road	Temp Road	Temp Road
Temp 17	New	0.181	Closed	Temp Road	Temp Road	Temp Road
Temp 18	Existing	0.602	Closed	Temp Road	Temp Road	Temp Road
Temp 19	New	0.152	Closed	Temp Road	Temp Road	
Temp 21	New	0.130	Closed	Temp Road	Temp Road	Temp Road
Temp 23	Existing	0.273	Closed		Temp Road	Temp Road
Temp 24	Existing	0.192	Closed	Reconstruct	Temp Road	Temp Road
Temp 28	New	0.513	Closed		Temp Road	Temp Road
Temp 29	New	0.214	Closed		Temp Road	
Temp 3	New	0.513	Closed	Temp Road	Temp Road	Temp Road
Temp 30	New	0.249	Closed		Temp Road	
Temp 31	New	0.496	Closed		Temp Road	
Temp 32	New	0.321	Closed		Temp Road	Temp Road

Route	Status	miles	MVUM	Alternative 1	Alternative 3	Alternative 4
Temp 33	Existing	0.226	Closed		Temp Road	Temp Road
Temp 34	New	0.435	Closed		Temp Road	Temp Road
Temp 35	New	0.436	Closed		Temp Road	Temp Road
Temp 36	Existing	0.581	Closed		Temp Road	Temp Road
Temp 37	New	0.301	Closed		Temp Road	Temp Road
Temp 38	Existing	0.124	Closed		Temp Road	Temp Road
Temp 39	Existing	0.285	Closed		Temp Road	Temp Road
Temp 4	New	0.248	Closed	Temp Road	Temp Road	Temp Road
Temp 40	New	1.022	Closed		Temp Road	Temp Road
Temp 41	New	0.204	Closed		Temp Road	Temp Road
Temp 42	Existing	0.161	Closed		Temp Road	Temp Road
Temp 43	Existing	0.074	Closed		Temp Road	Temp Road
Temp 44	Existing	0.280	Closed		Temp Road	Temp Road
Temp 45	Existing	0.210	Closed		Temp Road	Temp Road
Temp 46	New	0.227	Closed		Temp Road	Temp Road
Temp 47	New	0.366	Closed		Temp Road	Temp Road
Temp 48	Existing	0.448	Closed		Temp Road	Temp Road
Temp 49	New	0.262	Closed		Temp Road	Temp Road
Temp 5	New	0.179	Closed	Temp Road		
Temp 50	Existing	0.100	Closed		Temp Road	Temp Road
Temp 51	Existing	0.739	Closed		Temp Road	Temp Road
Temp 52	Existing	0.377	Closed		Temp Road	Temp Road
Temp 53	New	0.183	Closed		Temp Road	Temp Road
Temp 54	New	0.242	Closed		Temp Road	Temp Road
Temp 55	New	0.155	Closed		Temp Road	Temp Road
Temp 56	New	0.487	Closed		Temp Road	Temp Road
Temp 57	Existing	0.031	Closed		Temp Road	Temp Road
Temp 58	New	0.213	Closed	Temp Road	Temp Road	Temp Road
Temp 59	New	0.163	Closed	Reconstruct	Temp Road	Temp Road
Temp 6	New	0.619	Closed	Temp Road		
Temp 60	Existing	0.591	Closed		Temp Road	Temp Road
Temp 61	New	0.179	Closed		Temp Road	Temp Road
Temp 7	New	0.092	Closed	Temp Road	Temp Road	Temp Road
Temp 8	New	0.197	Closed	Temp Road	Temp Road	Temp Road
Temp 9	New	0.174	Closed	Temp Road	Temp Road	Temp Road
TR333	Existing	0.455	Closed	Temp Road	Temp Road	
TR62328	Existing	0.286	Closed		Temp Road	Temp Road
TR62331	Existing	0.149	Closed	Reconstruct	Temp Road	Temp Road

4WD=4 Wheel Drive; **ALL**=All Vehicles; **HLO**=Highway Legal Only **MVUM**=Motor Vehicle Use Map; **Temp**=Temporary
Blank entries indicate the item does not apply.

F. Response to Comments

The Environmental Protection Agency published a Notice of Availability (NOA) for the DEIS in the Federal Register on May 16, 2014. The 30-day comment period ended on June 16, 2014. In response to the Forest's request for comments, interested parties submitted 5,589 total letters including 154 unique individual letters and 5,435 form letters from 8 different organized groups. For tracking purposes, the interdisciplinary team assigned a respondent number to each letter as it was received. Each individual comment within each letter was also given a unique number. Forest Service direction requires that final Environmental Impact Statements respond to substantive comments on the draft EIS (FSH 1909.15, 25.1). Specific comments are within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the responsible official to consider (36 CFR 218.2).

This Appendix contains the summary comment statements, organized by the 19 general topics shown below. Similar comments are grouped and followed by the respondent numbers (Table F.01-1) and a response. The content analysis spreadsheet (project record) contains all specific individual comments. That spreadsheet also includes respondents sorted by letter number and respondents sorted by ID number.

1. Air Quality and Climate
2. Aquatic Resources
3. Cultural Resources
4. Ecology and Restoration
5. Fire and Fuels
6. Invasive Species
7. NEPA and NFMA
8. Recreation and Visual Resources
9. Salvage
10. Sensitive Plants
11. Soils
12. Society, Culture and Economy
13. Transportation
14. Vegetation
15. Watershed
16. Wild and Scenic
17. Wilderness
18. Wildlife
19. Other

Air Quality and Climate

1. **Comment**: a) The DEIS failed to analyze the impact of the project on climate change. b) Oddly, the DEIS also leaves out any analysis of the impacts of the project on the forest relative to ongoing climate change. The FS has declared climate change to be the biggest conservation threat to forests. An analysis of climate impacts in the DEIS would have concluded that in the Sierra Nevada resilience to climate change is best arrived at by allowing fire to regulate structure and succession (Hurteau and North 2010). This was accomplished with the Rim Fire. Science affirms the importance of allowing natural succession to take place to maximize climate change adaptation and resiliency.

5449 5438

Response: The project's potential impact to climate change was considered and is documented in Chapter 3.01 of the EIS.

2. **Comment**: The FS should use this tragic fire to revamp its outdated forestry policies and become the adaptive management steward that it needs to be to face the increasing uncertainty of climate change in the Sierras.

4539

Response: Addressing forest policy and adaptive management in the face of climate change is beyond the scope of this analysis. Cumulative affects related to climate change are addressed in Chapter 3.01 of the EIS.

3. **Comment**: The DEIS states, "From 1989 to 2002, four-wheel drive vehicle sales in California also increased by 1500 percent to 3,046,866 vehicles (Kordell 2005)". The reader is unable to investigate this source further because Kordell is not listed in the reference section.

   1879

   Response: This statement and reference are not found in the Rim Fire Recovery EIS, it is from the Stanislaus National Forest Travel Management EIS.

4. **Comment**: The DEIS did not provide an analysis of Greenhouse gas emissions. Specifically emissions from the Rim fire, emissions from decay, potential emissions from future wildfire, and the relationship to carbon storage between planted forests and where forest are not re-established (brush fields). Needs to follow CEQ guidelines.

   4855 5109 5397 5341

   Response: Analysis of greenhouse gas emissions has been incorporated into the Air Quality Chapter 3.02 of the EIS.

5. **Comment**: The DEIS did not discuss the emissions generated from equipment and mobile sources. These emissions in conjunction with burning should be examined to understand the exposure at Camp Tawonga.

   4318 5414

   Response: A discussion of equipment and mobile sources related to management activity is incorporated into Chapter 3.02 Air Quality of the EIS. Furthermore, the roads identified in the project area for hazard tree treatments have been in existence for decades, and have always been used to transport products out of the forest. The proposed activity would require about 30 days for completion. Dust abatement would not be required on the 1S02 road, as it is paved, and dust abatement on the 1S83 road would be minimal, as it is only 1/2 mile in length and would not require more than 2 truckloads of water per day when log hauling is taking place. Pile burning usually takes place from September through April, when the camp is in limited seasonal use.

6. **Comment**: The DEIS does not display tons of material treated and make a comparison of bio-energy alternatives to open burning.

   4855 5109 5110

   Response: Emissions of material treated and either removed for products or energy conversion are incorporated into the Air Quality section (Chapter 3.02) of the EIS.

7. **Comment**: The DEIS does not display tons of fuel removed or emission factors in biomass burning treatments.

   4855 5109

   Response: The tons of fuel removed and the emissions generated in biomass burning treatments are displayed in the Air Quality section (Chapter 3.02) of the EIS.

8. **Comment**: Incomplete analysis – cumulative effects should not be addressed by a discussion of Federal Conformity.

   4855 5109 5414

   Response: The California Smoke Management Program provides for the allocation of emissions from biomass burning with respect to cumulative effects. Biomass burning projects are regulated and coordinated by air quality regulatory jurisdictions and all entities submitting burns for approval. In making those decisions, air quality regulators consider forecasts, dispersion conditions, locations of proposed projects, and background air quality by air basin. These considerations have historical success in preventing cumulative effects of smoke. Federal Conformity only requires federal agencies to comply with state and local air quality regulations.

9. **Comment**: The DEIS does not adequately address all of the criteria pollutants, the National Ambient Air Quality Standards, non-attainment area designations, Class I Areas and community impacts from prescribed burning. It is not clear how the California Smoke Management Program prevents impacts.

4855 5109 5414

Response: Refer to EIS Chapter 3.02 Air Quality, Air Quality Management Practices. The California Smoke Management Program is administered by the California Air Resources Board and local air pollution control districts. It is designed to prevent violation of the National Ambient Air Quality Standards, prevent impacts to attainment status, protect public health by designating burn days, allocate emission limits, and approve individual projects. Class I Areas are managed by federal agencies and the California Regional Haze State Implementation Plan to improve or maintain visibility to natural conditions that are identified in the Plan. A significant element of smoke is considered in the natural background target.

Aquatic Resources

10. **Comment**: Disturbance is a primary concern given that "repeated disturbance has the potential to affect the physiological fitness of individuals" (pg. 85), especially considering the potential of fire and ongoing drought already affecting the physiological fitness of aquatic species.

4467

Response: The indicators used in the effects analysis include measures of disturbance, such as proportion of the watershed affected by project activities (Chapter 3.03 Aquatic Species).

11. **Comment**: No action would result in sedimentation capable of degrading aquatic habitats, which makes it imperative that feasible actions are taken to protect aquatic species and their habitats during salvage logging and other treatments.

4467

Response: Alternative 2, (No Action alternative) would result in an increase in sediment delivery into aquatic habitats due to post-fire watershed responses. This is especially true for watersheds with large expanses of high burn severity. Alternatives 1, 3, and 4 propose actions to reduce sedimentation (Chapter 3.03 Aquatic Species, Chapter 2 description of alternatives.)

12. **Comment**: Under all actions, decreases in population size of FYLF and WPT could occur for up to 10 years in the most severely burned and logged watersheds (pg. 130), elevating the importance of protecting existing individuals.

4467

Response: Salvage operations in severely burned watersheds can pose a greater risk of increased sedimentation of aquatic habitats, which can decrease habitat suitability in smaller streams. In some cases unsuitable habitat may occur at small scales within a watershed. In most cases, patches of moderate to high suitability habitats are also present. Within five to seven years, balance should be regained in most streams and watersheds. (Chapter 3.03 Aquatic Species, Summary of Effects Analysis Across All Alternatives).

13. **Comment**: Modifying alternative 4 will provide the best protections for individual aquatic species and their habitats because it will keep the most LWD and treats a smaller percentage of watersheds containing important habitat.

4467

Response: The responsible official will consider your input.

14. **Comment**: a) Although the EIS states: "…very little difference exists between the action alternatives for most of the aquatic features assessed for the FYLF" (pg. 129), these small differences can have a large impact. b). Under alternative 3, in Alder, Bull Meadow, Corral and Jawbone creeks, high levels of physical disturbance and high amounts of watershed effects, lead us to expect lower population numbers for five to seven years (pg. 121). c) The combination of already small populations in small streams should make a decrease in population size for five to seven years an unacceptable impact on a sensitive species.

4467

Response: In relation to the sensitive species, the risk of mortality and injury should remain low due to the flight response of the frog. However, there is the potential for physical disturbance. Duration of disturbance should be limited to 4 weeks in most locations, but the extent of operations suggests more individuals may be subjected to disturbance. The stress of disturbance may combine with the expected reduction in habitat suitability (less deep water habitat in small streams) and impair individual well-being. The added stress could indirectly lead to increased mortality rates over the first winter, effectively lowering population size. Buffering streams and limiting operating periods as proposed can decrease disturbance. Bull Meadow Creek is the only stream of the four referenced that has a known population of the FYLF. Occupancy in Alder Creek is assumed but not likely based on the very limited perennial water and the lack of breeding habitat associated with steep gradient. Occupancy is uncertain in Corral and Jawbone Creeks, but our surveys of these streams have not detected the frog, including new surveys conducted during the summer of 2014

15. **Comment**: A native trout fishery still exists in Corral Creek and that feature should be a major consideration during salvage and reforestation efforts.

    5469

    Response: The trout population in Corral Creek was introduced through stocking by the California Department of Fish and Wildlife many years ago. The presence of this fishery was given consideration during the salvage planning. Reforestation is not a part of this project.

16. **Comment**: If water is to be used for dust abatement, the water should be piped to off-stream holding tanks.

    5469

    Response: For larger streams with low gradients, this strategy is not practical because large pools can be used more efficiently for drafting. In some smaller streams proposed for use, diverting water to a holding tank is likely the only alternative for drafting.

17. **Comment**: Sufficient water should at all times be permitted to continue to flow downstream to maintain fisheries needs, while at the same time preventing further downstream siltation..

    5469

    Response: Maintaining adequate water in streams to protect fisheries is part of the proposed action and is addressed in Chapter 2 (Table 2.03-3). These management requirements identify allowable drafting opportunities based on the quantity of stream flow and are designed to minimize the impact to aquatic habitat downstream of the drafting sites.

18. **Comment:** Diversions are best done in the evening or the early morning hours to keep stream temperatures cool and constant. If water temperatures exceed 65 degrees, drafting should be discontinued.

    5469

    Response: Although 65 degrees is close to a thermal maximum for trout and would protect this species, our direction does not include temperature thresholds for drafting. Diversions for drafting would likely occur at all times of the day.

19. **Comment:** Post-fire logging in riparian areas greatly reduces or eliminates the delivery of large trees to the stream system, depriving aquatic systems (many of which are already deficient in large logs) of wood that is vitally important to stream ecology in general, and fish in particular.

    5313

    Response: The effects of post-fire logging on large woody debris in streams and to aquatic species are addressed in Chapter 3.03 of the EIS. Chapter 3.03 discusses the contributions of large woody debris (LWD) to stream ecology and aquatic species. In addition, management requirements are part of each action alternative and would require leaving a minimum of five large trees per acre adjacent to creeks for future LWD recruitment.

HABITAT

20. Comment: Karr et al. (2004) and Beschta et al. (2004) noted that the effects of salvage logging on aquatic ecosystems and watersheds include the following:

- Post-fire logging, especially tractor logging and road and landing construction and reconstruction, damages soils and watersheds through compaction and other soil damage, causing long-term soil loss and chronic sedimentation (as opposed to natural, pulsed sedimentation, which occasionally happens in localized areas shortly after fire occurs, and rejuvenates aquatic habitats).
- Post-fire riparian logging is inconsistent with the post-fire recovery of riparian vegetation and its important functions.
- Post-fire logging spreads and increases invasive weeds in riparian zones.
- Post-fire logging in riparian areas greatly reduces or eliminates the delivery of large trees to the stream system, depriving aquatic systems (many of which are already deficient in large logs) of wood that is vitally important to stream ecology in general, and fish in particular.
- Post-fire logging undermines the effectiveness of, and conflicts with, post-fire rehabilitation efforts that are aimed at reducing soil erosion and runoff.

5313

Response: The EIS addresses in depth the effects of the proposed alternatives regarding aquatic species, invasive species, soils, and watershed, and includes appropriate references to the scientific literature (see Chapters 3.03, 3.06, 3.11 and 3.14 respectively of the EIS). The Rim Fire was the principal agent of alteration in areas where there was stream corridor high burn severity. It opened canopies to provide sunlight energy that can enhance recovery of riparian obligate trees and shrubs, herbaceous plants and emergent aquatic vegetation. Salvage logging effects on natural recovery are mitigated by management requirements that prohibit damage to resprouting or unburned riparian vegetation. Evidence from past fires in salvage logged riparian areas on the Stanislaus National Forest has been that rapid regrowth of native obligate species occurs.

21. Comment: The atypical practices generally conducted on the STF and proposed for implementation in this enormous salvage project create significantly greater risks to aquatic resources in the Rim project area compared to other salvage projects being proposed or undertaken on national forests in the Sierra Nevada. The extensive area affected by salvage and the significant size of treatment units call for a more protective approach in riparian areas.

5438

Response: Management requirements designed to protect water quality and watershed conditions are derived from Regional and National Best Management Practices (BMPs) (USDA 2011d, USDA 2012a) and Riparian Conservation Objectives (RCOs) (USDA 2004a). Riparian resources within Riparian Conservation Areas (RCAs) and the Critical Aquatic Refuge (CAR) will be protected through compliance with the RCOs outlined in the Forest Plan (USDA 2010a). BMPs protect beneficial uses of water by preventing or minimizing the threat of discharge of pollutants of concern. BMPs applicable to this project are listed in the EIS in Chapter 2.03 displaying site-specific requirements and direction.

SPECIES

22. Comment: Alternative 4 creates the least amount of risk for SNYLF at several key locations, and alternative 1 creates the greatest risk (pg. 128).

4467

Response: This is displayed in the EIS.

23. Comment: Terrestrial-breeding salamanders are especially dependent upon down dead wood

5449

Response: Existing down woody material will be left on site and future recruitment of large woody material is addressed in the Aquatic Management Requirements.

California Red-Legged Frog (CRLF)

24. Comment: Alternative 1 poses the greatest risk to individual CRLF and their habitat (pg. 127). Further modification to alternative 4 to include the 30 foot no cut buffer around Homestead pond instead of felling trees directionally away from the pond would better protect this potential breeding site.

4467

Response: The Responsible Official will consider this recommendation while making a decision.

25. Comment: The Middle Fork Tuolumne River passes directly through the Camp Tawonga property, is a primary recreation area, and is the camp's water source for all irrigation and fire suppression. While, Alternatives 1 and 3 of the Draft EIS would impose "a 30 foot no cut and no equipment buffer around areas identified as suitable California red-legged frog aquatic habitat (breeding and non-breeding)" on portions of the Middle Fork Tuolumne River (DEIS, 26, 92), it is unclear whether that 30 foot buffer extends to those portions of the River that are directly adjacent to Camp Tawonga's property.

5414

Response: This buffer does not apply to the few units along the Middle Fork Tuolumne River that are adjacent to Camp Tawonga's property. Unit V10 is over 2.5 miles downstream (near Spinning Wheel) from the Camp and Unit U01 is over two miles upstream from the Camp.

26. Comment: There is no discussion about conducting surveys to validate presence of California red legged frog (CRLF). There should be options for conducting surveys that would reduce mitigations when frogs are not found. Page 26 includes mitigation measures for CRLF in unit "U01". Where is unit "U01"? Fish and Wildlife protocol calls for 300' foot buffer during the wet season adjacent to suitable habitat. Why the 1 mile buffer?

5424

Response: Unit U01 covers a large area between Camp Mather on the east, Abernathy Meadow near the west edge, the rim of the Tuolumne River canyon to the north, and the Middle Fork Tuolumne to the south. Suitable habitat for the CRLF is found in Birch Lake and Mud Lakes near Camp Mather. The outlet stream from Birch Lake provides suitable seasonal habitat for the frog. The one mile buffer would be implemented to provide protections to the CRLF during the wet season when the frog could be dispersing between or away from breeding habitats. The Forest Service is not aware of a standardized protocol established by the U. S. Fish and Wildlife Service that would permit a 300 foot operational distance from suitable habitat. The USFWS does allow for protocol level surveys that would provide additional flexibility to operations around suitable habitats. These surveys may be implemented at the discretion of the deciding official or at any time following the signing of the ROD which would include an agreement with the USFWS.

Foothill Yellow-Legged Frog (FYLF)

27. Comment: Alternatives 1 and 3 provide inferior protections for FYLF than alternative 4, which our center recommends be selected with further modifications.

4467

Response: The Responsible Official will consider this recommendation while making a decision.

28. Comment: Unit K01 at Indian Springs is included in all action alternatives, but should be removed for protection of FYLF habitat. In addition to being a sensitive area, it sits at the headwaters of an unnamed tributary that is known occupied habitat for FYLF. Despite BMPs, the potential for habitat degradation and impacts on FYLF still exists, and the value of removing the timber from this 11-acre unit does not outweigh the value of preventing impacts to sensitive species and their habitat.

4467

Response: The Responsible Official will consider this recommendation while making a decision.

Cultural Resources

29. **Comment**: Page 132: "Utilizing previous archaeological inventories from past projects that meet current survey standards (1986 to present) nearly 53 percent of the proposed treatment areas were eliminated from further inventory" Please describe the basis for eliminating these areas from further study (due to slopes greater than 40%).

5412

Response: All previous archaeological inventories within the project area were reviewed to ensure they met current "survey to standard" requirements. Inventories with survey intervals between 15 to 30 meters (50 to 100 feet) were determined to meet current survey standards (in accordance with the Forest Service Regional Programmatic Agreement) and eliminated from further consideration. Inventories with survey intervals larger than 30 meters were determined to be inadequate and required a new survey. Areas within the project with greater than 40 percent slope were determined to be un-surveyable due to steepness of slope and have been eliminated from further consideration.

30. **Comment**: Page 134: Delete the word "Infinite" there are many archeological sites in the burned area, but there are not "infinite" sites. Please replace infinite with many. Furthermore, the problems associated with vegetation islands are very different from fire-caused exposure of surface archeological deposits. This is a separate potential indirect beneficial effect of the action alternatives and should be discussed separately from the surface exposure and post-project monitoring.

5412

Response: The word "Infinite" was replaced with "many". Vegetation islands (areas of green timber left due to archaeological site avoidance during timber harvest) and fire caused exposure of archaeological deposits are different. Both either directly or indirectly indicate the location of cultural resource sites. Harvest of trees within site boundaries not only reduces the "vegetation island" appearance (thereby deterring looting) but also protects fragile fire affected cultural features from the damaging effects of impact from trees falling or fuel build up within site boundaries.

31. **Comment**: Page 131: "Assumptions Specific to Cultural Resources: Removal of salvage timber and hazard trees adjacent to Maintenance Level 2 roads through mechanical, cable and helicopter harvest methods will have no adverse effect to cultural resources. New road construction, reconstruction, maintenance and construction of temporary roads will not affect the integrity of cultural resource sites within the project boundary. Removal of hazard trees and commercial value logs from within site boundaries can have a beneficial effect on cultural resources. Harvest of these trees would lessen the potential for damage to already fragile bedrock mortar outcrops and historic earthworks such as ditches, roads trails and railroad grades." These assumptions need to be backed up with information of how the cultural resources will be protected from impacts. Please describe how tree removal, road construction, jackpot burning, hazard tree removal, etc. avoid ground disturbance and other impacts to surface and subsurface deposits in areas with archeological resources. Please allow public review of the Rim Fire Programmatic Agreement.

4500

Response: All cultural resource sites within the project boundary will be flagged for protection per the Rim Fire Emergency Recovery Undertakings Programmatic Agreement (Rim PA). Upon approval by the Forest Archaeologist, on a case by case basis and with an archaeologist present, harvest of trees within site boundaries utilizing rubber tired or tracked machinery will be allowed when the activity benefits the cultural resource. Trees will be felled directionally away from any site features and removed using full or one end suspension. Site features or artifact concentrations will be avoided by harvest machinery and any ground disturbance will be smoothed over using hand tools to prevent gullying or erosion. The State Historic Preservation Officer, Tuolumne Band of Me-Wuk Indians and the Advisory Council on Historic Preservation have determined those harvest/restoration activities outlined in the Rim PA will not affect cultural resources within the Rim Fire Recovery project.

32. **Comment**: Page 133: Tuolumne Me-Wuk Tribal Council should be Tuolumne Band of Me-Wuk Indians

4500 5412

Response: Revised to Tuolumne Band of Me-Wuk Indians.

33. **Comment**: Page 133: "The Rim Recovery project identifies 30,402 acres for salvage with an additional 15,253 acres of Maintenance Level 2 roads for hazard tree removal. These 45,655 acres constitute the Rim Recovery project APE. A pre-field review determined that 26,425 acres of the APE had been previously surveyed for cultural resources through various other projects. An additional 7,921 acres were eliminated due to slopes greater than 40 percent. The result of these surveys identified 1,901 prehistoric and historic properties within the project boundary of which 756 are located within or adjacent to treatment units and adjacent to Maintenance Level 2 roads likely to be affected by this project." These acreages don't match up with what is in the alternatives descriptions. It would be clearer if they were presented by alternative in a table.

4500 5412

Response: The Rim Fire Recovery project identifies 28,326 acres for salvage with an additional 16,315 acres of Maintenance Level 2 roads for hazard tree removal. These 44,641 acres constitute the Rim Fire Recovery project APE. A pre-field review determined that 26,425 acres of the APE had been previously surveyed to standard for cultural resources through various other projects. An additional 7,921 acres were eliminated due to slopes greater than 40 percent. The result of these previous surveys identified 1,901 prehistoric and historic properties within the Rim Fire boundary of which 756 are located within or adjacent to project treatment units and Maintenance Level 2 roads likely to be affected by this project.

34. **Comment**: We recommend that the results of consultations with tribal governments and with the Tribal Historic Preservation Office/State Historic Preservation Office (SHPO) be included in the EIS.

4564

Response: A letter of support from the Tribe for the Rim Fire Emergency Undertakings is contained within the public record. Results of consultations at SHPO are contained within the Rim Fire PA.

Ecology and Restoration

35. **Comment**: ...it seems that the FS staff on the Stanislaus NF don't understand the relationship between logging, planting, fire, salvage logging, planting, and the steady loss of species. Page 178…

5449

Response: Thank-you for your comment.

36. **Comment**: Predictions are made based on modeling for potential fire rather than the potential for habitat support. For example, the explosive populations of insects that occur in burned trees, and the resulting trophic support for a wide diversity of animal life, plus plant community benefits, are remarkably ignored in the DEIS.

5324

Response: The EIS addresses effects of the alternatives in depth on a wide variety of wildlife species, including snag dependent wildlife (See EIS Chapter 3.15 Wildlife).

37. **Comment**: a) The DEIS failed to analyze the impacts from the proposed project on early successional forest habitat as a whole. b) The DEIS failed to acknowledge or analyze the science in these papers other than by the multiple references to snag benefits. Early successional habitat is more than just snags.

5449

Response: Early seral habitat is a successional stage that is initiated after a stand replacing events. Recently burned forests can have dense patches of snags, abundant downed logs, montane chaparral patches and highly variable natural conifer regeneration (Swanson et al. 2010). Early seral conditions are an important stage in system development and provide multiple benefits to many species (Swanson et al. 2010, White et al. 2013). However, early seral post-fire habitats are just one component of a complex landscape. The importance of within and between stand heterogeneity maximizes the presence of numerous species (White et al. 2013).

38. **Comment**: We can and should take actions to stimulate ecological recovery while we try to benefit from a temporarily abundant timber resource.

5477

Response: Thank-you for your comment.

39. **Comment**: Delaying dead tree removal into 2015 could threaten revenues and restoration work that could improve water quality and filtration and soil stabilization. Allowing for various practices to be implemented before the 2014 winter months is paramount to ensuring longer-term forest health.

4893

Response: The Forest Service intends to begin implementation in summer/fall 2014.

40. **Comment**: The Project...violates the Forest Service's own principles. The fire deficit has resulted in a deficit of post-fire wildlife habitat…even setting aside salvage logging…there is already a substantial deficit of post-fire wildlife habitat…the Forest Service should be working to correct the deficit of post-fire wildlife habitat, not exacerbate it via salvage logging...Thus, the Project flies in the face of reality and must not go forward as planned. Further, the Forest Service is working to increase the amount of fire on the Sierra landscape to address ecosystem integrity, not to increase logging. The Rim project, on the other hand, directly contradicts this basic reality by proposing to log burned forest...Logging will only exacerbate the problems that even the Forest Service claims it wants to rectify by removing the very things that fire helps ensure on the landscape - e.g., snags, downed logs, post-fire vegetation (including shrubs), etc. Consequently, if ecosystem integrity is truly a desired outcome, then the Project cannot go forward under any of the proposed action alternatives (1, 3, or 4)...it is remarkable that the Forest Service proposes to log moderate severity areas, when, for years now, the Forest Service itself has acknowledged the deficit of such fire on the landscape...the EIS's proposal directly contradicts the Forest Service's past and recent actions in regard to ecosystem integrity.

5335

Response: The Forest Service's objectives are to increase resiliency to fires on the landscape, not to encourage high severity fires such as Rim. There are numerous studies documenting the historical occurrence of frequent, low severity fires in mixed conifer forests throughout the Sierra Nevada (Beaty and Taylor 2008, North et al. 2005, 2009, Scholl and Taylor 2010, Skinner and Chang 1996, Stephens 2001, Stephens and Collins 2004, Taylor and Beaty 2005). Collectively these studies suggest that historical forests had a low incidence of high severity or stand replacing fire. The goal is not to prevent fires within the forest, but to modify fire behavior to lower severity, and to bring these areas back to a more historic heterogeneous structure where fire complements and sustains the system instead of destroying it. Alternative 2, the "No Action" alternative describes the effects of performing no treatment on the public and forest resources.

41. **Comment**: After we sent our scoping letter, yet another research paper (Leverkus et al. 2014) was published that concluded that "post-fire salvage logging alters species composition and reduces cover, richness, and diversity in Mediterranean plant communities."

5324

Response: The referenced paper is a study in Spain, which may not reflect conditions in the Sierra Nevada. In the study, the salvage logging conducted included trees felled and then the trunks cleaned of branches with chainsaws. Trunks were piled in groups of 10 to 15, and the remaining branches and woody debris were chopped with a crawler tractor with a mechanical chopper. The study fails to address whether the conclusions that salvage logging reduces species richness and plant cover were due to the mastication ("chopping") of branches and woody debris on site. Mastication might be expected to reduce vegetation resprouting or seeding in the short-term depending on the depth and distribution of the masticated material. Long-term effects to vegetation in the Rim Fire are anticipated to be negligible, since even logged forests regenerate vegetation. Within the Freds Fire area on the Eldorado National Forest, a total of 206 plant species were identified throughout the fire area, 204 of which were present in the understory (understory is defined as all vegetation less than 6 feet tall). Forbs made up the majority of the species present, followed by either graminoids or shrubs, and then trees. About 60 percent of the fire area on National Forest System lands was salvaged in 2005. The range, sensitive plants, soils, watershed and wildlife sections disclose any localized effects on specific vegetation.

42. **Comment**: a) Allocate sufficient resources to ensure the Tuolumne River, forest and wildlife are a priority b). Ecologically healthy and resilient landscapes, rich in biodiversity, will have greater capacity to adapt and thrive in the face of natural disturbances and large scale threats to sustainability, especially under changing and uncertain future environmental conditions such as those driven by climate change and increasing human use. c) I strongly encourage the Forest Service to prioritize ecological resiliency and habitat restoration in its management plan for this area. d) We again ask that you adopt a recovery and restoration project that advances the commitment to protecting biodiversity, sustainable ecosystems, and water quality made by Region 5 in 2011 (Region 5 Ecological Restoration Leadership Intent, R5-MR-0483): e) The right course of action utilizes salvage logging as a tool to achieve a balanced outcome that contributes to ecosystem recovery by reducing dangerously high fuel loads, supports forest regeneration, retains an adequate buffer for wildlife habitat, helps restore wildlife migration corridors and fosters the recovery of fire-damaged developed and dispersed recreational areas. f) None of the current proposed alternatives fully provides the proper balance between wildlife, watershed, economic, and restoration needs. g) Rather than an industrialized scale logging salvage, post-fire management's emphasis should be on activities that benefit the health of the forest and water quality.

4397 5449 4431 4297 5438 4469 5422
4797 4331

Response: The analysis in the EIS focuses on restoring ecosystem function, process, and resiliency by addressing issues related to vegetative composition and structure, forest health, fuels, hardwood and wildlife habitat improvement, and socio-economic objectives. (EIS Chapter 1)

43. **Comment**: The notion that salvage logging assists the ecological recovery of naturally disturbed forests is fundamentally incorrect (Lindenmayer et al 2004). Hence justifications for salvage logging based on contributions to ecological recovery have little merit. We know of few circumstances where salvage logging has been demonstrated to directly contribute to recovery of ecological processes or biodiversity.

5438

Response: The purpose and need for the Rim Fire Recovery project includes fuel reduction, wildlife habitat enhancement including migration corridors, and public safety as major components of ecosystem recovery. Nowhere in the analysis is it stated that salvage logging assists ecological recovery of naturally disturbed forests. What the analysis does discuss is the unnatural condition of the forest that burned (far more trees and vegetation across the landscape, more closely spaced trees, and the exclusion of fire for decades to name a few) and the goal of setting up a fire resilient forest in the future. Lindenmayer et.al. (2008) also notes that "ecological values are only one of the criteria that society uses in making forest management decisions."

44. **Comment:** Ensure vegetation and fire management efforts are grounded in concern for biodiversity and ecological process both before and after disturbances like fire.

5438

Response: The purpose and need for the Rim Fire Recovery project includes fuel reduction, wildlife habitat enhancement including migration corridors, and public safety as major components of ecosystem recovery.

45. **Comment**: There are no ecological benefits from removing dead and dying trees from a post-fire landscape … only ecological destruction.

2

Response: Please refer to comment 43 above.

46. **Comment**: a) It will take modern intervention to remove excess forest fuels restoring those ecosystems to their previously health and productivity. b) Please see Attachments #8, #5, #14 and #15. Dead and dying trees have more value if left in the forest to function as Nature intended than removing them to provide corporate profit. c) If the dead trees are logged, the entire Sierra ecosystem will suffer as a result. d) Reconsider logging burned areas. Dr. Chad Hanson's spring visit to the Rim fire-burned area confirmed what scientists now know: fire-burned areas are the most biodiverse and wildlife-rich ecosystems in western forests.

107 2 3 4140 412

Response: The action alternatives are designed as the first step toward restoring this ecosystem.

47. **Comment**: I see NO evidence that you have adequately weighed the ecological cost of harvesting this severely (and beautifully) burned forest against the benefits of tree harvesting.

1

Response: The EIS addresses effects of the alternatives in depth on a wide variety of wildlife species, soils, watershed, aquatic species, sensitive plants, wilderness, and wild and scenic rivers among other resources (EIS Chapter 3).

48. **Comment:** Native plants and animals that occur only in severely burned forests have been detected throughout the burn. Some of the species are sensitive indicators of the ecologically special burned forest condition. Given that there are plenty of other places to harvest timber, why are you sacrificing this ecologically special area to the destruction that has been shown in the literature on salvage logging effects?

1

Response: Thousands of acres within the Rim Fire will be left unsalvaged and will provide habitat for various species that utilize burned forests. In addition, over 75,000 acres of burned habitat will be left within Yosemite National Park. The acreage being retained for burned forest habitat far exceeds the historic levels of high severity acreage that would have burned in a single fire within the Sierra Nevada. In addition, four to six large snags per acre will be left across treated units to provide habitat today and large woody debris in the future. No Forest Service Sensitive species or Threatened and Endangered species prefer this specific habitat type. Potential impacts from salvage logging have been analyzed for wildlife and aquatic species (see EIS Chapter 3).

49. **Comment**: a) Logging after the fire controverts historical scientific research on the ecological significance of post fire landscapes and the damage that occurs when those areas are logged. The Rim Fire is crucial in maintaining the Sierra ecosystem's biological diversity because dead and burned trees provide critical habitat for countless species. b) …the burn area deserves far more than the corporate-pressured rush to log…it's important to protect severely burned forests in order to maintain biodiversity and ecosystem integrity…Logged areas…are...destructive to the ecosystem. c) Ecologically, logging trees in the area of the Yosemite Rim Fire will delay, impair or even destroy the possibility of recovery of the surrounding area for generations and possibly forever. d) Salvage logging has the potential to be very detrimental on the surrounding flora and fauna especially that of Yosemite National Park which runs adjacent to the area planning to be salvaged. e) The most obvious omission in the DEIS is the proper use of the best available science regarding the impact of salvage logging on plant and animal habitats. Although the DEIS often acknowledges the negative impacts of salvage logging, it concludes that those impacts are not important because they, "do not meet the purpose and need to capture the economic value" of the salvaged logs (DEIS p. 46 and elsewhere). f) Salvage logging represents the old silvicultural model that has been responsible for seriously damaging the ecological health of the forest. g) Please base your decision to salvage log on sound science, not profit. h) We are also concerned that your proposal under-estimates the cumulative impacts of postfire logging and its potential effects on ecological integrity and forest health. In particular, the proposal seems to violate the National Forest System Land Management Planning Rule of 2012 (36 CFR Part 219) that directs the Forest Service to maintain the ecological integrity of a planning area as it relates to "the completeness of wholeness of an ecosystem's composition, structure, function, and connectivity." Postfire logging is inconsistent with the intent of the planning rule as it would greatly diminish ecological integrity of important postfire wildlife habitat while removing habitat for at-risk species, as noted. i)...it is clear that the project name, "Rim Fire Recovery," pertains primarily to the recovery of timber as a commodity, rather than ecological integrity, particularly given the strong consensus in the ecological literature that the creation of post-fire habitat is itself an example of ecological restoration—one that is not in need of intervention—and that post-fire logging seriously undermines ecological integrity and harms natural post-fire ecological succession (Hutto 1995, Karr et al. 2004, Lindenmayer et al. 2004, Noss et al. 2006, Hutto 2006, Swanson et al. 2011, DellaSala et al., in press). Noss et al. (2006) provided a useful summary of the current state of ecological knowledge regarding this habitat. i) I'm concerned about the scale of logging that's being proposed; logging on such a large scale could damage or even destroy reproduction habitat for countless native species that inhabit the area. I ask those involved in making decisions prioritize the rehabilitation of the ecosystem in this special area. k) ..all three of the proposed action alternatives would result in significant but avoidable negative impacts. The common reason is an unnecessarily high level of acreage to be salvage logged, as well as not retaining enough snags of various size to provide an adequate buffer of protection for these important public resource values. l) In reference to Attachment #2. Statements from more than 400 Ph.D. scientists describe the details of how scores of natural resources in the forest are damaged and/or destroyed by post-fire logging. As the scientists point out, some of this damage is long-term and so severe the resources will cease to function properly and the landscape will only restore itself after many decades --- if humans leave it alone. Human actions following any post-fire timber sale will only slow down the natural restoration process. m) This logging activity would degrade most of the 32,910 acres of moderate/high-severity fire that occurred in mature conifer forests on national forest land. n) The DEIS makes conjectural statements that are not backed up by facts (suggesting that salvage logging will make the forest "healthier," "reduce fuels" and protect wildlife"). The scientific record affirms that the opposite is either equally possible, or is likely. o) The Strategy veers radically off course from these new principles, first by failing to acknowledge the harm from salvage logging (p. 6, Veg Resiliency Strategy), and by suggesting that the science is ambiguous—which it is not. The science does not support that position. p) Salvage logging as proposed is an adverse environmental impact, in sum. There is no evidence that salvage logging provides any benefits to ecological health, and there is nothing in the DEIS to contradict this. q) This is a key to understanding the basic NEPA violation of the DEIS. There is no ambiguity about the harm from salvage logging. Three literature reviews since 2000 have found nothing positive for ecosystem resilience, integrity, or restoration resulting from salvage logging. r) The DEIS states at the outset that “Forest Service direction and intent, recent science summarized by GTR 220, and the Rim Fire Vegetation Resiliency Strategy (project record) provide an extensive foundation of information to draw from during the Rim Recovery planning effort” (p. 4). Why then does the DEIS fall back to old silviculture models and meaningless justifications for unnecessary and harmful salvage logging? s) The DEIS fails to properly identify and mitigate the adverse impacts arising from salvage logging. t) In fact, the DEIS ignores a large body of evidence the refutes the Forest Service’s assumptions concerning the impact of salvage logging that were presented in scientific references provided during the scoping process by numerous scientists. Even when the DEIS cites papers that offer contrary data, it ignores the primary conclusions. For example, while the DEIS cites Donato et al. 2006, a paper that concludes post fire logging hinders regeneration and increases fire risk, it only does so in reference to a minor point about soil, not fire (DEIS p. 211).

4331	4411	4441	4479	5324	5449	4422
5378	5313	4516	5358	2		

Response: Direct, indirect, and cumulative effects to wildlife, watershed, soils, fuels, sensitive plants, and aquatic species, among other resources, as well as management requirements to minimize adverse effects, are addressed in the EIS, with appropriate references to the scientific literature. The Forest Service acknowledges that there is uncertainty and conflicting science for some of the management actions. However, impacts to forest resources have been analyzed based on the rational presented and input from Pacific Southwest Research Station scientists. Numerous scientific publications are cited and utilized in the assessment of effects, showing both positive and negative effects. In addition, Alternatives 3 and 4 include detailed research proposals to address ongoing uncertainties and knowledge gaps in the scientific literature.

50. **Comment**: a) It is a scientific, biological fact that the forest does not need to have the "logs" removed and that leaving fallen trees in place creates habitat, returns minerals to the soil, protects the land from erosion and is vital and necessary to the health and well-being of the future forest that will rise in its place. b) I am writing to express our concerns with the potentially significant environmental harms contained in the Draft Environmental Impact Statement (DEIS) for salvage logging in the Rim Fire burn area. The health of forest ecosystems is one of our highest priorities.

4524	4803

Response: The purpose and need for this project is discussed in the EIS in Chapter 1. The EIS addresses effects of the alternatives in depth on a wide variety of wildlife species, soils, watershed, aquatic species, sensitive plants, wilderness, and wild and scenic rivers among other resources (EIS Chapter 3). As discussed in responses in the fire and fuels section, leaving the dead fuels across this landscape would have long-term consequences on fire behavior and the ability to fight fire as well as fire fighter safety.

51. **Comment**: a) I am concerned over the magnitude of salvage logging and road construction being proposed by the Draft Environmental Impact Statement. I feel very strongly that the Rim Fire should not be used as an excuse to remove (salvage log) more dead trees than is necessary to improve ecosystem recovery and reduce the risk of future catastrophic wildfire. I think that ecosystem recovery should take precedent over financial gain. b) Remove the logging proposal and let nature take its course. c) I wish to express my opposition to plans to salvage log rather than let nature repair the area. Preserve this area and allow it to recover as it has over millenniums. d) The Rim Fire Recovery Plan should have ecosystem recovery and protection as the top priority, not logging revenue. The current plans feel too aggressive in scale and should focus on the most severely burned areas and should leave marginally burned areas to recover naturally.

4652	4138	4351	5439

Response: Forest Service direction and intent, recent science summarized by GTR 220 and the Rim Fire Vegetation Resiliency Strategy (project record) provide an extensive foundation of information to draw from for the Rim Fire Recovery planning effort. The analysis in the EIS focuses on restoring ecosystem function, process, and resiliency by addressing issues related to vegetative composition and structure, forest health, fuels, hardwood and wildlife habitat improvement objectives. The proposed salvage is a tool to remove large heavy fuels in strategic locations to allow for the return and re-introduction of fire into areas recovering over time. Although these are long-term goals, how and where salvage logging is conducted, if conducted at all, will set the stage for future activities in this area while retaining habitat components within the burn that will not be replaced for decades to come (i.e., large down woody material). The Rim Fire burned over 250,000 acres and of that area, only 12 percent (if the maximum acres are selected for implementation) are proposed for salvage logging.

52. Comment: Essentially, how can the objective to reduce the significant level of large fuels spread across so many tens of thousands of acres be balanced with the often competing objective to fully protect watershed and soil resources on those same acres?

5358 4467

Response: The Interdisciplinary Team looked at each of the proposed units together and identified those with sensitive soils and the most erosion potential. Those units have specific watershed protection measures identified within them, either mastication or drop and lop of the smaller trees on the site to provide ground cover. Leaving isolated areas with more dead and down material is acceptable and should not inhibit the long-term goals of lower intensity fires across much of this landscape. One of the reasons for removing the larger dead trees from this landscape is to prevent high severity soil damage from future fires.

53. Comment: .I believe excessive logging will damage the landscape, destroy wildlife habitat and inhibit soil recovery needed through the natural decomposition of trees.

3946

Response: The EIS analyzed the potential impacts to resources found within the Rim Fire area including wildlife and soils and discloses those within Chapter 3.

54. Comment: Trees should be felled across slope, and chipping employed to restore soil holding, water storage and organic cycling to the soils.

5477

Response: Alternatives 3 and 4 include drop and lop and mastication in portions of units identified as watershed sensitive areas to increase ground cover.

55. Comment: If the Forest Service insists on playing a role in forest restoration, it should limit itself to hazard tree treatments. With time natural succession of the forest will lead to the growth of shrubs which: (a) …are great habitat for a lot of rare bird species; and (b) do not prevent conifer germination as is the common belief. In addition, the logging process will destroy any seedlings further delaying natural succession in the forest from occurring.

4318

Response: Over 70,000 acres burned within Yosemite National Park where natural succession is their policy and mandate. NFMA requires the Forest Service to keep land in its appropriate vegetative cover meaning land that was forested prior to the Rim Fire should be returned to that condition. Natural regeneration will be patchy at best and is mostly returning as shade tolerant white fir which is not likely to survive future fires and is shorter lived. Although brush does not inhibit conifer germination, it does efficiently uptake water and can easily out compete seedlings or planted trees.

56. Comment: Today's young forests, if resulting from purposeful regeneration harvest or from fire salvage harvest, lack some of the features and characteristics of unmanaged forests. CESFs [are rich in post-disturbance legacies (e.g., large live and dead trees, downed logs), and post-fire vegetation (e.g., native fire-following shrubs, flowers, natural conifer regeneration), that provide important habitat for countless species and differ from those created by logging (e.g., salvage or pre-fire thinning) that are deficient in biological legacies and many other key ecological attributes.

5336

Response: Under all action alternatives burned habitat would remain untreated throughout the project area and in the next several years when chaparral vegetation begins to recover, these areas may provide habitat to chaparral dependent species. Based on the existing condition, shrub habitat would not be treated. The action alternatives are described in detail in the EIS Chapter 2 and effects analysis is addressed in EIS Chapter 3.

In all alternatives, hardwood snags and 4-6 per acre of the largest size class snags are being retained along with the largest size classes of dead and downed logs greater than or equal to 12 inches in diameter at the midpoint at a rate of 10 to 20 tons/acre.(EIS Chapter 2).

57. **Comment**: Removing the standing snags would actually eliminate the current forested condition. Severely burned areas are still forests, they are simply those that have been transformed into Complex Early Seral Forests comprised of standing dead trees and other vegetation such as montane chaparral . . . The assumption that fire-killed and fire-injured trees need to be removed to make way for the replanting of live trees is a deeply flawed assumption, as such action would significantly harm snag-dependent species. . . Merely mentioning that severely burned forests provides some wildlife habitat does not constitute a full recognition of this habitat as a critical, natural, and relatively rare type that is as important for biological diversity as is old-growth/late-seral forests.

5336

Response: Under all action alternatives burned habitat would remain untreated throughout the project area and in the next several years when chaparral vegetation begins to recover, these areas may provide habitat to chaparral dependent species. Based on the existing condition, shrub habitat would not be treated. The action alternatives are described in detail in the EIS Chapter 2 and effects analysis is addressed in EIS Chapter 3.

In all alternatives, hardwood snags and 4-6 per acre of the largest size class snags are being retained along with the largest size classes of dead and downed logs greater than or equal to 12 inches in diameter at the midpoint at a rate of 10 to 20 tons/acre.(EIS Chapter 2).

58. **Comment**: While superficially acknowledging the benefits of snags for certain species, the DEIS claims that leaving large down logs on the ground could cause impacts “far more damaging that the Rim Fire” and cites one paper to back up such a sweeping assertion. The paper (Monsanto and Agee 2008)” (p. 7 of DEIS) was from a study in Eastern Washington and involved setting fire to large logs, and measuring the resulting increased temperature of the ground. This hardly suggests an outcome “far more damaging than the Rim Fire,” since it is well known that large down logs are vitally important to forest ecological processes such as nutrient cycling, microclimate, moisture retention, and habitat on the Stanislaus NF.

5449

Response: Existing large down logs will be left on site and future recruitment of large woody material is addressed in the Aquatic Management Requirements. As the commenter points out, there are several species of birds that occur more frequently in burned areas than in other cover types. As the Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA 2007) states, "Species are selected as MIS because their population changes may indicate the effects of land management activities." The black-backed woodpecker was chosen as a Management Indicator Species for the species that use snags in burned forest (Ibid.). The analysis of the effects on the black-backed woodpecker is presented in the EIS (Chapter 3.15: Wildlife/Black-backed Woodpecker: Environmental Consequences), the Draft Terrestrial Assessment, Evaluation, and Wildlife Report (Sec. 8: Effects of the Project Alternatives/Black-backed Woodpecker), and the Draft Terrestrial Management Indicator Species Report. By analyzing the effect on this MIS, the effects on other species that use snags in burned forests are also covered. California myotis, fringed myotis, and pallid bats use various structures for roosting including; bridges, buildings and other manmade structures, caves, rock crevices, mines, and trees (alive and dead) (Hermanson and O'Shea 1983, O'Farrell and Studier 1980, Simpson 1993).

59. **Comment**: Dead wood on the ground influences vertebrate abundance and richness by providing: necessary substrate, energy, and nutrients for many invertebrates and fungi upon which a wide range of amphibian, reptile, bird, and small mammal; sheltered areas for reproduction in a range of vertebrates from salamanders to black bears, and cover from aerial predators; a modified microclimate (cooler, moister, more stable temperature than surrounding habitat) that is essential to species that cannot tolerate extremes in temperature or humidity (several amphibians); runways for small mammals and display or lookout posts for birds; increased habitat diversity and aeration in water by forming riffles, small waterfalls, and pools, thereby creating habitat for amphibians and fish which are in turn fed on by other vertebrates; structures exploited by near-aquatic vertebrates as cover, foraging sites, or basking (e.g., river otter [*Lontra Canadensis*], mink, painted turtles [*Chrysemys picta*]; access routes for predators, especially under snow cover (e.g., weasels, marten).

5449

Response: Woody debris, which contributes to structures, will be left in the streams. The agency concurs that downed woody debris provides the structures to create subnivean (below snow) tunnels, interstitial spaces, and access holes for the Pacific marten and several species of weasel. Future recruitment is the focus of Management Requirements for enhancement of habitat for the California red-legged frog, Sierra Nevada yellow-legged frog, foothill yellow-legged frog, and western pond turtle as discussed in Chapter 3.03 of the EIS. The importance of downed woody debris for small mammal habitat is discussed in the EIS (Chapter 3.15) and in the Draft Terrestrial Assessment, Evaluation, and Wildlife Report. The effects analysis of the action alternatives on different species, including migratory birds (some of which use downed logs for perches), is presented in the EIS, the Draft Terrestrial Assessment, Evaluation, and Wildlife Report, and the Draft Migratory and Landbird Conservation Report.

Fire and Fuels

60. **Comment**: The National Park Service anticipates that cross-boundary fires will continue, and perhaps increase, and is supportive of the project's goal of 'reducing the size and severity of future fires'.

4500 5412

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

61. **Comment**: a) We just experienced along Evergreen Road a logging operation that focused on removing timber but didn't prioritize leaving the soils in good condition for forest re-growth. Huge slash piles have been left for burning - the last thing we need - rather than being chipped/mulched onto the forest floor to prevent erosion and return critical nutrients and material to the soil. c) Money from timber harvesting should be used to fund this broadcast chipping/mulching. The forest floor needs mulch to retain moisture and nourish the soil for reforestation, as well as to provide habitat and minimize risk of run-off and associated hazards. d) Chipping/mulching is particularly critical for areas where the fire came through very hot, leaving severely scorched earth. To see firsthand such an area that has this need yet has been left with huge burn piles; visit the area on the west side of Evergreen Road just south of the Evergreen Lodge. As we described in an earlier email to a number of Forest Service officials: e) While we understand the NFS has budget challenges that constrain its ability to mulch everywhere it is logging this summer, the 1/2 mile stretch along the west side of the road before the Evergreen Lodge is a particularly important area to invest in mulching. f) This stretch is one of the areas along the road where the fire came through hottest and burned every tree to a matchstick. As a result, every tree along the roadside and back from it a couple hundred feet has been removed. Mulching the material that is now stacked in that area will provide critical benefits...it will minimize erosion risk and risk of storm water run-off onto our property (a particularly big concern given the El Nino risk this year). It will also give the soil needed nutrients to promote regeneration in this highly visible area along a major tourist road contiguous with a large commercial enterprise. g) The current plan to burn the large stacks of non-merchantable trees and slash in that area is of significant concern to us as well. The material is a fire risk to our lodge (as well as an eyesore) that will be in place throughout the dry season, leaving us at great risk and with little time to react if the piles are set ablaze. Aside from the fire risk of the piles during the summer, when the piles are intentionally burned this fall, it will undoubtedly result in smoke issues for our guests and ash raining down on our property. Having gone through extensive property clean-up after the fire last year, another round of it is the last thing we'd like to face or that feels fair to us given the alternative to mulch. h) Other logged areas along Evergreen Road at elevations above the road are also very important to mulch rather than burn slash and small trees. With Cherry Creek road closed, Evergreen Road is the only access to our business, San Francisco's Camp Mather & Hetch Hetchy Reservoir (with both tourists and SF utility interests). Not mulching in the areas above Evergreen Road creates undue risk of erosion and run-off onto the road, which could cut off critical access and create a life safety hazard to drivers and above enterprises. Given that Cherry Creek Road will not be a safe option during storm events for quite some time, Evergreen Road will remain the emergency lifeline for the lodge and others for a number of years to come, making it more imperative that the road is well protected from logging related erosion. i) The decision not to broadcast chip/mulch appears to have been driven by economic concerns rather than forest regeneration and forest health concerns. Part of the money from harvesting trees in each area should be designated toward returning un-merchantable material to the forest floor. It is critical to maintain biomass onsite. Without such a plan, short term logging interests are served while long term forest regeneration interests are ignored.

5439

Response: Two hydrologists and one soil scientist on the Interdisciplinary Team (as well as field crews) looked at each of the proposed units and identified those with sensitive and erosive soils. Those units have specific watershed protection measures identified, either mastication or drop and lop of the smaller trees to provide ground cover. In addition, streamside buffers where no equipment is allowed were also identified on a site by site basis. Other locations did not require mulching to protect soils and prevent run off due to sufficient existing ground cover, vegetation, and soils type/conditions.

62. **Comment**: Not only will a healthy Forest be less susceptible to catastrophic wildfire, but each acre of thinned Forest could bring as much as an acre foot of water for each acre thinned in the snow/rain belt areas.

5478

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation..

63. **Comment**: Page 25: Salvage and Fuel Reduction. Ensure that this section addresses the NPS scoping comment: “Whether salvage treatments will also include fuels treatments, and how the slash will be treated. Fuel loading in high severity patches can be extremely high and can change fire behavior in subsequent fires and can change the trajectories of forest succession.” And also: “Whether brush will be treated in reforested areas. If brush is not treated, survival of saplings in subsequent fires will likely be negligible.”

4500 5412

Response: Fuel treatments are included with the salvage treatments, either biomass removal, mastication, tractor piling and burning or jackpot burning on each treated acre. All logging slash will be treated during the logging operation.

64. Comment: We are very concerned that if the timber salvage and fuel reduction efforts outlined in the Action Alternatives in the DEIS are not performed, a similar uncontrollable wildfire [2012 Chips Fire] could re-burn through the Rim Fire footprint within the next 10-15 years creating a wildfire that is even larger than Rim.

4855 5109

Response: As described in the Fire and Fuels section (Chapter 3.05 of the EIS), under Alternative 2 (no action), surface fuels are projected to average 42 tons per acre within 10 years and 78 tons per acre within 30 years. Fire effects under the No Action Alternative would result in higher stand loss as seen in the Rim Fire, with over 50 percent of the stand killed. It is expected that some fires, both human and lightning caused, would continue to escape initial attack under more severe weather conditions over the next 20 to 30 years. These fires are expected to kill natural regeneration and residual larger trees. Overall, the No Action Alternative would not reduce potential future surface fuels or predicted fire effects.

65. Comment: a) CTBC and RBF fully supports the post-salvage residual fuel loading goals in Alternatives 1, 3, and 4 of reducing fuel loading to 10-20 tons/acre.

4855 5109

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

66. Comment: In addition, the reference to Brown et al. (2003) on p. 143 of the DEIS is misleading and inaccurate with regard to the action alternatives. Brown et al. (2003) specifically states that the "resistance to control" issue stems from logs less than 10 inches in diameter - not from the larger trees that are also being targeted for removal by the project. The objective of post-fire logging is to remove commercially valuable trees that were not consumed by fire. The proposed action will therefore impair forest recovery and fire resilience by removing trees and snags that were not consumed by the fire. The unconsumed boles of large-diameter snags and trees feature high surface area-to-volume (S/V) ratios that limit the amount of oxygen feeding combustion, canopy biomass located high above the ground surface that resists ignition, and high water content that dampens fire intensity (Amaranthus et al. 1989, DellaSala et al. 2004). Large standing snags and trees and large downed logs obstruct solar radiation and ground-level wind movement, and their microclimatic influences tend to moderate ground temperatures, increase moisture of live and dead fuels, reduce the speed and variability of surface winds, and inhibit extreme fire behavior compared to sites cleared by logging (Countryman 1955, McIver and Starr 2000). Predominance of large trees, snags and logs at stand scales reduces fire effects compared to their absence (Arno 2000, Rothermel 1991)...It may take many decades for some fire-killed trees to fall. Once on the ground, larger (>9 inches) diameter logs do not readily ignite due to high S/V ratios and water content unless they are very dry and located in close proximity to each other - i.e., one log diameter apart (Albini and Reinhardt 1997).

5335

Response: Brown et al. (2003) describes the USDA Forest Service Pacific Southwest Region (1976) resistance-to-control rating scheme which is based on difficulty of hand line construction and an inventory of downed woody fuel loadings by size classes up to 10 inches. Brown et al. (2003) explains that the number of large pieces (greater than 10 inch) by length class is more important than their loading in determining resistance-to-control. If the number of pieces greater than a 10 inch diameter exceeded 10 to 20 per acre, depending on length, less 3 to 10 inch diameter material would be required to reach the high and extreme resistance-to-control ratings. Brown et al. (2003) also points out that high severity fire could be substantial where a large proportion of the soil surface was directly overlain by large woody material, which could accumulate from fall down of a large amount of tree basal area. Hand and dozer fireline is significantly slowed where firelines intersect large down logs. Snags contribute to long range spotting and increased fire size. Numerous snags preclude night time firefighting operations, normally the time when fire behavior is at its minimum and significant suppression activities may be conducted. Placement of the treated units would reduce overall fire size within the project area by reducing fireline intensities and fire effects providing opportunity for suppression forces to take appropriate actions (Finney 2001). Suppression forces could enter these areas and take appropriate actions as needed to manage fires to achieve the desired condition. Suppression forces would not be hindered by the high density of snags or high levels of CWD in the units which would allow immediate and appropriate action to be taken. Suppression actions would not be restricted by fire behavior; thus, direct suppression actions would be possible within treated stands. Without treatment, fires may present serious control problems torching out, crowning, and spotting, and control efforts at the fire head will probably be ineffective. Under Alternative 2, the general trend in high flame lengths (greater than 10 feet) and corresponding high fireline intensities are expected to continue at least 20 years into the future. For Alternatives 1, 3, and 4, after treatments, the CWD is estimated at 10 tons per acre; these areas could be directly attacked with suppression resources increasing the chance of containing wildfires in the project area while maintaining resource needs (Brown et al. 2003).

Fire-killed trees have lost most of their moisture making them brittle and more susceptible to breakage (Lowell et al. 2010). Large standing snags can alter the microclimate, potentially leading to lower relative humidity and higher temperatures from increased solar radiation as well as greater surface and subcanopy winds (Harrington 1982; Agee et al. 2000; Meyer et al. 2001; Whitehead et al. 2006). These changes can increase evaporation, which may enhance fuel drying (Countryman 1956; Harrington 1982). Conversely, open stands with lower leaf area intercept less precipitation, meaning that more water potentially reaches the forest floor, which can lead to higher fuel moisture in dead fuels following precipitation events (Samran et al. 1995; Whitehead et al. 2006). However, recent studies in dry Mediterranean summers characterized by precipitation free days suggest that during the driest time of the year when fire danger is the highest, macroclimatic factors (time since last precipitation event) are more important regulators of surface fuel moisture than factors influencing the microclimate (Faiella and Bailey 2007, Whitehead et al. 2006, Estes et al. 2012).

The transition from standing snags to coarse woody debris is important in determining relative contribution to fire behavior and effects. Snag retention was recently documented in a study showed that 81% of standing biomass (snags) was surface fuel by 8 years post-fire (Ritchie et al. 2013). As snags become coarse woody debris they contribute to fire behavior and fire spread as a source of embers (van Wagtendonk, 2006a), and can influence torching of trees due to preheating by burning of heavy fuels on the forest floor (Ritchie et al. 2013). As snags decompose snags they become an even greater receptive surface with greater potential for spot fires (Stephens 2004). In addition, fire effects are often related to the amount of fuel consumed (Knapp et al. 2005) and a substantial portion of the fuels consumed by fire may be contained within large logs, especially in areas that have experienced high tree mortality in the recent past (Ritchie et al. 2013). Large fuels increase burnout time, and prolonged heat exposure affecting soil porosity and structure (McNabb and Swanson 1990; Brown et al. 2003).

SALVAGE

67. **Comment**: Failure to rely on the best available science regarding the relationship between salvage logging and future fire...The Project's Objective Regarding Future Fire Is Unsupported. One of the project's stated purposes is to reduce fuels in order to reduce future potential fire intensity. But multiple lines of research positively correlate post-fire logging with increased fire hazard (Donato et

al. 2006, Thompson et al. 2007, McGinnis et al. 2012, Donato et al. 2013). Donato et al. 2006 (p.352) found that "the lowest fire risk strategy may be to leave dead trees standing as long as possible (where they are less available to surface flames), allowing for aerial decay and slow, episodic input to surface fuel loads over decades." Thompson and others (2007) controlled for past management, weather and topographical influences on fire behavior and severity in replicated post-fire logging treatments across many test plots that burned in both the 1987 Silver fire and the 2002 Biscuit fire. They report more severe effects in 2002 where post-fire logging followed the 1987 event than in areas where no logging occurred and snags were allowed to fall and accumulate on the ground over 15 years...McGinnis et al. (2010)...found that 1) post-fire logging conducted to reduce fuels in the long-term; and 2) post-fire logging, artificial conifer planting and herbicide spraying increased the spread and occurrence of highly combustible noxious/invasive weeds, and did not effectively reduce future fire intensity...Ritchie et al. (2013) found (p. 118): "When surface fuel biomass (>7.6 cm) was expressed as a percent of retained biomass, we found no linear relationship with basal area retention at any period of the study (Fig. 7)."...retaining high levels of snags - even 100% retention - did not lead to an increase in surface fuel. Further, Ritchie et al. (2013), at p. 119, "found no evidence of a treatment effect on either 1-10h fuel or 100h fuel." The authors identified these categories (pertaining to material less than 7.6 cm in diameter [less than 3 inches in diameter]) as the most relevant to future fire spread and intensity; thus, post-fire logging did not reduce fuels in the categories most relevant to fire either. McIver and Ottmar (2007) found "no differences among treatments in mortality of young trees" at 25, 50 or 100 years post-fire, and found that post-fire logging increased fuels and fire potential for at least 15 years post-fire relative to no logging. The DEIS's Fire and Fuels section simply fails to properly address these studies.

5335

Response: Hand and dozer firelines are significantly slowed where firelines intersect large down logs. Snags contribute to long range spotting and increased fire size. Numerous snags preclude nighttime firefighting operations, normally the time when fire behavior is at its minimum and significant suppression activities may be conducted. Placement of the treated units would reduce overall fire size within the project area by reducing fireline intensities and fire effects providing opportunity for suppression forces to take appropriate actions (Finney 2001). Suppression forces could enter these areas and take appropriate actions as needed to manage fires to achieve the desired condition. Suppression forces would not be hindered by the high density of snags or high levels of CWD in the units which would allow immediate and appropriate action to be taken. Suppression actions would not be restricted by fire behavior; thus, direct suppression actions would be possible within treated stands. Without treatment, fires may present serious control problems torching out, crowning, and spotting, and control efforts at the fire head will probably be ineffective. Under Alternative 2, the general trend in high flame lengths (greater than 10 feet) and corresponding high fireline intensities are expected to continue at least 20 years into the future. For Alternatives 1, 3, and 4, after treatments, the CWD is estimated at 10 tons per acre; these areas could be directly attacked with suppression resources increasing the chance of containing wildfires in the project area while maintaining resource needs (Brown 2003). Fire-killed trees have lost most of their moisture making them brittle and more susceptible to breakage (Lowell et al. 2010).

The commenter states that Ritchie et al. (2013) did not find a linear relationship. Ritchie et al. (2013) did observe a power relationship were over time the percent of retained biomass that accumulated as fuels increased as a power function so that by year 8, 81% of retained biomass was on the ground as fuel. Additionally, unsalvaged areas did have a higher percent of accumulated fuel as compared to the salvaged areas (see Figure 2 in Ritchie et al. (2013). Additionally, McIver and Ottmar (2007) found that model projections indicated that stand structure would deteriorate quickly with untreated stands having two to threefold more mass than treated stands.

68. **Comment**: Trees that are not part of the saw log harvest are not going to be any sort of fuel hazard for decades, and there is no economic or fuels hazard emergency associated with leaving them for now.

5449

Response: Effects of the alternatives on fuels and fire risk are addressed in Chapter 3.05 of the EIS. The No Action Alternative would lead to higher fuel loads from branches and boles of dead and down trees. Over the long-term (10 plus years), not implementing treatments would result in increased surface fuels. Increased surface fuels would result in increased flame lengths and higher fireline intensities leading to increased firefighter and public risk, and higher costs.

69. **Comment**: In order to match overall salvage logging treatment outputs from this project with the realistic needs of the industry's regional mill capacity, where should expensive helicopter and skyline treatments units be dropped to prioritize fuels reduction work to acres where treatments are most essential and least costly?

4467

Response: The responsible official will consider your recommendation.

70. **Comment:** a) This complex early seral habitat is currently substantially rarer than it was historically, due to fire suppression and post-fire logging, and is now even rarer than old forest (Swanson et al. 2011, Donato et al. 2012, Odion and Hanson 2013, Odion et al. 2014, DellaSala et al. in press). The Proposed Action in the DEIS represents an approach to post-fire environments in conifer forest that conflicts with the current ecological knowledge about the high value and rarity of this habitat. b) We urge you to consider what the science is telling us: that post-fire habitats created by fire, including patches of severe fire, are ecological treasures rather than ecological catastrophes, and that post-fire logging does far more harm than good to the nation's public lands.

4825 5313

Response: Swanson et al. 2011 stated that "maintenance of areas of naturally developing early successional forest ecosystems as part of a diverse landscape… should be 'in reasonable proportion to historical occurrences of different successional stages' as based on region-specific historical ecology". Early seral habitat is a successional stage that is initiated after stand replacing events. Recently burned forests can have dense patches of snags, abundant downed logs, montane chaparral patches and highly variable natural conifer regeneration (Swanson et al. 2010). Snags are created whenever a live tree dies from a mortality agent such as insects, disease or physical injury, including wind throw and fire. These components provide critical structures necessary to benefit many early seral species (Swanson et al. 2010, Collins and Roller 2013, White et al. 2013). However, early seral post-fire habitats are just one component of a complex temporal landscape. Recent research has documented the importance of within and between stand heterogeneity that represents all seral stages and maximizes the presence of numerous species (White et al. 2013). Late successional habitats dominated by conifer trees are also an important successional stage. This seral stage evolved with low to moderate intensity fire and has a limited capacity to recover after stand replacing events due to limited natural regeneration and extensive shrub cover (Collins and Roller 2013). As a result, once conifer forests may be converting to new vegetation assemblages following high severity fire (Perry et al. 2011).

Early seral conditions are important, but not rare in the Sierra Nevada landscape. Assessment of shrub cover in the Sierra Nevada landscapes suggest that the overall portion of the yellow pine mixed conifer landscape occupied by shrubs today is broadly similar to, but possibly somewhat lower than the portion occupied at the beginning of the 20th century (Safford 2013). Historical accounts from Leiberg (1902) reported that chaparral covered only 5.7 percent of the area he mapped (large portions of the Plumas and Tahoe NFs, and very small pieces of the Lassen, Eldorado and Lake Tahoe Basin MU). Additionally, based upon early 20th century forest surveys (i.e. the 1910-1912 Stanislaus timber survey cited by Center for Biological Diversity/John Muir Project) Show and Kotok (1924) estimated that chaparral covered only 11 percent of six National Forests (Lassen, Plumas, Tahoe, Eldorado, Stanislaus, and Sierra; Table 19, pg. 41) in the Sierra Nevada at the beginning of the 20th century. Modelling the historic presence of early seral conditions on a landscape that was characterized by 7 percent high severity fire showed that 20% would have been in the early successional stage (Miller, personal communication). Historic reports and models do not indicate that early seral conditions are rare in current conditions.

In fact, under the current and predicted climate scenarios early seral conditions will continue to increase on the landscape (Lenihan et al. 2008, Cole 2010). Miller et al. (2009) and Miller and Safford (2012) found "broad-scale, quantitative demonstration that the extent of forest stand replacing fire is increasing across a significant part of the western US." This increase is driven by greatly homogenized forests with higher canopy cover and dense trees that have the ability to burn in stand replacing events transitioning them to early seral conditions. Mallek et al. (2013) found that current rates of high severity fire in yellow pine and mixed conifer forests, which constituted much of the Rim Fire area on the Stanislaus NF, are similar to probable pre-settlement rates of high severity fire. In other words, in these forest types there does not seem to be a deficit of early seral habitat caused by fire. Future model predictions suggest increased transition of forest to chaparral and grassland being driven by increased fire activity (Lenihan et al. 2008).

The 2004 FSEIS ROD provides management guidelines for disturbance events such as wildfires including recovering the economic value of timber killed or injured by the "disturbance" (wildfire), re-establishing forested conditions and managing the development of fuel profiles over time. These guidelines include the recommendation to "…generally …not conduct salvage harvest in at least 10 percent of the total area affected by fire." (USDA 2004, pg. 52). Overall within the 257,314 acre area affected by the fire, 106,618 acres burned at high severity (Table 3.05-4 and Chapter 3.05 of the EIS, Affected Environment). Cumulatively, the Rim Fire Recovery proposes to treat 27,826 to 30,399 acres of high severity conifer forest which effectively retains roughly 34 to 37 percent of snag forest habitat to develop without any management intervention and exceeds the minimum retention guideline of 10 percent as specified in the 2004 EIS ROD.

71. **Comment:** The project's assumptions regarding high severity fire and high severity patch size are contrary to the science. Contrary to the implication in the DEIS (p. 7), and the Vegetation Report, high-severity fire patches several hundred acres to several thousand acres in size have been documented in historical mixed-conifer forests of the central and southern Sierra Nevada (e.g., USFS 1911, Baker 2014)...

5335

Response: Please refer to Response to Comment 70 above regarding the amount of high severity fire and response to papers supporting the lack of high severity fire across the landscape (Miller, personal communication).

High severity fire is a component of all natural fire regimes, and given the variable and interacting roles of weather, fuels, and topography in driving fire behavior, it is statistically certain that large high severity patches have occurred in mixed conifer forests at times over the previous millennia. The central concern for management is not these sorts of extreme events however (since they are largely driven by stochasticity), but rather the central tendency of the data. The evidence for mean high severity patch size in the literature was reviewed by Safford (2013), who found that almost all evidence pointed to a dominance by patches smaller than a few hectares in size.

Although the Baker (2014) study was spatially extensive (330,000 acres), the findings and conclusions are not necessarily applicable to Rim Fire. The studies cited in the comment base high severity patch sizes upon contiguous shrub patches or absence of large trees. None of them actually report patch sizes created in individual fires. A major problem with the Baker paper is that it is based on the General Land Office tree data (which only sampled 8 trees or fewer per square mile) is that they assume that areas of smaller trees only represent the effects of high severity fire. This critical and very tenuous assumption (tree regeneration can occur under all sorts of ecological conditions), is the focus of a response paper written to the Baker analyses by Fule et al. (2014). In addition, it is not known whether shrub patches described in those studies/reports were the result of a single stand replacement fire or multiple fires. It is possible that small shrub patches were enlarged by subsequent fires, and therefore the amount of stand replacement in an individual fire would be less than what is implied by the observed shrub patch size. For example, Show and Kotok (1924) specifically talk about fires reburning and enlarging shrub patches.

"Recent studies have shown (p3) that fires in brush are far more difficult to control than those in virgin forest, and attain a much larger average size. Once started, also, they are likely to sweep into adjoining timber stands with an intensity that results in wiping out the immediately adjacent timber belt, thus extending the brush fields themselves." Show and Kotok (1924), page 44.

Due to the long amount of time required for forests to develop, even small percentages of conifer stand replacing fire on average can result in a relatively large proportion of the landscape in early seral condition (Miller, personal communication). What we can say is that the patch size in the Rim is larger than any fire where severity was mapped (i.e. 1984).

Additionally, Baker's (2014) study is limited in geographic range focusing on disjunct locations with probably very different human impact at this time period. The vegetation reconstruction method utilizing General Land Office (GLO) surveys that Baker (2014) uses has known flaws and biases. Manies and Mladenoff (2000) found that interpolated vegetation maps "recreated" using GLO survey methods had inherent bias when compared against a "correct" air-photo map of the study area. Specifically, interpolated maps using GLO data were coarser in representation of the vegetation classes as compared to air-photo maps. Manies and Mladenoff (2000) found interpolated map had "…lower frequencies of smaller patches and higher frequencies of larger patches than the air-photo map." Low severity fire is purported to create a fine, grained landscape structure (Beaty and Taylor 2001). In addition, Manies and Mladenoff (2000) found that larger trees were less likely to be chosen as witness trees due their higher chance of being cut for lumber and diminished length of survival as compared to smaller trees. If a method that recreates a vegetation map from GLO data intrinsically displays a higher amount of large patches as opposed to small patches (Manies and Mladenoff 2000) primarily composed of smaller diameter trees, it could be incorrectly concluded that an area had large patches of high severity fire regenerating younger-aged stand.

72. **Comment**: The first question is essential to answer because fire in non-conifer areas (i.e., the lower elevation foothill and shrub vegetation types) generally results in the death of the vast majority of above ground vegetation (e.g., Odion et al. 2010, Keeley 2000). In conifer forest, on the other hand, fire has wide-ranging effects - from 0 percent to 100 percent tree mortality in any given area. It is, therefore, necessary to differentiate between conifer and non-conifer areas to meaningfully describe a fire's overall impacts....we determined [that] out of a total of approximately 257,000 acres within the perimeter of the 2013 Rim Fire, 153,000 acres (60%) were in conifer forest types. The remaining area consisted of unforested areas...or non-conifer forest...includ[ing] foothill vegetation types, mostly chaparral...and grassland, as well as oak woodlands dominated by black oak (black oaks are not killed by fire - even high-intensity fire...[they] flourish after such a fire). Foothill shrub habitat...generally require[s] stand replacing fire to germinate and reproduce most effectively. In other words, this shrub land vegetation commonly burns by crown fire, leaving shrub skeletons, and therefore such an outcome is ecologically appropriate...

5335

Response: Referenced units listed in Appendix A of letter. We agree with the commenter that non-conifer areas typically are characterized by stand replacing fires that usually consume the live portions of the shrubs and grasslands leaving behind skeletons in shrublands and therefore an outcome such as this is ecologically appropriate. As such, it is important to differentiate between These two distinct vegetation types and the portion of the area of each that are burned in the Rim Fire are addressed in Table 3.05-6 of the EIS. In this table, mixed conifer and ponderosa pine forests are represented in Fire Regime I and shrublands are represented in Fire Regime IV.

73. **Comment**: The second question is important for ecological context. For example, one of the most significant aspects of high-intensity fire in conifer forest areas is the immediate habitat it creates for rare species like the Black-backed Woodpecker. By identifying the amount of conifer forest that burned at high-intensity, one can begin to determine how much wildlife habitat has been created for species that rely on post-fire landscapes…we determined [that]...within the conifer forest area (including all land ownerships...), high-intensity fire comprised 33 percent of the effects...high-intensity fire areas...range from about 70-100 percent mortality, and often have some large surviving trees. (e.g., Hanson et al. 2010).

5335

Response: We agree that areas of high intensity and high severity fire provide important habitats for many species and that it is important to document how much of these habitats resulted from the Rim Fire. The amount of low, mixed and high severity fire within the Rim Fire is included in Table 3.05-6 of the EIS.

74. **Comment:** The third question provides insight in regard to the sometimes made claim that public lands should be logged more intensively - i.e., like private lands - in order to reduce the chance of high-intensity fire occurring. By examining the amount of private land that burned at high-intensity, as compared to public land, that assertion can be examined...we determined [that]...The forests with the least environmental protections from logging - i.e., private timberlands - had the highest levels of high-intensity fire: 39 percent. On public land, conifer forest in national forest (Stanislaus National Forest) had 34 percent high-intensity fire, and in national park (Yosemite National Park) had 29 percent high-intensity fire.

5335

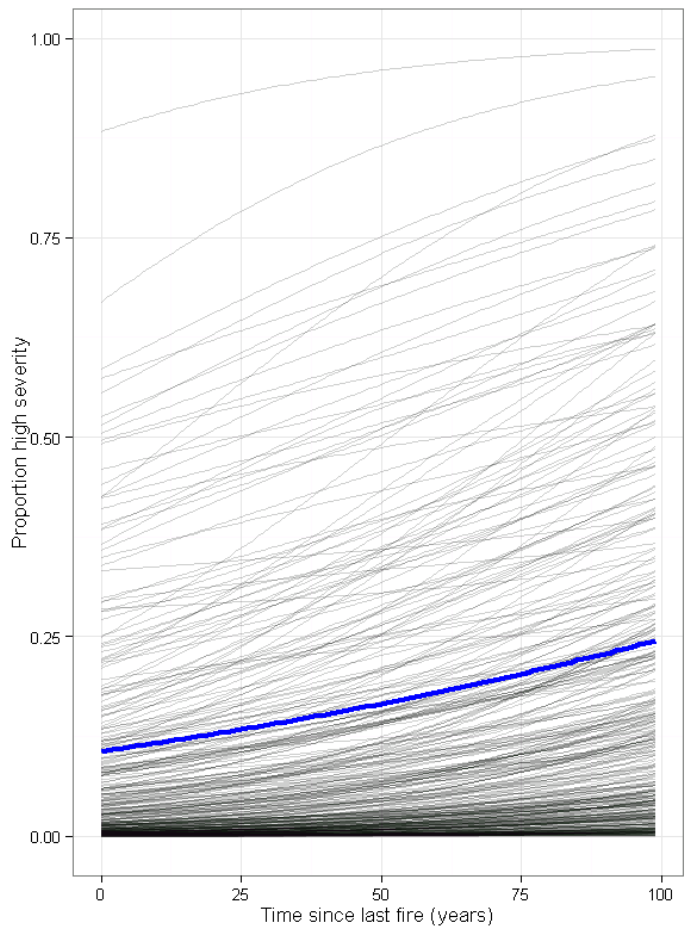
Response: Fire intensity can be the result of many factors including weather and topography. Although reducing fuels often helps to minimize the effects of fire and allow for fires to be slowed or stopped, nothing could have prevented the intensity of the fire on private and National Forest lands on the two days of 30,000 to 50,000 acre burns where the fire created its own weather.

75. **Comment:** The fourth question is important to investigate in order to address the assertion from the Forest Service that areas that have not burned recently are more likely to burn at high intensity. This assertion is routinely used by the Forest Service to argue for more logging in Sierra Nevada National Forests...we determined [that] on federal lands, the forest areas that had not burned recently prior to the Rim Fire (i.e., between 1987 and 2012) did not have higher levels of high-intensity fire. Instead, only 31 percent of these long-unburned forest areas burned at high-intensity (see attached map; map also shows numbers comparing treated and untreated areas)...The Rim Fire behavior...is consistent with the empirical studies of how fire behaves in California forests (e.g., Odion and Hanson 2006, Odion and Hanson 2008, van Wagtendonk et al. 2012). These studies have repeatedly found that forests where fire has been excluded for the longest do not burn at a significantly higher intensity.

5335

Response: Areas that burned in 1987 but not between 1987 and 2012 would have missed one or at most two fire cycles in comparison to the historic fire return interval (i.e. condition class 0 or 1) and therefore were not “long unburned”. Long unburned would be in fire return interval departure (FRID) condition class 3. It is understood that long-unburned forests do not always burn exclusively at high severity. Instead FRID is considered an indicator of risk of high severity fire. Although FRID would be expected to be correlated high severity, it does not directly account for expected fire severity (Long et al. 2014).

For semiarid conifer forests in the western US that were historically characterized by frequent, mostly low severity fire, biogenic decomposition of dead biomass is very slow, so the major fuel reduction force was (and continues to be) fire itself. Since fuel is required to ignite and carry fire, and since fire behavior, including severity, is related to the amount of available and consumable fuel (Sugihara et al. 2006, Parks et al. 2014), anything that results in increased fuel will have a tendency to increase fire severity. This is a simple first principle from physics. Fire suppression has had the result of removing fire as a controller of fuel amount in many low and middle elevation forest types in the Sierra Nevada, which has led to an accumulation of fuel. Between 1984 and 2011, the fire severity data available from California show that in yellow pine and mixed conifer forests there is a strong positive relationship between fire severity and time since last fire. The figure below shows the relationship between proportion of fire area burning at high severity and time since last fire for mixed conifer forests in California, 1984-2011. Each grey line represents a single fire in the fire severity dataset, the blue line is the mean. From Steel et al. in review.

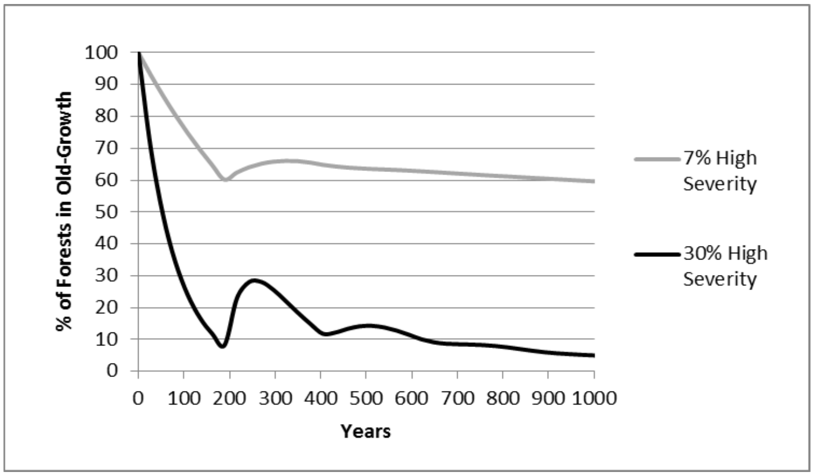


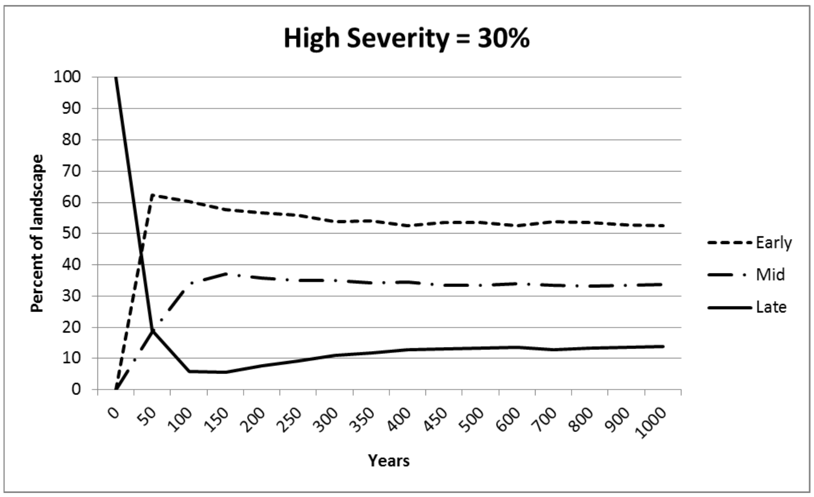
76. Comment: Failure to acknowledge and account for the fire deficit in the Sierra region, especially the deficit of moderate and high severity fire…The project ignores the fire deficit in the Sierra Region...There is currently a severe fire deficit of all severities in conifer forest in the Sierras (e.g., Stevens et al. 2007, Miller et al. 2012), Mallek et al. 2013, Odion and Hanson 2013, Hanson and

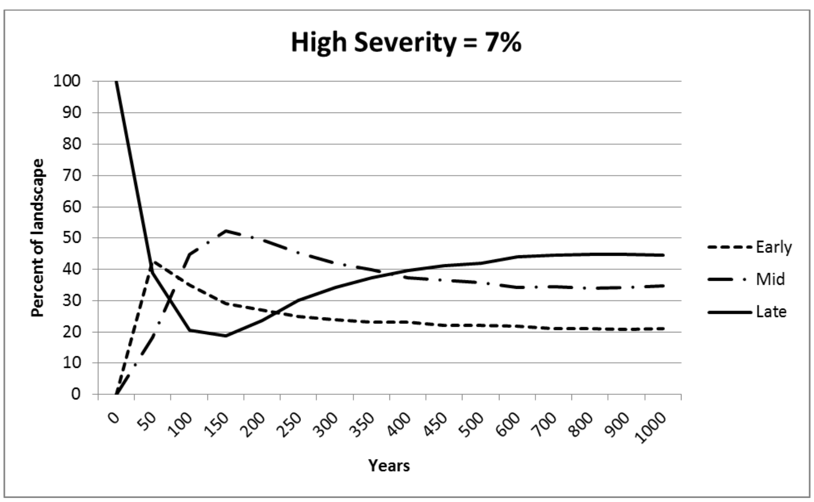
Odion 2014, Odion et al. 2014). Miller et al. (2012) found that the current high-intensity fire rotation in Sierra Nevada montane conifer forests is 801 years...The authors recommended increasing high-severity fire amounts...on the western slope of the Sierra Nevada...where the current high-severity fire rotation is 859 to 4650 years [Table3]...even when the 2012 and 2013 fires are integrated into the analysis (including the Rim fire), the high-severity fire rotation interval...is still slightly above 800 years...Historical high-severity fire rotation intervals in mixed-conifer forests of the Sierra Nevada were generally in the range of 200 to 300 years, indicating that we now have much less habitat created by high-severity fire now than we had historically - even before habitat removal from post-fire logging is taken into account (e.g., Odion et al. 2013, Hanson and Odion 2014, Odion et al. 2014). An additional study from the Forest Service, Mallek et al. (2013, Table 3), also concluded that we now have less low, moderate, and high-severity fire than we did historically in the Sierra Nevada, and estimated that we have a little over half as much high-severity fire now compared to historical levels in the following forest types: oak woodlands, dry mixed conifer, moist mixed conifer, yellow pine, and red fir...Mallek et al. was based upon a modeling assumption of only 6% high-severity fire effects in historical mixed-conifer and yellow pine forest...empirical studies that Mallek et al. (2013, Table 2) used for all other historical fire parameters, such as Beaty and Taylor (2001) and Bekker and Taylor (2001), concluded that historical high-severity fire percentages in these forest types were generally in the range of 20-35% (and often higher). Thus...even Mallek et al. (2013)...greatly underestimates the magnitude of the current deficit of high-severity fire.

5335

Response: The breadth of literature indicates that there is not a deficit of high severity fire in yellow pine and mixed conifer forests on the Western slope of the Sierra Nevada. As an example, Mallek et al. (2013) did not find that there is a general deficit in all fire types in the Sierra Nevada. Mallek et al. (2013) found that there is no contemporary deficit in high severity fire in yellow pine and mixed conifer forests; the deficit in these forest types is in low and moderate severity fire. Higher elevation forests (e.g., red fir, lodegpole pine, subalpine) are experiencing a deficit in all fire types. The Rim Fire mostly burned in yellow pine and mixed conifer forests. Additionally, Miller et al. (2012), Beaty and Taylor (2001) and Bekker and Taylor (2010) do not claim that high severity fire is increasing in the Sierra Nevada. Miller et al. (2012) found severity in mixed conifer forests was 12 to 13 percent when fire intervals were between 1 and 98 years. Those intervals were based upon areas that burned twice over the 1910 to 2008 period, and therefore were in condition class one or two. However, the first time that area burned after 1987 but where the date of a prior fire is unknown would have been in condition class three (the fire history data only begin in 1910) burned at a higher rate (16 percent, table 3). Beaty and Taylor (2001) and Bekker and Taylor (2001) provide rough estimates of 20 to 35 percent high severity fire for pre-settlement forests. However, both Bekker and Taylor (2001, 2010) and Beaty and Taylor (2001) were conducted in study sites (Thousand Lakes Wilderness) that are very different than that of the Rim Fire. We do not dispute that severity likely varied from location to location based upon topography, etc. [e.g. upper slopes could had higher severity rates, see (Taylor and Skinner 1998)]. But, it is simply not plausible that severity during pre-settlement times could have averaged as high as 20 to 35 percent over the whole Sierra Nevada bioregion. Based upon two different models, we estimate that only around 5 to 13 percent of pre-settlement Sierran mixed conifer forests would have been in old-growth condition if severity had averaged 30 percent. In contrast, 45 to 60 percent of mixed conifer forests would have been in old-growth condition if severity averaged 7 percent (see figures below) (Miller, personal communication). Information on the abundance of forest dominated by large trees in the study area before Euro American settlement substantiates our model results (Greeley 1907, Franklin and Fites-Kaufmann 1996).







The commenter also cites Hanson and Odion (2014) as support for their comment. Contrary to three other studies (Miller et al. 2009, Miller and Safford 2012, Mallek et al. 2013) Hanson and Odion (2014) is the only study that has found that the proportion and amount of high severity is not increasing in the Sierra Nevada. In a response prepared by Safford et al. (In review), the authors clearly identify major faults with Hanson and Odion (2014) such as: (1) inclusion of all fires regardless of management, (2) the use of an inaccurate, coarse scale vegetation map, and

(3) the combination of vegetation types that are characterized by different fire regimes. Hanson and Odion (2014) make the assertion that high severity fire is not increasing based upon an analysis of fires, including prescribed fires, from all jurisdictions; state, private, USFS and NPS. Differing management objectives across jurisdictions result in different severity responses. For example, salvage logging practices on commercial and private timber lands often entail removing scorched, but still live trees, within the first couple months after fire containment (Zhang et al. 2008). However, data from Hanson and Odion (2014) is based upon satellite images the year after fire containment (Eidenshink et al. 2007). Therefore the amount of high severity on private lands is over estimated in their dataset. By including prescribed fires, Hanson and Odion (2014) also underestimate the amount of high severity due to wildfires on NPS lands. In addition, by combining NPS lands, which are almost entirely managed under some policy of wildland fire use, and USFS lands, which are almost entirely managed under a policy of strict fire suppression. Additionally, Hanson and Odion (2014) combine forest types into three unorthodox regional groupings that join very different presettlement fire regimes. One example is the combination of mixed conifer-fir with red fir in their "western mid-upper montane" group. These systems as detailed by many authors (Sugihara et al. 2006, Safford and Van de Water 2013) are distinctly different in their presettlement fire regimes. The response by Safford et al. (In review) provides a detailed explanation of the possible sources of error associated with the Hanson and Odion (2014) paper, and therefore, it provides interpretable information on fire severity trends on Forest Service lands.

Fire rotations or the time required to burn an area equal to a defined area of the landscape is often used as a metric to describe a fire regime. During the fire rotation an entire area may not burn during this period and some sites may burn several times and others not at all. The commenter cites Miller et al. (2012) for a current high severity rotation of 801 years. However that number only applies to west-side mixed conifer. A more applicable estimate would be within the representative vegetation types of the Rim Fire which include mixed conifer, yellow pine and red fir forests on the east and west-sides. Historic fire return intervals for mixed conifer and yellow pine were similar (11 to 16 years) but about 3 times longer for red fir (40 years) (Van de Water and Safford 2011). Therefore it makes most sense to compare historic versus modern rotations grouping mixed conifer with yellow pine separately from red fir. Therefore data from table 3 in Miller et al. (2012) would yield a contemporary high severity rotation for mixed conifer and yellow pine of 630 years combined for Forest Service and Yosemite NP (639 years for FS only). Mallek et al. (2013) computed a very similar rotation of 563 years (data from tables 1 & 3). Based upon a thorough literature review, Mallek et al. (2013) found that estimates of pre-settlement fire rotations ranged between 11 and 34 years in yellow pine/dry mixed conifer and 15and 70 years for moist mixed conifer (table). Based upon those rotation estimates and an estimate of around 6 percent (table 5) high severity on average for pre-settlement fires would result in a mixed conifer/yellow pine pre-settlement high severity rotation of between 200 and 691 years (Mallek et al. 2013). Therefore, current high severity rotations and annual area burned at high severity in mixed conifer/yellow pine forests on average are actually within the range of estimates from the literature for pre-settlement forests (Mallek et al. 2013).

77. **Comment:** There is considerable public interest in a science-based restoration plan based on ecological integrity. There is also widespread recognition that the previous management history of the region is largely responsible for the severe effects of the Rim Fire. Previous timber harvests and planting activities after the 1987 Stanislaus Complex fires, and numerous other fires in the region contributed to a deadly fire hazard structure. It is essential that the Forest Service not repeat that scenario.

5449

Response: The Salvage EIS and subsequent planning in the Rim Fire will consider a science-based restoration plan founded on current research reported in the PSW Science Synthesis and other literature. Considerable monitoring by partner agencies will also help to support adaptive management.

78. **Comment:** In closing, I would like to encourage the Forest Service to not only plant the most damaged sites, but also to have in place a long-term monitoring and fuel treatment program in those reforested areas so that we avoid a repeat, if at all possible, of last year's events.

5479

Response: Reforestation and subsequent fuel treatments will be considered in future planning efforts. Long-term monitoring is a valuable way to inform future management endeavors. Long-term research projects as well as monitoring will be conducted within the Rim Fire.

79. **Comment:** Just planting trees isn't enough - using active management over time, we must see these young plantations through to becoming mature forests with all the social, economic and ecological benefits they will offer to future generations.

5479

Response: Please refer to Response to Comment 79 above.

80. **Comment:** You also state in this need that "leaving the dead trees on site would create a large and dangerous fuel load in this vast area," which is also patently false. Show me the data. There is no evidence that 1000-hr fuels contribute to higher fire risk down the road, and there are more than enough published references to dump this myth once and for all. Please show us the data that a more severe fire will now follow what just got burned.

1

Response: EIS Chapter 3.05 explains the relationship between 1,000 hour fuels and Coarse Woody Debris. Coarse woody debris has a direct relationship to resistance to control (see the Fire and Fuels report). The fuels report cites Brown et al 2003, "Coarse Woody Debris: Managing Benefits and Fire Hazard in the Recovering Forest". The project never claims that a more severe fire will follow. The discussion of Alternative 2, No Action, in Chapter 3.05 provides modeling data that shows IF a fire starts within the project area, it would have sufficient flame length and fire intensity to make control difficult, in as soon as 5 years following the Rim fire. This is due to the accumulation of surface fuels.

81. **Comment:** a) However, we point out that it is debatable to use modeling that utilizes fire weather defined as High (90th percentile weather) because that underestimates the large fire event historic reality of fires that actually burned at the 95th percentile weather conditions. b) …while using the 90th percentile weather is an established, widely used norm, we respectfully underscore that it is not during the times when those dry, low wind speed conditions exist that the gigantic wildfires actually burn so intensely across this landscape.

4467

Response: The 90th percentile weather requirement comes from Forest plan direction, page 35.

82. **Comment:** …the proposed alternatives would "lop and scatter" slash, i.e., spread hazardous fuels created by logging on the ground across treatment units, which will create a uniform bed of uncompressed fine (<10 hour) fuels. Moreover, post-fire logging will impair forest resilience to future fires by removing fire-resistant woody structure that was not consumed in the fire and replacing it with flammable logging slash and planted trees, which will increase fire hazard.

5335

Response: Less than 10 hour fuels may increase in the short-term on some units but will be less than what would accumulate under the no action alternative in the short and long-term. Logging slash will be treated to acceptable levels for firefighter and public safety as well as to increase suppression options should a wildfire start in the project area. Follow up tractor piling, jackpot burning and mastication are also proposed to ensure the initial fuels are treated. Tree planting is not part of the project.

83. **Comment:** Failure to analyze and account for shrub fuels when analyzing fire…the DEIS fails to account for the fuels associated with shrubs, which when accounted for show there is little difference in the future [fire] as to logging versus not logging…the DEIS's Fire and Fuels section claims that the action alternatives would have substantially lower future potential fire intensity than no action, but this conclusion, and all analysis to support it, is predicated upon the assumption that shrubs would be substantially reduced or removed, which is not part of any of the action alternatives...Table 3.05-2 on page 139 of the DEIS clearly states that mature shrub cover is associated with high flame lengths of 12-25 feet. The DEIS, p. 147, predicts higher flame lengths and fire intensity in the No Action alternative because "[t]hese sites would be dominated by brush...however, none of the action alternatives propose brush reduction/removal, so this conclusion would apply equally to the action alternatives. For this reason, the conclusions in the DEIS regarding fire and fuels under the action alternatives are not supported, and there is no rational connection between the facts found and the conclusions made...the DEIS' fire/fuels analysis, and fire modeling outputs for the action alternatives (relative to no action), are either predicated upon the assumption of shrub reduction/removal or improperly eliminate shrubs from all fire/fuels analysis, creating a skewed impression of the no action versus action alternatives.

5335

Response: The project does account for snag fall and shrub, forb, and tree growth out 20 years for each alternative. It is reflected in the fuel models, EIS Chapter 3.05 and also seen in the fire modeling maps in the Fuels report. The action alternatives address brush in the fuels report and the EIS Chapter 3.05. The report recognizes brush will establish and maintenance will be needed to maintain the treatment units.

84. **Comment:** Failure to properly educate the public about burned forests and to accurately describe the Rim Fire area…The Rim Fire must be appropriately described. It is essential to provide the public and decision-makers with adequate and accurate information about forest fires. The Forest Service, however, continues to present a one-sided view that intense fire is ecologically harmful and something to be outright avoided....The DEIS...does almost nothing to provide the public with an understanding of the ecological benefits of the Rim Fire and instead portrays it only in an unenlightened, negative way so as to justify logging and other actions. This is not scientifically valid, and just as importantly, wrongly deprives the public of an adequate understanding of the situation.

5335

Response: EIS Chapter 3.05 discusses the range of burn severities and associated acres. The project area includes 81,549 acres of High Severity burn, the treatment units range from 27,826-30,399 acres. This means that none of the low or mixed severity burn areas are being treated as well as retaining 34 to 37 percent of the high severity burned areas. The high severity burned areas are being left to accommodate wildlife and other resource needs. EIS Chapter 3.05 also discusses the historical fire severities and the differences between historical and the Rim Fire.

85. **Comment:** Although we submitted this reference to you in our scoping comments, the paper by McGinnis, Keeley, Stephens, and Roller in 2010 addressed “Fuel buildup and potential fire behavior after stand-replacing fires, logging fire-killed trees and herbicide shrub removal in Sierra Nevada forests” This is an explicit description of the plantation forests within the Rim Fire on the Stanislaus NF, it could not be ignored. Yet, the Stanislaus NF did ignore this paper, and many others, in their analysis for the Rim Fire DEIS. This is a far cry from utilizing the best available science as required by FS policy, NEPA (49 CFR 1500.1 (b) and the planning rule.

5449

Response: The paper cited was considered. It does not address the type of logging that was implemented. This is important because we cannot determine if the treatments were the same as what we are proposing. The paper does talk about the increased effects of logging slash on fire behavior. The Rim project is treating logging slash to meet resource needs as well as firefighter safety. The paper does state that logging dead trees reduces the potential fire brand production, smoldering fires and improves fire-fighter safety pg. 23. Herbicide and tree planting are not part of this project.

86. **Comment:** a) The project does not mention inclusion of the formation of fuel breaks. Such fuel breaks should be considered as a component of the salvage operation. b) Fuel breaks should be created and incorporated into the project design to permit future habitat management options, to provide for forest resilience and to protect forest investments form future catastrophic fires. c) Designation of fuel breaks as a component of other features such as migration corridors and other deer winter range habitat management would be beneficial.

5469 5420 5469

Response: Fuel breaks are incorporated into the project within Strategically Placed Landscape Area Treatments (SPLATs) – disconnected area treatments of various sizes and shapes in some kind of regular pattern across the landscape that would modify fire growth and behavior – and Strategic Fire Management Features (SFMF). For all alternatives the most intensive treatments are located in SPLATS and SFMF which are located around or near communities, camps, private property and residential areas (EIS Chapter 3.05). These areas include significant ridges, are above river canyons and along many roads.

87. **Comment:** Recent fire history makes it very clear fuel breaks are needed adjacent to populated areas, such as Buck Meadows, Groveland, and Tuolumne.

5469

Response: Groveland and Tuolumne are outside the project area. Buck Meadows is incorporated into a SPLAT (EIS Chapter 3-05 and the Fire and Fuels report).

88. **Comment:** In addition, safety concerns preclude firefighting forces from directly attacking on the ground because of the jackstraw of logs and dead standing trees left from the first fire.

107

Response: Standing dead trees and logs are identified as a hazard to firefighters in the FIES in Chapter 1.03 number 2. Provide Worker and Public Safety and Chapter 3.05 Fire and Fuels, Post fire conditions.

89. **Comment:** Also, part of the science that should be incorporated in the restoration plans would include designing treatments with an understanding that mixed severity fire effects is part of the Natural Range of Variability for the area and needs to be acknowledged and supported in the design.

5298

Response: The natural range of fire effects variability is acknowledged in the EIS (Chapter 1 Project development) "The goal is not to prevent fires within the forest, but to modify fire behavior to lower severity and to bring these areas back to a more historic heterogeneous structure where fire complements and sustains the system instead of destroying it." General Technical Report 220 (North et al. 2009a) provides guidance that "Historically, both topography and fire influenced forest structure and composition in the Sierra Nevada. Management that creates and mimics those historic stand structures and fire-mediated processes will help restore the natural role of fire on the landscape, create structural heterogeneity at multiple scales, and improve habitat quality by providing multilayered canopies and other key structures associated with sensitive wildlife species, such as the Pacific fisher, California Spotted owl, and northern goshawk." Proposed activities are initial steps toward restoring historic fuel conditions. "Fuel treatments in the salvage harvested stands would result in fuel characteristics reflective of Condition Class 1, where prescribed fire could be used for Maintenance and the likelihood of damage to succeeding stands would be reduced" (EIS Chapter 3.05).

90. **Comment:** And although the DEIS acknowledges the uncertainty of the role salvage logging plays in reducing future fire behavior, it repeatedly implies that the post-Rim Fire landscape is an extremely dangerous one because the burned trees "could result in a fire with intensity similar to that seen during the Rim Fire" (DEIS p. 143).

5324

Response: The statement references should be revised to "could result in a fire with severity similar to that seen during the Rim Fire". This change will be made in the final EIS. The Rim Fire did result in a far higher percentage of high vegetation severity burn than is typical for this landscape and this proportion is undesirable in future fires here.

91. **Comment:** Plantations that burned in the Rim Fire (which were not identified in the DEIS) epitomize the definition of "degraded, damaged, or destroyed" requiring restoration under new national definition and direction incorporated into the planning rule and new directives: Restoration. The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on reestablishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystems sustainability, resilience, and health under current and future conditions. (26 CFR 219.19).

5449

Response: No specific reforestation projects are proposed and it would be speculative to address reforestation at this time. The analysis of reforestation is thus beyond the scope of the Rim Recovery EIS.

FUEL REDUCTION

92. **Comment:** A recent review of fuels reduction needs compared to historical fire by North, Collins, and Stephens (2012) determined that current fuels reduction on FS land in the Sierra Nevada averages 87,923 acres annually (mechanical, prescribed fire, and wildfire). Estimated historical burning in the Sierra Nevada from 276,136 to 1.7 million acres annually (Stephens et al. 2007). Fuels have now been reduced by 257,314 acres in one fire. The Rim Fire region was choked with a hazardous fuel structure due to past management missteps.

5449

Response: North et al. (2012) and Stephens et al. (2007) focused on the pre-European fire regimes. In the context of mixed conifer, this would have been characterized by mainly low to moderate severity fire with some isolated high severity fire typified by vegetation types in fire regime 1. North et al. (2012) main management recommendation was the inclusion of low to moderate severity fire in our current planning process. The fire severity characteristics of the Rim Fire fell outside of the range of variability. See response to comment 5335.003 for a further discussion on fire severity.

93. **Comment:** P.3 - Project Development - Shaded fuelbreaks should not only be "along roads" but also strategically located along prominent ridge tops.

3623

Response: The term shaded fuel break was not used in the document. The area in which we are implementing fuel treatments cannot support shaded fuelbreaks in its present state. We do propose strategically placed units in the project area called SFMF and SPLATS, (EIS Chapter 3.05).

94. **Comment:** P. 8 - Discussion here states there will be situations where there will be up to 20 tons/acre of fuel loading after proposed activities. But under management requirements, p. 26, it states that the limit is 10 tons/acre.

3623

Response: EIS Chapter 2 refers specifically to Alternative 1 which had a maximum fuel loading of 10 tons. Alternatives 3 and 4 have a 10 to 20 ton range (EIS Chapter 3.05).

95. **Comment:** Further, it is not clear that Chapter 3 has included an analysis of fuel loading in the foreseeable future - namely, estimating the growth of small trees and brush, the rotting of standing

dead that will fall over on the brush in the next 5-10 years, and then the cumulative total of fuels/acre and the risk of wildfire five to ten years from now.

3623

Response: Fuel models were used to calculate fuel loadings up to twenty years into the future for the action and no action alternatives. The fuel models took into account predicted loadings of the fuels stratum (EIS Chapter 3.05). Please also refer to Response to Comment 98 above.

96. Comment: a) Focus the most intensive fuel reduction and snag removal treatments around the heavily visited private family camps, residential areas, and other vulnerable at-risk communities. Those are the areas where the most aggressive treatments make the most sense. b) Prioritize treatments around important recreational and residential resources.

4239 4297

Response: For all alternatives the most intensive treatments are located in SPLATS and SFMF which are located around or near communities, camp, and residential areas. (EIS Chapter. 3.05 Fuels report)

97. Comment: I am concerned that those down logs and associated smaller fuels at the levels of retention proposed in Alternatives 3 and 4 are going to preclude the opportunity to keep recurrent prescribed fire at low levels of intensity. The two goals of maintaining high levels of snags and down logs across the landscape and allowing recurring low intensity fire to happen across the landscape are not compatible with one another in the climatic and typical fuels conditions present in the area of the Rim Fire, at least not on a sustainable basis. I would like to see this conflict addressed in your analysis before you commit to retaining high levels of snags...history tells us that high intensity fires will occur in parts of the area again. In [weather conditions that prevailed during the fire this time], every snag remaining and all those that have turned to down logs will fuel that high intensity, jeopardizing whatever progress might have been made toward restoration in the interim.

4460

Response: Chapter 3.05 of the EIS and the Fire and Fuels report state that it is recognized that Coarse Woody Debris (CWD) is an essential component of ecosystems within the Rim Fire area, providing wildlife habitat, soil protection and other important functions. CWD maintained at required levels, would meet resource needs. In dry forests of interior western North America, large woody debris was limited historically by frequent fire that consumed logs (Skinner 2002) an excess of CWD in the project area could result in a fire with intensity similar to that as seen during the Rim Fire of 2013. The Fire and Fuels report states that after treatments the CWD is estimated to be approximately 10 tons per acre; these areas could be directly attacked with suppression resources increasing the chance of containing wildfires in the project area while maintaining resource needs (Brown et. al., 2003; Fites et. al., 2007). It also states that proposed units would alter the spread and effect of fire in this area. Units were strategically placed to affect fire movement on the landscape and provide advantageous areas for fire suppression actions. As managers continue to move the forest toward the desired condition fire would be able to resume its natural role in developing and sustaining these ecosystems.

98. Comment: Unless a significant portion of the widespread snags now blanketing the burn area are strategically managed to reduce fuel levels, the risk will be unacceptably high for another out-of-control conflagration that would likely set back whatever forest recovery is taking place and consume remaining patches of green, residual mature forest habitat.

4467

Response: Treatment areas were strategically placed to reduce the potential for another out-of-control conflagration (see Fire and Fuels report). Proposed units would alter the spread and effect of fire in this area. Units were strategically placed to affect fire movement on the landscape and provide advantageous areas for fire suppression actions. CWD which includes standing snags are being treated to levels that meet all resource needs including fire suppression actions and safety (see the Fire and Fuels report and EIS Chapter 3.05).

99. Comment: It is preferable for the forest service to identify the specific units that provide the most bang for the buck in terms of fuel reduction benefit while simultaneously being economically best for the timber industry, and while also meeting the competing objective of leaving widely distributed snag forest habitat for wildlife. Identifying specific priority units also can ensure that wood will be removed in the very narrow window of implementation time before saw logs lose economic value.

4467

Response: The area burned on National Forest lands is 154,530 acres and treatments are proposed on 27,826 to 30,403 (18 to 20 percent) of the area. The units were chosen because of their fuel reduction benefit, economic feasibility and wildlife habitat needs.

100. Comment: Far too often we leave forest management up to Mother Nature. With fire season upon us, a drought and limited active forest management to reduce fuel loads, it is the perfect environment for large catastrophic fires.

4893

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

101. Comment: CSERC respects the fact that positive aim of Stanislaus Forest and regional fire/fuel managers to attempt to strategically reduce fuel levels through the strategic placement of units that provide a break in the fuel profiles crossing the project area. This "fuel break" combined with fuel reduction areas along the managed road system will, if funded and maintained, better position USFS land managers to apply managed prescribed burn treatments across the landscape in combination with mastication, shredding, thinning logging, and other fuel reduction treatments.

4467

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

102. Comment: The assumption that mastication is somehow beneficial to future fire behavior has not been supported by the literature, either. For example Safford (2008) notes, "In a number of cases, the persistence of dry surface fuels in the masticated units appears to have abetted rather than resisted fire." Such surface fuels can persist in the Sierra Nevada's dry forests for decades. Plantations with medium to high cover of live shrubs mostly survived fire (Safford 2008).

5449

Response: Mastication treatments are proposed in Alternatives 3 and 4 for areas that are identified as Watershed Sensitive Areas (WSAs) to increase soil cover, and in to enhance deer habitat in brushy areas. This treatment would be conducted in areas that do not meet the minimum requirements for soil cover and/or are in WSAs. This treatment would not be used where post treatment fuel levels exceed objectives (EIS Chapter 2).

103. Comment: I believe it is essential the Stanislaus National Forest develop fuels management plans that protect wildland-urban interfaces. The proximity of the Rim Fire to the communities of Buck Meadows, Groveland (Pine Mountain Lake) and Tuolumne City was truly frightening. If fire had jumped the North Fork of the Tuolumne River Canyon, it might well have burned Tuolumne County to the ground.

5471

Response: Fuel breaks were strategically incorporated into the project within SPLATS and SFMF. Chapter 3.05 of the EIS and the Fire and Fuels describe this in detail. The Forest Service concurs, long-term fuel management plans are an important part of protecting the wildland urban interface. Fuel management plans are outside of the scope of this Rim Fire Recovery EIS.

104. Comment: I am in favor of removing the dead and dying trees for the reasons that I highlighted in the article: Fire killed trees eventually fall to the forest floor, forming heavy fuels. Brush seedlings rapidly fill in, replacing the lost understory vegetation. A few years after the first fire, the fuels for a return blaze are in place. This second fire will be even more intense and damaging to the soils and watershed because of the increased fuel loading from the dead trees left from the first fire.

107

Response: The EIS Alternatives 1, 3, and 4 propose to remove most of the dead trees within treatment units.

105. Comment: CSERC respects the thoughtful insight and knowledge that went in to that overall approach to design an outcome that makes the regenerating Rim Fire landscape more fire resilient. We believe, however, that modifying the proposed fuel treatments, snag retention levels, and surface fuel/CWD levels is not only appropriate for a balanced overall project, but modifications are appropriate to make the best use of timber industry treatments that will otherwise be so flooded with wood that many units may end up left untreated due to a lack of market demand.

4467

Response: Snag retention levels, and surface fuel/CWD levels were based on the desired surface fuel levels that would accumulate in the first 20 years and habitat requirements. Flame length and fireline intensity influence the ability of future fire suppression efforts to be successful. Flame lengths over 4 feet or fireline intensities over 100 BTU/FT/second may present serious control problems. See EIS Chapter 3.05 for a more detailed discussion.

106. Comment: Treat fuel, snags, and slash to limit severity and duration of future fires with particular consideration for high severity areas and green tree islands.

4500 5412

Response: The project is treating fuels, timber created activity slash and many of the snags within treatment units. Treating fuels in green tree islands is not within the scope of this project.

107. Comment: Although the DEIS continually cites the need to remove standing dead trees to reduce future fire severity and increase suppression control, the emphasis ignores the fact that such treatments have questionable value when placed in wildland areas rather than strategic locations around assets at risk.

5324

Response: The goal is to leave no more than 20 tons per acre and 10 tons per acre in Strategically Placed Landscape Area Treatments (SPLATs) while working with other resources to ensure soil and hydrologic stability and wildlife habitat needs (EIS Chapter 1). The strategic placement of the treatments and amount of fuel left is based on the ability to manage future fires. Snag retention levels, and surface fuel/CWD levels were based on the desired surface fuel levels that would accumulate in the first 20 years, and habitat requirements. Flame length and fireline intensity influence the ability of future fire suppression efforts to be successful. Flame lengths over 4 feet or fireline intensities over 100 BTU/FT/second may present serious control problems. Refer to EIS Chapter 3.05 for a more detailed discussion.

108. Comment: The Project does not include the formation of fuel breaks which should be considered as a component of the salvage operation. The Department recommends the Forest Service include the creation of fuel breaks to allow habitat management, forest resilience, and protection from future catastrophic fire events in the Project design

5420

Response: The EIS does not include the formation of fuel breaks, but includes proposed Strategically Placed Land Area Treatments (SPLATs) which are designed fire control areas.

109. Comment: Cleanup of unsalvageable downed trees and slash should include some pile burning, as well as plenty of broadcast chipping. The outdated method of 'limb, lop & scatter', as evidenced in the 'Hazard Tree Removal' project above the Middle Fork on Evergreen Road is a mish-mash of debris & looks unsightly. The forest floor needs mulch to retain moisture and nourish the soil for reforestation, as well as providing habitat, and broadcast chipping seems the most resourceful means. Areas where it is not cost-effective to log should be chipped for broadcast as well as ultra power resources. In areas where timber is not salvageable, fuels should be reduced and used for ultra power.

5428

Response: Mastication will be considered in areas that do not meet the minimum requirements for soil cover and/or are in watershed sensitive areas (WSAs). This treatment will not be used where post treatment fuel levels exceed objectives (EIS Chapter 2).

110. Comment: The Rim Fire fuels analysis provides no comparative measure of fuel loads by prescription. We are left the unlikely assumption that there will be 10-20 tons per acre outside SPLATS and SFMF and 10 tons per acre within these zones with identical fire behavior (expressed as flame length and fire line intensity) today and up to 20 years out.

5438

Response: The EIS Chapter 3.05 discusses the maintenance of these treatment units to maintain the fuel loading and fuel models desired for the project. The difference between the treatments is Alternative 1has a 10 ton maximum CWD and Alternatives 3 and 4 have a 10 to 20 ton range for outside SPLATs and SFMFs and 10 tons an acre for inside SPLATs and SFMFs.

111. Comment: Of particular concern is the Fuels Report, which prescribes the identical management regime that led to the thousands of acres of homogenous, even aged, fire hazardous pine plantations characteristic of the Rim Fire region before the fire. Demonizing the shrubs and other early successional forest components and structures that are vitally important habitat and food for multiple species and are necessary to restore Sierra Nevada forests does not express integration of current science and policy. The fuels report may as well have been written in 1987.

5449

Response: Reforestation is outside of the scope of the Rim Fire Recovery EIS. The Fire and Fuels report treats the development and management of the fuel and fire situation. Discussion of the value of early seral habitat and species management are outside of the scope of the fuels report.

112. Comment: [The DEIS] Claims that there is a need to reduce fuels on this landscape are now specious.

5449

Response: Treatment areas were strategically placed to reduce the potential for another out-of-control conflagration (see Fire and Fuels report). Proposed units would alter the spread and effect of fire in this area. Units were strategically placed to affect fire movement on the landscape and provide advantageous areas for fire suppression actions. CWD which includes standing snags are being treated to levels that meet all resource needs including fire suppression actions and safety (see the Fire and Fuels report and EIS Chapter 3.05). The goal is to leave no more than 20 tons per acre and 10 tons per acre in Strategically Placed Landscape Area Treatments (SPLATs) while working with other resources to ensure soil and hydrologic stability and wildlife habitat needs (EIS Chapter 1). The strategic placement of the treatments and amount of fuel left is based on the ability to manage future fires. Snag retention levels, and surface fuel/CWD levels were based on the desired surface fuel levels that would accumulate in the first 20 years, and habitat requirements. Refer to EIS Chapter 3.05 for a more detailed discussion.

113. Comment: a) The Rim Recovery DEIS is overwhelmingly fixated on fuels, despite the fact that fuels have now been reduced on 257,314 acres. If there is a fuels problem, it exists elsewhere in the forest where fire has been excluded, and b) It appears that the development of the alternatives was given to the District Fire Fuels Managers (p. 8, Vegetation Resiliency Strategy,), as if current and future fire hazards within the project area are an urgent issue, which they are not.

5449

Response: All resource specialists worked together to develop the alternatives. The interdisciplinary team as a whole recognized that the major threat to this landscape is future fires and that in order to restore a functioning forest in the long-term, fuels reduction is a key component. The alternatives meet the multiple objectives that were identified to meet the Purpose and Need of this project. The large fuels that remain will influence fire in the future as the regrowth of herbaceous, shrub and tree layers restore smaller fuels. Higher levels of large fuels would make this area more prone to future high-intensity fires, burning through the recovering forest before it could mature. In order to re-introduce fire into these areas as soon as possible, the current fuel load needs to be reduced to a level where fire would burn in patchy mostly low, and some moderate, vegetative burn severities (EIS Chapter 1). Management outside of the Rim Fire Recovery area is outside of the scope of this EIS.

114. Comment: The FS has misplaced its priorities and needs to focus fuels reduction in places where it matters. And, regular controlled burns in the Rim Fire to maintain islands of surviving older trees is the kind of ecology-based, restorative treatment that needs to happen, not the wholesale removal of valuable snags and other types of wildlife habitat under the guise of fuels reduction.

5449

Response: Restoration treatments including regular controlled burns to maintain islands of surviving older trees is outside of the scope of the Rim Fire Recovery EIS.

115. Comment: Alternatives 3 and 4 propose unreasonable mastication treatments that have been demonstrated to increase future fire severity in young forests, in areas designated for soil protection, suggesting that prescribed fire will not be utilized to reduce mastication fuels. This doesn't make any sense. On the one hand the DEIS justifies tree removal in the name of fuels reduction, then justifies tree removal in the name of soil protection.

5449

Response: Mastication treatments are proposed in Alternatives 3 and 4 for areas that are identified as Watershed Sensitive Areas (WSAs) to increase soil cover and in deer habitat areas that contain primarily brush. This treatment would be conducted in areas that do not meet the minimum requirements for soil cover and/or are in WSAs. This treatment would not be used where post treatment fuel levels exceed objectives (EIS Chapter 2).

116. Comment: Are fuel treatments within the watershed a benefit to the environment?

5481

Response: Fuel treatments are proposed to reduce the existing fuel load of standing dead trees to protect multiple resources including soils and watersheds from future high-intensity fires (see EIS Chapter 1).

MODELING

117. Comment: CSERC strongly supports the majority of modeling conclusions, written statements, and assumptions contained in the Rim Fire Recovery Fire and Fuels chapter.

4467

Response: The Forest Service and peer reviewed based science does also.

118. Comment: The Fuels Report failed to provide scientific based evidence for the modeling assumptions made in the DEIS about fuel loading and flame length. The Rim Fire is no longer a forest, and it cannot burn like one.

5449

Response: The modeling was based on vegetation regrowth in previous fires within and adjacent to the Rim Fire (EIS Chapter 3.05 and the Fire and Fuels report). Six large fires provided a general look at what can be expected in the Rim Fire area over the next 27 years.

SALVAGE

119. Comment: Without salvage logging fuel reduction treatments on a major scale within the Rim Fire area, the excessive fuel loading that now is so pervasive will likely exacerbate the impacts of the next major wildfire and continue to pattern of high severity forest impact such as had already occurred from the 1987 complex fire, the Rogge Fire, the Pilot Fire, the Early Fire, the Ackerson Fire, and various other wildfires that have eliminated or severely degraded suitable mature forest habitat for so many declining forest-dependent wildlife species.

4467

Response: The salvage logging and fuel reduction proposed in Alternatives 1, 3 and 4 of the EIS address the excessive fuel loading.

SNAGS

120. Comment: We agree that once this large material is on the ground, it contributes to higher fuel loads and the fire intensity is likely to increase (pg. 141).

4467

Response: If large woody materials are allowed to accumulate on the ground, fuel loads will increase and fire intensity will increase in terms of energy release per unit of fireline.

121. Comment: We agree that in areas with high concentrations of snags, jackstraw logs, down logs, and associated smaller diameter fuels, it will be dangerous and nearly impossible for direct suppression efforts to succeed under hot summer conditions.

4467

Response: Standing dead trees and logs are identified as a hazard to firefighters in the EIS in Chapter 1.03 number 2. Provide Worker and Public Safety and Chapter 3.05 Fire and Fuels, Post Fire Conditions.

122. Comment: ...the landscape average snag level is likely to well exceed an average of the proposed 6 snags per acre maximum on OFEA and similar areas of Alternatives 3 and 4…At six snags per acre, the average spacing of snags would be 85 to 120 feet…The largest snags available are likely taller than 120 feet on average. For forest employees working on salvage and subsequent restoration or fire suppression activities, such a distribution leaves little area where a worker can stand that would not [sic], on average, be safe from threat of falling trees. This concern alone should prompt serious consideration of significantly reducing snag retention or doing some significant consolidation of where snags are retained rather than distributing them well across the units.

4460

Response: The Forest Service concurs that a snag retention average of 6 per acre, or any level of snag retention, will still pose some level of hazard to forest employees working in the area. However, the reduced snag density produces a significantly safer working environment than the untreated densities that are several times that high. In addition, snags will be clumped together to allow for more of the area to be hazard free. Snags are retained as an important habitat element for wildlife species.

Invasive Species

123. Comment: By classifying these two species as low priority for the scope of the project, the potential for their increased presence is greatly amplified. We urge that the EIS states that to the extent possible that supplies and materials used in the projects area during the salvage project be verified to be free of cheat grass and Himalayan blackberry plants and their seeds, along with the other weed species designated by the Forest Service.

4467

Response: The environmental requirements of the EIS require that 1) the equipment cleaning requirements in the standard contract provisions for all contract operations and activities be implemented; 2) the Forest Service will designate the order, or progression, of unit completion to emphasize treating uninfested units before treating infested units to reduce the risk of weed spread from infested units into uninfested units; 3) equipment will be cleaned before moving from infested sites and prior to being transported from the project area; 4) certified weed-free mulches (woodstraw and rice straw are preferred) are used where available and staged in weed-free sites only; 5) construction materials, including crushed rock, drain rock, riprap and soil, shall be obtained from sources free of high and moderate priority weeds. If sources do contain these priority weeds either flag and avoid or move topsoil to a nearby location that will not be disturbed and cover. These environmental requirements of the project are not specific to any select group of invasives, but are meant to limit the spread of all non-native plant species, including cheat grass and Himalayan blackberry.

124. Comment: …the project will facilitate the spread of invasive flora, particularly exotic grass, which will lead to a more flammable and less fire-resilient landscape, contrary to the stated purpose and need for action.

5335

Response: The weed risk assessment does state that Alternatives 1, 3 and 4 of the project will facilitate the spread of invasive plants, which could indeed lead to vegetation type conversion to non-native grass/forbs, which are often more highly flammable than native plants. However, management requirements in Chapter 2 of the EIS will lower the risk of invasion from high to moderate for Alternatives 3 and 4 (but not for Alternative 1).

125. Comment: Avoid transport of invasive species by washing all earth-moving equipment.

4500 5412

Response: The EIS requires that 1) the equipment cleaning requirements in the standard contract provisions for all contract operations and activities be implemented; 2) the Forest Service will designate the order, or progression, of unit completion to emphasize treating uninfested units before treating infested units to reduce the risk of weed spread from infested units into uninfested units; 3) equipment will be cleaned before moving from infested sites and prior to being transported from the project area. These requirements are designed to limit the spread of all non-native plant species.

126. Comment: It is disturbing to read that only 5% of the area within the project has been surveyed for noxious weeds. The DEIS readily communicates the high likelihood that project activities will substantially assist in the spread of a diversity of noxious weeds through site disturbance and seed distribution.

4467

Response: While at the time of writing the DEIS only 5 percent of the project area had been surveyed this spring and summer more weed surveys have been completed. At this time roughly 75 percent of the project area has been surveyed.

127. Comment: a) Page 52: Invasive plants are identified to greatly increase in population because of disturbance and increased vectors. However, the invasive plant treatments identified in section 3.06 (Invasive plants) do not seem to adequately mitigate the risk. b) Is the existing noxious weed management plan sufficient?

4500 5412 5481

Response: The weed risk assessment and associated management requirements in Chapter 2 of the EIS adequately address Forest Service regulation and policy to mitigate the spread of high and moderate priority noxious weeds. This is not to say that these measures will entirely prevent the spread of weeds, hence the overall weed risk assessment ranking of moderate for Alternatives 3 and 4 and a high ranking for Alternative 1.

NEPA and NFMA

128. Comment: The 2001 Framework specifically noted that PACs must be determined to be unoccupied before they are removed from the network. However, the 2004 changes to the Framework significantly weakened protections for spotted owls, including…eliminating the requirement that PACs be documented as unoccupied before removing them from the network. Thus the 2004 Framework changes are likely to precipitate the need to list the California spotted owl as endangered or threatened, particularly since researchers have documented continuing declines of the species.

5336

Response: 16 USC 1604 regulates development of NFS land and resource management plans, not project-level analyses. All action alternatives of this project demonstrate compliance with the Forest Plan and Regional Conservation strategies for terrestrial wildlife, and may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl. (EIS Chapter 3.15)

129. Comment: An assessment of the available habitat within specific PACs and HRCAs is necessary to evaluate the degree of impact on spotted owls in the project area from the alteration of habitat quality and to assess the benefit that the burned forest provides to specific owl sites. We also believe that such an assessment is required by National Environmental Policy Act (NEPA) and to evaluate compliance with the National Forest Management Act (NFMA).

5438

Response: Chapter 3.15 "Wildlife" of the EIS summarizes the evaluation of effects that implementation of any of the alternatives would have on wildlife including the California spotted owl. The existing conditions are described and environmental consequences of each alternative are discussed.

130. Comment: a) Failure to complete an SEIS as to the outdated 2004 Sierra Framework…The 2004 Framework Is Obsolete Due to Significant New Information and a Supplemental Environmental Impact Statement (SEIS), or a Sierra Nevada-wide Cumulative Effects EIS, Must Be Prepared. The 2004 Framework was based upon several key assumptions and conclusions about forest ecology and management that have now been refuted or strongly challenged (and the weight of scientific evidence now indicates a different conclusion) by significant new scientific information, which requires a fundamental reevaluation of the plan under NEPA through a supplemental SEIS. Below we describe specific issues in this regard, and identify the key new scientific sources pertaining to each issue. [The commenter then discussed the following issues related to the 2004 Framework: Issue #1 - Fire/Fuel Condition Class, Issue #2 - "Ecological Collapse" Due to High-Intensity Fire, Issue #3 - Spotted Owl PACs "Lost" Due to High-Intensity Fire, Issue #4 - Spotted Owl Population Trend, Issue #5 - Black-backed Woodpecker Habitat Needs and Population Threats, Issue #6 - Pacific Fishers, Fire and Forest Structure, and Issue #7 - Fire Severity Trend].. b) Can the existing Stanislaus Forest Land and Resource Management Plan be made better?

5335 5451 5481

Response: The referenced 2004 “Framework” is not an ongoing, agency action. Therefore, NEPA’s supplementation regulations (40 CFR 1502.9(c)) do not apply to the 2004 Framework EIS; nor does NEPA require the agency to prepare a “Sierra Nevada-wide Cumulative Effects EIS." Even though the Forest Service is not required to prepare a supplemental EIS for the 2004 Framework based on new scientific information, the agency is responsible for considering new information at the project level, when such information is relevant to the project being considered. In this way, new science is addressed at the time and scale that is most relevant and practical.

The Forest Service recognizes that the state of scientific knowledge has changed since the 2004 Framework was issued and that forest plans should strive to remain consistent with the current scientific understandings. However, it is not practical to supplement programmatic EISs and revise LRMPs every time new information arises; doing so would lead to an unending loop of programmatic planning. The National Forest Management Act (NFMA) recognized the need for stability in forest planning, and envisioned that LRMP Revision would only occur every 10-15 years. The 2004 Framework is approximately 10 years old, and the region has begun to revise the LRMPs for the Sierra Nevada National Forests, with the first three plan revisions expected to be completed in 2015. It would be impractical for the agency to prepare a new EIS for the 2004 Framework while the agency is devoting its resources to revising the plans covered by the 2004 Framework through the current LRMP revision process. Until the LRMP revisions are completed for the Sierra Nevada National Forests, new scientific information and changed circumstances can be addressed in the site-specific project context, when the new information or changed circumstances are relevant to the project being considered.

131. Comment: Please limit logging in the Rim Fire Area.

5212 3863 5322 4251 4254 4422

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

132. Comment: It is not possible, nor is it necessary, to attempt to rehabilitate the entire 154,530 acres of National Forest lands within the Rim Fire. However, a significant portion of the fire footprint can and should be salvaged, reforested, and provided with fire prevention features that will enable the area to once again become a diverse and productive part of the Sierra Nevada's Ecosystem.

5471

Response: Salvage harvest and fuel reduction is a component of the purpose and need of the Rim Fire Recovery project.

133. Comment: Organizations have worked together since then to preserve the entire Tuolumne River watershed. They are working together today to insure that Forest Service (USFS) recovery efforts in the aftermath of the Rim Fire take full advantage of the opportunities to form partnerships. Hopefully, stakeholders with divergent interests will be able to create a balanced approach, utilizing science based techniques to solve the myriad challenges facing them. We must acknowledge that mutual respect and co-operation among all stakeholders is essential for recovery efforts to succeed.

5361 5370

Response: Public involvement and working with collaborative groups has been an important aspect of this project. The decision maker values the ideas and information brought forward by the many stakeholders who have participated in this process.

134. Comment: a) The goal of fire protection can be achieved in a less invasive way, the existing plans should be reconsidered in that light. b) This area will grow back to its previously mature habitats without the proposals put forth by the U.S. Forest Service. c) Please accept this email as my vote against the clear-cutting of the trees at Camp Tuolumne. d) Our public trust lands must continue to be protected for water, wildlife and the public. e) Our government must stop yielding our public interest to enrich powerful special interests. f) The town of Groveland would be able to retain tourism rather than losing tourists who are appalled at the firescape and the logging devastation. The native animals would have a chance to travel through the river corridor and not get stuck, harmed or killed in a logging zone. And I won't have to teach visitors to Yosemite why those logging trucks are traveling to and from the forest, taking from an ecosystem that needs those dead trees and their nutrients in order to regenerate and survive.

3218 3863 4640 4797 5212

Response: The responsible official will consider these comments when making her decision.

ALTERNATIVES

135. Comment: a) Of all the Alternatives proposed, Alternative 4 is the one heading most closely to the "right direction" but it should be strengthened to increase more protection for wildlife and wildlife habitat and reduce still the amount of road construction. b)Modify your current Alternative 4 with the following: retain additional large snags on every acre; reduce the number of miles planned for new temporary road construction; keep salvage logging completely out of the core roadless area in the Clavey River canyon; reduce or eliminate expensive skyline and helicopter treatment units; leave patches of untreated areas along commercial timber plantation buffers; focus the most intensive fuel reduction and snag removal treatments around the heavily visited private family camps, residential areas, and other vulnerable at-risk communities. c) I urge the Forest Service to drop its proposed action and instead find an alternative that: 1. Reduces the amount of salvage logging. 2. Better considers the needs of birds, other wildlife, and sensitive plants by leaving more burned forest standing. 3. Retains the important management guidelines for frogs and other species where logging does occur. 4. Builds no new roads. 5. Considers whether there are existing roads that should not be reconstructed. 6. Achieves the safety goals outlined. 7. And, perhaps as important as any other factor, calls for educating the public about the ecological role of fire plays in the regions, including why it is important to protect severely burned forests in order to maintain biodiversity and ecosystem integrity. d) Alternative 1 does not provide sufficient protections of aquatic species and their habitats, while Alternative 3 and Alternative 4 are preferable, but not fully protective. The overall impacts to aquatic species posed by the three EIS action alternatives further supports CSERC's request for a Modified Alternative 4.

2408	4400	4524	4734	5100	5408	4431
4444	4467	4834	5477	5075	5278	5298
5357	4299	4337	4467	4797	4803	5358
5360	4458	5379	5281			

Response: The responsible official will consider these comments when making her decision.

136. Comment: Alternative 4 is heading in the right direction but needs more protection for wildlife habitat and forest re-growth, including not logging partially burned trees, leaving a good portion of snags standing, and chipping/mulching of biomass in place of wherever feasible.

5439

Response: Partially burned trees are not proposed for logging in any of the alternatives unless they pose an imminent safety risk. The intent of snag retention in Old Forest Emphasis Areas, Home Range Core Areas and Forest Carnivore Connectivity Corridor units is to retain legacy structure where it exists for long-term resource recovery needs (i.e., the development of future old forest habitat with higher than average levels of large conifer snags and down woody material). In all cases, snag retention is designed to ensure consistency with Forest Plan and Regional Conservation strategies for terrestrial wildlife and is one of the 5 purposes of the project. Large snag retention is important at this time since future recruitment of these old forest features is not expected to occur until decades to centuries into the future. Areas are proposed for biomass treatment to meet strategic fuels reduction needs and improve wildlife movement. Biomass may also be left on site and masticated or cut and lopped on the ground for soil cover, or machine piled.

137. Comment: a) Please consider the suggestions put forth by the Central Sierra Environmental Resource Center of a modified Alternative 4. This modified Alternative would include retaining large standing snags on every acre of the burned area, keeping Temporary Road construction to a minimum, not permitting Salvage Logging in the Clavey River Canyon, or on steep slopes that are unstable and prone to erosion, leaving unharvested patches of burned timber as Buffer Zones along the heavily logged private timber lands, and allowing the heaviest logging around the highly trafficked Family

Camps, residential areas, and vulnerable communities. b) The means to do this is to adopt a modified version of Alternative 4 by reducing both the acres subjected to salvage logging and increasing the retention of snags in areas that are salvage logged.

5357 5358

Response: Two alternatives that retained substantially more areas untreated were considered but eliminated from detailed study for the following reasons:

- They did not meet the purpose and need to capture the economic value since most of this habitat includes the largest and most dense stands of dead trees within the burn.
- They did not meet the purpose and need to provide worker and public safety since hazard trees would not be removed where roads run through PACs.
- They did not meet the purpose and need to reduce fuels for forest resiliency in those areas left unlogged. In 10 to 15 years when most of those trees fall to the ground, the large amount of fuel in these areas would make future fires difficult to manage and contain, jeopardizing future fire resiliency.

138. Comment: In contrast to Alternative 3, Alternative 4 increases benefits to high profile ecological priorities by dropping 2,500 acres of high intensity proposed salvage logging units and leaving those acres for snag dependent species.

4467

Response: Alternative 4 further addresses the Snag Forest Habitat issue with additional black-backed woodpecker habitat retention of approximately 2500 acres compared to Alternative 3.

139. Comment: Alternative 4 seems to provide the best balance, by minimizing road construction and maintenance impacts. In addition, the research studies of watershed, soil, fuels, and wildlife included under Alternative 4 are essential to support informed decision-making in the future.

4429

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

140. Comment: As the current extreme drought exemplifies, water is always an issue in our state and our lives and the proposed logging under any alternative except for the fourth option will only further degrade this all important watershed.

4539

Response: Alternatives 1, 3 and 4 comply with the intent and procedural requirements of Water Quality Best Management Practices. None of the action alternatives anticipate measurable changes in stream flow or effects to beneficial uses. (EIS Chapter 3.14)

141. Comment: Alternative 4 also better responds to the clear statements contained within the DEIS describing known benefits of retaining higher levels of snags and large down woody material.

4467

Response: The Responsible Official will consider this recommendation while making a decision.

142. Comment: a) I support Alternate 4 with three modifications: 1. In Alternate 4 map, I'm pleased with the harvest areas A08C and A05C in the steep areas near the Clavey River in Sections 7, 8, 17, and 18 northwest of Wolfin Meadow. This map is a pleasure to work with at an enlarged scale that shows the multitude of accurate ground features. b) With such a good map available, I ask that you update the map for the chosen alternate once a year, or more often, as work progresses to let the public see the road clearing, salvage areas underway, erosion and road work that are working as planned including roads planned for re-closing, Temp roads obliterated after harvest, and other roads closed after harvest, as well as any that have needed extra work to keep them in use, or a necessary change of harvest plan. Announce the updates by email. 2. As clear as Alternate 4 map is, the "Treatment" legend does not include all the other five treatments started in the text beginning with biomass removal on through jackpot burns totaling perhaps up to 28,000 additional acres (p xvi, electronic page 20, Alternate 4) that are not located on this or any other map that I can find. I recognize that some overlap will occur with the salvage areas, but how can the reader know that these five unmarked treatments areas do not overlap any of the prohibited entry zones established in the text? An approximate location of these five zones would be reassuring that they too will be under good control.

5373

Response: The Forest Service will consider your recommendations for providing updated maps throughout the recovery process and including all treatment areas in the map and legend. All proposed treatments are within the units shown on the map. The tables in Appendix E identify where the proposed watershed, fuels, and wildlife treatments would occur.

143. **Comment**: a) Of the four alternatives, we support Alternative 3 because a large amount of salvage timber value is captured, a significant amount of wildlife habitat is enhanced or preserved, the residual fuels are treated to an acceptable level, and there is provision for scientific research. b) We support Alternative 3. c) Please consider adoption of Alternative 3 with a special treatment prescription for Berkeley Tuolumne Camp

5109	4855	5405	5420	5478	5448	4855
5104	5427	5436	5444	5469	5471	4474

Response: The responsible official will consider these comments when making her decision.

144. **Comment**: The Rim Fire has the potential to create large expanses of monotypic habitats and block migratory corridors. Therefore, the Department supports alternatives that will enhance the attributes which will have the highest potential for wildlife population maintenance and enhancement. Alternatives 3 and 4 have potential for wildlife population sustainability over an extended time period and include specific wildlife measures.

5420

Response: The Responsible Official will consider this recommendation while making a decision.

145. **Comment**: I urge the Forest Service to choose Alternative 2.

4318	1	5313

Response: The Responsible Official will consider this recommendation while making a decision.

146. **Comment**: Without treatment, most of the area will remain closed to the public for an extended period of time, fuel loading from falling dead timber and regrowing brush will be unacceptable, and it will be many decades before conifer forests start to regenerate.

5407

Response: The EIS includes the "no action" alternative (EIS Alternative 2). The effects of no treatment to the public and forest resources is disclosed for each resource in EIS Chapter 3.

147. **Comment**: Stop the logging and the replanting of the Rim Fire burn area now.

4128

Response: Replanting is not addressed in this project. The responsible official will consider this response when making her decision

148. **Comment**: a) Withdraw the logging proposal and protect the snag forest habitat created by the Rim Fire. b) Forest fires have regenerative powers and the snag forest habitat created by the Rim Fire is a biodiverse and wildlife rich ecosystem. I appeal to you to not log the area. c) The natural process of infrequent fires must not be used as an excuse to destroy the burned area. We do not want any salvage logging or road building in the Rim Fire area. d) I am adamantly opposed to logging in the burned Rim Fire area. I believe it will destroy the recovery of this area. e) Please stop the logging and preserve the natural environment. f) Protect this 40,000 acre habitat. g) I am writing to express my concerns for Rim Fire Recovery plans that call for excessive logging...to recover salvage logs.

3863 4354 4255 4703 3923 4129 4133 5401 3946

Response: The EIS includes the "no action" alternative (EIS Alternative 2) which proposes no salvaging logging. The responsible official will consider this response when making her decision.

149. Comment: a) Both alternative 3 and alternative 4 as they now exist are preferable to "no action" alternative 2. Unless a significant portion of the widespread snags now blanketing the burn area are strategically managed to reduce fuel levels, the risk will be unacceptable high for another out-of-control conflagration that would likely set back whatever forest recovery is taking place and consume remaining patches of green, residual mature forest habitat. b) It would not be in the public interest for the "No Action" alternative to be selected for there to be any delay in implementing a significant level of salvage logging and fuel reduction treatments on national forest lands within the Rim Fire as speedily as possible. c) RBF strongly supports the Forest Service's valiant efforts to accelerate this NEPA process in order to salvage as much of the value of the burned timber as possible before it deteriorates any further. d) Furthermore the salvage efforts will help protect the young plantations from future stand-replacing fires, allow for unobstructed movement of migratory terrestrial wildlife (specifically the Jawbone deer herd), and allow for unobstructed maintenance and management activities in the newly replanted forest. e) RBF also fully approves of the Stanislaus NF's efforts to expedite the NEPA process as well as limit implementation delays from administrative appeals by obtaining the Emergency Situation Determinations from the Washington office and Regulatory Streamlining from the Council on Environmental Quality. f) Alternatives 3 and 4 appear to make very real attempts at mitigating damage to the environment from Salvage Logging operations, and in turn, encouraging the ecosystem to heal. I applaud this. I hope the Planning process moves forward with this sensitivity to ecosystem health and restoration.

4467 5357 5471 5335 5109

Response: The responsible official will consider these comments when making her decision.

150. Comment: a) We support the implementation of Alternative 1, b) I strongly support implementation of Alternative One, the proposed action, which treats the maximum practicable area of the Rim burn, c) TuCARE applauds the speedy and thorough work with which the Forest Service has tackled this enormous recovery task planning process. Thank you for your efforts on behalf of Tuolumne County. We support the Proposed Action – Alternative #1 and concur with the findings of the FS with regards to a best-practices forest recovery plan.

5407 4318 5070 5424 5431 5479 5409

Response: The Responsible Official will consider this recommendation while making a decision.

151. Comment: Under no circumstances should the Forest Service pursue Alternative 1 as it does not do enough to minimize hydrological and soil impacts of erosion due to the increase in disturbed soils caused by the lack of forest cover.

4318

Response: Both Alternatives 3 and 4 add additional actions to improve cover, erosion hazard ratings, erosion ratings in WSAs, and porosity and to decrease effects to soils. The responsible official will consider this when making her decision.

152. Comment: a) Alternative 1 does not fully meet legal requirements, does not respond to science-based input discussed at the two Sacramento sessions, and does reflect scientific studies that document the value to retaining extensive areas of conifer snags and large down logs across a burned forest landscape for wildlife, watershed, and soil benefits. Alternative 1 cannot be the final choice for implementation. b) Alternative 1 does not reflect the best available science nor does it reflect the commitment made by Forest and Regional staff to respond to strong concerns related to the potential for ecological impacts from salvage and hazard tree treatments. CSERC respectfully assumes that the Forest will dismiss Alternative 1 from consideration as the selected final action.

4467

Response: Direct, indirect, and cumulative effects of each alternative to wildlife, watershed, soils, fuels, sensitive plants, and aquatic species, among other resources, as well as management requirements to minimize adverse effects, are addressed in the EIS, with appropriate references to the scientific literature. Numerous scientific publications are cited and utilized in the assessment of effects, both positive and negative. In addition, Alternatives 3 and 4 include detailed research proposals to address ongoing uncertainties and knowledge gaps in the scientific literature.

153. **Comment**: Request for changes to be made to the final NEPA document: It will include an Alternative #5 that was analyzed in detail in a new DEIS that would fell and remove hazard trees (green and dead) adjacent to 341 miles of forest roads.

2

Response: This proposed was not analyzed in detail because it does not meet the Purpose and Need of the project. See Chapter 2.04 of the EIS for specific details.

154. **Comment**: Page 19: Primary Objectives: "The action alternatives represent a wide range of perspectives designed to address the purpose and need (Chapter 1.03) and the issues identified through scoping (Chapter 1.08)." Delete the word "wide" as the alternatives in reality present a narrow range of actions.

4500 5412 5449

Response: The alternatives present a range of actions that fall within the Purpose and Need of the project and meet the identified objectives. Alternatives that do not correspond with the Purpose and Need of the project were eliminated from detailed study.

155. **Comment**: I would like to see larger trees left, and smaller trees chipped.

5476

Response: All action alternatives would retain 4 of the largest snags per acre in each treatment unit and Alternatives 3 and 4 would leave 4 to 6 of the largest depending on their size. Smaller trees are being either removed for biomass, masticated (chipped on site), dropped and lopped, or tractor piled depending on the site and the amount of fuels. The Interdisciplinary Team soil scientist and hydrologists identified where specific activities needed to occur in order to protect the soil resource and prevent erosion. Chipping all small trees across the landscape would not have met the fire and fuels goals of 10 to 20 tons per acre of flammable material.

156. **Comment**: Page 24: If research is a primary objective of the plan, it should be a component of each action alternative.

4500 5412

Response: The Proposed Action - Alternative 1 was developed prior to research being identified as a primary objective.

157. **Comment**: The FS should have developed an Alternative that would maximize the potential to reach the new goals for resilient ecosystems through enhancement of biodiversity and adaptation. Such an alternative could still remove saw logs for economic value while leaving the majority of the Rim Fire to regenerate naturally.

5449

Response: Alternatives were developed to address the purpose and need for the project and issues brought forth from public scoping. Under all action alternatives, the vast majority of the Rim Fire on National Forest lands is not proposed for salvage logging (70 plus percent).

158. Comment: a) Page 46: Retain 100 Percent Black-Backed Woodpecker Modeled Pairs "It does not meet the purpose and need to capture the economic value since most of this habitat includes the largest and most dense stands of dead trees within the burn." Under Alt 1, salvage logging could still take place in roughly 7,000 acres which could still be economically valuable. b) Page 46: Retain 75 Percent of the Black-Backed Woodpecker Modeled Pairs "It does not meet the purpose and need to capture the economic value since most of this habitat includes the largest and most dense stands of dead trees within the burn." Under Alt 1, salvage logging could still take place in roughly 14,000 acres which could still be economically valuable.

4500 5412

Response: As stated in Chapter 2.04 of the EIS, these two dropped alternatives do not meet any of the Purpose and Needs for the project, not just the economic value purpose. Although some acres could still be logged under these dropped alternatives, there would be far fewer acres harvested than in action alternatives 1, 3, and 4. Alternative 4 drops an additional 2,500 acres of high quality black-backed woodpecker habitat from harvest relative to Alternative 1 and 3. Thousands of acres of habitat within the fire area not receiving any treatment

159. Comment: Page 46: Retain Pre-Fire Spotted Owl PAC Boundaries, No PAC Remapping or Retiring "It does not meet the purpose and need to capture the economic value since most of this habitat includes the largest and most dense stands of dead trees within the burn." Under Alt 1, salvage logging could still take place outside the PAC boundaries, which could still be economically valuable.

5412

Response: As stated in Chapter 2.04 of the EIS, this alternative did not meet some of the Purpose and Needs for the project (public and worker safety and fuels reduction), not just the economic value purpose. Although many acres could still be logged, it would have been fewer acres than in any of the action alternatives. In addition, Forest Plan Direction requires that habitat conditions be evaluated after a stand-replacing event and opportunities for remapping of PACs be identified. PACs are delineated to encompass the best available 300 acres of habitat.

160. Comment: a) …the DEIS (p. 308) admits that "a growing body of evidence indicates that spotted owls persist within fire affected landscapes (Bond et al. 2002, Roberts et al. 2011, and Lee et al. 2012)", and that (p. 301) California spotted owls preferentially select high-severity fire areas for foraging because of the abundant small mammal prey base in such habitat, yet the DEIS then states that PACs and HRCAs must be dropped or re-drawn to eliminate higher-severity fire areas (pp. 297-298), allowing them to be logged, despite the fact that the science shows that such areas are indeed suitable habitat. There is no rational connection between the facts found and the proposal here and, therefore, the analysis of impacts and cumulative effects is inherently flawed. b) The Rim Fire burned habitat within 46 spotted owl Protected Activity Centers ("PACs"), at least 34 of which would be adversely affected by logging even under Alternative 4...Spotted owls often remain in PACs with severely burned forests....once again I am forced to make the...request - that the Forest Service refrain from...eliminating severely burned forests from PACs...dropping PACs from the network and re-drawing PACs is an outdated and flawed notion that is completely unsupported by not only the multitude of scientific studies, but by the Forest Service's own survey data from the Rim Fire. I strongly object to the methodology the Forest Service used to assess project impacts to Spotted Owls, which was to first 'retire' (i.e. eliminate) or re-draw PACs with larger levels of high-severity fire areas, and then to quantify the amount of logging that would occur in the re-mapped owl habitat (which then ignores any analyses of impacts on habitat in the retired PACs or the severely burned areas of the original re-drawn PACs, habitat which may be used by spotted owls)...The project impacts should be assessed on the original PAC acres rather than the remapped areas...To redraw the PACs or retire PACs and then conduct the analysis on the new PAC acres...results in a process whereby the true impacts on owls...cannot be quantified or assessed...No PACs should be redrawn.

5331 5336

Response: The DEIS (p. 299) states that the desired condition for CSO PAC is to have 1) at least two tree canopy layers; 2) dominant and co-dominant trees with average diameters of at least 24 inch dbh; 3) at least 60 to 70 percent canopy cover; 4) some very large snags (greater than 45 inches dbh); and 5) snag and down woody material levels that are higher than average. The PACs under consideration to be removed from the conservation network burned at high severity and have small amounts of suitable habitat remaining, resulting in very low to no probability of continued occupancy. (DEIS p. 297). The post-fire PAC evaluation was completed with technical assistance from Pacific Southwest Region Research Station (PSW) owl scientists. Originally ten PACs were retired and the boundaries of the remaining PACs were redrawn, based on that evaluation (EIS Chapter 3.15: Wildlife/California Spotted Owl: Affected Environment). Surveys for California spotted owl have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Based on those surveys, six PACs have been re-established (EIS Chapter 3.15: Wildlife/ California Spotted Owl: Affected Environment). As new information is obtained, the agency will follow Forest Plan direction: “As additional nest location and habitat data become available, boundaries of PACs are reviewed and adjusted as necessary to better include known and suspected nest stands and encompass the best available 300 acres of habitat” (USDA 2010a).

161. Comment: Failure to analyze as an alternative the scientific recommendation to protect enough Black-Backed Woodpecker habitat to maintain at least 75% of the modeled pairs…The DEIS violates NEPA...by failing to fully analyze a reasonable range of alternatives. The DEIS (p. 46) dismisses this recommendation from a scientist panel with only a perfunctory and vague statement about not wanting to leave too much fuel, apparently referring to the medium and large snags in the higher-severity fire patches. Such a cursory dismissal of major scientific concerns cannot satisfy NEPA's requirements. In light of the foregoing, the DEIS failed to take a hard look, and adequately analyze cumulative effects to Black-backed Woodpeckers, under NEPA.

5335 5438 5451

Response: The Rim Fire Recovery Final Environmental Impact Statement (EIS) analyzes four alternatives in detail. It also includes several alternatives considered, but eliminated from detailed study. They include: Remove the maximum amount of timber value, Hazard tree removal only, Retain 100 percent black-backed woodpecker modeled pairs, Retain 75 percent of the black-backed woodpecker modeled pairs, Retain pre-fire spotted owl Pac boundaries, No PAC remapping or retiring, and Natural succession. These alternatives did not meet the objectives identified through the Purpose and Need of this project. Cumulative effects of each alternative are analyzed in Chapter 3. Per 36 CFR 220.7 (b) (2), no specific number of alternatives is required or prescribed.

162. Comment: You even rejected consideration of alternatives that would avoid such impacts because they did “not meet the purpose and need to capture the economic value, thus clearly relegating ecological concerns to a lower status compared to economic ones.

5280

Response: All action alternatives must meet the objectives identified in the Purpose and Need of this project. There is no hierarchy in the objectives.

163. Comment: The management requirements for the alternatives, starting on page 26 and continuing throughout the document are very specific with little flexibility to adjust for on the ground conditions.

5407 5070

Response: The management requirements for all action alternatives are designed to implement the Forest Plan to minimize or avoid potential adverse impacts, while meeting the objectives identified in the Purpose and Need of this project. (EIS Chapter 2)

164. **Comment**: In contrast to the objective to protect old forest structure, the action alternatives are actually targeting standing large, old forest structures for removal. An alternative should be developed that protects most large, old forest structures (living or dead).

5438

Response: Alternative 2, No Action, analyzes retention of all trees across the landscape.

165. **Comment**: Dropping the skyline and helicopter treatments due to resource impacts, excessive fuel loads, cost, remoteness, and failure to contribute to the long term fuels strategy should have been considered in a separate alternative.

5438

Response: These units were proposed for inclusion because they specifically met one or more aspects of the purpose and need, often fuels reduction. The potential impacts from these proposed activities were analyzed in Chapter 3 of the EIS.

166. **Comment**: a) Failure to consider that depth of relevant information and issues from the Ecological Workshops is a violation of NEPA's requirement to conduct an "accurate scientific analysis" 40 CFR § 1500.1 (b); and to rigorously explore and objectively evaluate all reasonable alternatives 40 CFR §1502.14. b) The DEIS fails to meet NEPA's requirements to conduct "accurate scientific analysis," (40 CFR § 1500.1 (b)) and to rigorously explore and objectively evaluate all reasonable alternatives (40 CFR §1502.14). The DEIS also fails to assess the impacts of climate patterns and effects based technical information generated by Region 5 staff and fails to assess the connected and cumulative actions that result from changing climate patterns. These omissions arbitrarily limited the range of alternatives in the DEIS for the Rim Fire Restoration landscape.

5438 5449

Response: The cumulative effects analysis of the Rim Fire EIS is consistent with Forest Service NEPA regulations (73 Federal Register 143, July 24, 2008; p. 443084-43099). (EIS Chapter 3.01) The Forest Resiliency Strategy which was compiled in October 2013 for the Rim Fire landscape utilized climate change modeling information as part of the basis for its conclusions and recommendations and Climate Change is addressed in EIS Chapter 3.01. Climate change information was addressed in this EIS, and did not limit the range of alternatives in the EIS.

167. **Comment**: There is precedence for this determination as Mount St. Helens received monument status shortly after its historic eruption. At a minimum, the Forest Service should maintain the integrity of the areas within several miles of the park ecosystems and evaluate an alternative that does not forgo opportunities to create a network of protected wildlands that would be consistent with President Obama's emphasis on climate resilience and forest carbon storage. We note that areas protected from extensive and cumulative human disturbances are more likely to be resilient to climate change and to have high ecological integrity. To accommodate this request, the Forest Service needs to expand the purpose and need of the proposed project to include considerations other than mainly deriving short-term economic benefits from post-fire logging that is likely to alter the area's unique character for decades.

5313

Response: The alternatives that are considered in detail are consistent with the objectives identified in the Purpose and Need of this Project, which are multi-faceted and include: Capture economic value through salvage logging, provide worker and public safety, reduce fuels for future forest resiliency, improve road infrastructure to enhance hydrologic function, enhance wildlife habitat, and research.

168. **Comment**: EPA has rated the DEIS and all action alternatives as Lack of Objections: The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measure that could be accomplished with no more than minor changes to the proposal.

5464

Response: The Responsible Official will consider this recommendation while making a decision.

169. Comment: a) Alternatives 1, 3, and 4 are extremely similar in actions and outcomes and fail to provide for a “reasonable range” of alternatives as called for in NEPA. This failure has both procedural and substantive impacts by arbitrarily limiting options in the project design and by increasing harm to the natural resources within the Rim Fire landscape as discussed below. b) As can be seen in the table comparing alternatives (DEIS, p. 51), there is little difference in activities and outcomes among the alternatives and 67% (25 out of 37) of the comparative measures were the same among the alternatives. c) All the key concerns relevant to the Rim Fire should have been grouped into issues for the DEIS and used to develop reasonable alternatives to be analyzed in detail. d) 4) With so much public attention focusing on the value of leaving widespread snags and large down wood for both short-term and long-term wildlife, soil, and watershed benefits, where should currently-proposed tractor ground salvage treatment units be dropped in order to increase the overall retention of snags and large down woody material across the landscape as legacy structural attributes into the future, while still creating strategic fire management units in an effective array of SPLATs and road system fuel reduction zones? e) The DEIS improperly narrows the purpose and need by requiring all action alternatives to maximize removal of "fuels." Many of the best areas for wildlife are being proposed for logging simply to meet the Forest Service's "Strategic Fire Management" goal, but the Forest Service fails to explain why the areas chosen (see attached map of yellow "Strategic Fire Management Areas") actually need to be logged at all, or in the manner or to the extent chosen, to meet any particular goal. f) As already described in our original letter, the DEIS' purposes are too narrow and resulted in important alternatives being eliminated from consideration. Here, the project purposes are unreasonably narrow, and therefore violate NEPA, because they are directly contrary to the conservation of post-fire wildlife/habitat...As a result of the DEIS' narrowing of purposes to avoid conservation of post-fire wildlife habitat, the environmental review is wrongfully skewed heavily in favor of logging.

5438 4467 5535 5451

Response: The Rim Fire Recovery Final Environmental Impact Statement (EIS) is a public document that provides evidence and analysis for determining a chosen alternative for this project. The EIS describes existing conditions in the Project area and includes the direct, indirect and cumulative effects on a wide range of habitats and forest resources associated with implementing any of the action alternatives. It also discusses environmental consequences associated with taking no action (the No Action Alternative). The environmental analyses presented in the EIS and detailed in the Project record are focused on full disclosure of the environmental consequences of the proposal so that the Responsible Official can make an informed decision. The alternatives that are considered in detail are consistent with the objectives identified in the Purpose and Need of this Project, which include: Capture economic value through salvage logging, provide worker and public safety, reduce fuels for future forest resiliency, improve road infrastructure to enhance hydrologic function, enhance wildlife habitat, and research.

The Sierra Nevada Forest Plan Amendment Record of Decision (USDA 2004) provides for ecosystem restoration following large, catastrophic disturbance events. Restoration activities may be conducted in all land allocations and include objectives for managing disturbed areas for long-term fuel profiles, restoring habitat, and recovering the economic value of some dead and dying trees. Restoration projects can include salvage of dead and dying trees for economic value as well as for fuels reduction (USDA 2004, p. 6).

The Forest Plan has standards and guidelines pertaining to salvage activities following large disturbance events, such as the Rim Fire (USDA 2004, pp. 52 and 53). Salvage harvest of dead and dying trees may be conducted to recover the economic value of this material and support objectives for reducing hazardous fuels, improving forest health, re-introducing fire, and/or re-establishing forested conditions (USDA 2004, p. 52). Standards and guidelines direct managers to design post-disturbance restoration projects to: (1) reduce potential soil erosion and the loss of soil productivity caused by loss of vegetation and ground cover; (2) protect and maintain critical wildlife habitat; (3) manage development of fuel profiles over time; and (4) recover the value of timber killed or severely injured by the disturbance (USDA 2004, p. 52).

170. **Comment**: Failure to complete one EIS to address both salvage logging and reforestation…Failure to account for the cumulative effects associated with salvage logging and reforestation…The DEIS Fails to Properly Address Future Reforestation Activities and a Single EIS is required…The DEIS (p. 368) also states that the Forest Service's "future management" intentions for the high-severity fire areas of the Rim fire include "planting conifers", and the DEIS (pp.147, 368) asserts that this is not effective unless shrubs are reduced/removed...the Forest Service has already stated its intention to conduct an artificial reforestation project in the Rim fire area...The impacts and cumulative effects of the subsequent reforestation activities, however, are not analyzed in the DEIS. The DEIS's section on reasonably foreseeable future actions (pp.453-455), for example, contains no mention of this future action, and the DEIS's cumulative effects sections in each of the issue sections...fail to include discussion or analysis of the cumulative effects from reforestation activities...Furthermore, the reforestation project would not occur absent the salvage logging and the two are therefore inextricably connected. The EIS is thus...in violation of NEPA because the Forest Service improperly prepared a separate EIS for salvage logging and for artificial reforestation, even though these are similar, cumulative and connected actions...

5335

Response: No specific reforestation projects are proposed and it would be speculative to address reforestation at this time. The analysis of reforestation is thus beyond the scope of the Rim Recovery EIS.

171. **Comment**: The DEIS failed to disclose the cost of reforestation resulting from these preceding large fires, although this is relevant information and should have been included for the public and decision makers to consider.

5449

Response No specific reforestation projects are proposed and it would be speculative to address reforestation at this time. The analysis of reforestation is thus beyond the scope of the Rim Recovery EIS.

172. **Comment**: In aggregate, the DEIS is seriously flawed because it does not analyze, or adequately analyze: a) impacts of proposed logging to current levels of natural regrowth of vegetation in high-severity fire patches; b) impacts to California Spotted Owl occupancy and viability and Black-backed Woodpecker population viability; and c) a reasonable range of alternatives (the three action alternatives all propose similarly large levels of post-fire logging, while none of the action alternatives fully analyzes an approach that would protect substantially more California Spotted Owl habitat, including higher-severity fire areas, which comprise suitable foraging habitat, and substantially more Black-backed Woodpecker habitat).

5313

Response: The analysis in the EIS focuses on restoring ecosystem function, process, and resiliency by addressing issues related to vegetative composition and structure, forest health, fuels, hardwood and wildlife habitat improvement, and socio-economic objectives. (EIS Chapter 1) Chapter 3.15 specifically analyzes the impacts of each alternative to CSO and BBWO, along with other wildlife.

CUMULATIVE EFFECTS

173. **Comment**: The DEIS failed to identify correctly the agency's culpability in the Rim Fire devastation due to past logging and replanting practices. This has been well documented in the literature and is nothing new, yet nowhere in the DEIS is there any acknowledgment of the agency's culpability in this massive tragedy. This is an essential analysis needed to inform the current decision to be made, and is essential to conducting an accurate cumulative impacts analysis.

5449

Response: The Council on Environmental Quality states that, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ 2005). The cumulative effects analysis in the Rim Fire Recovery EIS is consistent with Forest Service NEPA regulations (73 Federal Register 143, July 24, 2008; p. 43084-43099). (EIS Chapter 3.01)

174. **Comment**: Cumulative effects analysis is inadequate.

5449

Response: Chapter 3 of the EIS summarizes the physical, biological, social, and economic environments that are affected by the alternatives and the effects on that environment that would result from implementation of any of the alternatives. The direct, indirect, and cumulative effects, along with applicable mitigation measures, are also addressed in Chapter 3.01.

FOREST PLAN

175. **Comment**: …if a Forest Plan Amendment was to be considered as part of this project planning, it would have been to reduce the snag retention level requirements specified in the Forest Plan on the basis that: 1) those guidelines were not developed with the habitat and vegetation conditions of the Rim Fire in mind and 2) to expand the area basis on which snag and down log levels were to be analyzed from a unit basis to a watershed basis. A watershed average retention level of 3 conifer snags per acre clumped in areas that are difficult to access or not proposed for treatment would be much more to my liking.

4460

Response: The Responsible Official will consider this recommendation while making a decision.

176. **Comment**: SPI supports Forest Plan direction based on a comprehensive assessment of present and anticipated uses, the demand for, and supply of renewable resources as required by the National Forest Management Act of 1976.

5424

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

PROPOSED ACTION

177. **Comment**: [Regarding DEIS page 26, paragraph 4] Add a stipulation to retain a number of trees that have survived to address the NPS scoping comment “Trees that survived the Rim Fire, particularly in high severity areas, could be important habitat to wildlife species that cross the park-forest boundary, or that seasonally migrate from high elevations to low elevations.” And also: “Green (i.e. survivor) trees and islands of green trees within the large, high severity patches should be treated as important resources. These trees/islands may be the seed source nucleus for future regeneration patterns. Fuels should be treated in green tree islands to reduce the severity of subsequent fires. Large diameter snags within the green tree islands should be retained for wildlife habitat, as trees burned in the Rim Fire will not provide habitat for all snag obligates.”

4500 5412

Response: Alternatives 1, 3, and 4 do not propose to remove green trees (a tree with any visible green needle) unless one is deemed as hazardous along Maintenance Level 2 roads and would likely die within the next two years.

178. Comment: Page 27: Actions need to be affirmative. Remove the word "consider" and replace with a strong action statement as in the following examples: 7. Retain additional snags and downed logs to meet habitat needs in Old Forest Emphasis Areas (OFEA), Spotted Owl Home Range Core Areas (HRCA), and forest carnivore connectivity corridor (FCCC). 8. Avoid construction of new landings and skid trails within PACs. 9. Avoid road construction within 0.25 miles of nest roost sites. 11. Mitigate areas where roadside hazard treatments are within PACs and HRCAs by adding acreage to the PAC and/or HRCA equivalent to the treated acres of the most suitable habitat available.

4500 5412

Response: The Management Requirements that contained the word "consider" were analyzed as not occurring and have been removed from the Management Requirements in the EIS.

179. Comment: Page 27: Add the following statement to prevent the spread of invasive plants: All staff working on site shall be informed of, and follow best management practices for preventing the introduction and spread of non-native, invasive species. Equipment previously used outside the forest must be cleaned before leaving any paved surface. All digging, drilling, or earth-moving equipment will be cleaned prior to arrival at the project or staging areas to minimize the importation of non-native plants.

4500 5412

Response: Your recommendations regarding the prevention of the spread of invasive plants will be considered. Most are included in Alternatives 3 and 4 of the project.

PURPOSE AND NEED

180. Comment: a) Page 19: "The purpose and need includes five primary objectives identified for the proposed action (Chapter 1.03)." The identified "purpose and need" present solutions and objectives rather than problems to be solved by actions in the alternatives. b) Page 20: Table 2.01-1 Primary Objectives. The "purposes" identified in the table represent actions rather than foundational objectives upon which action alternatives can be derived. c) Identify the "Purpose" of the plan to guide actions that will achieve the ecological, research, recreational, and economic objectives of the USFS. d) Describe the "Needs" for the plan as statements of existing conditions that need to be changed, problems that need to be remedied, and policies and mandates that need to be implemented. e) PURPOSE: The purpose of the plan is not overtly stated in this section. Purpose is a broad statement of goals that the USFS intends to fulfill by taking action. Example – The purpose of this plan/EIS is to guide actions in order to: Restore the forest at a landscape scale Conserve ecological structures, processes, and functions that are desirable and sustainable for future forested conditions; Bring areas back to a more historic heterogeneous structure where fire complements and sustains the system instead of destroying it; Restore ecosystem function, process, and resiliency by addressing issues related to vegetative composition and structure, forest health, fuels, hardwood and wildlife habitat improvement, and socio-economic objectives; Repair infrastructure to allow for appropriate administration; Research the unique scale and intensity of the Rim Fire to answer questions and provide more information on a wide range of research topics; Provide for public health and safety. f) NEEDS: Needs should be statements of existing conditions that need to be changed, problems that need to be remedied, and policies and mandates that need to be implemented. The need for the plan should emphasize that the effects of the Rim Fire present immediate threats to public safety, administration, and forest ecology. Capture economic value through salvage logging is not a problem that needs to be remedied. It draws too specific a conclusion thereby limiting the development of a range of alternatives. Here are some suggested need statements: The Rim Fire has left an opportunity for salvage logging; Public and worker safety is at risk due to the hazardous trees which resulted from the Rim Fire; The Rim Fire directly and indirectly caused damage to essential roads. GOALS: The items listed as needs for the plan are better stated as overarching goals and objectives of the plan. Enhancing habitat and hydrologic function, and improving forest resiliency are also goals.

4500 5412

Response: The narrative description of the identified "Purpose and Need" in Chapter 1.03 of the DEIS has been clarified in the EIS to reflect the "Purpose" as the desired achievements of the project, and the "Need" reflects the general actions and objectives of the project.

181. Comment: The purpose and need and alternatives do not adequately take into account the benefits of the burned landscape to species at risk and the risks to species from the proposed activities and provided very limited analysis of the adverse impacts to these species.

5438

Response: Chapter 3 of the EIS summarizes the physical, biological, social, and economic environments that are affected by the alternatives and the effects on that environment that would result from implementation of any of the alternatives. The direct, indirect, and cumulative effects, along with applicable mitigation measures, are also addressed in Chapter 3.

182. Comment: We classified Objectives 1, 2, 5b, and 6 as principally economic objectives since there was no clearly stated ecological benefit associated with these objectives.

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Response: Only Objective 1 is an economic objective. Objective 2 is to protect public and worker safety and although it includes the removal of dead trees (including large ones in some cases), it would also remove isolated trees and those in areas where they may have to be felled and left in place because there is no way to bring them to the road. No response is required. Objective 5b is leaving more of the large snags per acre within treated units which would take away from the economic value of the timber sale. Objective 6 is adding research that left more untreated areas across the landscape and removing fewer large trees in some areas.

183. Comment: We considered Objective 2 not to be related to public safety or hazard reduction since this objective was simply assigned to units through which a road proposed for hazard reduction treatment passed. In such cases, the road hazard reduction aspect of the treatment is often a very small proportion of the treated area.

5438

Response: Objective 2 is to protect public and worker safety and although it includes the removal of dead trees (including large ones in some cases), it would also remove isolated trees and those in areas where they may have to be felled and left in place because there is no way to bring them to the road..

References

184. Comment: Dr. Franklin, with others, has written extensively about this issue [salvage logging], yet the DEIS failed to acknowledge the seminal scientific literature that was submitted for your consideration, for example Swanson et al 2011 and Lindenmayer, Burton, and Franklin's book Salvage Logging and It's Ecological Consequences (2008), an entire book dedicated to the environmental impacts of salvage logging. The book contains a table of scientifically documented impacts from salvage logging that could have been used as a starting point for a credible analysis of salvage logging impacts.

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Response: Numerous publications authored or co-authored by Dr. Franklin are referenced in the EIS. Lindenmayer et al. 2008 is referenced in the EIS Chapter 3.15 wildlife effects section.

Science

185. Comment: a) The Rim Fire Recovery plan should be based on sound science and ecosystem recovery should be top priority. Alternative 4 is heading in the right direction, but still allows too much salvage logging and road creation; not enough protection for wildlife habitat. b) ...the DEIS's proposed, misguided approach will not restore the forest, but will instead seriously damage the ecosystem, while precluding important natural succession processes. The adverse impacts would include damaging high quality early seral habitat (complex early seral forest) for rare species, degrading soils, damaging water quality through run off from logging and roads, and reducing carbon storage by removing forest carbon pools. c) Such an approach violates the intent of the Region 5's Ecological Restoration Implementation Plan and fails to adhere to one of the main Goals of the 2010 Forest Plan Direction for the Stanislaus National Forest.

5100 4400 5313 2 5324

Response: The Sierra Nevada Forest Plan Amendment Record of Decision (USDA 2004) provides for ecosystem restoration following large, catastrophic disturbance events. Restoration activities may be conducted in all land allocations and include objectives for managing disturbed areas for long-term fuel profiles, restoring habitat, and recovering the economic value of some dead and dying trees. Restoration projects can include salvage of dead and dying trees for economic value as well as for fuels reduction (USDA 2004, p. 6).

The Forest Plan has standards and guidelines pertaining to salvage activities following large disturbance events, such as the Rim Fire (USDA 2004, pp. 52 and 53). Salvage harvest of dead and dying trees may be conducted to recover the economic value of this material and support objectives for reducing hazardous fuels, improving forest health, re-introducing fire, and/or re-establishing forested conditions (USDA 2004, p. 52). Standards and guidelines direct managers to design post-disturbance restoration projects to: (1) reduce potential soil erosion and the loss of soil productivity caused by loss of vegetation and ground cover; (2) protect and maintain critical wildlife habitat; (3) manage development of fuel profiles over time; and (4) recover the value of timber killed or severely injured by the disturbance (USDA 2004, p. 52). The proposed action includes design features and management requirements (Chapter 2 of the Rim Fire Recovery EIS) to protect and maintain critical wildlife habitat following large, catastrophic wildfires. Enhancing wildlife habitat is one of the purposes of the Rim Fire Recovery Project.

186. Comment: a) As we noted in our scoping comments, we seek the adoption of a science-based alternative for the Rim Recovery Project that is congruent with the current knowledge regarding the ecological value of post-fire habitats as well as the Regional Forester's leadership intent on ecological restoration. b) In our scoping comments, we asked that the science of post-fire management be applied to future actions in the Rim Fire area. c) Use the best science to make policy and defend it against the political pressures that have for too long influenced and driven the NF decision makers. d) The wealth of research indicating that salvage logging causes significant environmental damage has been ignored by the DEIS. This is a clear violation of the planning rule stating that Forest Service officials shall use the best available scientific information (BASI) to inform the planning process. e) Failure to…ensure scientific accuracy and integrity…The DEIS Fails to Ensure Scientific Accuracy and Integrity...in violation of NEPA, 40 C.F.R. 1502.24. f) Failure to acknowledge and account for the breadth of current science regarding fire ecology, forest ecology, and the detrimental impacts of salvage logging to forest wildlife...Failure to rely on the best available science as to post-fire wildlife habitat...The DEIS Violates NFMA by Failing to Consider the Best Available Science…especially as to owls, woodpeckers, and shrub habitat specialists, as well as fire/fuels analysis and analysis of effects of ground-based logging on existing natural conifer regeneration, the DEIS failed to comply with this requirement and, therefore, violated NFMA. g) Thus, as directed by the new planning rule, the Rim Fire project must take into account the best available science information (BASI; 36 CFR § 219.3) in the design of the appropriate actions in the post-fire environment. h) By hurrying the DEIS, the DEIS failed to include and analyze the current reality on the ground. As described in our June 15 comments, there exists a) substantial post-fire conifer regeneration already occurring in the high-severity fire patches, b) substantial flushing in burned trees, and c) presence of owls and goshawks in moderate and high-severity burned areas. The narrative in the DEIS, however, tries to state otherwise. Therefore, the DEIS must be supplemented to address and incorporate these important realities on the ground. To do otherwise will wrongfully continue to skew the DEIS towards logging which results directly in harm to life trees and to wildlife. b) …there is a consensus of scientific opinion that post-fire logging and artificial conifer plantation establishment is one of the most ecologically damaging activities that could occur after mixed-severity fire (Karr, J.R., Rhodes, J.J., Minshall, G.W., Hauer, F.R., Beschta, R.L., Frissell,C.A., and Perry, D.A, 2004. Postfire salvage logging's effects on aquatic ecosystems in the American West. BioScience, 54: 1029-1033. Hutto, R. L. 2006. Toward meaningful snag-management guidelines for postfire salvage logging in North American conifer forests. Cons Biology 20:984–993). We urge you to please fundamentally reconsider your proposal in light of the current science.

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5451 5378

Response: Forest Service direction and intent in the Forest Plan, recent science summarized by General Technical Report 220, ""An Ecosystem Management Strategy for Sierran Mixed-Conifer Forest"" (North et al. 2009), 2004 Framework, the Rim Fire Vegetation Resiliency Strategy, and subject matter expert participation have provided an extensive foundation of information from which to draw during the Rim Fire Recovery planning process. The analysis in the EIS focuses on restoring ecosystem function, process and resiliency by addressing issues related to vegetative composition and structure, forest health, fuels, hardwood and wildlife habitat improvement, and socio-economic objectives. The 2004 Framework is not an ongoing, agency action. Therefore, NEPA's supplementation regulations (40 CFR 1502.9(c)) do not apply to the 2004 Framework EIS; nor does NEPA require the agency to prepare a "Sierra Nevada-wide Cumulative Effects EIS.""

Even though the Forest Service is not required to prepare a supplemental EIS for the 2004 Framework based on new scientific information, the agency is responsible for considering new information at the project level, when such information is relevant to the project being considered. In this way, new science is addressed at the time and scale that is most relevant and practical.

The Forest Service recognizes that the state of scientific knowledge has changed since the 2004 Framework was issued and that forest plans should strive to remain consistent with the current scientific understandings. However, it is not practical to supplement programmatic EISs and revise LRMPs every time new information arises; doing so would lead to an unending loop of programmatic planning. The National Forest Management Act (NFMA) recognized the need for stability in forest planning, and envisioned that LRMP Revision would only occur every 10-15 years. The 2004 Framework is approximately 10 years old, and the region has begun to revise the LRMPs for the Sierra Nevada National Forests, with the first three plan revisions expected to be completed in 2015. It would be impractical for the agency to prepare a new EIS for the 2004 Framework while the agency is devoting its resources to revising the plans covered by the 2004 Framework through the current LRMP revision process. Until the LRMP revisions are completed for the Sierra Nevada National Forests, new scientific information and changed circumstances can be addressed in the site-specific project context, when the new information or changed circumstances are relevant to the project being considered.

187. **Comment**: Claims of harm from "doing nothing" are not supported by science.

5449

Response: The EIS addresses effects of the "no action alternative" (Alternative 2) on a wide variety of resources and includes appropriate references to the scientific literature.

Recreation and Visual Resources

188. **Comment**: a) The DEIS states that it will rely on the use of "existing skid trails" for transportation of vegetative matter or wood products. Fortunately or unfortunately, the vast majority of designated OHV routes on the Forest occur on old skid or logging roads. Should any of the aforementioned OHV system routes be converted to skid trails the mitigation measures for impacts to those facilities should be analyzed and incorporated into the project. Often the cost for reconstruction is approximately $20,000 dollar per mile. The EIS should address this issue and return all OHV trails

back to required maintenance levels. The non-motorized trails also need to be replaced under this project. However, we could not find where the DEIS identifies mitigation concepts or measures for system roads managed as trails (greater than 50 inches in width) or for system trails (50 inches or less in width) impacted by the project, that is why both non-motorized and motorized trails need to be addressed in the EIS. b) We would also request that during the Rim Fire forest rehabilitation process that all OHV roads and trails are returned to their original condition before the Rim fire.

5394 5405 5423 5425 5448

Response: Many of the trails were repaired and returned to pre-fire conditions treated as part of the initial BAER actions (see Recreation, Existing Conditions, Dispersed Recreation of EIS Chapter 3.08). Under the action alternatives, roads and trails will be returned to their pre-fire conditions similar to conditions prior to the fire and reopened for use. Some risks will remain along trails and level 1 roads where hazard trees may remain. The Project does include alternatives that propose to use some motorized trails for access and product removal (as haul routes). These routes would receive the same mitigations and best management practices as other roads used for haul. In addition, the motorized trails would have drainage restored to a condition similar to pre-Project conditions, and would continue to remain designated as previously designed and displayed on the motor vehicle use map. Trails not providing access to proposed treatments are generally outside the scope of the Rim Fire Recovery EIS. For more information on motorized trails used in this Project, see the Transportation Specialist Report.

189. Comment: I urge the Forest Service to work with the City of Berkeley, Tuolumne River Trust, and the Friends of Berkeley Tuolumne Camp to plan safe, recreation-appropriate and science-based salvage logging operations along the South Fork Tuolumne and other developed recreation sites.

4444

Response: The Forest Service has sought information, comments and assistance from federal, state and local agencies and individuals or organizations that are interested in or affected by the proposed action. This includes all of the organizations mentioned. We are grateful for their participation and will be working closely with them when implementing dead tree removal within the developed recreation sites they manage and use. See Chapter 1.07 Public Involvement in the EIS.

190. Comment: The City wishes to acknowledge the concern that many of its citizens and other users of Berkeley Tuolumne Camp have regarding the impact of logging and tree loss on the Camp property.

5176

Response: The Forest Service shares your concerns and will be working closely with the camp during the removal of the dead trees to ensure long-term camper safety and protection of resources.

191. Comment: If additional trails can be identified and implemented, such as the burned up rail bed rails, we hope those pathways might also be used to expand or replace lost trail opportunity within the forest.

5461

Response: The addition of new trails or the elimination of no longer needed trails is an ongoing responsibility of the Forest Recreation staff. Any new opportunities would be evaluated outside of this EIS.

192. Comment: Opening up camping in the Forest will relieve pressure placed on Yosemite campgrounds.

4500 5412

Response: This is discussed in the final EIS in under Chapter 3.08.

193. Comment: Chapter 3.08 Recreation: On page 170 of the DEIS there is a statement that reads "Berkeley-Tuolumne Camp was completely destroyed in the Rim Fire and may be rebuilt". This is not an accurate statement. As a matter of record, I request that the section be changed to read as follows: "A majority, but not all, of the Berkeley-Tuolumne Camp was destroyed in the Rim Fire. It is the intent of the City of Berkeley, in cooperation with the Stanislaus National Forest to rebuild the camp."

5176

Response: The wording in the EIS has been will be changed reworded to: read: "A majority of the Berkeley Tuolumne Camp was destroyed in the Rim Fire and is currently not available for use."

194. Comment: How can you think of proposing to allow logging after closing the area to the public with gates and boulders on the pretense of protecting it, and posting signs for yellow-legged frog protection, while keeping thousands of federal claim owners off the claims? Logging is much more destructive than mining.

3570

Response: Salvage logging in the Rim Fire Area meets the objectives identified in the purpose and need of this project, which include: worker and public safety, capturing economic value through salvage logging, reducing fuels for future fire resiliency, enhancing hydrologic function, enhancing wildlife habitat, and research.

195. Comment: a) While many Forest Service managed recreation sites may be closed during the Project implementation period, private lands such as Camp Tawonga will remain open. The EIS does recognize that "logging operations and hauling during peak travel time for visitors to the forest" can create a "potential for accidents related to industrial vehicles in use in the project area." (DEIS, p. 172.) But, this general statement about potential safety impacts on recreational does not satisfy the Forest Service's duty to take a hard look at Project effects. b) Specifically, the EIS does not evaluate the safety hazards posed by the huge increase in truck traffic along Forest Roads 1N07, 1S02, and 1S83-which are the only roads that provide access to Camp Tawonga from Highway 120. c) "During the summer months, the logging and other truck traffic associated with the Project will be sharing the roads with Camp Tawonga buses and SUVs, which are often full of children. As described above, during the summer months, Busloads of children arrive and depart Camp Tawonga on a weekly basis. In addition, six days a week during the summer months, Camp Tawonga staff transport children to Yosemite National Park for day hikes and backpacking trips." d) Forest Road 1N07 (Cherry Lake Road) averages only 18 to 20 feet at its narrowest point. Yet, a loaded logging truck is typically 8 feet wide, over 50 feet long, and up to 80,000 lbs. The buses used to transport children to and from Camp Tawonga are 8.5 feet wide and 45 feet long. Thus, it is physically impossible for both logging trucks and buses to concurrently occupy the same stretch of roadway on Forest Road 1S02 (Mather Road) since the combined width of trucks and buses will exceed the road width. e) On Forest Road 1N07 (Cherry Lake Road), there will be only mere inches separating buses and logging trucks. Moreover, due to the topography of the area surrounding Forest Roads 1N07 and 1S02 specifically, it would be very dangerous for a bus full of children, on a steep grade on a road bounded by cliffs and rock walls, to have to back-up to avoid an oncoming logging truck. Yet, if the Forest Service does not incorporate mitigation measures restricting truck traffic along these roads, under the existing Project Camp Tawonga buses will be presented with this substantial risk on a daily basis. f) ...the increase in truck traffic will cause significant increases in wear and tear on Forest Roads that are used by staff and visitors of Camp Tawonga. Forest Roads 1N07, 1S02, and 1S83 must remain in a condition that is suitable for safe travel by staff and visitors to Camp Tawonga. g) While the EIS vaguely references the incorporation of "appropriate safety procedures related to traffic management requirements" into "Timber Sale contracts," it provides no analysis of the nature of the public safety impacts or any description whatsoever of what those traffic management requirements will be. These errors must be remedied.

5414

Response: See EIS Chapter 3.13, Transportation Environmental Consequences for description of direct and indirect effects of both the action and no action alternatives. This section describes actions to be included for traffic management that might include temporary road closures under the action alternatives or permanent closures under the no action alternative. Also, treatment activities are governed by standard public health and safety guidelines, Forest Service direction, and other applicable laws and guidelines. Additionally, Forest Service inspectors would monitor all aspects of implementation to ensure public safety and compliance with Occupational Safety and Health Administration (OSHA) regulations

196. Comment: a) I propose that instead of logging you follow the highly successful model that the Forest Service established at Mt. St. Helens National Monument, where instead of logging the Forest Service built a world-class visitor center that has attracted over half a million visitors a year for 32 years and counting. The Rim Fire is the largest fire in Sierra Nevada history, the most famous wildfire in California history, and it's strategically situated at the entry point to one of the most famous national parks in the world—a "Rim Fire National Monument" would be an immense long-term asset for both the Forest Service and for a vibrant local economy. b) The Rim fire covered 257,171 acres. This included 151,258 acres of conifer forest, approximately one-third of which experienced high-severity fire. In our comments we demonstrate that such areas are biologically unique, ecological diverse, and therefore, should receive consideration for administrative protections such as a national monument designation by the President. c) Why not use this opportunity to establish an attraction that will generate millions of dollars of tourism to campgrounds and a visitor center. The center could focus on fire science, and show how fire can be beneficial, but that it should also be done in a carefully controlled way. It could pay homage to all the brave firefighters in the Forest Service's employ. The Stanislaus forest is just outside Yosemite. Why not take advantage of that immense traffic flow and funnel tourism into a monument that will generate money the green way for the long term, instead of from a few seasons of dangerous, giant carbon foot printed logging. d) I have read about a proposed Rim Fire National Monument and wonder if your current documents adequately address this possibility, and how short-term planning might keep that option open. e) I would like you to consider a proposal by a well-respected naturalist, David Lukas to erect a Rim Fire National Monument as a place to attract more visitors to our region to gaze upon the great grey owls and other wildlife…perhaps you can generate enough funds from this model to also create a fire education center for a world class visitor experience. f) "Rim Fire National Monument" on the other hand offers a viable long-term solution because it would become one of the premier destinations in the state of California, and it could turn the Stanislaus National Forest and Highway 120 into the most important route into Yosemite National Park. At the very least, you owe it to the residents of the state of California to analyze the benefits of creating a "Rim Fire National Monument" and to make a meaningful comparison against the logging plan. g) In fact, local groups have been rallying that instead of logging, the forest service should create a Rim Fire National Monument, (6) based on the highly successful model established at Mt. St. Helens National Monument.

5201	3000	4741	5445	5447	5313	4937
5300	3946	5375				

Response: The creation of a "Rim Fire National Monument" is not responsive to the purpose and need for this project, and is beyond the authority of the Forest Service. Separate from this project there is an educational component of the overall Rim Fire Recovery efforts addressing the opportunity to provide information about the Rim Fire, forest ecosystems and fire ecology, including but not limited to, a set of interpretive displays at the Rim of the World overlook, displays that are available to travel to schools, and Adopt-a-Forest activities. These efforts have the potential for reaching a wider audience and for longer extended periods of time.

197. Comment: a) Consider the human cost: the impact this plan will have on tourism will be the worst conceivable. This is a concern for people who make their livelihood along Highway 120.

3218	4318

Response: Although projects address removal of hazard trees along routes within the forest, it does not provide for the other objectives of this project (see Purpose and Need in Chapter 2 of

EIS). The science is still unclear on the tourism values of salvage areas versus areas left to recover on their own. It is clear that additional recreation opportunities along trails, dispersed use areas and access to other recreation sites along Level 2 roads will become available and safer sooner under the action alternatives. After the 1987 wildfires extensive logging was done adjacent to Highway 120 and within the Stanislaus National Forest and tourists continued to visit the Forest and surrounding communities.

198. Comment: I would like to see a large section of the burned forest along Hwy 120 left as is (no logging) and developed into a visitor attraction to teach people about forest fire. The emphasis would be to teach people about fire as a natural process and the consequences of us preventing fire over a long period. I would also like to see this attraction teach the latest thinking about what can be done to minimize fuels buildup in a forest.

3925

Response: A major portion of the fire area would remain untreated as it is now. On NFS lands 154,530 acres were burned. The proposed action identifies 44,641 of those acres for salvage and Alternative 43,518. This leaves the vast majority of the burned area within the Forest plus those areas on private and NPS lands untouched. Under all of the alternatives the opportunity for teaching the latest thinking about fire behavior and recovery will remain. See description of alternatives in Chapter 2 of EIS.

199. Comment: To what degree should the already high level of roads within the project area be expanded by new permanent roads or by temporary road construction and reconstruction of roads that are not currently open for motorized travel?

4467

Response: Existing roads would be used whenever possible to access the proposed treatment units under the action alternatives. Since log yarding over long distances (greater than> 1/4 mile) is both expensive and often can cause more disturbance than temporary roads, we have proposed some new roads to reduce log yarding distances in some areas were proposed. A variety of options are present across the alternatives: Alternative 1 includes proposed 5.4 miles of new construction and temporary roads; Alternative 3 includes 1.0 miles of new road construction at all; while Alternative 4 proposes no new road construction and drops the unit requiring this access. The amount of new construction and also does not include any new permanent roads. Any new temporary roads being built for the project would be closed and rehabilitated after logging to maintain proper drainage and eliminate vehicles from entering and using the route. In addition, there would be no increase in roads designated for public motor vehicle use. Also please refer to Chapter 2 of the EIS for a summary of permanent and temporary new road construction, reconstruction, and maintenance in the project area.

200. Comment: The EIS must evaluate and mitigate Project impacts on the use of Camp Tawonga as a recreational site, specifically how recreational users of the Camp property will be impacted by the increases in truck traffic. At the very minimum, the DEIS should impose the same restriction on harvest operations from Memorial Day to Labor day that was adopted for Evergreen Road, on Cherry Lake Road, Forest Road 1S02, and Forest Road 1S83 to allow safe public access of staff and visitors of Camp Tawonga.

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Response: It is our goal to conduct operations in the Camp Tawonga area in an expedient manner. The DEIS (page 172) states: Activities are planned on NFS land adjacent to privately owned Camp Tawonga (Table 3.08-3). The camp will experience temporary negative effects from noise, dust, and increased traffic associated with the cutting and removal of trees. It should take 30 days or less to log and haul the dead timber on tractor units within 1 mile of the camp. In addition, appropriate safety procedures related to traffic management requirements will be included in all Timber Sale contracts. This may be accomplished by placing warning or closure signs in locations that ensure maximum visibility for forest visitors.

ACCESS

201. Comment: Areas of the forest not currently being logged should be opened and should be closed only for safety reasons during logging operations.

5428 5439

Response: Worker and public safety is a primary objective that has been identified in the purpose and need of this project, and access will be determined with that in mind. The project area is currently closed to the public by temporary Forest Order, to provide for public safety and protect natural resources. During project implementation, temporary route closures to public traffic are expected, to provide for worker and public safety. Both of these result in temporary short-term reduction in public access; however, the proposed treatments are designed to provide for continued long-term access on system routes within the fire area for both public and administrative use.

TOURISM

202. Comment: a) I question whether your documents adequately calculate the economic benefits of continued and increased tourism to the area. Tourists, especially those unfamiliar with California fire ecology, will certainly be discouraged from stopping in mountain towns near areas that are planned for intense logging. People will always visit Yosemite, but they may decide to access the park through more scenic areas south of the fire zone. b) Logged areas…discourage long-term revenue generation from tourism and recreation.

5300 3 4411

Response: From a tourism economics perspective, the noise, traffic, and other activities of logging will create a short term disruption in environments that historically drew recreationists and tourism to the National Forest in Tuolumne and Mariposa Counties. On the other hand, the Rim Fire has already changed those environments in ways that discourage tourism for most people. If one accepts the science behind the proposed actions that are intended to restore a healthy forest ecosystem faster than would occur from this point without human intervention, then in the long run the tourism economy will benefit from returning to attractive recreation environments faster and traditional travel patterns to Yosemite may be restored sooner.

203. Comment: a) Why not, instead of the mess and further devastation of clear cutting, provide information to the public on natural environmental process by instituting a Visitor Center, which would not only further education of our natural world and ecology, but further provide economic growth through tourism. Think of what was done with the urging of the community for the Mt. St. Helens Visitor Center. This is not only a reasonable thing to do, and the right thing, but even more importantly, the best ecologically sound thing to do for the health of our planet. b) Why not use this opportunity to establish an attraction that will generate millions of dollars of tourism to campgrounds and a visitor center. The center could focus on fire science, and show how fire can be beneficial, but that it should also be done in a carefully controlled way. It could pay homage to all the brave firefighters in the Forest Service's employ. The Stanislaus forest is just outside Yosemite. Why not take advantage of that immense traffic flow and funnel tourism into a monument that will generate money the green way for the long term, instead of from a few seasons of dangerous, giant carbon foot printed logging.

4741 4937

Response: This is outside of the scope of the purpose and need for this project. There is nothing in the current proposed actions that would preclude the subsequent proposal, analysis, or development of a Visitor Center. Such an educational facility, when done is an attractive and engaging manner such as with the Mt. St. Helens Visitor Center, can lengthen the stay for visitors in the area, and induce some additional visitation. Visitor Centers as a rule do not make money, however, and would require subsidy from somewhere.

VISUAL RESOURCES

204. Comment: Some resemblance of the original landscape should be maintained to provide contrast to the devastation for aesthetic reasons. The visual characteristic of the forest is important.

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Response: The original landscape and visual characteristics of the forest was altered substantially by the fire. Under all action alternatives, the vast majority of the Rim Fire on National Forest lands is not proposed for salvage logging (over 70+ percent), thus most of the post fire visual characteristics would be unchanged.

Salvage

205. Comment: The Project also has a very long implementation period of 5 years. (EIS, p. 9.)

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Response: Trees killed in the fire will be viable for timber removal for a maximum of 2 years. The 5 year implementation time frame addresses the issue of additional die off from drought and insects which will likely occur. This is particularly important in addressing roadside hazard trees.

206. Comment: Maximum flexibility to adjust yarding systems to fit on the ground conditions must be included in the EIS and timber contracts. Given the total volume of deteriorating timber to be harvested and the high cost of both cable and helicopter yarding, it is likely that requiring the use of these systems will be cost prohibitive and may result in "no bid" situations if the added costs cannot be amortized over a large volume of otherwise profitable timber. These yarding systems could be made optional or specialized ground based equipment could be allowed if it could meet the end results required.

5070 5407

Response: The proposed harvesting systems were identified by unit based on the most economical option for removal on the specified piece of ground. If another system is available that would ensure resource impacts did not exceed those analyzed in the analysis, a change could be considered at the time of implementation.

207. Comment: All helicopter logging and logging on steep slopes should be dropped entirely. This logging will disturb the soil and contribute to erosion. There is no need to remove these trees, and they will continue to help stabilize the slope. Steep slopes are most vulnerable to soil disturbance, and although skyline and helicopter logging operations have the least on-the-ground impact, there is more value to eliminating these types of very expensive logging operations.

5298

Response: As stated, helicopter and skyline logging have low impact to soils, and the stumps would be left in place to help continue to stabilize these slopes. A much greater potential impact to soils could occur from a high intensity fire burning through the standing material once it has fallen, causing more severe damage to the soil resource. Helicopter logging is proposed on a very small portion of this project. In most cases, these steeper slopes are in key areas adjacent to PACs or other surviving green areas that are important to protect from future high intensity wildfires and maintain for long-term forest viability. Others are proposed within strategic fuel reduction areas.

208. Comment: Focus on specific units that are most strategic in providing both fuel reduction benefit and economic benefit while also meeting the competing objective of leaving widely distributed snag forest habitat for wildlife. Identifying specific priority units can ensure wood will be removed before sawlogs lose economic value.

5422

Response: The EIS has multiple objectives and all the proposed harvest units address one or more of those objectives.

209. Comment: CCC, prisoners, and volunteer groups such as Boy Scouts, youth groups, 'Friends of' the various family camps, etc. should be engaged for forest restoration where ever possible. Utilize local property owners who are willing to do rehabilitation on forest lands adjacent to their property.

5428

Response: The Forest is actively seeking out volunteers to help with various restoration projects within the Rim Fire. Currently the CCCs are re-building range fence along the Yosemite Park boundary and volunteers recently pulled noxious weeds adjacent to the Tuolumne River. The Forest Service will be utilizing a variety of opportunities to accomplish restoration within the burn.

210. Comment: a) In fact, logging all of the burned areas outside of Yosemite National Park would have another unintended consequence by creating a hard edge across the landscape. In other words, it will create an abrupt transition between landscape features that prevents plants and animals from moving upslope or downslope in response to climate change or to the seasons, and b) ...but you will also be logging every burned stand along the western border of Yosemite National Park, creating a "hard edge" in the landscape that prevents plants and animals from moving upslope or downslope in response to climate change or the seasons. This is exactly the moment in history when most land managers and policy makers are starting to think about long term solutions to climate change problems, yet the Forest Service seems blind to their responsibility to this landscape.

5375 5201 5445 5447

Response: The Forest Service is not proposing, under any alternative, to log every burned stand along the western border of Yosemite National Park. Maps for each alternative were presented in the DEIS which display where treatment units are proposed. Very few areas adjacent to Yosemite National Park are proposed for logging and those areas would retain some standing dead trees within them. Movement of plants and animal species should not be affected by logging, it is more likely that the unlogged areas would become impassable once the dead trees fall down impeding the movement of deer (fawns in particular) and other mammals due to the jackstrawed trees. Less than 5 units are proposed adjacent to Yosemite and those are spread out along the boundary leaving many miles of boundary untreated. Within Critical Winter Deer Range and adjacent to Yosemite National Park units were identified for salvage and/or biomass removal to achieve desired forage/cover ratios and to provide for deer passage and access.

211. Comment: In areas of significant conifer habitat where the burns have been intense enough to create early seral habitat, this project is essentially a clear cut.

5375

Response: Four to six of the largest dead trees per acre will be left within each treatment unit.

212. Comment: ...the title of the primary stated objective of the project (DEIS, p. 7)—"Capture Economic Value through Salvage Logging"—appears to take a non-ecological view that fire-killed trees are a waste or loss, and of no ecological or economic value, unless it is related to a "salvage" operation.

5313

Response: Although listed first, "Capture Economic Value through Salvage Logging" is not the primary objective of the project. There are five parts to the purpose and need of the project identified in Chapter 1 of the DEIS and they are not listed in their order of importance or ranking. In addition, Research was added as an objective and is identified in Chapter 2. In developing this project, Stanislaus National Forest Fire and Fuels managers together with Researchers from the Pacific Southwest Research Station (PSW) compiled a strategy for the Rim Fire area outlining conditions along with features on the landscape that could help reduce the size and severity of future fires. Simultaneously, Forest wildlife biologists and PSW subject matter scientists evaluated the post-fire Protected Activity Center (PAC) conditions to determine viability of each one and options for those no longer providing the desired habitat. In addition, foresters verified the vegetation burn severity and identified economically feasible timber harvest of dead trees estimated to be a minimum of 5,000 board feet (BF) per acre of trees 16 inches diameter at breast height (dbh) and greater. These three efforts, along with Interdisciplinary (ID) Team review of the area and identification of the potential issues, led to the formation of the Proposed Action and associated Management Requirements.

213. **Comment**: The DEIS (p. 13) states that 85 percent of the proposed salvage logging would be ground-based under the Proposed Action (and similar proportions under the other action alternatives). Substantially lower conifer establishment and conifer seedling mortality in other heavily logged areas post-fire have been documented (Donato et al. 2006) and we expect this will be the case in the Rim fire area for the same reasons as documented by others.

5313

Response: Since only dead trees are being proposed for salvage, seed dispersal from the remaining living trees would not be affected. Gabrielle Bohlman (U.C. Davis) authored the 2012 annual progress report entitled "Inventory and Monitoring of Current Vegetation Conditions, Forest Stand Structure, and Regeneration of Conifers and Hardwoods within the Freds Fire Boundary". As her report describes, when there are adequate seed sources, P. ponderosa is capable of recovering on its own after severe fire (Haire and McGariga 2010). And while regeneration tends to be highest in low to moderate severity patches (Lentile et al. 2005), Bonnet et al. (2005) found that seedling establishment was very successful in patches of high severity that were within 39.4 ft. (12 m) of unburned forest canopy. Seedling abundance decreased exponentially towards the center of the high severity patches, but seedlings were still found up to 590.6 ft. (180 m) away from unburned forest edges (Bonnet et al. 2005). The ability of a forest to regenerate on its own after a stand replacing fire is highly dependent upon available seed sources. As patch sizes increase, the distance to the nearest seed source increases and seed availability drops off at an exponential rate (Bonnet et al. 2005). Since the majority of the Freds fire burned at high severity, many areas are more than 200 feet away from the nearest surviving trees. Both conifer and hardwoods showed a negative relationship between the regeneration per plot and the distance to seed source, but only the conifer relationship was significant (p less than0.02). This preliminary analysis of tree regeneration in the Freds Fire shows a high level of natural regeneration occurring throughout the fire despite the low numbers of living trees per acre (41 conifer TPA). This is also despite the fact that about 60 percent of the fire area on National Forest System lands was salvaged in 2005.

214. **Comment**: To be clear, the Trust believes there is an appropriate and needed role for salvage logging in the restoration process, but it is a much different approach than what has been done in the past, which maximized logging volumes at the expense of all other forest resources. We believe that the right course of action utilizes salvage logging as a tool to achieve a balanced outcome that contributes to ecosystem recovery by reducing dangerously high fuel loads, supports forest regeneration, retains an adequate buffer for wildlife habitat, helps restore wildlife migration corridors and fosters the recovery of fire- damaged developed and dispersed recreational areas.

5358

Response: The purpose and need for the Rim Fire Recovery project includes fuel reduction, wildlife habitat including migration corridors, and public safety as major components of ecosystem recovery.

215. **Comment**: Within the four alternatives, specifically Alternatives 2 and 4, we concluded that the Forest Service has the needed spectrum of options to achieve a balanced outcome that would establish a solid foundation for the various restoration activities. Based on this judgment, the Trust was a signatory to the letter from the YSS to the Forest Service opposing delays in implementing appropriate, science-based salvage logging.

5358

Response: Thank you for your support.

216. Comment: Generally, though, to achieve this balanced outcome, salvage logging must be excluded from environmentally sensitive areas, as well as those with high natural resource values. Snag dependent wildlife must be provided for through a combination of leaving ample snag-rich acres intact, and retaining sufficient snags in areas that are salvaged.

5358

Response: No salvage treatments are proposed within Wilderness or Inventoried Roadless Areas. No salvage treatments are proposed within the wild classification segments of the Wild and Scenic Rivers. In all alternatives, hardwood snags and 4 to -6 per acre of the largest size class snags are being retained along with the largest size classes of dead and downed logs greater than or equal to 12 inches in diameter at the midpoint at a rate of 10 to 20 tons per acre. (EIS Chapter 2).

217. Comment: I note that this alternative will only treat approximately 44,000 acres (28,000 acres in treatment units and 16,000 acres along low standard roads), which is only about a third of the approximately 157,000 acres of National Forest land burned and less than 20 percent of 257,000 acres of the total burned area. Salvage of the burned timber is necessary to recover the economic value of the dead and dying trees, reduce fuel loading to reduce the impact of future fires in the burned area, prepare the land for future reforestation, and restore and protect remaining wildlife and watershed values.

5407

Response: The purpose and need for the project includes recovering the value of some of the burned trees before they deteriorate substantially, thus reducing the future fuel load and potentially offsetting the cost of other restoration treatments. Areas are proposed for treatment to meet strategic fuels reduction needs, wildlife movement, and reduce safety hazards.

218. Comment: The value recovered should be used to help complete the work that is necessary to abate the hazard dead trees pose to the public and workers engaged in restoration activities, and reduce fuel loads to levels that will decrease the likelihood high intensity burns will occur in the future so future reforestation efforts will be successful.

5424

Response: The intent of salvage harvest is to recover value that could be used to pay for restoration treatments, particularly fuel reduction and watershed enhancement activities identified in the EIS.

219. Comment: a) Leave patches of untreated areas as buffers along commercial timber plantations. The DEIS proposes to heavily log almost all snags across vast USFS areas adjacent to private timberlands. Yet most of the private timberlands within the fire are already being heavily logged, creating a large expanse of disturbance with few remaining snags. Thus, to provide some natural diversity, the Forest Service should leave extensive blocks of untouched snag forest habitat in the areas around the denuded private lands in order to support wildlife and provide watershed and soil protection, instead of heavily logging the private land buffer. b) Provide habitat buffer adjacent to private lands. c) It is appropriate to place special emphasis on snag retention in areas near private timberlands, since there will be less likelihood of their retention therein.

5298 5469 4239 4299

Response: There are large expanses of burned National Forest System lands within the Rim Fire which would not be treated, including areas adjacent to private land. The retention of the required level across the project area was considered in the effects analysis on wildlife (EIS Chapter 3.15: Wildlife, throughout the Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The Responsible Official will consider this recommendation while making a decision.

Buffers adjacent to private lands exacerbate a hazardous situation for the private property owner and increase fuel accumulation on and adjacent to private property as snags begin to fall and accumulate on the forest floor.

220. Comment: a) The DEIS inappropriately limited the analysis by failing to analyze the impacts on early successional forest vegetation resulting from salvage logging—impacts that affect the entire forest food web and are significant at this scale. b) The DEIS did not evaluate the impacts of salvage logging and other destructive proposals on early successional plants, animals, and processes. This refers to more than snags. It refers to the entire stage of forest development that has been identified as "the rarest forest type" by Dr. Jerry Franklin of the University of Washington, now a member of the National Academy of Sciences. c) The early successional forest provides the snags, down logs, and legacy structures discussed in the DEIS--but also provides the primary food production that feeds multiple other species over decades until canopy is closed. Thus, any activity that reduces the primary food production of the ecosystem will have repercussions throughout the ecosystem.

5449

Response: Conifer forests are the predominant vegetation type where proposed activities would occur. Action alternatives would remove primarily dead vegetation and may damage live trees or plants during harvest operations, but the extent of damage would be localized and long term effects to vegetation would be negligible. The range, sensitive plants, soils, watershed and wildlife sections disclose any localized effects on specific vegetation.

221. Comment: Further, logging of burned forest now may "commit resources prejudicing selection of alternatives before making a final decision" (49 CFR § 1502.2 (f)) in any future decisions about planting, since salvage logging is known to interfere with natural regeneration (Donato et al 2006, Lindenmayer et al 2008, Peterson et al 2009); if clearcutting is used this would predispose the agency towards future tree planting.

5449

Response: Reforestation is not proposed in the EIS, nor is it a connected action. Since only dead trees are being proposed for salvage, seed dispersal from the remaining living trees would not be affected. Gabrielle Bohlman (U.C. Davis) authored the 2012 annual progress report entitled "Inventory and Monitoring of Current Vegetation Conditions, Forest Stand Structure, and Regeneration of Conifers and Hardwoods within the Freds Fire Boundary". As her report describes, when there are adequate seed sources, P. ponderosa is capable of recovering on its own after severe fire (Haire and McGariga 2010). And while regeneration tends to be highest in low to moderate severity patches (Lentile et al. 2005), Bonnet et al. (2005) found that seedling establishment was very successful in patches of high severity that were within 39.4 ft. (12 m) of unburned forest canopy. Seedling abundance decreased exponentially towards the center of the high severity patches, but seedlings were still found up to 590.6 ft. (180 m) away from unburned forest edges (Bonnet et al. 2005). The ability of a forest to regenerate on its own after a stand replacing fire is highly dependent upon available seed sources. As patch sizes increase, the distance to the nearest seed source increases and seed availability drops off at an exponential rate (Bonnet et al. 2005). Since the majority of the Freds fire burned at high severity, many areas are more than 200 ft. away from the nearest surviving trees. Both conifer and hardwoods showed a negative relationship between the regeneration per plot and the distance to seed source, but only the conifer relationship was significant (p less than 0.02). This preliminary analysis of tree regeneration in the Freds Fire shows a high level of natural regeneration occurring throughout the fire despite the low numbers of living trees per acre (41 conifer TPA). This is also despite the fact that about 60 percent of the fire area on National Forest System lands was salvaged in 2005.

222. Comment: The sentence that mentions the use of feller bunchers on slopes up to 45 percent should state the use of "low ground pressure tracked equipment (i.e. masticator/feller buncher/log loader)" can be used on slopes up to 45 percent.

5424

Response: Thank you for suggested input to the document.

223. Comment: However, the 16,315 acres of proposed "hazard" tree felling in the DEIS is an entirely different matter, since it involves roads not maintained for public use (USFS maintenance level 1 and 2 roads). These are generally old logging roads—many are dead-end and/or are largely not passable with motorized vehicles—and thus are not needed for public access. As such, we request that you remove this 16,315 acres of roadside logging proposed in the DEIS as it would unnecessarily cause severe ecological damage and loss, as discussed below, and is inconsistent with the best available science standard in the 2000 transition rule (36 CFR 219.35).

5313

Response: Only roads currently open to the public (Level 2 Roads) are proposed for hazard tree removal. Level 1 Roads (which by definition are not open to the public) used for project implementation will have hazard trees removed because they are within or adjacent to larger salvage units and being utilized for tree removal. No Level 1 Roads outside units are proposed for hazard tree removal. The EIS addresses effects of the alternatives, including hazard tree removal, in depth on soils, watershed, and aquatic species, with appropriate references to the scientific literature. Numerous scientific publications are cited and utilized in the assessment of effects, both positive and negative.

224. Comment: a) Retain survivor trees particularly in high severity areas as important habitat and seed sources for regeneration. b) Please consult the advice of an impartial arborist before cutting trees that survived the Rim Fire. c) …don't clear cut! Especially around the river…

4500 4588 4576

Response: No trees with any visible green needles are proposed for salvage harvest under any of the alternatives, those green trees may be removed adjacent to roads if they are deemed to be an imminent hazard with a high degree of probability to die or fail within the next 2 years.

225. Comment: a) Much of the east side of Cherry Lake has a mosaic burn that retained green crowned trees. Sampling in this area indicated that some of the green crowned trees have significant cambium damage and may not survive. Returning to harvest tree mortality or leaving significant amount of dead/dying trees does not meet the USFS stated goals and creates more potential water quality impacts over time. b) USFS Report #RO-11-011 provides salvage tree marking guides to allow trained tree markers to designate trees highly susceptible to mortality. The SFPUC suggests using trained tree marking crews that use established USFS marking guidelines and specific prescriptions developed (or reviewed) by a USFS Certified Silviculturist with Interdisciplinary (ID) Team input. Reference: US Forest Service, Region 5, Forest Health Protection May 2011 (Report # RO-11 -01); Marking Guidelines for Fire-Injured Trees in California, by Sheri L. Smith and Daniel R. Cluck. c) East Side of Cherry Lake. The USFS 2010 Forest Plan classifies all treatment units within the Wildlife Management Area. Observations indicate a mosaic burn and underburn throughout most of the area. Units 011A and 012 are the only units mapped with moderate/high burn intensities, although all the designated units (Units O08 through 12) exist in areas of concentrated mortality. Burn intensities increased as the fire moved from Cherry Lake towards Lake Eleanor. Green crowned trees may be dead and some browned crowned trees may be live depending on cambium condition and whether the terminal buds are live. Based on probable continued burned tree mortality, the entire area east of Cherry Lake to the NPS boundary could be one unit and be marked as described in Report # RO-11 -01. Another option is to maintain the individual units but designate the remaining area for salvage as trees die within the time period of this proposed project. d) The DEIS states that only trees without any green needles may be removed through salvage harvesting. After a significant wildfire coniferous trees may retain green needles for 2 - 4 years then still succumb to the impacts of the fire. Forest Service foresters should be allowed to conduct a risk analysis of the burned trees in the project area and select for removal all trees that are dead or are likely to die in the next few years. Otherwise, it will be difficult in the short to medium term to accomplish the stated goal of reducing future fire hazards from dead wood remaining on the sites. e) The standard of only designating dead trees based on "no green needles visible from the ground" should be changed to follow the scientifically developed Region 5 Marking Guidelines for Fire-Injured Trees in California May 2011 (Report #RO-11-01). The Fire-Injured Tree guidelines should also be used for the associated roadside hazard trees within this EIS.

5429 5431 5424

Response: It is anticipated salvage harvest operations continue for up to 5 years to capture additional mortality where it is feasible to do so, primarily along roads (EIS Chapter 2). Actual timing may vary based on deterioration of material, weather and resource availability (personnel and budget). The conservative approach to remove dead trees with no green needles (as visible from the ground) is designed to maximize the preservation of live trees in the burned landscape by substantially reducing the risk of cutting a tree that would not have succumbed to its injuries. Trees which fade and die within other salvage sale units may be removed as part of contracts open if management requirements are met.

226. Comment: The reason this forest type is so rare is because of the types of activities the Forest Service is now planning for the Rim Fire: salvage logging operations and subsequent planting and spraying activities that have been the standard practice on public and private lands, and have been for more than half a century. The Forest Service has been made aware of this through the comment submissions of myself and many other contributors.

5449

Response: The Rim Fire Recovery Project does not propose any planting or spraying.

227. Comment: ...the DEIS's claim (pp. 8, 46) that the proposed salvage logging is needed to facilitate the return of a new conifer forest is undermined by the failure of the DEIS to acknowledge the substantial natural conifer regeneration already occurring, as discussed above, the loss of such regeneration that will occur due to planned tractor logging, and associated felling, skidding, and how large-scale post-fire logging conflicts with the best available science standard, and the planning rule's emphasis on ecological integrity and resilience.

5313

Response: Action alternatives would remove primarily dead vegetation and may damage live trees or plants during harvest operations, but the extent of damage would be localized and long term effects to vegetation would be negligible. The range, sensitive plants, soils, watershed and wildlife sections disclose any localized effects on specific vegetation. While studies following wildfire indicate that regeneration tends to be highest in low to moderate severity patches (Lentile et al. 2005), Bonnet et al. (2005) found that seedling establishment was very successful in patches of high severity that were within 39.4 ft. (12 m) of unburned forest canopy. The ability of a forest to regenerate on its own after a stand replacing fire is highly dependent upon available seed sources. As patch sizes increase, the distance to the nearest seed source increases and seed availability drops off at an exponential rate (Bonnet et al. 2005). The preliminary analysis of tree regeneration in the Freds Fire on the Eldorado National Forest (Bohlman 2012) shows a high level of natural regeneration occurring throughout the fire despite the low numbers of living trees per acre (41 conifer TPA). This is also despite the fact that about 60 percent of the fire area on National Forest System lands was salvaged in 2005.

228. Comment: a) CTBC fully supports the speedy salvage of as much of the burned timber as possible in order to recover as much of the timber value as possible. b) RBF fully supports the speedy salvage of as much of the burned timber as possible in order to recover as much of the timber value as possible.

4855 5109

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action.

While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

229. Comment: a) Focusing on the units that are most strategic rather than attempting to approve every single one of the 356 units in alternative 4, for example, will not only ensure that sawlogs actually get removed before the wood loses value, but the forest can select specific treatment units that are most strategically appropriate given competing goals within the burned landscape. b) "...preferable for the Forest Service to identify the specific units that provide the most bang for the buck in terms of fuel reduction benefit while simultaneously being economically best for the timber industry, and while also meeting the competing objective of leaving widely distributed snag forest habitat for wildlife. Identifying specific priority units also can ensure that wood will be removed in the very narrow window of implementation time before sawlogs lose economic value.

4467 5358

Response: While recovering economic value is part of the purpose and need for the project, economic considerations are but one factor. Areas are proposed for treatment to meet strategic fuels reduction needs, wildlife movement, and reduce safety hazards.

230. Comment: a) …plans to thin the Bear Mountain area of the Groveland Ranger District prior to the Rim Fire were abandoned because many of the stands [sic] did not have enough large trees available for harvest after meeting cover requirements to pay for removal of the inordinate number of small trees with no lumber value. Retaining four to six of the largest trees in such areas easily result in leaving 25 to 50 percent of the salvageable volume in those stands. b) Please do not put commerce over nature. The Rim Fire was bad enough and logging is going to multiply that devastation.

4460 4513

Response: While recovering economic value is part of the purpose and need for the project, economic considerations are but one factor. Areas are proposed for treatment to meet strategic fuels reduction needs, wildlife movement, and reduce safety hazards.

231. Comment: It is a false economy that would take the trees for salvage, e.g. for profit for the logging company, and leave the future forest barren, eroded, stripped and compacted.

4524

Response: While recovering economic value is part of the purpose and need for the project, economic considerations are but one factor. Areas are proposed for treatment to meet strategic fuels reduction needs, wildlife movement, and reduce safety hazards. All mechanical harvest operations will adhere to Standards and Guidelines set forth in the timber sale administration handbook (FSH 2409.15) and the Best Management Practices as delineated in the Region 5 Amendment to the Forest Service Water Quality Management Handbook (USDA 2011d) and the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA 2012a). Timber sale contracts contain many standard provisions that help ensure protection of soil and water resources. These include provisions for an erosion control plan, road maintenance, skid trail spacing, and restrictions for wet weather operation. Little change is expected in surface and soil organic matter between the four alternatives. The overall soil porosity for Alternatives 1, 3, and 4 is expected to improve due to implementing the management requirement to subsoil primary skid trails and temporary road prisms situated on existing disturbance (EIS Chapter 3.11).

232. Comment: a) We would like to emphasize that time is of the essence in the salvage of merchantable timber (as recognized in the scoping document). Much of the severely burned timber is small diameter second growth which has a high proportion of sapwood. This timber is already starting to deteriorate and defect will rapidly increase after the first year following the fire. Delay in harvest will adversely affect many of the project objectives, making some impossible to achieve. b) I support dead tree removal to help the land impacted by the Rim Fire through forest re-growth. It is important that there be no litigation to further delay this activity. Removing trees while there is still value brings revenue back to local communities and helps offset restoration costs. If it is not done while there is value, it will likely never be done, only creating more fuel load for the next fire.

5070 4893 5407

Response: The purpose and need for the project includes recovering the value of some of the burned trees before they deteriorate substantially, thus reducing the future fuel load and potentially offsetting the cost of other restoration treatments. It is agreed that the burned timber is subject to rapid deterioration and that time is of the essence. The commercial value of the trees is highest now, and, although diminished by 20 percent or so, will still be valuable during the coming 2014 harvest season. During the following year's harvest season sufficient value should still remain to salvage dead trees in the burn area, but after about two years it will not be economically feasible for private industry to conduct the operations commercially because the dead timber will have deteriorated so badly (Bowyer et al. 2007) (EIS Chapter 3.10).

233. Comment: Salvage logging operations should avoid sensitive wildlife habitat, roadless areas and areas adjacent to Yosemite National Park.

4400 5298 5379 4422 5186

Response: The action alternatives vary by type and amount of wildlife habitat enhancement treatments for critical deer range and increased snag retention. Within Critical Winter Deer Range and adjacent to Yosemite National Park units were identified for salvage and/or biomass removal to achieve desired forage/cover ratios and to provide for deer passage and access. No logging is proposed within Roadless Areas and very little adjacent to these locations.

234. Comment: Forests recovering from fires provide much needed habitat for wildlife and regeneration of undergrowth. This is part of the natural process of healing. Logging (clear cutting) is detrimental to the environment by virtue of the exhaust fumes and strain on roads, not to mention dangers of logging trucks on small roads and the impact on existing traffic.

4741

Response: The EIS addresses effects of the alternatives in depth on a wide variety of wildlife species, soils, watershed, aquatic species, sensitive plants, wilderness, and wild and scenic rivers among other resources (EIS Chapter 3) including traffic and recreation

235. Comment: a) It is critical to capture the value of the deteriorating timber now so there will be no irreparable loss of merchantable volume that could be converted into wood products. Delay in removing the dead timber will only delay the restoration and reforestation effort which is necessary to prevent harm to watersheds and to accelerate the renewal of the forest that will benefit wildlife, water quality, recreation, and provide wood for the use of future generations. b) The two lumber mills able to use timber from the Rim Fire, Sierra Pacific Industries and Sierra Forest Products have their operations in communities that will benefit from the management on these lands which ultimately dictates not only the viability of their businesses, but also the economic health of the communities and the health of the forest itself. In particular, Sierra Pacific Industries owns over 15,000 acres damaged by the fire and has taken the initiative to quickly salvage its lands and to reforest. I want to see the Forest Service do likewise, so the national forest land does not become a tinderbox of unsalvaged, jackstrawed, dead trees scattered through brush fields or young plantations that can burn at high intensity again and spread to adjacent private and Forest Service managed land. c) Prompt salvage is needed to renew the forest in the Rim Fire area. It is also vital to mill infrastructure. The survival of these mills is essential for the Forest Service to accomplish fuel reduction and restoration in unburned forests so a major conflagration like the Rim Fire is not repeated. d) It is of utmost importance that forest logging and thinning projects start as quickly as humanly possible, to avoid the loss of any value the salvage logging can bring to the community, our economy, and to way of life for the residents of the area, and our forest health returned to its majestic beauty. e) Time is of the essence as the timber is going to begin to decay rapidly and we fear that once this begins to happen, there is not going to be a market for the timber. If this happens, the sales will go unsold, and this material will eventually fall to the ground and add to the future fuel load and make another fire more likely. f) I believe it is essential the Forest Service move at its fastest pace to remove dead and dying vegetation, before it loses all value and becomes a huge removal liability. AS it presently stands, the Rim Fire is a detriment to Tuolumne County and to its fisheries, wildlife and other forest-dependent resources. g) But we must begin by getting the salvageable wood off the Forest floor as soon as possible. h) Harvesting the timber is the first step for this recovery. We encourage road building and other common sense solutions that will make the harvest of the timber as economical as possible. The timber market is currently depressed, and the easier you make these sales for the purchaser to operate will allow the government to attain the highest value for the resource. i) We feel that in order for true Ecological Recovery to begin in the areas affected by the fire, that salvage logging should begin as quickly as possible, and without delay from possible litigation from outside groups that do not have the same vested interest as our members do. We understand that you have to abide by the EIS process, and we support this process but desire it to be expedited as much as possible.

5407 5461 5470 5471 5478

Response: Expediting the removal of the dead trees to maximize economic benefits (and to begin the recovery process as quickly as possible) has been a goal of this process since the beginning. To that end, the Forest has worked with the President's Council on Environmental Quality (CEQ) and the Chief of the Forest Service to attain Alternative Arrangements and an Emergency Situation Determination. These measures were granted and significantly shortened the time frames required within the NEPA process to allow for more quickly implementing this project and capturing the rapidly deteriorating timber.

236. **Comment**: a) The DEIS does not evaluate the potential loss of large structures from salvage operations. b) Retention of snags in the old forest emphasis as described on page 284 reduces the overall value of the timber sale by excluding the highest valued logs. Retaining the largest trees could remove approximately 7,000 board feet per acre of high value timber from the sale offering. c) 1) Separate from the snag retention levels proposed for the OFEA, HRCA, and FCCC areas, and for the PSW research areas, what is an appropriate, science-based snag retention level to maintain within the General Forest acres to be treated? d) Snags that now exist in many high severity burn areas are the only large structural components for both snag habitat and for future downed log habitat that will be available for many decades into the future. e) While we recognize that snags need to be left for these purposes, the numbers and size requirements appear to be excessive. This is particularly true for providing habitat for the black-backed woodpecker. There will be tens of thousands of acres of dead forest left untouched by any salvage activities to provide blacked-backed woodpecker habitat. The EIS needs to better highlight that there will be abundant snag habitat in the uncut areas and the final decision should consider scaling back the excessive snag retention in the harvest units. f) We note that there is little quantified data to show how much improvement results from leaving the largest snags as opposed to leaving medium sized snags. Since the timber to be salvaged will have deteriorated for more than a year prior to the start of operations under the most optimistic time lines, these large trees will have most of the economic value of salvage timber.

5438 5424 4467 5070

Response: The intent of snag retention in Old Forest Emphasis Areas, Home Range Core Areas and Forest Carnivore Connectivity Corridor units is to retain legacy structure where it exists for long-term resource recovery needs (i.e., the development of future old forest habitat with higher than average levels of large conifer snags and down woody material). In all cases, snag retention is designed to ensure consistency with Forest Plan and Regional Conservation strategies for terrestrial wildlife and is one of the 5 purposes of the project. Large snag retention is important at this time since future recruitment of these old forest features is not expected to occur until decades to centuries into the future. The EIS addresses effects of the alternatives in depth on wildlife with appropriate references to the scientific literature.

237. **Comment**: Many of the management requirements require leaving the largest dead trees available for wildlife and other purposes. Examples include leaving 6 snags per mile along both perennial and intermittent streams (item 4c, page 26), and leaving 4 to 6 snags per acre in the old forest emphasis area of alternative three, if it is selected. (Item 6a, page 29). While recognize that snags need to be left for these purposes, the numbers and size requirements appear to be excessive.

5407 5070

Response: The snag levels proposed are to ensure consistency with the Forest Plan standards and guidelines and Regional conservation strategies for terrestrial wildlife.

BIOMASS

238. Comment: The USFS should focus on retention of biomass on site to maximize retention of soil and water that will facilitate rapid reforestation. In addition, downed and standing biomass will maximize wildlife populations in the area that will also support reforestation (e.g. through seed dispersal).

4498

Response: Areas are proposed for biomass treatment to meet strategic fuels reduction needs and improve wildlife movement. Biomass may also be left on site and masticated or cut and lopped on the ground for soil cover. Non-merchantable material would be removed while leaving live shrubs and all green trees to provide forage and cover. Non-merchantable material next to or near surviving or sprouting oaks would be removed to provide growing space and greater sunlight penetration to oaks. In addition, the removal of this material would allow for the uninhibited re-establishment of herbaceous vegetation important to deer in the fall and spring on the winter range. Treatments are designed to achieve optimal forage to cover ratios.

239. Comment: The DEIS needs to use costs that are representative of projects similar to Rim Recovery as a basis for evaluating impacts as well as acreage of specifically prescribed fuel treatments.

4855

Response: Costs were based on historic rates for work within both fire salvage and green treatment areas on the Stanislaus and nearby Forests.

240. Comment: The DEIS does not substantiate its estimates for the actual cost of biomass removal. A fair evaluation of the biomass removal treatment option requires a well-supported estimate of the physical removal costs, and we cannot tell from the present draft DEIS how those costs have been estimated. Perhaps even more importantly, it requires consideration of the real environmental costs of other alternatives, such as the mass burn approach.

5397

Response: Costs were based on historic rates for work within both fire salvage and green treatment areas on the Stanislaus and nearby Forests. The environmental costs were weighed by the Interdisciplinary Team when choosing to prescribe biomass removal or tractor piling on each site.

241. Comment: The County is pleased to see significant biomass removal using a variety of methods; however, the County encourages more removal rather than pile burning. Transporting the biomass to an energy producing plant such as Pacific Ultra Power will prevent unnecessary air pollution caused by pile burning and will generate electricity.

5427

Response: It is agreed that there are ecosystem value benefits to be gained by burning biomass in power plants that can contain a majority of the particulates and greenhouse gases, rather than burning the material in open piles (EIS Chapter 3.10). Biomass removal varies depending on the need for retaining material onsite for various resource needs, cost, and contractor capacity.

242. Comment: Retention of biomass on site will help rejuvenate soils and reduce runoff and sedimentation.

5298

Response: Areas are proposed for biomass treatment to meet strategic fuels reduction needs and improve wildlife movement. Those units where it is proposed were looked at by Forest Service hydrologists and soil scientists and it was determined that leaving the biomass material on site was not necessary to reduce or prevent runoff or erosion from these areas Biomass may be left on site and masticated or cut and lopped on the ground for soil cover in specific units where additional material was necessary for soil protection.

243. Comment: a) If deer are to have any chance of surviving predation within much of the Rim Fire, it is essential to remove downed timber. Biomass is the best option for opening those areas and preventing heavy deer loss [from predation]. b) [The California Department of Fish and Wildlife] will be able to provide hard data to help in decision-making efforts when designing biomass salvage units. First priority should be given to migratory deer when designing those biomass units.

5469

Response: The EIS recognizes the benefit of removing biomass to enhance deer use and movement (EIS Chapters 3.10 and 3.15). Removing non-merchantable material within migration corridor pinch points would allow deer to continue to use traditional migration routes without obstruction. Deer would benefit by more easily traversing through the winter range and evading predators due to removal of non-merchantable material (EIS Chapter 3.15).

244. Comment: The discussion of "biomass removal" throughout the document is likely misleading. None of the biomass generates sufficient revenue to overcome the transportation cost to the nearest wood-fired powerplant of the shavings mill. P. 21 - ...There are no acres of biomass removal that can carry the cost of transportation to the closest biomass powerplant. "Biomass removal" should be defined as moving the material into a pile at a landing. Removal off the project area would be by agreement in the contract or biomass piles could also be sold separately to willing fuel buyers. I suggest changing the "biomass" definition in the Glossary and/or also adding a Glossary Term (Biomass Removal) that reflects what I've stated here.

3623

Response: Biomass is proposed for removal as firewood, shavings logs, pulpwood, removed for biomass fuel for electric cogeneration plants, or decked and left on site for public firewood cutting. The extent of biomass removal to processing facilities will depend on costs and markets. It is recognized in the DEIS, that the cost of biomass removal may be subsidized in part by sawtimber harvest. While recovering economic value is part of the purpose and need for the project, economic considerations are but one factor. Areas are proposed for biomass treatment to meet strategic fuels reduction needs and improve wildlife movement. Biomass may also be left on site and masticated or cut and lopped on the ground for soil cover, or machine piled.

245. Comment: Is enough biomass from various size snags and brush available for both present and future soil and plant development?

5481

Response: The EIS addresses the effects of the alternatives on soil cover and surface organic material. In general, harvest activities are expected to generate ground cover from both slash and breakage (EIS Chapter. 3.11). Because of the addition of soil cover, alternatives 3 and 4 show marked improvement in cover values, Erosion Hazard Rating and erosion rates. Soil organic material (SOM) will recover regardless of management activities in the long-term. SOM is expected to recover more rapidly in areas where SOM was displaced by fire, because nutrient cycling of ash and rapid vegetation regrowth of root dense, nitrogen-fixing shrubs will facilitate deposition of organic matter by decomposing roots and mineralization of decaying material in the soil. Under Alternative 2 (no action) the predicted fuel loading levels pose a risk to soil productivity if reburned in a subsequent wildfire (EIS Chapter. 3.11).

246. Comment: Retain biomass on site.

5298

Response: The term biomass does not refer to all ecological above and below-ground material, but instead to woody material in excess of defined quantities which represents fuel loading levels of concern. Biomass removal is important for fuel reduction. Key areas identified as treatments are critical for creating greater fire resiliency of future forests. Removing burned trees and fuels where tree mortality exceeds the needs for snag and log recruitment is the first step to meet desired fuels conditions. The goal is to leave no more than 20 tons per acre and 10 tons per acre in Strategically Placed Landscape Area Treatments (SPLATS) while working with other resources to ensure soil and hydrologic stability. Higher levels would make this area more prone to future high-intensity fires, burning through the recovering forest before it could mature. In order to reintroduce fire into these areas as soon as possible, the current fuel load needs to be reduced to a level where fire would burn in patchy mostly low, and some moderate, vegetative burn severities.

247. Comment: It is likely that the value of the products when it concerns biomass won't pay for the products to be delivered to a facility. Biomass removal should be subject to agreement when part of a timber contract or offered as a separate contract following operations.

5424

Response: The EIS recognizes that biomass removal is not economically viable in all cases. In some of the treatment units, service contracts may be employed to remove biomass, masticate on site, drop and lop, or pile and burn to meet the desired conditions.

HABITAT

248. Comment: Retaining snags at a rate of 12 sq. ft. basal area per acre across the 28,140 acres proposed for treatment would provide less than half of the level of snags that are documented to occur in occupied fisher habitat... It would provide far less than the level documented to occur in occupied marten habitat.

4467

Response: Alternatives 3 and 4 are designed to address the issue of retaining additional snag habitat and increase snag retention to 30 square feet of basal area, with a minimum of four and a maximum of six per acre.

249. Comment: a) By focusing salvage logging areas most strategically important for fuel load reduction, you can exercise flexibility and restraint by leaving more acres intact for their habitat value and minimizing salvage logging elsewhere. b) It is incumbent upon the Stanislaus National Forest to salvage timber and biomass over portions of the Rim Fire, while providing thoughtful husbandry to the recovering forest. Driving management goals should be a desire to achieve forest ecosystem resilience and maximum biodiversity. c) Tuolumne County Farm Bureau supports the alternative that will harvest the timber and treat the most acreage. We encourage the government to treat more acreage than is proposed. The alternatives only treat approximately 30 percent of the area affected by the fire. It is ridiculous that we have to fight so hard to accomplish so little.

5358 5469 5470

Response: In development of this project, Stanislaus National Forest Fire and Fuels managers together with Researchers from the PSW compiled a strategy for the Rim Fire area outlining conditions along with features on the landscape that could help reduce the size and severity of future fires. Simultaneously, Forest wildlife biologists and PSW subject matter scientists evaluated the post-fire Protected Activity Center (PAC) conditions to determine viability of each one and options for those no longer providing the desired habitat. In addition, foresters verified the vegetation burn severity and identified economically feasible timber harvest of dead trees estimated to be a minimum of 5,000 board feet (BF) per acre of trees 16 inches diameter at breast height (dbh) and greater. These three efforts, along with Interdisciplinary Team review of the area and identification of the potential issues, led to the formation of the Action Alternatives and associated Management Requirements.

250. **Comment:** AW supports removal of hazardous trees but has concerns about any large-scale salvage of wood that is needed for habitat and ecological recovery.

5379

Response: The responsible official will consider this when making her decision.

251. **Comment**: Beetle-infested stands provide the ideal (and possibly only productive) habitat for some woodpecker species.

5449

Response: The EIS recognizes that burned forests provide high quality habitat for some woodpecker species. Several thousand acres on the Forest as well as within Yosemite National Park are being left untreated and will provide this habitat across the landscape. In additional, 4 to 6 snags per acre are being retained on treatment units to also provide this dead tree habitat. Effects of the alternatives on this habitat are thoroughly discussed in the EIS Chapter 3.15

252. **Comment**: a) These large burned trees should be retained across the burn landscape to contribute important structure and diversity to the existing habitat. b) The DEIS essentially applies snag retention guidelines for green forests to the action alternatives. This practice has been identified by scientists studying burned forests as entirely inadequate to meet habitat requirements in post-fire landscapes (Beschta et al. 2004, Hutto 2006, Lindenmayer et al. 2008). In all cases, these scientists recommend that when necessary to meet other non-ecological objectives, legacy snags and down wood in addition to snags across all size classes should be retained. For instance, Beschta et al. (2004) recommend retaining 50 percent of the snags in an area to be salvaged. c) Based on our review of the project objectives and impacts to resources, we suggest that additional units be dropped from the Rim salvage project in order to improve conservation of sensitive resources. We suggest that 126 units totaling 10,422 acres be dropped to improve habitat conditions for sensitive raptors and BBWO, reduce watershed disturbance and impacts, increase retention of legacy structures, support the development of complex early seral stages, and eliminate costly treatments. d) The Forest Service proposes to heavily log almost all snags across vast areas adjacent to private timberlands. Yet most of the private timberlands within the fire are already being heavily logged, creating a large expanse of disturbance with few remaining snags. To provide some natural diversity, the Forest Service should leave extensive blocks of untouched snag forest habitat in the areas around the denuded private lands in order to support wildlife and provide watershed and soil protection, instead of heavily logging the private buffer. e) The Forest Service should adopt a modified version of Alternative 4 with elements of the no action Alternative 2. This approach can best meet the overall needs of the public by achieving an outcome that balances the benefits of salvage logging with the imperative to do so in an ecologically-sound and scientifically-supported manner. We reference the specific proposal being presented by CSERC, which provides greater details and justification. f) Focusing on the units that are most strategic rather than attempting to approve every single one of the 356 units in alternative 4, for example, will not only ensure that sawlogs actually get removed before the wood loses value, but the forest can select specific treatment units that are most strategically appropriate given competing goals within the burned landscape. g) There are areas that make sense to log more heavily. Where it isn't steep, easily accessible, near established roads, near populated areas or where the public camps and hunts, thus cutting down fire risk. h) Leave patches of untreated areas as buffers along commercial timber plantations. i) Provide habitat buffer adjacent to private lands. j) It is appropriate to place special emphasis on snag retention in areas near private timberlands, since there will be less likelihood of their retention therein.

5438 5360 4299 5298 5469

Response: The responsible official is working to balance operability and worker safety with wildlife habitat needs and future forest conditions. These comments are appreciated and will be considered.

253. **Comment**: Intensely burned forest, if left intact, can be of benefit to owls (e.g., Bond et al. 2009) – what is unsuitable as habitat is post-fire areas that have been salvage logged. The best available

science indicates that burned forest is suitable owl habitat and that salvage logging adversely affects spotted owl occupancy and reproduction: [commenter then presented summaries of findings from several articles, including Lee et al. 2012, DellaSala et al. 2010, Keane et al. 2012, Clark et al. 2013, Bond et al. 2009, Roberts 2008, Bond et al. 2002, Bond et al. 2013, USDA 2004 {Sierra Nevada Framework}, p. 37, 52, 54-55, Bond et al. 2011, p. 23, USDA 2005b, pp. 201-202, USDA 2013, pp. 46-49, USDA 2014c, p. 90, pp. 90-92, and USDA 2014d, pp. 170-171]...in light of the current science, salvage logging owl habitat/pre-fire PACs and HRCAs clearly has an adverse impact and cumulative effect on California spotted owl viability and pushes the owls toward listing under the ESA.

5335

Response: The EIS addresses recent research which indicates that California spotted owls show the strongest associations with mature forest conditions for nesting and roosting but will forage in a broader range of vegetation types (Keane 2013). California spotted owls will occupy landscapes that experience low-to moderate-severity wildfire, as well as areas with mixed-severity wildfire that includes some proportion of high-severity fire (Bond et al. 2009, Bond et al. 2010, Roberts et al. 2011, Lee et al. 2012, Bond et al. 2013, Lee et al. 2013). Clark (2007) found that while spotted owls did roost and forage within high severity burn areas, the use was very low suggesting that this cover type was poor habitat for California spotted owls. Thus, uncertainties remain regarding long-term occupancy and demographic performance of spotted owls at burned sites (Keane, personal communication, EIS Chapter 3.15). Effects to spotted owls are addressed in the EIS Chapter 3.15. The EIS recognizes the potential benefits of burned forests to spotted owls; for example: "snags and down woody material function as habitat elements important for owl prey. Snags also serve as potential hunting perch sites that may be utilized by foraging owls. ... Work by Bond et al. (2009, 2013) indicates that owls preferentially select high-severity fire areas for foraging and that foraging owls with burned forest within the home range appear to utilize a variety of prey, particularly gophers (Thomomys spp.) and flying squirrels (Glaucomys sabrinus). Bond et al. (2013) also found that wood rats (Neotoma spp.), sciurid squirrels (Family Sciuridae), and deer mice (Peromyscus spp.) were represented as important prey items for owls within a post-fire habitat mosaic" (EIS Chapter 3.15). The EIS discusses the role snags play in the structure of the future forest. Alternatives 3 and 4 were developed to address issues related to wildlife habitat, including habitat for spotted owls, and include research designed to address uncertainty related to salvage logging intensities and spotted owl occupancy and use of post-fire environments. Based on the analysis of effects and the current scientific evidence, the biologists determined that none of the action alternatives would affect viability of spotted owls nor lead to a trend toward Federal listing under the Endangered Species Act (EIS Chapter 3.15).

PRESCRIPTIONS

254. Comment: Please handle with extreme care the decision of which trees to cut down. Camp Tuolumne has been our home away from home for many summers. We want to return and find as many trees as possible.

5360

Response: The Forest Service will work closely with Camp Tuolumne in determining which trees to remove and how to protect the camp and campers in the future. Camper and worker safety is one of the main objectives of this project.

255. Comment: a) To keep faith with this irreplaceable recreational heritage, the Trust recommends that the Forest Service develop a “Special Treatment Prescription” for these four camp areas. Each prescription should be tailored to the particulars of each camp with the goal of restoring these areas for their long-established highest and best use for family and children’s recreation. b) We urge the Forest Service to directly engage the leadership of each of these camps so that their knowledge and priorities are fully considered and addressed in the Special Treatment Prescription for their camp areas.

5358

Response: The Forest Service will work closely with Camp Tuolumne in determining which trees to remove and how to protect the camp and campers in the future. Camper and worker safety is one of the main objectives of this project.

256. Comment: a) Tuolumne River Sub-watershed near Camp Mather. The USFS 2010 Forest Plan classifies all treatment units within the Scenic Corridor Management Area. SFPUC would appreciate quick action near Camp Mather (Units Q14a, 14b, and U02). SFPUC would appreciate harvesting in the burned areas to the west and north of Camp Mather that are currently not included in Map 1. b) 6. Forest road 1N07, Cherry Lake road south of the Tuolumne River. The Cherry Lake road is the primary access road used by HHWP personnel. In addition HHWP invests in annual improvements to drainage and pavement. a. Associated units W03, W05, V04 b. The junction of 1N07 and 1S02 (Mather road) is a significant location on the HHWP project. The top of Intake Hill is a convergence of facilities; both power transmission and distribution lines as well as access roads all share this small area. Directly below this point at the bottom of the canyon is the Intake Switchyard. Several watercourses pass through both roads and drain into the switchyard at which point they are diverted into the Tuolumne River. c. All slash should be removed or stabilized above the high water mark along the watercourses between 1N07 and 1S02. d. Landing location should be coordinated with HHWP ROW Maintenance Manager prior to start of operations.

5429

Response: These considerations will be incorporated into implementation operations. Removal of logging slash from water courses is a standard practice and provision in Forest Service timber sale contracts.

257. Comment: a) At Berkeley Tuolumne Camp in particular, salvage logging can improve fire safety but must also balance the need for the unique recreation experiences and traditions at this special use permit area. I hope you'll develop a "Special Treatment Prescription" that considers the recreational needs in this high-use area. While there are many hazard and damaged trees that must come down, we hope the Forest Service will leave as many trees standing as possible in this area. b) I hope the Special Treatment Prescriptions will allow maximum flexibility for specific sites, no matter which alternative is approved. Even if an alternative, such as 1, is approved, it would be nice if there was still latitude to treat a specific site like The Berkeley Camp to strategies that fit it, even if those strategies were different than the plan as a whole. Since the discussions about the camp site are going to be slow in unfolding, leaving as many trees as possible will leave options open while plans are considered. c) Please do not clear cut trees in Camp Tuolumne unless absolutely necessary. d) It is my sincere hope that clear cutting will not be the practice in dealing with damaged trees, particularly at the Berkeley Camp as well as other areas that have possible salvageable trees. I realize clear cutting may be most expedient & necessary in some areas but allowing some trees to naturally recover would encourage other life forms to return sooner. Please allow the camp at least to retain something of its former self.

4444 4625 5370 4621 4630

Response: Refer to responses above concerning Camp Tuolumne. No live trees are proposed for harvest under any of the alternatives unless they are deemed to be imminent hazards with a high degree of probability to die or fail within the next 2 years. The Forest Service will work closely with Camp Tuolumne in determining which trees to remove and how to protect the camp and campers in the future. Protection of forest users is the main priority within these heavily used areas and will require special considerations and implementation

258. Comment: a) Since reconstruction at Berkeley Camp is years off and access to the site can be restricted, as it is today, I would request that you consider Canopy recovery and the shade it provides is essential to the operation. Please leave as many trees standing as possible. Give those trees with the slightest chance of surviving the time to do so. Restricted access makes moot the argument that people will be exposed to hazard trees. Fast recovering Dogwood and other species considered shrubs must be preserved along with the trees, as they will provide the initial shade essential for the resumption of recreational activities. b) Retain survivor trees particularly in high severity areas as important habitat and seed sources for regeneration. c) The majority of trees that have burn damage but still have any green on them should be retained. Given the extent of tree death from the fire, trees that appear partially burned should not be taken down. The current standard of taking trees down if they are just partially damaged is way too aggressive. Trees that had needles but no green on them at all are coming back to life. Many of these trees, with less resource competition due to nearby trees being removed, may have enough nutrients to survive. Efficiency of logging shouldn't drive the decision to remove trees that might survive. The NFS should involve their personnel or other non-loggers in this decision-making rather than leaving it entirely to the loggers, who have incentive to take too many trees.

5370 5412 5439

Response: No trees with visible green needles are proposed for harvest under any of the alternatives except adjacent to roads where they are deemed to be imminent hazards with a high degree of probability to die or fail within the next 2 years. This is an extremely conservative approach.

259. **Comment**: a) Trees can be selectively cut down near public areas and hiking trails to eliminate public safety concerns, but I do not agree that they need to be removed. Just look at the recovery from the massive Yellowstone fire in the 90's for an example to follow. In this case, the forest was allowed to regenerate largely on its own and within a few short years the burned-out areas were showing incredible signs of rejuvenation and new growth. b) Salvage logging should be minimized and only allowed adjacent to existing roads. There should be strict limits on the extent of salvage logging permitted, with biomass retained on site whenever possible to support regrowth of the forest. c) If any salvage logging is to be done, it needs to be limited to areas near communities and infrastructure that involve threats to public safety. d) Focus the most intensive fuel reduction and snag removal treatments around the heavily visited private family camps, residential areas, and other vulnerable at-risk communities. Those are the areas where the most aggressive treatments make the most sense. e) Please do not cut more trees than needed for safety. f) Concentrate treatments around camps, recreation sites and communities.

4952 4431 5324 5298 4588 5298

Response: The forest type in Yellowstone National Park (lodgepole pine) is completely different ecologically than the pine and mixed conifer forests that burned in the Rim Fire. That landscape is rejuvenated by fire and actually requires fire for regeneration. An alternative that would only cut and remove dead trees for safety was considered but eliminated from detailed study for the following reasons: a) it does not meet the purpose and need to capture the economic value since most of this habitat includes the largest and most dense stands of dead trees within the burn. b) If only roadside hazard trees are removed, only minimal fuels reduction would occur across this large landscape, making future fires difficult to manage and contain, jeopardizing future forest resiliency. c) At a minimal level, it meets the purpose and need of improving the hydrologic function of the road system where timber is removed.

260. **Comment**: Please don't clear-cut the trees. Only cut what must come down.

4978

Response: The proposed salvage is designed to meet the purpose and need for the Rim Fire Recovery project. The purpose and need includes fuel reduction, wildlife habitat including migration corridors, and public safety as major components of ecosystem recovery.

261. **Comment**: Merchantability standards included in salvage timber contracts used to implement this project must be flexible enough to allow for the deterioration of included timber over the life of the contract. Provisions must be made for how originally included timber in a contract that becomes

merchantable due to deterioration will be treated. This is particularly important for helicopter sales where logging expense is high and margins are razor thin.

4952 5407

Response: Merchantability standards for contracts are an implementation issue and outside the scope of this analysis; however timber sale contracts contain minimum merchantability standards for trees that are designated for cutting.

262. Comment: a) I urge you to reconsider the logging plan proposed in this draft. The effects of logging the forest as proposed would be devastating to the natural landscape and it would never recover into a forest. If the land was allowed to regenerate with support from land managers (removal of invasive species, planting natives, monitoring, leave trees to decompose, i.e.) rather than logging it, the landscape has a better chance at recovery. The trees that would be removed under the proposed logging plan contain vital nutrients such as lignin that will help the forest to regenerate. b) Logging a forest is more destructive than fire. A post-fire landscape is abundant and beautiful in its own right - nothing is wasted except tax payer dollars! c) We urge you to recognize the high ecological value of this post-fire habitat, and ask that you protect, rather than log, mature/old forest areas that experienced moderate/high-severity fire. Though there are many serious problems with the Proposed Action, and other action alternatives, in the DEIS, we focus our comments on several key issues, as discussed below. d) I would like to see the final Plan allow standing snags to naturally benefit the ecosystem versus heavily logging the area and harvesting more timber than regional lumber Mills can process. e) A recent study by the Center for Biological Diversity and the John Muir Project (5) recommended rather than industrial scale salvage logging, post-fire management should focus on activities that benefit forest health, water quality and the many species that depend upon fire for their very existence.

5212 3863 5313 5357 5375

Response: An alternative that would rely solely on natural succession but included some restoration activities was considered but eliminated from detailed study

263. Comment: a) I am writing in support of alternatives to any clear cutting plan designs regarding the Rim fire recovery. I believe it is important, instead, to think of the health of the community and environment. b) In selecting appropriate snags to be retained, the larger snags should be assigned the higher priority, as they will tend to last the longest, and it will be a very long time (if ever) before they will be duplicated. c) Leave many snags and much down logs in the areas salvaged and worked.

4741 5469 5477

Response: Under the action alternatives, all hardwood snags and 4 to 6 of the largest snags per acre are being retained.

MANAGEMENT REQUIREMENTS

264. Comment: We understand from talking to Forest Service ID team members that rather than falling the snags along streams as stated in the DEIS, they will be left standing to deteriorate naturally which is much more feasible.

5407 5070

Response: Alternative 1 contains the following management requirement: To provide key pieces of wood to the channel, retain a minimum of 20 pieces of large woody debris (LWD, trees of the largest diameters) per mile of perennial and intermittent channels in salvage units. These snags should be felled into the stream in an upstream direction (greater than 45 degrees from perpendicular) to the maximum extent possible in order to actively recruit large wood to the channel. This management requirement is not part of Alternatives 3 or 4.

265. Comment: Page 41: Borax use and pesticide use is mentioned within BMP, however, on p17 it is specified that sporax will not be used. On p264 it is mentioned borates will be used. It is unclear if they will be used on not.

4500 5412

Response: Sporax is proposed for use in this project and would be applied to live stumps of firs only (this would therefore only apply to the Roadside Hazard Trees). Chapter 1.08 of the DEIS stated that the application of sporax was a concern based on public comments submitted during scoping, but does not state it will not be used.

266. Comment: a) Choosing this alternative would not work as describe because of safety concerns. The light thin prescription, leaving approximately 100 sq. ft. of basal area is not feasible or safe for any type of logging operation. The normal salvage prescription that retains 30 sq. ft. of basal area also has safety concerns. Any broad scale retention across a unit should not be considered due to safety. Any retention of snags and dead trees should be grouped and kept separate from operations. This needs to be noted for any snag retention for any alternative chosen. b) We strongly believe that the habitat conservation area (HCA) approach provides the greatest benefit to wildlife and operational safety for forestry and logging crews. The area approach to snag retention has been utilized by the Eldorado National Forest and SPI with success and is a feasible, cost effective approach to snag retention. c) Increase snag retention in general in a variable retention pattern that goes well beyond the green tree retention ideas of the past. d) We note that there is little quantified data to show how much improvement results from leaving the largest snags as opposed to leaving medium sized snags. Since the timber to be salvaged will have deteriorated for more than a year prior to the start of operations under the most optimistic time lines, these large trees will have most of the economic value of the salvage timber.

5424 5298 5407

Response: The deciding official is working to balance operability and worker safety with wildlife habitat needs and future forest conditions. These comments are appreciated and will be considered.

267. Comment: a) Schedule all logging, hauling, mastication, and pile or jackpot burning activities in treatment units within 1 mile of Camp Tawonga property boundaries to occur only between September 16 and May 5. b) Provide notice to Camp Tawonga 30 days prior to any logging, hauling, mastication, pile or jackpot burning within 1 mile of the Camp. c) Between May 6 and September 15 prohibit loading and transporting hazard trees from Forest Road 1S26. During this period trees may only be felled and removed from this roadway to abate hazards but must be left in place. d) Between May 6 and September 15 prohibit harvest operations within units that are adjacent to Forest Roads 1N07, 1S83, 1S02, 1S03, and 1S90. During this period trees may be felled to abate hazards but must be left in place. e) For the entire duration of the Project, establish a signal light system to convert 1N07, 1S02, 1S26, 1S83, and 1S90 to one-way roads. f) Require all truck traffic associated with harvest operations to provide pilot vehicles and flagmen to warn oncoming traffic of logging 1S83, and 1S90 to avoid traffic collisions or other hazardous road conditions. g) Impose restrictions on all truck traffic using Forest Roads 1N07, 1S02, 1S83, and 1S90 on days when Camp Tawonga buses are transporting children to and from the camp (Friday and Sundays during summer months) to allow Camp Tawonga buses to travel safely from Highway 120 to Camp Tawonga. h) Require logging and non-logging truck drivers to use radio connection with Tawonga bus drivers to avoid traffic conflicts and safety hazards on Forest Roads 1N07, 1S02, 1S83, and 1S90 associated with both weekly bus traffic to Camp Tawonga and daily vehicle trips from Camp Tawonga to Yosemite National Park. i) Impose reduced speed zones on Forest Service Roads 1N07, 1S02, 1S83, 1S90, and those portions of 1S26 and 1S81 that are within a quarter mile of Camp Tawonga. j) Install signage regarding children and school buses being present on Forest Service Roads 1N07, 1S02, 1S83, 1S90, and those portions of 1S26 and 1S81 that are within a quarter mile of Camp Tawonga. k) To the extent feasible, install emergency turnouts on Forest Roads 1N07, 1S02, IS83, and 1S90. l) Any Project plans should not include the addition of any gates on Forest Roads that would impede emergency vehicles (fire, police, and medical) from accessing Camp Tawonga. m) To address wear and tear on roadways due to increases in truck traffic, require repair of Forest Roads 1N07, 1S02, 1S26, 1S83, and 1S90 to a usable condition that is safe for travel by all vehicle types. Such repair shall occur on an annual basis after each logging season has concluded but prior to April 15 of each year during the Project implementation. n) Prohibit any storage of fuels, placement of cleaning equipment, and placement of refueling areas within 1 mile of Camp Tawonga property boundary. o) Immediately repair any hazardous road conditions and immediately notify Camp Tawonga of the existence of any hazardous road conditions that may impede access to or from Camp Tawonga.

5414

Response: Close coordination and cooperation between Camp Tawonga, the Forest Service, salvage contractors and other operators was led by the Groveland District Ranger during implementation of the 2014 Rim Hazard Tree Project and will continue throughout this project in order to ensure safety and operational timing issues specific to Camp Tawonga are addressed.

268. Comment: Extend existing 30 foot buffer zones to portions of Middle Fork Tuolumne River within 1 mile of Camp Tawonga, where no harvest operations will occur.

5414

Response: Management requirements designed to protect water quality and watershed conditions are derived from Regional and National BMPs (USDA 2011d, USDA 2012a) and Riparian Conservation Objectives (RCOs) (USDA 2004a). Riparian resources within Riparian Conservation Areas (RCAs) and the Critical Aquatic Refuge (CAR) will be protected through compliance with the RCOs outlined in the Forest Plan (USDA 2010a). BMPs protect beneficial uses of water by preventing or minimizing the threat of discharge of pollutants of concern. BMPs applicable to this project are listed in the EIS Chapter 2 with site-specific requirements and comments.

269. Comment: Evaluate the use of silt fencing or other debris-retention barriers devices in high-bum areas that are particularly at risk of additional erosion from Project activities.

5414

Response: Timber sale contracts contain many standard provisions that help ensure protection of soil and water resources. These include provisions for an erosion control plan, road maintenance, skid trail spacing, and restrictions for wet weather operation. The overall soil porosity for Alternatives 1, 3, and 4 is expected to improve due to implementing the management requirement to subsoil primary skid trails and temporary road prisms situated on existing disturbance (EIS Chapter 3.11).

270. Comment: Impose (1) a quarter-mile buffer around Camp Tawonga where no borate compounds will be applied, and (2) a 10-foot buffer of all surface waters, regardless of chance of rain. In both of these areas hand-grubbing should be performed to the extent invasive species become a problem.

5414

Response: Given the highly focused application method for borate, application of granular product to cut tree stump surfaces, the potential to contaminate surface water is limited. In addition, management requirements, including not applying within 10 feet of surface water, when rain is falling, or when rain is likely that day (i.e. when the National Weather Service forecasts 50 percent or greater chance), would minimize any actual effect to a minor or negligible amount. Effects to municipal and domestic supply, contact and non-contact recreation, and warm and cold freshwater habitat are not anticipated. New or expanding portions of post-Rim Fire infestations of invasive species would be manually treated before seed dispersal. Manual treatment will entail the cutting, digging, or pulling of all flower heads and/or vegetative reproductive parts (i.e. rhizomatous root parts). Application of Borate Compounds would not take place within camps when children are present, and all MSDS label requirements and restrictions would be followed.

ROADS

271. Comment: Prohibit salvage logging in the roadless areas in the Clavey Watershed.

4297

Response: No salvage treatments are proposed within Wilderness or Inventoried Roadless Areas.

272. Comment: a) Salvage logging operations should utilize the existing road network, and there should be no new road construction. The burned watershed doesn't need more bulldozing and compaction or more vehicle disturbance for already stressed wildlife and soil. b) AW is opposed to the construction of new roads for salvage logging operations and encourages the use of the existing road network.

5298 5379

Response: There is no new road construction proposed under Alternative 4; Alternative 3 proposes 1 mile of new road construction and there are 5.4 miles identified for Alternative 1 (EIS Table 2.05-1). Impacts of new road construction were analyzed for all resources in Chapter 3 of the EIS.

273. Comment: a) As most of the identified skid trails proposed for use in the salvage operations occur on designated trails and roads, it is not clear of these trails will be returned to original condition, or as best as possible, following the BMP's currently in place for restoration of said trails. Concern does exist for impact upon these trails and roads, and absolutely should be incorporated into any planning process moving forward, and mitigation needs to be considered where applicable within the DEIS. This would include the 50" + Rule for roads, and 50"- Rule for trails. b) No salvage logging should occur on steep slopes because building roads and logging on steep slopes are the major causes of erosion which also damages the forest in the long term

5461 5186 5349 5187

Response: No mechanical harvesting is planned on steep slopes. Logging would be done using helicopters or skyline systems. In order to reduce negative effects on steep slopes, skyline or helicopter logging systems will generally be used where slopes exceed 35 percent. All harvest operations will adhere to the Standards and Guidelines set forth in the timber sale administration handbook (FSH 2409.15) and the BMPs as delineated in the Region 5 Amendment to the Forest Service Water Quality Management Handbook (USDA 2011d) and the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA 2012a). Timber sale contracts contain many standard provisions that help ensure protection of soil and water resources. These include provisions for an erosion control plan, road maintenance, skid trail and cable corridor spacing, and restrictions for wet weather operation. The overall soil porosity for Alternatives 1, 3, and 4 is expected to improve due to implementing the management requirement to subsoil primary skid trails and temporary road prisms situated on existing disturbance (EIS Chapter 3.11). Alternative 2 (no action) involves no logging activities nor road construction, providing further options for the responsible officials decision.

274. Comment: a) I am writing to express my concerns for Rim Fire Recovery plans that call for excessive building new roads to recover salvage logs. b) Please be sure there is no new road construction. Salvage logging operations can use the existing road network. c) Use existing roads, especially in the Clavey River corridor; this is preferred to building new roads. d).Areas of the forest not currently being logged should be opened and should be closed only for safety reasons during logging operations.

5439 3946 4397 4410

Response: There is no new road construction proposed under Alternative 4; Alternative 3 proposes 1 mile of new road construction and there are 5.4 miles identified for Alternative 1 (EIS Table 2.05-1). Impacts of new road construction were analyzed for all resources in Chapter 3 of the EIS. Due to dangerous conditions from trees damaged or killed by the Rim Fire, access to the project is currently closed to the general public. After determining that circumstances presented unsafe conditions for public travel, Stanislaus Forest Supervisor Susan Skalski issued a temporary Forest Order prohibiting public use within the burn area. On April 14, 2014, the Forest Supervisor issued the current Order, opening portions of the previous closure area and prohibiting public use within the remaining portions of the burn area until November 18, 2014.

275. Comment: Constructing 500 miles of road and logging over 100,000 trees in addition to those burned in the fire can only add to the devastation that has already taken place.

3218

Response: The comment regarding the amount of road construction actually refers to the approximate mileage of road reconstruction. New construction is minimal to none (5.4 miles under Alternative 1 and 0 miles for Alternatives 4. The comment regarding 100,000 trees refers to the Rim Fire Hazard Trees Project, not the Rim Fire Recovery Project. Only trees with no visible green needles are proposed for salvage treatments, these trees were killed by the Rim Fire.

SAFETY

276. Comment: There cannot be situations where dead trees are harvested amongst retained dead trees.

5424

Response: Operational safety related to snag retention has been considered during project development.

277. Comment: Drop proposed hazard tree felling on most Maintenance Level 1 and 2 roads (i.e., roads that are not maintained for public use), except where such roads are indispensable for access to private inholdings.

5313

Response: Hazard tree falling is only proposed along Level 2 Roads which are open to the public and maintained for public use. Providing a safe environment for both the public and forest workers is critical and the reason for the removal of dead and damaged trees that could fall onto roads. In addition, open and maintained roads are critical for fighting future fires in these areas. Firefighter safety would be at risk if these trees were left untreated due to the multiple dead trees and excessive fuel loading. The Chief of the Forest Service and the Regional Forester stress that the safety of the public and our employees is our central concern. Within the transportation corridors, hazard tree management is vital to everyone's safety (USDA 2012c).

278. Comment: Comments on Power Transmission and Distribution Lines & Right-of-Way: The following mitigations for "Power Transmission and Distribution Lines & Right-of-Way" were also not found in the draft EIS: Working around transmission lines: a. Minimum "Safe Clearance^', organized by operating voltage, are specified by Cal/OSHA, California Public Utilities Commission General Order 95 and the National Electrical Safety Code (NESC). For the appropriate clearances related to HHWP facilities, it is best to assume you are working near energized 230,000 volt transmission lines. Follow all safety guidelines when working under or adjacent to transmission lines. b. No jackpot piling within the wire zone on the transmission ROW. c. No whole tree processor piles allowed on the transmission ROW. d. No decking logs against towers. e. No landing logs and loading trucks in the wire zone. f. Notify HHWP ROW Maintenance Manager prior to falling operations adjacent to transmission ROW in units N01, W05, W06, U01 and U03. Working around distribution lines: a. Follow CAL OSHA guidelines for working with boom type equipment. b. No jackpot piling within 50' of the centerline on the distribution ROW. c. No whole tree processor piles allowed within 150' of the centerline on the distribution ROW. e. No decking logs against distribution poles. f. No skidding within 25' of guy wires. g. No landing logs and loading trucks in the power distribution ROW unless approved by HHWP ROW Maintenance Manager. h. Notify HHWP ROW Maintenance Manager prior to falling operations adjacent to power distribution ROW in units N01, W05, W06, U01 and U03.

5429
Response: Areas adjacent to power transmission and distribution lines were analyzed within the Hazard Trees EA project and these safety requirements were incorporated into that project. Operational safety and protection of existing facilities is of primary importance during implementation of any hazard tree removal project.

SCIENCE

279. Comment: In the absence of known, secured, available funding for any of the proposed research, the setting aside of area or modifications of proposed treatments for the express purpose of conducting research is in my mind an irretrievable commitment of wood fiber. By the time it becomes apparent that funding cannot be secured for the proposed research, the fire-killed timber reserved for the research...will have deteriorated beyond recovery, becoming a future fuels liability that was not offset by any value of gained knowledge from research or economic recovery in the form of stumpage. Please give careful consideration to the extent of area you are willing to commit to research if indeed funding for said research is at all in question.

4460
Response: The areas proposed for research under Alternatives 3 and 4 do not preclude salvage harvesting; in fact salvage harvesting is essential to implement the research looking at effects of both wildfire and salvage logging. It is true that for Alternatives 3 and 4 some treatment units were dropped from the project and some unit boundaries were modified based on the needs of the research proposals. Scientists at the Pacific Southwest Research Station (PSW) developed the research agenda in collaboration with the Stanislaus National Forest and research partners at multiple universities and other government agencies. Just like other proposed actions in these alternatives, the intent is to implement the research component if Alternative 3 or 4 is selected.

280. Comment: a) Any additional post-fire tree felling [other than that outlined in the roadside EA], however, is ecologically damaging and unnecessary to achieve the objectives of ecological integrity and climate resilience. In addition, because this project involves substantial removal of large pools of carbon currently stored in burned trees, especially large ones, a sound analysis on the carbon losses from logging should be conducted, as these appear to be inconsistent with the President's Climate Change Executive Order of November 2013. b) Focus the most intensive fuel reduction and snag removal treatments around the heavily visited private family camps, residential areas, and other vulnerable at-risk human communities. Those are the areas where the most aggressive treatments make the most sense. Otherwise you are taking away carbon that may never grow back, nor can the soil afford to lose. c)

5313 5298
Response: Carbon is not stored in burned trees; rather it is released to the atmosphere as the dead trees decompose. Hence, the first one or two decades after fire are dominated by carbon release. If the post fire stand has poor or no regeneration, forest growth will not replace the carbon lost through combustion and decomposition, and the net carbon storage over a fire cycle will decrease. Decomposition of dead roots and boles for several decades following fires may release up to three times as much carbon into the atmosphere as the fire itself (AuClair and Carter 1993), and carbon loss may exceed assimilation by young post fire vegetation for several decades after the disturbance (Crutzen and Goldhammer 1993). A lack of tree regeneration following fires would significantly reduce the amount of carbon stored in the ecosystem over the long term, especially in relation to the amount of carbon loss through decomposition (Kashian et al. 2006).

281. Comment: Although the impacts from salvage logging are well documented in the scientific literature and in the many letters that the FS received from the public, including scientists with expertise on the topic, the FS did not conduct an analysis of direct, indirect, and cumulative impacts of salvage logging on the plant community as a whole that will exist for 30 years or more succeeding the fire.

5449

Response: Conifer forests are the predominant vegetation type where proposed activities would occur. Action alternatives would remove primarily dead vegetation and may damage live trees or plants during harvest operations, but the extent of damage would be localized and long term effects to vegetation would be negligible. The range, sensitive plants, soils, watershed and wildlife sections disclose any localized effects on specific vegetation.

282. Comment: However, three major literature reviews in 2000, 2008, and 2009 confirm the harm, and lack of ecological benefit from salvage logging (McIver et al 2000, Lindenmayer et all 2008, Peterson et al 2009). New evidence continues to mount in support of the wisdom of preserving the early successional forest structure, including snags and large down wood, that provides a variety of benefits and amenities ranging from increased biodiversity, improved habitat, soil building, climate change adaptation, pollinator mutualisms, etc. (Swanson et al 2011, Franklin and Johnson 2012, Swanson et al 2014).

5449

Response: Early seral structural elements are addressed in the EIS through varying snag retention (100 percent in no action to 4-6 of the largest) and retention of down logs. The literature reviews listed in the comment are referenced and cited in the EIS in the discussion of effects of the alternatives on various resources. The newer Swanson et al publication concludes that while post-disturbance logging removes key structural legacies, and damages recolonizing vegetation, soils, and aquatic elements of disturbed areas (Foster and Orwig 2006; Lindenmayer et al. 2008), where socioeconomic considerations necessitate post-disturbance logging, variable retention harvesting (retention of snags, logs, live trees, and other structures through harvest) can maintain structural complexity in logged areas (Eklund et l. 2009). Franklin and Johnson 2012 discuss restoration of Douglas fir forests in the Pacific Northwest, and as such is not specifically applicable to post fire restoration in the Sierra Nevada. Reforestation is not proposed in the Rim Fire Recovery EIS, so a discussion of effects of reforestation on early seral structure is premature.

SPECIES

283. Comment: …it is essential that in selecting snags for retention, an array of snag sizes and tree types are part of the mix whenever possible. [because wildlife use all sizes, shapes, and types of snags]

5469

Response: In Alternatives 3 and 4, snag retention in Old Forest Emphasis Area (OFEA), Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC) units, is to retain legacy structure where it exists for long-term resource recovery needs (i.e. the development of future old forest habitat with higher than average levels of large conifer snags and down woody material). This management requirement will retain all hardwood snags greater than or equal to 12 inches diameter at breast height (dbh) and in addition, retain 30 square feet basal area of conifer snags per acre by starting at the largest snag and working down, with a minimum of four and a maximum of six per acre.

VEGETATION

284. Comment: a) Within the salvage units, there is very limited retention of legacy snags and other valuable habitat structures. b) Relying upon "abundant downed wood outside of units and future recruitment from low to moderate burn severity areas," as is described, is not sufficient given the amount of time it would take for that recruitment to occur, and the distance to areas that could be a legitimate source of LWD. c) The Department recommends snags for retention be defined in the

Project as not all snags are equal in value to wildlife. Within the proposed treatment units, the Department recommends a mosaic pattern for snag retention. Clumps or small groups of snags or untreated areas, rather than individual, evenly spaced snags will provide essential habitat for fire dependent species and create a beneficial edge effect. Retention of the largest snags generally provides the most benefit to wildlife. d) Clear cutting should be avoided. Instead, a reasonable percentage of snags, perhaps 10 to 20 percent per acre, particularly cedar snags (that are long standing), need to be retained to provide habitat for raptors and numerous other species. e) Retaining snags with broken-out tops may provide nesting platforms for large raptors, especially if they are within canopies of green timber. f) Clear cutting should be avoided. A reasonable percentage of snags, particularly large trees and long standing cedar snags, should be retained to provide habitat of raptors and numerous other species, as well as to maintain some semblance of the original landscape. Keeping large snag up is against logger interests and will require FNFS or other selection/monitoring in the field. g) …it is essential that high-quality, long-lasting downed logs be retained over the forest landscape.

5438 4467 5420 5428 5469 5439

Response: In all alternatives, hardwood snags and 4-6 per acre of the largest size class snags are being retained along with the largest size classes of dead and downed logs greater than or equal to 12 inches in diameter at the midpoint at a rate of 10 to 20 tons/acre.(EIS Chapter 2).

285. **Comment**: Heavily logged areas and tree plantations generally lack critical shrub and herbaceous plant species, multi-layered tree structure, downed wood and snags, and the fire regime that support diverse wildlife assemblages.

5438

Response: The Rim Fire Recovery Project does not propose any planting. Multilayered live tree structures would not be affected by the proposed activities since no live trees are planned for harvest. Long term effects to vegetation in the Rim Fire are anticipated to be negligible, since even logged forests regenerate vegetation. In the Freds Fire area on the Eldorado National Forest, a total of 206 plant species were identified throughout the fire area, 204 of which were present in the understory (understory is defined as all vegetation less than 6 feet tall). When broken down into life forms, it becomes clear that forbs made up the majority of the species present, followed by either graminoids or shrubs, and then trees. This is also despite the fact that about 60 percent of the fire area on National Forest System lands was salvaged in 2005. The range, sensitive plants, soils, watershed and wildlife sections disclose any localized effects on specific vegetation. In all alternatives, hardwood snags and 4-6 per acre of the largest size class snags are being retained along with the largest size classes of dead and downed logs greater than or equal to 12 inches in diameter at the midpoint at a rate of 10 to 20 tons/acre.(EIS Chapter2).

Sensitive Plants

286. **Comment**: The mitigation to “flag and avoid” one acre of the densest concentration of the sensitive plant Clarkia virgata plants with the best habitat” is not congruent with FS policy and direction, which requires the FS to design the proposal in order to maintain or improve sensitive plant populations for long-term viability.

5449

Response: Clarkia virgata is not a Region 5 Regional Forester's Sensitive Plant Species. No management requirements protecting this species were incorporated into the Rim Fire Recovery EIS. As discussed in the Rim Recovery Sensitive Plant Biological Evaluation (BE), FSM 2670.32 direction for sensitive species is to "avoid or minimize impacts to species whose viability has been identified as a concern." The decision maker may make a decision to impact sensitive species provided that the impacts do not "result in loss of species viability or create significant trends toward federal listing" (FSM 2670.32). The Stanislaus National Forest Plan Standards and Guidelines advise us to "modify planned projects to avoid or minimize adverse impacts to sensitive plants" and to design projects to "conserve or enhance TEPS plants and their habitat." The Rim Fire Recovery project contains management requirements (EIS Chapter 2.03) which require project activities to avoid sensitive plants or minimize impacts to specific species of sensitive plants or where hazard tree abatement for public safety takes precedence. In some cases, the management requirements are designed to enhance the habitat of some sensitive plants species. Therefore, the Rim Fire Recovery project is consistent with these Standards and Guidelines.

287. Comment: The forest plan, Sierra Nevada Forest Plan Amendment directs the agency to minimize or eliminate direct and indirect impacts from management activities on threatened, endangered, proposed and sensitive plants (TEPS) unless the activity is designed to maintain or improve plant populations (SNFPA Standards & Guidelines, Vol. 1, p. 366). This standard was affirmed on November 18, 2004 by the Chief of the Forest Service during his review of the SNFPA appeals decision made by the Regional Forester. Surveys should be floristic in nature, in other words, all species seen should be identified. The botany report did not identify whether or not surveys will be completed prior to activities on the landscape, nor if the surveys were floristic as required. This information needs to be included in the EIS.

5449

Response: The Rim Fire Recovery management requirements for sensitive plants are consistent with the Forest Plan and direction in SNFPA in that they minimize or eliminate direct and indirect impacts to sensitive plant occurrences from management activities. The purpose and need of the project does not include habitat improvement for sensitive plants. However, as discussed in the environmental consequences (EIS Chapter 3.09 and BE, pp. 51-60), some permitted activities would improve the habitat of some species. The Forest Plan refers to the Region 5 Botanical Program Management Handbook (FSH 2609.26.11) for guidance on how to conduct surveys for sensitive plants. The handbook does not require floristic surveys. The guidance provided is to "identify every species noted in the field to the extent necessary, to ensure that it is not a sensitive species." As noted on pages 2 and 21 of the BE, surveys for sensitive plants would be conducted in 2014 in project activity areas, where lacking. The BE is incorporated by reference into the EIS. Surveys for sensitive plants began in April, 2014 for early season species and continued through the appropriate blooming period for each of the target species. If an action alternative is selected, surveys for sensitive plants will be completed in each proposed sale area before project activities are implemented.

288. Comment: The Forest Service has not engaged in statistically valid monitoring in the past or present, and has not attempted to improve or enhance habitat for sensitive plants on the Stanislaus National Forest.

5449

Response: "Statistically valid" monitoring is not required by Forest Service policy or the Forest Plan. Informal presence/absence monitoring, activity-specific monitoring, such as OHV traffic in sensitive plant areas, and project implementation monitoring are conducted as needed to detect whether impacts are occurring, to determine the effects of impacts and to prescribe remediation. This level of monitoring provides adequate information to make management decisions concerning protection of sensitive plant occurrences. In the Rim Fire Recovery project, activities which would enhance habitat for *Clarkia australis, Clarkia biloba ssp. australis, Mimulus filicaulis* and *Mimulus pulchellus* would be allowed within occurrences of these species during the dry, non-growing time of year when these species are tolerant of these types of disturbances. These types of activities have been conducted successfully in occurrences of these species in past projects with no long-term adverse effects to the occurrences.

289. Comment: No management plans have been created to guide management decisions to protect sensitive plants, in contradiction with the Stanislaus National Forest Land and Resource Management

Plan, signed in 1991. Allowing destruction of known sensitive plant populations without prior monitoring and management planning violates national and regional direction.

5449

Response: National and Regional policy and the Forest Plan do not require the preparation of management plans for sensitive plant species. The Rim Fire Recovery project management requirements were designed to minimize or eliminate impacts to sensitive plants in order to avoid destruction of sensitive plant populations, consistent with Forest Plan Direction (2010) and FSM 2670.32. As explained in the EIS (Chapter 3.09) and in the BE, no occurrences of sensitive plants are expected to be eliminated as a result of Rim Fire Recovery project activities. As displayed in the BE (pp. 61-72) and incorporated by reference into the EIS, analysis of effects to sensitive plants revealed that while individual sensitive plants might be impacted in some areas, the project would not result in a trend toward federal listing of any sensitive plant species. The project is consistent with management direction and Forest Service policy.

Soils

290. **Comment**: Post-fire logging undermines the effectiveness of, and conflicts with, post-fire rehabilitation efforts that are aimed at reducing soil erosion and runoff.

5313

Response: BAER erosion control treatments included several thousand acres of aerial helimulch immediately after the fire to provide ground cover during the first winter. BAER is an emergency action intended to provide effectiveness through the first year after wildfire. The Rim Fire Recovery Project proposes supplemental erosion control treatments in high erosion risk areas (see EIS Appendix E.04). Since these will be done in conjunction with logging they are not expected to be adversely affected by it.

291. **Comment**: The dying and dead trees are supposed to decompose and fall to the ground to replenish the organic matter in the soil.

2

Response: The Forest Plan provides direction to "maintain topsoil organic matter to at least 85 percent of its original total in the top 12 inches" in areas dedicated to growing vegetation. Impacts to soil organic matter from proposed activities are analyzed in detail in the soils analysis for the project and is summarized in the EIS.

292. **Comment**: Logging the area will steal nutrients to the ecosystem that are vital to the health of the natural environment.

4141

Response: While impacts to soil nutrients are not specifically analyzed, as described in Forest Service Manual Chapter 2550, the National Forest Management Act (NFMA) of 1976 (which amended The Forest and Rangeland Renewable Resources Planning Act of 1974) requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. Impacts to soil productivity are analyzed in detail in the Soils Report for the project and are summarized in the EIS.

293. **Comment**: You cannot remove lignin and tear up islands of intact soil without destroying the ability of the forest to recover.

5201

Response: As described in Forest Service Manual Chapter 2550, the National Forest Management Act (NFMA) of 1976 (which amended The Forest and Rangeland Renewable Resources Planning Act of 1974) requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources.

Impacts to soil productivity are analyzed in detail in the Soils Report for the project and are summarized in the EIS.

294. Comment: My belief is little intrusion of the site with roads and logging should be priorities. Priority should be given to doing everything possible to restore the soil and reduce runoff.

4469

Response: Alternative 4 analyzes an alternative with no new road construction.

295. Comment: a) The report describes soil considerations such as compaction and erosion. I didn't see in the Soils section discussion of the structure of the soil. I believe helping the soil recover and thrive should be a primary goal. Would it make sense to include in the soils discussion consideration for leaving some Biomass on site as mulch, so the nutrients and minerals are available to the critters underground? b) The areas where the fire burned particularly hot can benefit from mulching and chipping to avoid erosion and to encourage forest regeneration.

4625 5427

Response: The purpose and need for the project are described in detail in Chapter 1 of the EIS. Areas proposed for addition of mulch for cover through proposed activities are described in the soils report as Watershed Sensitive Areas, and are included in the analysis of Alternatives 3 and 4.

296. Comment: a) It is very important to promote the long term health of this valuable ecosystem. We need to help nature recover by working with natural systems not against them. For example, retention of biomass on site will help rejuvenate soils and reduce runoff and sedimentation. b) I oppose this logging operation as it will result in the removal of organic material/soil that is much needed for rapid regeneration of plant life. Removal of all of this organic material will slow the recovery of the area and leave a barren landscape more prone to erosion. Scientists are now 80% certain we will have a major El Nino effect this summer and fall - which typically translates to major rain storms for Northern California. We know that heavily logged areas are subject to extreme erosion. El Nino-driven rains will cause much more soil to wash away, clogging streams and other waterways and further reducing the nutrient level of the soil in burned areas. c) The logging process (e.g., movement of heavy equipment over the terrain) will further disrupt the already unstable soil leaving it susceptible to wind and water erosion. This will further diminish the soil quality which will delay the natural restoration of the forest. This will also impact water quality and clarity in nearby rivers and other bodies of water, which will impact the biodiversity of the water system. In this case again the NFS should focus on "Hazard Tree Treatments" and chip downed trees to use as soil cover. d) Retention of biomass on site will help rejuvenate soils and reduce runoff and sedimentation.

4652 5323 4318 4400

Response: As described in Forest Service Manual Chapter 2550, the National Forest Management Act (NFMA) of 1976 (which amended The Forest and Rangeland Renewable Resources Planning Act of 1974) requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. Impacts to soil productivity are analyzed in detail in the Soils Report for the project and are summarized in the EIS. Impacts of proposed activities on runoff and sedimentation are analyzed in detail in the Hydrology report for the project and are summarized in the EIS.

297. Comment: Reduce or eliminate expensive skyline and helicopter treatment units - Steep slopes are most vulnerable to soil disturbance, and although skyline and helicopter logging operations have the least on-the-ground impact, there is more value to eliminating these types of logging, especially since the existing Alternative 4 calls for removing more board feet than regional mills can handle.

4239

Response: As described in Forest Service Manual Chapter 2550, the National Forest Management Act (NFMA) of 1976 (which amended The Forest and Rangeland Renewable Resources Planning Act of 1974) requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. Impacts to soil productivity are analyzed in detail in the Soils Report for the project and are summarized in the EIS.

Industry capacity will be considered by the responsible official in making her decision.

298. **Comment**: I am very concerned the proposed Rim fire recovery plan will create even more damage and devastation rather than promote recovery. Specifically, I don't agree with the salvage logging proposal and plans for creating hundreds of miles of new roads. New roads will increase erosion in already compromised hillsides and watersheds and disrupt wildlife.

4952

Response: Alternative 4 was developed to include no new road construction. Impacts to forest resources from the proposed project activities are analyzed in the individual specialist reports and are summarized in the EIS.

299. **Comment**: Rim fire recovery efforts should focus on shoring up hillsides to reduce erosion, and seeding barren areas with native plants. The massive burned and partially burned biomass must be allowed to naturally decompose and fertilize the forest floor to provide much needed nutrients for re-growth.

4952

Response: The purpose and need for the project are described in detail in Chapter 1 of the EIS. As described in Forest Service Manual Chapter 2550, the National Forest Management Act (NFMA) of 1976 (which amended The Forest and Rangeland Renewable Resources Planning Act of 1974) requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. Impacts to soil productivity are analyzed in detail in the Soils Report for the project and are summarized in the EIS.

300. **Comment**: a) The Forest Service itself reports that 45 percent of the soils in the burn area were moderately to severely damaged by the fire. This means that lignin was burned from the soil and the only significant source of replacement lignin are the trees that you'll be logging from the land. Without replacement lignin, the soils will remain damaged for hundreds of years and damaged soils cannot grow new trees even if you put out new seeds or seedlings. Lignin is absolutely vital to the recovery of the burn area yet the word "lignin" does not appear once in your 522-page DEIS. Why is this? Does the Forest Service fail to understand how vital this concept is? b) You will be tearing up the landscape and severely damaging the ability of the forest to recover. One of the things I'm referring to is the "bootstrap hypothesis" whereby small isolated pockets of microbial communities and mycorrhizal fungi help pull a damaged ecosystem back together. This is already evident throughout the burn area, where small pockets of green forbs indicate the presence of intact soils and intact microbial communities. But all we have to do is look at Evergreen Road to see what's going to happen when the Forest Service comes in with heavy equipment to "clean" things up. Every pocket of intact soil and microbial life was bulldozed into oblivion, and this is exactly what severely damages the ability of the forest to recover. You cannot tear up islands of intact soil without destroying the ability of the forest to recover. c) Taking the burned trees out of this region will leave the soil desiccated and starving for organic material. Once we remove the decomposing trees, the area will no longer have the ability to bounce back with new growth because its soil composition will not support new growth. d) ...I believe excessive logging will…inhibit soil recovery needed through the natural decomposition of trees.

5201 5445 5447 3928 3946

Response: The purpose and need for the project are described in detail in Chapter 1 of the EIS. As described in Forest Service Manual Chapter 2550, the National Forest Management Act (NFMA) of 1976 (which amended The Forest and Rangeland Renewable Resources Planning Act of 1974) requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. Impacts to soil productivity are analyzed in detail in the Soils Report for the project and are summarized in the EIS. NFS Land hazard tree removal along Evergreen Road and elsewhere does not include moving equipment over the entire area as suggested by the comment.

Society, Culture and Economy

301. Comment: Please examine the tradeoffs between providing opportunities for resource extraction corporations to profit financially versus the long-term ecological damage that post-fire logging will inflict.

2

Response: The purpose and need for the proposed action is to apply the most up-to-date science in order to restore and enhance the long term, post-fire forest ecology. Done properly, salvage logging is not in conflict with this long term ecological health, and in fact can provide funding for a portion of the near term government costs of implementing forest restoration activities.

302. Comment: We can all appreciate the need for work to sustain families but that work has to be sustainable and consider the long term health and wellness of children and their children. I hope you make sound choices for the best benefit of future generations.

4739

Response: The proposed actions are designed to take a long-term view. Not only would jobs be created in the short term to conduct immediate actions, which sustains families, but by restoring the forest ecology a healthy resource can continue to create sustainable jobs and support families in future generations.

303. Comment: a) The impact assessment for the Alternatives seems to be narrowly focused on job creation only. While job creation is a very good thing, and we can reasonably assume that more jobs will result in a positive impact to the regional economy, the actual dollar impacts, the values, to the economy and human community are significant and need to be discussed... For example, we believe the following, at minimum, should be estimated and discussed: b) Value (including the multiplier effect) of: Local direct and indirect jobs

5109 4855

Response: The Society, Culture and Economy Indicators Chapter 3.10 was expanded to include the statement "Jobs were selected as the single best indicator of economic health because jobs are intuitively understandable and easily observed by the communities affected, but it should be noted that beneficial or adverse economic impacts on jobs are highly correlated with such other measures of economic health as gross regional product, economic output, personal income, and the portion of gross regional product that ultimately finds its way into local and state taxes."

304. Comment: Value (including the multiplier effect) of: Local and state taxes,

5109 4855

Response: Using the IMPLAN regional economic modeling system, once the impact on the selected indicator (jobs) has been determined, the portion of economic impact flowing to local and state taxes (including multiplier effect) will be a simple arithmetic factor moving proportionately with jobs.

305. Comment: Value (including the multiplier effect) of: The strengthened local forest contractor base and industrial wood users (both forest products and bioenergy)

5109 4855

Response: The value of strengthening the industry is discussed qualitatively (e.g., beneficial or adverse), but was not quantified because it is impossible to know the extent to which contractors and other industry participants from more distant counties will become involved in the effort.

306. Comment: Value (including the multiplier effect) of: Tourism (increased and decreased)

5109 4855

Response: The methodology section describes how tourism has long been an important part of the society and culture of Tuolumne and Mariposa Counties, but notes that economic quantification of the value of recreation and tourism cannot be made with any precision in this analysis. On the other hand, increases or decreases between alternatives are described qualitatively in the analysis.

307. Comment: Value (including the multiplier effect) of: Renewable energy produced vs fossil fuel energy offset by turning Rim Fire fuel into renewable energy

5109 4855

Response: In an era of suspected global climate change caused by greenhouse gas emissions, there is an ecological service value created by substituting renewable energy for fossil fuel energy. As was stated in the Indicators section, however, non-market values such as ecological services are difficult or impossible to quantify and are treated qualitatively in the analysis.

308. Comment: a) Value (including the multiplier effect) of: Potential risk of property loss from future wildfires originating within the Rim Fire footprint on communities along the Hwy 108 and 120 corridors. b) Value (including the multiplier effect) of: Future wildfire fighting costs and resource damages 10 and 20 years from now for each Alternative, particularly Alternative 2

5109 4855

Response: Risk of future fires will increase with fuel loads remaining in the landscape, but is impossible to quantify because to do so would require speculation regarding the size and location of future fires. The costs of fighting future fires will rise in proportion to the risks of fires occurring, but are impossible to quantify because to do so would require speculation regarding the size and severity of future fires

309. Comment: The human/social effects of the no action alternative are noted. If no merchantable timber is harvested from the Rim fire area, Sierra Forest Products, the one remaining sawmill at the southern end of the Sierra Nevada range in Terra Bella, CA will likely close. The Sierra Pacific Industries sawmill in Standard, CA was renovated at significant expense, based on the prediction of a stable, province wide supply of timber. The foregone lumber production from not salvaging the Rim Fire would have to be replaced by lumber imported from outside California some from countries outside the U.S. with less stringent environmental standards. About 80% of the wood products used in California are imported across state lines and local use of resources is supported by the salvage.

5070 5407

Response: Sierra Forest Products relies on additional sources of timber other than the Rim Fire. The Aspen fire on the Sierra National Forest is also proposed for some salvage harvest. The timber potentially available from the Rim Fire is a short-term proposition; deteriorating rapidly. For the longer term, sawmills will need to rely on other sources of raw materials. It is outside the scope of this analysis to speculate on the market forces that may attend a specific sawmill and the business decisions the owners may make. However it is agreed that the Rim Fire itself changed the forested landscape on both private and public lands and impacted the availability of timber for many decades to come.

310. Comment: The Forest Service must take action as quickly as possible to remove fuels and saw logs that will otherwise lose any economic value. This fire has already had a huge economic impact on all of the gateway communities surrounding it.

5104

Response: Delay in the salvage effort will reduce the amount of timber remaining of merchantable quality, and thus will reduce the government's ability to defray some of the costs of proposed actions. As described in the EIS, communities in Tuolumne and Mariposa Counties have already suffered adverse economic impacts. Comment noted.

311. Comment: a) the DEIS makes a poorly substantiated estimate of the actual cost of biomass removal treatments from the Rim Fire units in the Wildlife/Fuels/Biomass Removal section (p. 185 DEIS). b)

It is very unclear that the assumed average biomass removal treatment cost of $1,250/acre is anything more than an arithmetic average of the two estimates of $500 and $2,000/acre. Where did the $500 and $2,000/acre numbers come from? If they are from actual contracts awarded recently by the Forest Service, were they from wildfire restoration projects like Rim Recovery, from green tree thinning operations, or hazardous fuel reduction project in a WUI? c) The DEIS needs to use costs that are representative of projects similar to Rim Recovery as a basis for evaluating impacts as well as acreage of specifically prescribed fuel treatments.

5109 4855

Response: The $1,250 per acre factor was selected as the best average cost of treatment and is indeed the arithmetic average of the high ($2,000 per acre) and low ($500 per acre) costs of treatment that the Forest Service has experienced in the recent past for similar post-fire treatments of biomass. The Wildlife/Fuels Biomass Removal discussion has been expanded to be more specific about these assumptions.

312. **Comment:** Quite a few local business owners are deeply concerned and scared by the Rim Fire logging plan because our local gateway communities are based on tourism not logging. Your plan to log the burn area will have a tremendous impact on tourism both during and after the logging, and this is not sustainable for local rafting companies, hiking companies, tour bus companies, restaurants, hotels, rental property agencies, cafes, and many other businesses.

5201

Response: From a tourism economics perspective, the noise, traffic, and other activities of logging will create a short term disruption in environments that historically drew recreationists and tourism to the National Forest in Tuolumne and Mariposa Counties. On the other hand, the Rim Fire has already changed those environments in ways that discourage tourism for most people. If one accepts the science behind the proposed actions that are intended to restore a healthy forest ecosystem faster than would occur from this point without human intervention, then in the long run the tourism economy will benefit from returning to attractive recreation environments faster.

313. **Comment:** Highly damaged and impacted soils will be what tourists and visitors to this area will see for countless generations if you log these hills, and tourists don't come to Yosemite National Park to see a logging wasteland so they'll take alternate routes through Mariposa or Oakhurst, thus destroying the heart and soul of Tuolumne County's tourism industry.

5201

Response: Using the best current science, the proposed actions are designed to improve the hydrologic function of existing post-fire roads, and lay the groundwork for restoration actions that may follow. Combined, these interventions are intended to restore the landscape to an attractive forest environment faster than natural forces alone will accomplish. Future generations will benefit from action taken today.

314. **Comment:** Finally, your plan does a great job of calculating the economic returns and jobs created by 1-2 seasons of logging, but you failed to calculate the economic benefits and jobs created by leaving the burn area intact and maintaining a healthy tourism industry in our county.

5201

Response: A healthy ecosystem that creates attractive opportunities for recreation will generate more tourism related jobs than a less vibrant environment. The proposed actions are designed to restore the environment faster than would be the case without human intervention in the landscape.

315. **Comment:** The impact to Tuolumne County's economy is difficult to summarize. The value of the timber lost is only a small portion of the cost; losses of future timber production within the Rim Fire will impact the counties timber industry for the foreseeable future. Tuolumne County's tourism industry took a huge hit, as well. Not only were forests users not excluded from the Rim Fire area

immediately after the fire; to this day, they are still excluded from most of the Rim Fire area. Fortunately the Yosemite National Park corridor along Highway 120 has since been reopened.

5471

Response: It is indeed helpful to the local economy that Highway 120 has reopened. The tourism economy will remain depressed while the Rim Fire area remains closed to the public. Timber production will be diminished for years to come as the forest regenerates.

316. Comment: Chapter 3.10 Society, Culture, and Economy should display or discuss the effect of the fire for a longer period than just five years. It is necessary for planning to maintain the existing forest industry infrastructure.

5070

Response: The Forest Service will consider analyzing the effect of the fire on forest industry infrastructure further into the future.

317. Comment: a) The 3.10 Society, Culture and Economy section should include tentative appraisal determinations for each Action Alternative. Without it, it is impossible to assess whether or not all of the proposed treatments can be achieved economically. b) Also, how about some discussion on money? Is all this timber just being given away, no strings attached? c) We realize that there is some economic pressure for significant salvage logging, but the economic equation here is not that simple. For example, an analysis by the Government Accountability Office of salvage logging after 2002 Oregon's Biscuit Fire showed that the logging produced $8.8 million in revenues, but cost taxpayers $10.7 million. Perhaps the economics are not as favorable as logging proponents would suggest. d) Furthermore, the proposal fails to disclose address [sic] the amount mills will pay for logs; the costs of logging and transporting logs to mills; Forest Service Receipts; Stanislaus NF costs to prepare and administer timber sales; Timber related overhead costs at regional and Washington offices; Stanislaus NF costs for planting activities related to logging; or Payments to counties.

3623 4458 4803 5335

Response: EIS Chapter 3.10 addresses economic aspects of the project, and implementation contracts will include economic appraisals. Log purchase pricing and operational costs are market based, fluctuates frequently, and as such more appropriately considered in individual implementation contract appraisals rather than speculatively in the EIS.

318. Comment: a) We also stated that we do not oppose the removal of burned trees that are hazards to human safety and infrastructure; however, we do oppose post-fire logging for principally economic purposes given the high cost to ecological integrity. b) This analysis indicated to us that close to 50% of the area to be salvaged logged primarily is driven by economic objectives.

5438

Response: The purpose and need for the project includes recovering the value of some of the burned trees before they deteriorate substantially, thus reducing the future fuel load and potentially offsetting the cost of other restoration treatments. Economic recovery of timber value is but one of the five purposes which also include enhancing wildlife habitat, improving road infrastructure to enhance hydrologic function, reducing safety hazards, and reducing fuels to promote fire resiliency.

319. Comment: a) From this analysis, we find that more salvage volume can be retained for ecological benefit while still providing significant contributions to the economy and more timber than the local mills can utilize each year. Thus, the statements in the DEIS that claim the economic objectives of the project will not be met if less area is salvaged or more snags retained are arbitrary and not supported by evidence. The analysis above indicates that there is significant area not directly contributing to a strategic fire management strategy (Objective 3) and significant volume beyond what can be utilized by the local mills that could be deleted from Alternative 4 or treatments redesigned to retain greater ecological value and still provide reasonable economic return. b) Removal of these units would result in less commercial timber value being recovered, but the estimated volume remaining after removal of these units and the volume from roadside hazard removal for level 2 roads would still provide sufficient volume to meet the capacity of the mills in Standard and Chinese Camp for over two years.

5438

Response: The purpose and need for the Rim Fire Recovery project includes fuel reduction, wildlife habitat including migration corridors, and public safety as major components of ecosystem recovery, in addition to recovering value from deteriorating timber. Supplying the two local mills is not the purpose of the project.

320. Comment: Since it is expected that timber from the Rim Fire areas will not be viable after two years, 250 mmbf of timber would satisfy the local mill capacity for two years. Thus, the estimated volume (540 mmbf plus additional volume from the logging of dead and green trees during roadside hazard removal) from Alternative 4 (least acres affected) provides more than two-fold the volume that can be utilized by the local mills. We are aware that other mills outside the local area may be interested in timber from the Rim Project area, but the travel distances are likely too far to be economical and those mills (e.g., the mill in Terra Bella with a capacity of 28 mmbf per year) are likely to be receiving timber from other salvage projects.

5438

Response: This purpose to remove dead trees to recover their economic value is but one of the five purposes which also include enhancing wildlife habitat, improving road infrastructure to enhance hydrologic function, reducing safety hazards, and reducing fuels to promote fire resiliency. The volume of timber that can be sold and harvested will depend on the market forces operating at the time of sale, including the milling and decking capacity, logging capacity, availability of trucks, and the price of lumber. There are mills in the northern part of the state that may be interested in purchasing timber from the Rim Fire. These market forces are beyond the control of the Forest Service; however you are correct in your assessment that the supply of timber from the Rim fire may exceed the demand. This is recognized in the DEIS on page 194: "Given the limited ability to expand capacity in the short term over the next two years, it is possible that the Forest Service would not be able to sell as much salvage timber as they are planning for. Although the overall impact of Alternative 1 [same for 3 and 4] would be beneficial to the local economy, sale of less than 100 percent of the timber would partially represent a lost opportunity from not being able to realize the full benefit.

321. Comment: Significant portions of the burn area are capable of providing "commercial saw timber, public fuel wood, and miscellaneous wood products, while considering environmental factors and other resource values" (Forest Plan Direction, April 2010).

5424

Response: Providing wood products while considering environmental factors and other resource values is a desired outcome of the Rim Fire Recovery project.

322. Comment: However the economics of including all this work in a Timber Sale contract will be cost prohibitive. The Forest needs to consider offering this work as a service type item or potentially within an Integrated Resource Timber Contract (IRTC).

5424

Response: The EIS identifies that the fuel reduction work and some of the biomass treatments would be performed post salvage. Chapter 2 of the EIS states: "Salvage and hazard tree removal are expected to take place first in order to capture the highest economic value of the standing timber and to remove hazard trees for safety of operations. Biomass removal may be completed simultaneously with the salvage operation or occur as a second entry into the area. Post-harvest evaluation would determine the extent of treatments necessary to meet fuels, watershed, and wildlife objectives for ground cover and fuel loading." Service contracts would be an indispensable tool to completing the fuel reduction treatments proposed.

323. Comment: You state that "the tremendous number of dead tress across this large landscape creates the need for the removal of this perishable commodity in a timely manner" when it does not. Trees are a commodity, but our public lands should not be managed to maximize commodity production.

1

Response: The purpose and need for the project includes recovering the value of some of the burned trees before they deteriorate substantially, thus reducing the future fuel load and potentially offsetting the cost of other restoration treatments. It is not to "maximize commodity production." The commercial value of the trees is highest now, but after about two years it will not be economically feasible for private industry to conduct the operations commercially because the dead timber will have deteriorated so badly (Bowyer et al. 2007). So long as the dead trees can be salvaged within two years, a major economic benefit would be gained in all the action alternatives in that a meaningful portion of the public cost of the Rim Fire Recovery project can be offset by the proceeds of the sales to private industry (EIS Chapter3.10).

324. Comment: Further, there is no analysis of the economic fact that there are already substantial amounts of post-fire logging occurring on private land within the Rim Fire as well as from the Hazard Tree EA sale.

5335

Response: Cumulative effects of other salvage efforts within the Rim Fire are addressed in the EIS in Chapter 3.10.

325. Comment: Economic returns from logging pale in comparison and all you're left with is a devastated landscape that may never grow trees and forests again. This kind of logging does not benefit our local communities, the state of California, or the nation.

5445 5447

Response: The EIS addresses effects of the alternatives in depth on a wide variety of wildlife species, soils, watershed, aquatic species, sensitive plants, wilderness, and wild and scenic rivers among other resources (EIS Chapter 3)

326. Comment: The Proposal is Not Logistically Explained. The DEIS acknowledges that the project would be beneficial to the timber industry but would have an "adverse economic" impact on taxpayers due to the massive amount of timber that would be logged. Yet this is not meaningfully addressed.

5335

Response: The EIS does not say that the project would have an adverse economic impact on taxpayers. The EIS simply acknowledges that the market forces of supply and demand may have a downward effect on the price of raw materials.

327. Comment: Often logs from the West Coast forests are milled after export. The finished products are then returned and marketed in the US. So the milling jobs, which are where the greatest value is added is paid to foreign workers.

5360

Response: Federal law prohibits the export of logs from National Forest lands. Therefore all milling and manufacturing of wood products from logs originating on National Forest lands under this project would be done domestically.

328. Comment: It would not surprise me that all helicopter units and perhaps all skyline units when analyzed individually will appraise deficit (below base rates). If that's the case they should be offered only as "Optional Subject to Agreement" in the Timber Sale/Stewardship Contracts....P. xvi The skyline and helicopter Units in all action alternatives should be shown as Optional Subject to Agreement if skyline and/or helicopter appraise deficit (below base rates).

3623

Response: It is agreed that helicopter logging is expensive and that it may appraise deficit. While recovering economic value is part of the purpose and need for the project, economic considerations are but one factor. Areas are proposed for treatment to meet strategic fuels reduction needs and reduce safety hazards. In some cases, on steep slopes and sensitive soils, helicopter logging is the best and only option.

329. Comment: [DEIS Chapter 3, Page 55] There are effects on existing Forest Service contractual obligations. I think a separate section needs to be added to address those obligations or specifically address each of them under Section 3.10 (Groovy would be an example).

3623

Response: The existing timber sales are discussed in Appendix B in the context of cumulative effects analysis. The high severity burned portions of these projects are covered within the acreage proposed for treatment in the EIS. Modifications to these contracts resulting from the fire and the decision made for the Rim Fire Recovery project would be addressed pursuant to the contract provisions.

330. Comment: [DEIS Chapter 3, Page 191 (Megawatt Capacities)] DTE Stockton is rated at 45 megawatts of operating capacity rather than 25. Sierra Forest Products at Terra Bella and there biomass power plant (Sierra Power Company) had an explosion this past year. The owner has no interest in proceeding with the multi-million dollar repairs and start-up. This plant should be removed from the list.

3623

Response: Thank you for this information.

331. Comment: The Stanislaus National Forest timber sale program is a significant contributor to our operations and the Alternative selected to implement the Rim Fire recovery will have a direct impact on our ability to operate our business.

5424

Response: All action alternatives have substantial timber volume associated with them ranging from 541 MMBF to 661 MMBF. By any measure, this potential volume exceeds the annual sale volume of the Stanislaus and surrounding National Forests tributary to the Sierra Pacific Industries sawmills. It is recognized that selection of the No Action alternative could have an impact on the local sawmills.

332. Comment: The economics of helicopter and cable based harvest systems is highly questionable with what the condition of the wood will be at time of project implementation. Timber within these areas should be subject to agreement with a potential offer on a timber sale.

5424

Response: It is agreed that helicopter and to a less extent cable logging is expensive and that it may appraise deficit. While recovering economic value is part of the purpose and need for the project, economic considerations are but one factor. Areas are proposed for treatment to meet strategic fuels reduction needs and reduce safety hazards. In some cases, on steep slopes and sensitive soils, helicopter logging is the best and only option.

333. Comment: We believe the best available job information for wood-fired power plants including gathering and hauling feedstock comes from work done by Dr. Gregg Morris (The Value of the Benefits of U.S. Biomass Power, 1999). I have attached that research publication for your consideration. The jobs discussion is at page 12 where it states that the "total employment [is] equal to 4.9 full time jobs per each megawatt of net plant generating capacity." It takes 8,000 bone dry tons of feedstock to generate 1 megawatt. I believe you'll find that there will be 25-40 bone dry tons/acre generated on acres that are salvaged. Assuming an average of 30 bone dry tons/acre; salvaging 28,326 acre; and 8,000 bone dry ton/1 megawatt, a job estimation can be derived. Of course the issue is how many bone dry tons will actually be hauled to a power plant or the shavings mill.

3623

Response: Thank you for the suggested reference. Based on the assumptions and data you have provided, the proposed biomass removal could generate up to 140 jobs under alternative 1, 154 jobs under alternative 3, and 147 jobs under alternative 4. This assumes that all the biomass would be removed to power plants. As described in the EIS, biomass is proposed for removal as firewood, shavings logs, pulpwood, removed for biomass fuel for electric cogeneration plants, or decked and left on site for public firewood cutting. The extent of biomass removal to processing facilities will depend on costs and markets.

334. Comment: P. 184-185 Jobs Determinations - We believe using Dr. Mackillop's information for direct jobs is the best available (6.4 jobs/mambo harvested). However, it's uncertain whether or not you've used best available information for 1) indirect and induced jobs and 2) biomass removal and consumption at a wood-fired power plant. We believe the Forest Service IMPLAN runs by County in the Sierra Nevada's are the best available information for indirect and induced jobs. The most recent I have is the 1996 IMPLAN runs done for the 2001 Sierra Nevada Framework which showed 2.25 indirect and induced jobs/mmbf for Tuolumne County. I've attached that section of the '01 Framework. The DEIS says IMPLAN was used but I don't see it in References.

3623

Response: In the methodology used for alternatives analysis, multipliers are derived from the IMPLAN system, developed and vended by the Minnesota IMPLAN Group, Inc. (MIG). Multipliers are lower for small economic areas than they are for the state as a whole, and the relevant multipliers for the direct industries affected average 1.5, indicating that for every job directly generated by the commercial salvage operations, another half a job would be supported in Tuolumne or Mariposa Counties through indirect or induced mechanisms. The IMPLAN reference is in the EIS References Chapter with the citation: MIG, Inc. (Minnesota IMPLAN Group), IMPLAN Professional Version 3.0, Copyright 2014. Stillwater, MN.

335. Comment: Require that local timber operations receive priority in securing contracts.

4297

Response: Mechanisms for contracting are outside the scope of this analysis. The bidding process for Stewardship contracting can provide added weight to local community economic enhancement, including favoring local contractors. Timber sale contracts however are awarded based on bid price and a responsibility determination.

336. Comment: Logging companies have a pretty sorry track record for moderation, clean up and protecting diversity. Environmental groups don't trust them and neither do I.

4458

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

Transportation

337. Comment: I am writing to express my concerns for Rim Fire Recovery plans that call for excessive building new roads to recover salvage logs.

3946

Response: The three action alternatives propose 5.4 miles, 1.0 mile and 0 miles of road respectively for Alternatives 1, 3 and 4. To address public concerns associated with new permanent roads, we have developed Alternative 4, which does not include any permanent roads, limits temporary road construction, and, similar to the proposed action, does not increase long-term public access in the project area.

338. Comment: a) Please be sure there is no new road construction. Salvage logging operations can use the existing road network. b) Use existing roads, especially in the Clavey River corridor; this is preferred to building new roads. c) Salvage logging operations should utilize the existing road network and there should be no new road construction. d) It is with reluctance that we attempt in a spirit of compromise to accept the temporary new roads that we identify in our specific recommendations. e) Creating more roads in already divested area is not the answer. I am opposed to any new roads, even if they are temporary. I definitely don't want to see any new roads, even temporary, in the Clavey River- Wild and Scenic Corridor.

4397 4410 4400 4467 5476

Response: Existing roads would be used whenever possible to access the proposed treatment units under the action alternatives. Since log yarding over long distances (greater than 0.25 miles) is both expensive and often causes more disturbance than roads, we have proposed some new roads to reduce log yarding distances in some areas. A variety of options are present across the alternatives: Alternative 1 includes proposed new and temporary roads; Alternative 3 includes only 1 mile of new road construction and temporary roads; while Alternative 4 reduces the amount of temporary road construction and also does not include any new permanent roads. Any new temporary roads being built for the project would be blocked and rehabilitated after logging to maintain proper drainage and eliminate vehicles from entering and using the route. In addition, there would be no increase in roads designated for public motor vehicle use.

339. Comment: a) Regarding the Rim Fire Recovery Plan, it needs to be based on sound scientific reports and processes. I am concerned about the amount of logging and the roads/road construction that comes along with it. Your Plan needs to take in account the natural environment and what is best for it, not just supporting the logging pressures being applied to this Plan. Salvage logging should utilize existing roads, and by there should not be any logging or road construction at all within the Clavey River Wild and Scenic River corridor. Any new roads should not be built where they are visible from the roadways – visual impacts need to be taken into account, we don't want our already fire ravaged forest to look like a clear-cutting logging operation. b) Keep salvage logging completely out of the core roadless area in the Clavey River canyon that is so important for wildlife.

4458 4239 4734

Response: No road construction is proposed under the action alternatives within the Clavey River Wild and Scenic River corridor; and 1/2 mile is proposed within the Scenic corridor. Some existing roads within the corridor are proposed for maintenance and roadside hazard tree mitigation, to provide for safe public and worker safety as well as to provide for long-term access. Numerous scientific publications are cited and utilized in the assessment of effects, both positive and negative. In addition, Alternatives 3 and 4 include detailed research proposals to address ongoing uncertainties and knowledge gaps in the scientific literature. There is no new road construction proposed in Alternative 4; Alternative 3 plans 1 mile of new road construction and there are 5.4 miles identified for Alternative 1 (Table 2.05-1). Alternative 1 proposes to build 0.2 miles of new road on P3N56Y to access unit A01A within the Scenic portion of the Clavey river corridor. Effects of Alternatives on the Clavey corridor are addressed in the EIS Chapter 3.12.

340. Comment: a) There should not be new roads constructed for salvage logging. Temporary road construction should be minimized. Existing roads should be repaired and maintained for public use. b) CSERC strongly opposes the construction of any new permanent road as proposed in Alternative 1 and Alternative 3 of the Rim Recovery DEIS.

5439 4467

Response: Alternative 4 was developed to address similar concerns, and follows these suggestions. Existing roads would be maintained or reconstructed to provide for safe and efficient Project implementation as well as to provide for long-term public and administrative access.

341. Comment: Reduce the number of miles planned for new temporary road construction (the burned watershed doesn't need more bulldozing and compaction or more vehicle disturbance for already stressed wildlife).

4239

Response: Alternative 4 provides a reduced amount of temporary road construction, while Alternative 2 addresses the effects of no action.

342. **Comment**: A major problem on the National Forest is the sediments from poorly maintained roads that are washing into creeks and rivers from uncontrolled erosion.

4467

Response: Best management practices will be employed on all Project roads, specifically to address water quality concerns through minimization of erosion leading to sedimentation.

343. **Comment**: Adding more permanent roads to an already backlogged system is simply not acceptable.

4467

Response: Alternative 4 includes no new permanent roads added to the Forest transportation system.

344. **Comment**: a) CSERC strongly urges the adoption of our Center's proposed Modified Alternative 4, which eliminates the construction of any new permanent roads and reduces the construction of new temporary roads from 8.38 miles to 3.11 miles. b) To the extent that no new temporary roads could be approved, that is what would be most beneficial for the watershed, wildlife, and soil resources within the project area. c) Road Construction: This is one of the Trust's highest concerns. The negative impacts of road construction on the health of forest resources has now been thoroughly documented. d) Additionally, it is equally documented that the extent of the existing road system within the Stanislaus National Forest is excessive and is the source of significant adverse impact to public resources. At a time when the forest has yet to reduce its road network to reduce those impacts, we strongly oppose any additional new roads to be constructed. e) Adoption of this portion of Alternative 4 is needed as it would eliminate any new road construction. By adopting the modified version of Alternative 4 detailed in the CSERC comment letter, significant further reduction of road related impacts would be achieved as fewer roads would need to be reconstructed or re- opened. f) Keep salvage logging completely out of the core roadless area in the Clavey River canyon that is so important for wildlife.

4467 5358 4239

Response: Alternative 4 has a reduced amount of temporary roads, while Alternative 2 includes no actions - including no temporary roads. This provides a decision space for the responsible official that could include your recommendation.

345. **Comment**: Even new temporary road construction that will be put to bed post-project still has high potential for erosional issues as well as disturbance of natural habitat. Recovering vegetation will be bulldozed and roots severed. Compacted, intact soil will be bulldozed, cut, filled, and otherwise reallocated on the slope.

4467

Response: Temporary road construction will be completed in accordance with the assigned management requirements and best management practices, as documented in the EIS. These practices are designed to reduce negative impacts, including erosion, in order to minimize sedimentation and protect water quality. Decommissioning will also be completed with applicable requirements, including proper drainage and subsoiling, to decompact the soil and rehabilitate the disturbed area.

346. **Comment**: as our Center recommends a reduced number of designated salvage units (see list CSERC's "Keep" and "Drop" units in Appendix A), we recognize that some of the units (that we reluctantly support to be retained in our Modified Alternative 4 for strategic fuel reasons) will be best served and have the least environmental impact by the addition of new temporary roads as proposed by Forest Service staff.

4467

Response: We acknowledge your preference to eliminate temporary roads that involve new construction where no route previously existed. The responsible official will consider this when making her decision.

347. Comment: a) Appendix B lists all the temporary new roads proposed in Alternative 4, with CSERC's comments on whether to "Keep" or "Drop" each of these roads. Note that the only temporary roads that CSERC has commented on are ones that are actually fully new construction, rather than being an old unclassified route or being a motorized trail, etc...b) Use existing roads, especially in the Clavey River corridor; this is preferred to building new roads.

4467 4625

Response: We acknowledge your preference to eliminate temporary roads that involve new construction where no route previously existed.

348. Comment: Salvage logging operations should utilize the existing road network, and there should be no new road construction. Salvage logging should be prohibited in sensitive areas, such as critical wildlife habitat, steep slopes and riparian corridors.

4652

Response: Salvage logging would be conducted in accordance with assigned management requirements and best management practices, as presented in the EIS in Chapter 2.03.

349. Comment: Prohibit construction of new roads and landings (whether "temporary" or not) due to long-term negative effects on soils and related watershed functions (Beschta et al., 2004; Karr et al. 2004).

5313

Response: Alternative 2 provides the responsible official with the effects from no action, including no new roads and no new landings.

350. Comment: Failure to properly analyze level 1 and 2 roads…Level 1 and 2 Roads Are Not Properly Analyzed. The roads maintained for public use were addressed with regard to hazard trees in the separate EA. The remaining roads [Maintenance Levels 1 and 2] are not maintained for public use, and are not essential for access. As such, logging along these roads is unnecessary, and amounts simply to additional acreage of post-fire logging, given that such roads could simply be closed, rather than logged...No basis is provided for the need to log all of these roads given that many, or all, are not essential to human transportation and could be closed or at least closed temporarily. Moreover, the urgency for treating the roads has not been established - for example, the roads (in part or in whole) could be closed temporarily until after flushing issues or wildlife issues are addressed...Finally, trees that are felled should be retained in the forest to provide large downed log habitat for small mammals, reptiles/amphibians, and invertebrates.

5335

Response: Maintenance level 2 roads are managed for high clearance vehicle use, and provide the majority of access to the fire area. While these roads are not "public roads" in the same fashion that the passenger car roads are considered, the majority of them are still currently designated open for public motor vehicle use. The Rim Fire Recovery Project presents a major opportunity to do something with the maintenance level 1 and 2 roads, before dead and burned trees begin to fall across and bury these routes, blocking access for future public and administrative use indefinitely. The proposed road treatments would not change any allowed uses within the Project area. In addition, the Project proposes to provide other treatments on these maintenance level 1 and 2 roads, including drainage improvements, in order to support long-term management of these routes. Without any treatments, the roads would eventually become inaccessible, and lack of maintenance, including drainage work, would be anticipated to lead to negative resource effects, including erosion and sedimentation.

351. Comment: The Rim Fire Recovery Road Treatments maps identify reconstruction of eleven Forest Service roads with encroachments on SR 120 and one skid zone east of Buck Meadows that appears to be in the SR 120 right of way. The exact scope of activities that may take place in the highway right of way is unclear.

5426

Response: The Forest Service plans to coordinate with CalTrans for work within the Highway 120 corridor, including new intersections where encroachment permits may be necessary,

352. Comment: We do not see the benefit of any new road construction, just temporary roads necessary for the logging project, as well as maintenance of existing roads. Temporary roads should be totally eliminated after completion of all logging operations, and the areas affected should be rehabilitated. Existing roads should be repaired and maintained for public use.

5428

Response: Any new temporary roads constructed for project access would be properly closed and rehabilitated in accordance with the assigned management requirements and best management practices, as documented in the EIS.

To address public concerns associated with new permanent roads, we have developed Alternative 4, which does not include any permanent roads, limits temporary road construction, and, similar to the proposed action, does not increase long-term public access in the project area.

Existing roads would be used whenever possible to access the proposed treatment units under the action alternatives. Since log yarding over long distances (greater than 0.25 miles) is both expensive and often can cause more disturbance than roads, we have proposed some new roads to reduce log yarding distances in some areas. A variety of options are present across the alternatives: Alternative 1 includes proposed new and temporary road; Alternative 2 includes no construction at all; while Alternative 4 reduces the amount of new construction and also does not include any new permanent roads. Any new temporary roads being built for the Project would be closed and rehabilitated after logging to maintain proper drainage and eliminate vehicles from entering and using the route. In addition, there would be no increase in roads designated for public motor vehicle use.

353. Comment: Unit D09: The USFS Groveland Ranger District applied (or planned to apply) for funding from the USFS Regional Office for the Granite Watershed Road Restoration Project. One purpose of this project was to close the road in Unit D09. The SFPUC wrote a letter of support for this project in 2011. Map 1 indicates this road will be reconstructed. The SFPUC prefers that this road be used only for administrative purposes and either be decommissioned or otherwise closed at the end of restoration activities (e.g., to be a temporary road through timber harvesting and reforestation).

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Response: It is our intention to have no changes to the existing Forest transportation system under this project decision. The road you refer to is currently stored (not drivable) and not designated for public motor vehicle use, and would be returned to this condition after project completion.

354. Comment: a) Comments on Road Use, Improvements, and Maintenance SFPUC has specific concerns (detailed in SFPUC's scoping letter dated January 3, 2014) with Forest Roads 1N14, 1N04, 1N86, 1N96, 1N96E, 1N82, 1N07, and 1S02. SFPUC's concerns are generally addressed in the purpose and need item 4 on page 8 and in management requirements (Table 2.03-3, page 37). The specific concerns were not located in the EIS other than Roads 1N14, 1N04, 1N86, 1N96, 1N96E, 1N82 being designated for reconstruction in Appendix E, pages 509, 510, and 512. SFPUC would appreciate the USFS contacting and working with Hetch Hetchy Water and Power (HHWP) staff when working on these roads. b) 1. Forest road 1N14 is a primary access road to Lake Eleanor for SFPUC and Yosemite National Park. a. Associated units O01, O02, O201. b. Surface replacement c. Grading and drainage. Upon completion of timber operations the road should be graded, culverts and ditches cleaned. d. Improvements, crossing. Please coordinate drainage improvements with HHWP.

5429

Response: The Forest Service will coordinate with HHWP when working on these routes.

355. **Comment**: 2. Forest road 1N04from its origin to the intersection with 1N14. a. The road has a number of survey benchmarks on the dam used to monitor movement. The monuments should be identified and left undisturbed. b. During grading surface material should be floated back across the road and not cast off the road.

5429

Response: The roadwork would be conducted in a manner to preserve existing assets including survey monuments and aggregate.

356. **Comment**: a) 3. Burnout Ridge Road is a new spur road off 1N86 and provides access to the Burnout Ridge Communication site. a. Associated units N03 b. Grading and drainage. This road has a steep approach to the facility and should not be used for skidding. Upon completion timber operations the road should be graded, culverts and ditches cleaned. b) 4. Forest roads 1N96, 1N96E, 1N82 are primary project roads used and maintained by HHWP. a. Associated units N01 b. Grading and drainage. Upon completion of timber operations the road should be graded, culverts and ditches cleaned.

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Response: The Forest Service plans to require an appropriate level of post-haul maintenance in the timber sale contracts.

357. **Comment**: 5. Forest road 1N07, Cherry Lake road north of Tuolumne River. The Cherry Lake road is the primary access road used by HHWP personnel. In addition HHWP invests in annual improvements to drainage and pavement. a. Associated units M05, N01 b. Crossings other than existing should be avoided. Landing on the road should be avoided. If crossings are proposed other than existing, coordinate with HHWP ROW Maintenance Manager on approach design, timing, and equipment type.

5429

Response: The Forest Service will coordinate with HHWP personnel regarding new crossings of the Cherry Lake Road.

358. **Comment**: 7. Forest Road 1S02 (Mather Road) is the primary access route for SFPUC staff and the general public visiting the National Forest, Yosemite National Park (Hetch Hetchy Reservoir) and Camp Mather. Traffic can be heavy at times. The road is set along the rim of the Tuolumne River Canyon and passes through several steep cliff areas. a. Associated units W06, U01, U02, U03 b. Public Safety is a primary concern. During haul set up traffic lights to control traffic on narrow segments, blind corners and steep slopes. ii. Establish a maximum speed of 25 through steep cliff areas. iii. Restrict hauling during the week leading up to the Strawberry Festival and part of the week after. iv. Avoid hauling logs during the winter months.

5429

Response: We will consider traffic safety mitigations as part of the timber sale contract. Also, Chapter 3.08 of the EIS states: "Because logging operations would not occur along or adjacent to Evergreen Road on weekends during the peak summer season (from July 3 through July 5, during Memorial Day and Labor Day weekends, and during the special event on Evergreen Road), negative effects are lessened for Diamond O Campground and Peach Growers Recreation Residence Tract, along with the private properties of Camp Mather and Evergreen Lodge. The reduced logging operations and hauling during peak travel time for visitors to the forest should reduce the potential for accidents related to industrial vehicles in use in the project area."

Vegetation

359. Comment: [DEIS Chapter 1, Page 17] "Application of sporax may affect implementation of the logging because it is not necessary and adds costs." Why is sporax application unnecessary if it prevents root rot? Is it unnecessary because sporax is ineffective or that USFS is not concerned with root rot?

4500 5412

Response: This was an issue statement made by the public during scoping, not a proposed action by the Forest or an effects analysis. Chapter 2 of the EIS describes the proposal for borate application.

360. Comment: The Draft EIS does not currently analyze the potential risks to nearby recreational users who may encounter granular borate on the forest floor or swim in rivers or streams that are contaminated with borate. The Forest Service, in a 2006 report concerning the application of borate compounds (e.g. Sporax), noted that for "a child that consumes Sporax applied to a tree stump, hazard quotients exceed the level of concern for small children (HQ range of 2 to 16)," and that the most likely adverse effects to children would probably be vomiting and diarrhea. (U.S. Dept. of Agriculture, Forest Service, Human Health and Ecological Risk Assessment for Borax (Sporax), Final Report, 2006, pp. x, 3-26.) The report also stated that "developmental, subchronic and chronic toxicity studies show that the primary targets for borate toxicity are the developing fetus and the male reproductive system."

5414

Response: A site specific risk assessment consistent with direction from Forest Service Manual (FSM) 2150 and Forest Service Handbook (FSH) 2109.14 was completed for the project and analyzes the potential risk of borate application associated with the proposed project. This analysis includes risks to Forest users. This report was used to inform project management requirements. Sporax will be hand applied to cut green fir stumps which means all will be within roadside hazard tree areas since within salvage units only those trees with no visible green needles will have borate applied.

361. Comment: a) Because the application will be granular, ground disturbance by either humans or wildlife, or high winds in areas near surface waters could also present risks of contamination of water bodies. The Middle Fork of the Tuolumne River runs directly through Camp Tawonga's property, and thus any and all potential water contamination should be minimized to the extent feasible. b) We would ask that the Draft EIS be amended to specifically analyze the risks to recreational users in areas by treatment units where borate will be applied, in particular small children who are at an increased risk of exposure and increased risk of illness from exposure. Because of the heightened risk to young children, at Camp Tawonga we physically remove invasive vegetation in order to avoid the use of pesticides such as Sporax.

5414

Response: A risk assessment consistent with direction from Forest Service Manual (FSM) 2150 and Forest Service Handbook (FSH) 2109.14 was included in the Vegetation report for the project and analyzes potential risk of borate application associated with the proposed project. This analysis includes risk of spill and water contamination. This report was available for the EIS and was used to inform project design criteria.

362. Comment: a) Reforesting should not include the use of any herbicides, as this would poison the very fragile ecosystem, as well as pollute the vast watershed that we all rely on. b) Use of herbicides must be avoided by reforesting quickly before shrubs come in. Herbicides can poison the very fragile ecosystem and pollute the vast watershed that we all rely on, and if too much logging occurs too quickly, reforestation efforts won't happen in time to avoid the need for herbicides to get rid of shrubs that will dominate the new trees. c) Reforestation with native vegetation should be the top priority of forest management within the burn zone. d) The current forest plan (Sierra Nevada Forest Plan

Amendment) requires the FS to initiate restoration of natural fire regimes. Plantations result in simplified forest structure, loss of natural successional processes, loss of biological diversity and wildlife habitat; and they contribute to increased fire hazard while making it next to impossible to restore natural fire regimes (Sapsis and Brandow 1997; CDFG 1998; Franklin and Agee 2003; Odion 2004; Franklin 2004; Stephens and Moghaddas 2005; Noss et. al 2006, Donato et al. 2006). e) In closing, I would like to encourage the Forest Service to not only plant the most damaged sites, but also to have in place a long-term monitoring and fuel treatment program in those reforested areas so that we avoid a repeat, if at all possible, of last year's events. f) Just planting trees isn't enough - using active management over time, we must see these young plantations through to becoming mature forests with all the social, economic and ecological benefits they will offer to future generations. g) Withdraw current plans to artificially plant conifers, and remove/reduce shrubs, in the Rim fire area. h) In addition to conifer re-plantings, other rehabilitation efforts within the Corral Creed drainage might include select riparian vegetation plantings, such as willow and alter. It is possible there will be enough response of natural vegetation to negate any need for rehabilitation efforts. i) We strongly urge that the Forest Service commit to designating an appropriate budget that will allow inventory and mitigation for stopping the spread of noxious weeds post-project across the many tens of thousands of acres of both hazard tree removal and salvage logging treatments. j) The DEIS did not analyze the cost of repeating the same failed silvicultural methods that preceded the current disaster. Embarking upon salvage logging at the scale proposed in the Rim Fire commits resources to the first step in a trajectory that is headed towards more planting, increased fire hazards and unnatural fuel loading, and loss of biodiversity, as it did in the Stanislaus Complex, Ackerson, and Rogge fires. k) When the Forest Service progresses to reforestation efforts within the Corral Creek drainage, Douglas Fir is certainly the coniferous tree that should be featured. l) Granite Creek watershed. The SFPUC appreciates and supports efforts to mitigate soil movement and debris flows that could potentially impact Holm Powerhouse. The SFPUC supports all restoration efforts and encourages reforestation throughout the area. m) Complex early seral forest can result in natural resilience to climate change. Early seral forests naturally regenerate and provide for better adaptation to present and future climate change and other environmental stressors over nursery grown plants. Salvage logging can result in a loss of resilience.

5428	5439	4498	5449	5479	5313	5469
4467	5429	4331				

Response: No specific reforestation projects are proposed and it would be speculative to address reforestation at this time. The analysis of reforestation is thus beyond the scope of the Rim Recovery EIS.

363. Comment: [The DEIS] Fails to Analyze Adverse Impacts and Cumulative Effects of Tractor Logging on Current Conifer Seedlings...Nowhere does the DEIS divulge the existence of regenerating conifers or analyze the adverse impacts and cumulative effects of proposed logging - approximately 85% of which would be ground-based tractor logging - on this natural regeneration, especially in terms of direct mortality of seedlings (see, e.g., Donato et al. 2006). This is particularly problematic given that facilitating the return of conifer forest is one of the main stated purposes and needs of the Project (DEIS, p. 8), and given that the Forest Service must have known about the natural regeneration well before the DEIS was released - a DEIS which claims...that natural conifer regeneration will not occur in the large high-severity fire patches except adjacent to edges.

5335

Response: Nothing in the Purpose and Need (Chapter 1 EIS) or in the EIS discusses the facilitation of the return of conifer forest within the landscape. The Vegetation Report (part of the project record) did look at the effects of salvage logging on natural regenerating seedlings.

364. Comment: We agree that salvage logging is the logical, best use of the burned areas of the national forest; the sooner the better, while the trees are still salvageable. Begin reforestation efforts as quickly as possible before competing shrubs have a chance to take hold.

5428

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

365. Comment: Please recognize that much of the private land in the burn area (managed by timber companies) is already being severely cut, scraped and replaced with commercial tree plantations. This activity places even more importance on the idea that recovery plans for the public forest should focus on restoring biological diversity and protecting sensitive species.

4803

Response: We agree.

366. Comment: At present there is a reasonable seed catch of Douglas Fir seedlings from burned parent trees. It would be best to avoid those young trees where possible.

5469

Response: Natural regeneration would continue to be present in areas where salvage logging does not occur. The avoidance of individual patches of regeneration would result in increased complications to operability and drastically increase the cost of implementation.

367. Comment: I am writing as a concerned California citizen who loves our forests and wants to see them healthy and robust for future generations. Forestry management is complex - and I hope that the forest service is using the best available science to make reasonable decisions. The long term health of the forest and the community is vitally important, and the science should be directed towards that end. We should not be managing our forests for short-term economic gains at the risk of long term devastation. This implies that no additional roads should be built in order to salvage what's left of the Stanislaus, unless it can be proven that roads are helpful to the forest soil and ecological health. It also implies that a big investment should be made in replanting areas that need it. Replanting and restoration generates jobs while it lays the groundwork for a beautiful place for people to enjoy.

4739

Response: Alternative 4 does not propose any new road construction.

368. Comment: The DEIS's Assumptions About Natural Conifer Regeneration in High-severity Fire Areas are Erroneous and Unsupported...The DEIS claims (p. 147) that natural post-fire conifer regeneration will not effectively occur in higher-severity fire patches...This claim is contradicted by the current science...One recent study found 715 naturally-regenerating conifer seedlings per hectare in high-severity fire patches in the Storrie fire... (Crotteau et al. 2013). An earlier study found that, in eastside mixed-conifer forests dominated by fir species prior to the fire, there were 183 conifers/ha over 2m tall at 23 years post-fire in an unmanaged high-severity fire patch, and the natural conifer regeneration was 79% "yellow pine complex"...(Raphael et al. 1987). Moreover, the Vegetation Report (p. 10) misrepresents Crotteau et al. (2013) and Donato et al. (2009), which did not provide data on post-fire conifer regeneration as a function of distance into high-severity fire patches; indeed, Crotteau et al. (2013) found high natural post-fire conifer regeneration when surveys in high-severity areas were focused in very large patches (Crotteau et al. 2013, Fig. 1). The other citations on p. 10 of the Vegetation Report on this point either do not support this assertion, or cannot be verified due to incomplete citations (e.g., citations followed by multiple question marks in the text, and citations that are not in the references section). Further, the Vegetation Report (p. 15) implies that natural post-fire conifer regeneration will not occur more than two mature tree lengths into high-severity patches due to lack of seed source, citing McDonald (1983)...McDonald (1983) is not included in the references section and did not come up in a search of the literature...Further, the Forest Service's often asserted assumption that higher-intensity fire areas will not naturally regenerate with conifers is directly contradicted by the Forest Service's own data regarding natural post-fire conifer regeneration in large high-intensity fire patches (Collins et al. 2010)...consistent with findings from other studies (Shatford et al. 2007). while a more recent report from Collins and Roller (2013) claims to find little natural conifer regeneration in many high-severity fire areas...in that study, nearly half of the area surveyed had been subjected to intensive post-fire logging...and most of the other areas had been clearcut prior to the fires...or were naturally non-conifer forest, e.g., black oak.

5335

Response: The Vegetation report deals with this discussion and made some corrections based on comment.

369. Comment: Failure to acknowledge and account for the post-fire conifer - especially pine - regeneration that is already occurring in the project area…The DEIS Fails to Disclose Natural Post-fire Conifer Regeneration Currently Existing Deep within Large High-severity Fire Patches...On May1, 2014, approximately two weeks before the DEIS was released, we conducted a site visit of the Rim fire on the Stanislaus National Forest, focusing on the six largest high-severity fire patches within conifer forest...In all cases we found natural post-fire conifer regeneration already occurring - not only within 100 meters of patch edges, but also dozens to hundreds per acre (and occasionally thousands per acre) hundreds of meters - even more than a kilometer - into the interior of the largest high-severity fire patches [commenter included several photographs taken by Chad Hanson, Ph.D., 5/1/14].

5335

Response: Best available science was used in the analysis. Regeneration is discussed in the Vegetation report under existing conditions and in effects.

370. Comment: …the DEIS fails to meaningfully divulge the existing natural regeneration of oaks in the large high-severity fire patches, or analyze the impacts and cumulative effects of ground-based logging on regenerating oaks, in violation of NEPA [commenter attached two photographs taken by Chad Hanson, Ph.D., 5/1/14].

5335

Response: Flagging and avoiding hardwood aggregations is included as management practices (6g) for alternatives 3 and 4 in Chapter 2 of the EIS.

371. Comment: Failure to properly acknowledge and account for post-fire flushing (see Hanson and North 2009)…The DEIS Fails to Account for Flushing. The DEIS does not adequately address the existence and extent of post-fire conifer flushing - production, in late spring of 2014 (and ongoing), of new green needles in many thousands of ponderosa pines that had no green needles after the fire (Hanson and North 2009) - and the degree to which this alters the assumptions and conclusions in the DEIS with regard to conifer seed sources, fire/fuel loads, ground cover, and fire severity in California Spotted Owl PACs/HRCAs.

5335

Response: Salvage proposal is to salvage dead trees and to remove green and dead hazard trees. If trees flush is visible prior to salvage logging, which based on the literature sited in the comments would have occurred, these trees would not be removed during salvage operations. (Chapter 1EIS.)

Watershed

372. Comment: Stay out of the South Fork Tuolumne's flood plain.

5298

Response: Management requirements designed to protect water quality and watershed conditions are derived from Regional and National BMPs (USDA 2011d, USDA 2012a) and Riparian Conservation Objectives (RCOs) (USDA 2004a). Riparian resources within Riparian Conservation Areas (RCAs) and the Critical Aquatic Refuge (CAR) will be protected through compliance with the RCOs outlined in the Forest Plan (USDA 2010a). BMPs protect beneficial uses of water by preventing or minimizing the threat of discharge of pollutants of concern.

BMPs applicable to this project are listed in the EIS in Chapter 2 with site-specific requirements and direction.

373. Comment: Comments on Management Requirements 4c, page 26. Falling trees into watercourses at greater than 45 degrees from perpendicular could divert water flow into and erode streambanks. This potentially increases turbidity and negatively impacts water quality. Strategically placed logs across watercourses could slow water flow and create aquatic habitat. The SFPUC requests that this requirement include professional input on a site-specific basis.

5429

Response: We agree that certain channel types would be vulnerable to bank erosion if additional large woody debris is introduced intentionally into the channel and impacts to water quality could occur. The involvement of a watershed specialist is discretionary but could be used under specific conditions. Alternatives 3 and 4 would require snags retained in riparian areas to remain standing until natural forces bring them down.

374. Comment: Berkeley Camp is located in the riparian corridor of the South Fork Tuolumne River. Onsite mastication techniques should be employed to effect immediate initial erosion control measures. Such techniques should also be employed along all of the burned-over sections of the South Fork Tuolumne, where practical.

5370

Response: Mastication is planned for certain locations within selected salvage harvest units that have high erosion risk (See EIS Appendix E.04). Erosion control treatments outside of salvage units are administered under different authorities, including Special Use Permits.

375. Comment: ...the DEIS does not contain an adequate analysis of the Soils or Watershed sections (or any other sections) about the adverse impact of ground-based logging (and associated trampling by logging crews) on the abundant natural vegetation regeneration currently occurring in the high-severity fire patches—including in the large patches—in the Rim fire area.

5313

Response: Project effects of ground-based logging on natural vegetation recovery are summarized in Chapter 3.01 in the EIS. For riparian areas, see management requirements for avoiding damage to riparian obligate trees and shrubs (EIS Chapter. 2.03), and see the Watershed Report for effects. For hillslopes, management requirements mitigate salvage harvest effects on vegetation recovery by limiting tractor footprint, and by subsoiling skid trails, which reduces compaction and increases infiltration to improve potential for vegetation recovery. Dominant local ground cover such as bear clover often fills in as well as manzanita and deerbrush. Sprouting hardwoods such as oaks are usually not affected by ground based logging. Though the rate of hillslope native species regrowth may be slowed it will return and provide adequate cover to stabilize areas affected by post-fire management activities.

376. Comment: a) Post-fire logging, especially tractor logging and road and landing construction and reconstruction, damages soils and watersheds through compaction and other soil damage, causing long-term soil loss and chronic sedimentation (as opposed to natural, pulsed sedimentation, which occasionally happens in localized areas shortly after fire occurs, and rejuvenates aquatic habitats). b) Both Karr et al. (2004) and Beschta et al. (2004) note that post-fire riparian logging is antithetical to post-fire watershed recovery. However, the project proposes a large amount of riparian logging, the long term impacts of which are not adequately assessed in the DEIS. Importantly, the impacts of post-fire logging on watershed processes and conditions, including aquatic wood loss and soil damage, are extremely persistent, contributing to long term watershed impairment. c) The DEIS also fails to reasonably assess the persistent damage to watersheds and aquatic systems caused by the cumulative impacts of the proposed post-fire logging and related activities. Finally, as discussed above, the DEIS is inconsistent with the best available science standard of the NFMA regulations. d) Failure to properly address soil and watershed impacts…Soils and Watersheds Are Not Appropriately

Described or Analyzed. The DEIS fails to meaningfully address or analyze the detailed scientific comments of hydrologist Jon Rhodes (scoping comments) and Chris Frissell (scoping comments) with regard to adverse impacts and cumulative effects of proposed logging and road/landing construction/reconstruction on soils, watersheds, and aquatic systems, including soil compaction, chronic sedimentation/erosion, and reduction in potential for delivery of large logs to stream systems. As such the DEIS fails to take a hard look under NEPA. We fully incorporate by reference the scoping comments of Jon Rhodes of [sic] Chris Frissell into these comments. The DEIS also proposes helicopter logging on many units but fails to discuss the serious impacts such logging can have due to its occurrence on steep slopes.

5313 5335

Response: The amount of road construction is negligible to none among the action alternatives (5.4, 1 and 0 miles for alternatives 1, 3 and 4). Road reconstruction is expected to reduce sedimentation by improving drainage function. Chronic soil loss is not expected though short term erosion and sedimentation effects from logging have been disclosed in the EIS. Soil erosion from ground based logging is mitigated by limiting the amount of disturbed area, water barring skid trails and landings and subsoiling both to reduce compaction and increase infiltration. Based on stream monitoring (see Watershed Report and Stanislaus Streamscape Inventory data, Project Record), and long term watershed staff observations, past salvage logging and related (cumulative) activities on the Stanislaus National Forest has not resulted in chronic or persistent soil loss or sedimentation that has adversely affected vegetation growth or aquatic habitats or species.

377. Comment: a) Restoration of the watershed must be the theme of the Rim Fire recovery. Certainly salvage and risk management timber removal is the key to the management of the resources, however the value of leaving significant amounts of wood materials is a substantial benefit to soil restoration. b) Dead trees add biomass to the soil which lessens the effect of soil erosion during storms. c) Salvage work should be sensitive to the potential for runoff and sedimentation. Leaving existing biomass will eventually enrich the soil and reduce runoff.

5422 5099 4410

Response: The purpose and need for the project are described in detail in Chapter 1 of the EIS. The maximum extent of proposed activities covers approximately 30 percent of the National Forest System lands within the Rim Fire Perimeter. Watershed Sensitive Areas were identified in the EIS as areas where soil surface organic material is required to benefit water and soil resources and specific prescriptions for "drop and lop" or mastication to protect these areas are part of Alternatives 3 and 4. Dead tree retention will occur. See management requirements in Chapter 2.03 for wildlife, near-stream large woody debris and soil protection for amounts and types of wood to be retained on site. See also Watershed Treatments (EIS Appendix E.04).

378. Comment: The current drought conditions throughout the State, including the Tuolumne River watershed, have significant effects on the availability of water we can supply to our 2.6 million customers in the Bay Area. In response, we are working to repair the Lower Cherry Aqueduct (LCA, damaged in the Rim Fire), which would restore SFPUC's historic capacity for accessing the Cherry Creek standby watershed for domestic drinking water supply during dry periods. We are working to make the LCA functional within this calendar year. Since it is increasingly likely that these standby watersheds, for which the SPFUC has water rights, will be used for domestic water supply for extended periods of time starting as early as November 2014, our concerns related to potential effects from salvage logging activity (e.g., turbidity) have also increased.

5429

Response: There are no salvage logging units proposed upslope of the LCA. There are four helicopter units proposed upstream near the confluence of Cherry Creek and Miguel Creek. These are expected to produce negligible sedimentation/turbidity since helicopter logging reates minimal ground disturbance.

379. Comment: There's no discussion on water sources as to whether or not it is reasonable to expect sufficient surface flows for drafting to take care of dust abatement on the native surfaced and aggregate surfaced roads, particularly late summer and early fall. If there is likely to be insufficient water, the action alternatives should include several permanent wells with underground storage tanks to provide sufficient water. These can also serve in the future to assist on any fire suppression, vegetation treatments, and or prescribed burning activities.

3623

Response: It is expected that there will be sufficient flows for drafting over the course of this project. If drought conditions persist, it is likely more drafting from larger rivers will be required resulting in additional haul distances. There are plans to use temporary storage tanks as needed.

380. Comment: The draft EIS indicates dust abatement will occur within the Project area; it is unclear if surface water will be used as the sole method for dust abatement. The Department has concerns regarding water drafting from surface waters during times of drought. The Department encourages the Forest Service to investigate other means of dust abatement and road treatment methods to minimize the amount of water needed. The Department also advises the use of storage tanks to collect water gradually (i.e. over a 24-hour period), and to include recovery times between pumping events. Further, the Department encourages the Forest Service to incorporate best management practices into the project design that reflect this historic drought.

5420

Response: Surface water is expected to be the sole source of drafting for dust abatement. Though the Forest Service has federal reserved water rights for such use, drafting is subject to BMP-based management requirements to retain water in streams for aquatic species and maintaining minimum flows, (see Water Sources Management Requirements in Chapter. 2.03 of the EIS). Storage tanks are planned as needed for increasing recovery times between drafting events.

381. Comment: a) Based on the acute concern expressed in the literature about the effects of salvage logging on aquatic resources, the action alternatives must provide far more detail and criteria on which to base a decision to salvage log in these sensitive areas. Nonetheless, the current action alternatives allow extensive salvage logging in Riparian Conservation Areas without establishing how such activities will benefit riparian function or meet the riparian conservation objectives in the forest plan (USDA Forest Service 2004a). b) We also found no specific discussion in the DEIS about the Riparian Conservation Objectives (RCOs) or the consistency of the action alternatives with the RCOs. c) We ask that consistency with the RCOs be explicitly evaluated in the EIS for all actions proposed in the RCAs.

5438

Response: See Table 2, in the Watershed Report (Project Record). This table, Compliance with the Forest Plan and Other Direction, displays how project activities meet riparian conservation objectives.

382. Comment: The Forest Service should consider more intensive salvage in riparian areas such as was conducted after the Panther fire on the Klamath National Forest especially in the steeper slopes where the riparian areas served as chimneys to rapidly spread the fire. The objectives of the riparian treatment for the Panther salvage under the Northwest Forest Plan was to reduce fuels in the riparian areas to minimize the risk that unsalvaged riparian areas would serve as expressways for wildfire to reach a vast acreage. The Forest Service should adopt more extensive salvage in riparian areas in the Rim Fire project.

5407

Response: Salvage logging will be conducted in riparian areas within high and moderate burn severity salvage units. The principal purpose is to reduce fuel loading to help lessen the risk of future wildfire in stream corridors acting as potential "wicks" for spreading fire to the uplands. See management requirements for operations in RCAs in Chapter 2.03 of the EIS.

383. Comment: a) The Rim Salvage project appears to allow far more disturbance in sensitive riparian areas than any other recent salvage project that we have reviewed. This occurs because the Stanislaus National Forests (STF) appears to be implementing atypical practices in Riparian Conservation Areas (RCAs). Apparently, the STF imposes an equipment exclusion zone only within the first 15 feet of any stream course regardless of classification. b) We are aware of no other national forest, except the STF, that utilizes an equipment exclusion zone as small as 15 feet. c) All of these examples provide significantly greater protection from ground disturbance and disruptive actions compared to the management requirements for the Rim salvage project.

5438

Response: Only low ground pressure track laying machines such as masticators and feller-bunchers are allowed to operate as close as 15 feet of streams. There is also a management requirement to maintain or provide ground cover within 100 feet of perennial and intermittent streams and SAFs to the maximum extent practicable, with the goal of a minimum of 50% well distributed ground cover. The ground-based RCA equipment exclusion zone would be increased to 100 feet in areas where slopes immediately adjacent to perennial and intermittent streams have slopes of 25 percent to 35 percent and slope lengths are greater than 100 feet.

384. Comment: a) Most important is to foster water quality and soil health. No new roads should be built for this project. Road density is already excessive on the project area for watershed health, and there is more timber available than time to harvest and process it. b) New road construction in the burned area should be avoided as burned slopes are particularly susceptible to mass wasting and erosion along road corridors. These effects will negatively impact the ability to reforest the burned landscape and are likely to have devastating effects on fish and wildlife. Increased sedimentation will negatively affect water storage potential in downstream reservoirs. c) New roads construction and any plan that includes clear cutting, skidding logs with heavy equipment on side hills or steep slopes, or any removal of green timber will only further damage the watershed. d) Any logging trucks and roads in the area will only add to erosion as they disturb the soil. e) My main concern is with the proposed road creation within the watershed and surrounding area. If a human consistently walks the same path through a forest, a trail is made, next time you are on a trail please recognize the lack of vegetation and life within that footpath.

5477 4498 4539 5099 5100

Response: Alternative 1 would result in 5.4 miles of new construction which is much less than a 1 percent addition to the existing road mileage in the fire area. Alternative 3 proposes 1 mile, and in Alternative 4 there would be no road construction. Project management requirements carefully control construction and the Watershed Report describes that soil and water effects will be negligible based on this very small scale of road construction.

385. Comment: The salvage logging proposed in the Clavey River watershed threatens rare and unique resources. Protection of these and other unique resources should have been considered in a conservation alternative. Salvage logging, as noted below, in the uplands and riparian areas of this watershed increase the likelihood of sediment transport and increase risks to water quality.

5438

Response: Management requirements were designed to protect water quality and watershed conditions and are derived from Regional and National Best Management Practices, Riparian Conservation Objectives, and are in compliance with the Forest Plan. (EIS Chapter 2.03)

386. Comment: Substantial soil movement and loss has occurred due to the fire. Siltation has resulted in has choked spawning gravels in Reed Creek, Corral Creek, Jawbone Creek and numerous other waterways. Large soil losses occurred over areas within the Cherry Creek watershed. In all, significant damage to water quality resulted from the devastating fire. Watershed enhancement over much of the intensely & extensively burned areas, including meadow protection and rehabilitation, is a definitely need.

5471

Response: We agree with the two points of your comment: siltation has adversely impacted spawning and watershed enhancement is needed in the fire area. We consider the actions proposed in this EIS to be one part of the restoration of portions of the burned area. The existing fuel loads create localized conditions for enhanced fire behavior in the future. This is an example of a restorative action and it also lends itself to more efficient reforestation in the future. .

387. **Comment**: In reference to Beschta et.al. 2004. Here is what you present to the public on page 258 of the DEIS: "The type of logging system used can affect sediment production. Helicopter logging and cable yarding systems with partial or full suspension typically have smaller impacts on sediment production (Beschta et al. 2004)." Here is a quote from the Abstract excluded from the source above showing public deception is your goal. “We examined, via the published literature and our collective experience, the ecological effects of some common postfire treatments. Based on this examination, promising postfire restoration measures include retention of large trees, rehabilitation of firelines and roads, and, in some cases, planting of native species. The following practices are generally inconsistent with efforts to restore ecosystem functions after fire: seeding exotic species, livestock grazing, placement of physical structures in and near stream channels, ground-based postfire logging, removal of large trees, and road construction. Practices that adversely affect soil integrity, persistence or recovery of native species, riparian functions, or water quality generally impede ecological recovery after fire.”

2

Response: Following the statement about helicopter and cable yarding systems in Chapter 3.14, ground-based logging effects are described as well. The expected effects of all Rim Fire salvage logging methods are described.

388. **Comment**: a) The possibility that this salvage activity would cause sedimentation of the watershed which kills fish and aquatics and is expressly forbidden by the State Water Board should be sufficient reason to be extremely cautious in doing any mechanical activity in any area that is steep, sloped, or near a watercourse. b) Those forest and brush lands represent a huge watershed and the remaining trees are what little there are too slow heavy rains and retain topsoil for short-term recovery. Heavy equipment in the steeps area creates ruts that carry water too quickly from where it is needed and loads streams with mud.

4524 5360

Response: Management requirements carefully regulate mechanized activities (EIS Chapter 2.03)

389. **Comment**: The EIS states that BMPs will protect the water quality of the rivers, but acknowledges that these BMPs will not effectively address all anticipated stream sedimentation, and in particular in portions of the Middle Fork Tuolumne River, which runs directly through the Camp Tawonga property. (DEIS, p. 260.) This statement, however, does not carry through to the EIS's "Summary of Effects" (p. 280.)

5414

Response: The statement referred to in Chapter 3.14 begins with the last paragraph on page 280 and continues on page 281 of the DEIS. The page number may vary in the EIS.

390. **Comment**: ...the EIS must clarify that stream sedimentation is an 'unavoidable adverse effect" of the Project.

5414

Response: Unavoidable adverse effects of the project are described in Chapter 3.19, which by reference includes stream sedimentation.

391. Comment: It is clear that the EIS has not effectively considered all possible mitigation measures for further reduction of sedimentation effects of the Project. For example, the Draft EIS should explore the use of silt fencing or other debris-retention barrier devices in high-bum areas that are particularly at risk of additional erosion from Project activities. The Draft EIS should also impose additional buffer zones and should specify what sediment-control devices will be used to reduce sedimentation of streams, rivers, and other aquatic features in the Project area.

5414

Response: All known cost-effective erosion control measures have been planned as well as additional special project practices for areas of high erosion risk (see Management Requirements, EIS Chapter 2 and Watershed Sensitive Areas, and EIS Appendix E.04). Silt fences or barriers such as fiber rolls are not cost-effective at the scale of the Rim Fire.

392. Comment: Use and reconstruction of existing Forest Service roads and encroachments should incorporate storm water best management practices to reduce sediment tracking onto SR 120. Road reconstruction under encroachment permits will be subject to current Departmental standards.

5426

Response: Proposed access roads for Project use will receive treatments in line with assigned management requirements and best management practices as documented in the EIS.

Any new temporary roads constructed for Project access would be properly closed and rehabilitated in accordance with the assigned management requirements and best management practices, as documented in the EIS.

393. Comment: Project activities, including operation of equipment within the SR 120 right of way, present the potential to alter drainage patterns and affect SR 120 drainage facilities. Project design and environmental evaluation should anticipate the need to maintain existing drainage patterns and to mitigate for any changes to peak flows to Department facilities.

5426

Response: Roadwork will be designed to minimize adverse effects to SR 120.

Wild and Scenic

394. Comment: a) Preserve the proposed Clavey River Wild and Scenic corridor - allow no road construction or salvage logging there. b) There should be no road construction or salvage logging in the proposed Clavey River Wild and Scenic corridor. c) The Forest Service is officially on record as endorsing the Clavey River for Federal Wild and Scenic River status. Great care must be given to do nothing that would diminish the prospect of that status being reached. No new roads and no salvage logging in this specific area should take place. d) It is imperative that the watershed of the Clavey River be left alone, that no new roads be constructed, and that the river's watershed should have salvage logging only where absolutely necessary to protect existing, traveled roads. e) Outstanding and Remarkable Value # 8, Recreation: "Access is limited and portions are remote and wild, resulting in a rare and unique opportunity for solitude and non-motorized recreation experiences" (Stanislaus Forest LMP as quoted in Steve Apperson, et. al., Wild and Scenic River Value Review [W&SRVR], Stanislaus National Forest, USFS, December 1997). This value pertains to river segment 5, the lower Clavey canyon. However I would argue that because of the unique characteristics of the Clavey (below), it should apply to the entire watershed. There should be absolutely no road building or ground disturbance in the watershed of the Clavey is order to keep this Value. f) "(Segments 1-5) The Clavey River (including Bell and Lily Creeks) has a combination of landscape ecology features making it distinct within the Sierra Nevada: 1) free-flowing characteristics; 2) abundance and quality of life zones and vegetation; 3) elevation range; and, 4) relative remoteness and lack of development" (W&SRVR, p. 2-1). The "relative remoteness and lack of development" is an attribute of the entire watershed that needs to be protected by management decisions. Again, there should be no new roads and no logging except for hazard trees that are absolutely a danger to those using the roads. g) In another part of the W & S Study, the unique character of the Clavey is noted again and explained:

"Another feature of the Clavey River is its minimal development. It is almost entirely under federal ownership; even the portions outside of Wilderness are relatively undisturbed and remote. Private lands and developments such as towns and roads line portions of most other rivers in the Sierra. The Clavey, although crossed by several roads, has remained relatively undisturbed because of its remoteness, rugged nature and its north-south geographic orientation. For much of its length, the Clavey runs perpendicular to the east-west trend of major roadways in its watershed" (W&SVR, p. 2-1). Leave it undisturbed! Of course there are now portions where the conifer forest has burned, but that has ecologic and scenic value as well. We all must learn to appreciate the landscape that has burned, as well as we appreciate the one that is heavily forested. h) Finally, the DEIS' "Wild and Scenic Draft Specialists Report" makes an important observation: "Fire activity in the Tuolumne River canyon will be ongoing and is part of the evolution of the ecosystem. Scenery and other ORVs are forever changing in this system with vegetative growth, fire, and regrowth" (pg. 6). This is an extremely important point going to the question as to what "scenic values" should look like and how the watershed should be managed. In spite of the Rim Fire, the Clavey watershed is still an extremely unique and valuable drainage. There is great scenic and ecological value for recreationists as well as forest professionals in seeing how the land "recovers" without logging disruption and in the face of climate change. i) Stay out of the Clavey Watershed. j) Despite recognizing these truly "outstandingly remarkable qualities," the Preferred Action Alternative proposes to salvage log 664 acres and construct new roads into the proposed Wild & Scenic corridor. k) The risks to the array of its outstandingly remarkable qualities far outweigh any of the benefits associated with the proposed salvage logging. Alternative 4 should be modified to eliminate all of the proposed salvage logging and road construction within the proposed Clavey Wild and Scenic River corridor. l) Additionally, the proposed salvage logging within the Clavey watershed should be significantly reduced as its large tract of old-growth forest habitat is probably the most important area for snag-dependent, at-risk wildlife within the Stanislaus National Forest. m) The Forest Service is to be commended for expeditiously restoring access to the river put-in at Meral's Pool by removing hazard trees. With Lumsden road now open for river access, the most important hazard removal work has been completed within the existing Wild & Scenic corridor. We recommend avoiding further work within the Wild & Scenic corridor, as risks to the aesthetic experience outweigh the minimal benefits of such work. n) Since so much of the overall quality of the experience of being on the river is its sweeping vistas, ever-changing mosaic of vegetation and the opportunity to experience native wildlife, we urge that salvage activity be minimized within the viewshed. o) Where it is deemed necessary for fuel reduction purposes or to open migration corridors, the minimal amount needed [salvage] for those purpose should be removed in order to minimize impacts to the visual experience and wildlife habitat, which are highly valued part of the recreational experience. p) Wildlife habitat and roadless areas should be maintained especially in the proposed Clavey River Wild and Scenic corridor. q) The logging being done along the highway is great and fine, but building roads into the Wild and Scenic section of the Tuolumne for salvage logging purposes will destroy the beauty and seclusion that canyon offers state residents. Please consider the Wild and Scenic nature of the canyon salvage logging will destroy. r) There should be no road construction or salvage logging in the proposed Clavey River Wild and Scenic corridor as this will negatively affect the unique values that make this area a candidate for Wild and Scenic status.

4397	4400	4865	5298	5358	5457	3928
4498						

Response: The Wild and Scenic Rivers Act of 1968 (Public Law 90-452) and The California Wilderness Act of 1984 directed management agencies to "protect and enhance" the Outstandingly Remarkable Values (ORVs) of the river corridors. In the later management plans (Stanislaus NF LMP and the Tuolumne Wild and Scenic River Management Plan), standards and guidelines were designed to recognize that long-term protection and enhancement of river values sometimes involved short-term impacts. In the Rim Fire Recovery Project, salvage and road development activities (construction, reconstruction, repair, and maintenance) are proposed in Wild and Scenic River areas only where the activities address the Purpose and Need elements for public safety, excessive fuels reduction, and protection of hydrologic function (see Section 1.03, Purpose and Need). There are no activities proposed in any alternative in any of the Wild segments of the three Wild and Scenic Rivers. The purpose for salvage in the Scenic segments is not to meet the Purpose and Need element for recovering economic value. Salvage activities and road work in the Clavey WSR will have short term impacts, particularly on Scenic quality as viewed from and near the river. The trade-off is in the FS's ability to make roads and recreation sites safe from decaying, falling trees, thus allowing the reopening of the area to recreationists. Salvaging also allows the reduction of excessive fuel loading that remains after the fire. Not reducing the fuel loading greatly complicates the effectiveness of any future fire suppression efforts in the corridor as well as increasing the adverse impacts of additional high severity fires in the future. With the exception of 0.2 miles of new road construction proposed in Alternative 1 for access to unit A01A, all road reconstruction, maintenance, and temporary use/reversion is for the purpose of access for necessary salvage as described above, or for the purpose of protecting hydrologic function and water quality. Thus there are long-term enhancements and protections provided to the river corridors, at the expense of short-term impacts to scenery and esthetic experience.

Significant issues for this project were based on public comments on the Proposed Action (Alternative 1). These issues were used to develop alternatives to that alternative. One of the significant issues that was used to drive alternatives was that, "Proposed activities may . . . impact the outstandingly remarkable values and integrity of the Clavey River due to impacts from salvage logging." The unique characteristics of the watershed are described in the EIS Chapter 3.12 Special Areas/Wild and Scenic Rivers: Affected Environment:

The Clavey River is one of the longest remaining free-flowing streams in the Sierra Nevada. It is 47 miles from source to mouth, including both headwater forks, Bell and Lily Creeks. Free-flowing condition is an important value because little remains in the Sierra Nevada. From the Feather River on the north to the Kern River on the south, all but one (the Consumnes) of the 15 major rivers in the Sierra, are impounded. Of 90 major tributaries, only four streams greater than 40 miles are free-flowing with no impoundments or diversions from headwaters to mouth. The Clavey River contains all but one Sierra Nevada life zone within its watershed. Elevation ranges from 1,200 feet at its mouth to 9,200 feet at its headwaters, allowing for all life zones except true alpine. At its headwaters, sub-alpine forests of red fir, lodgepole, western white pine and mountain hemlock combine with mountain meadows and granite-bound lakes. All forest habitats are found as elevation decreases, ending with the California chaparral type at the mouth of the river. Within the Clavey's wide variety of high to low elevation vegetative types, one is truly unique: Bell Meadow, at 6,500 feet along Bell Creek, contains the largest stand of quaking aspen (110 acres) in the southern half of the Sierra Nevada.

Another feature of the Clavey River is its minimal development. It is almost entirely under federal ownership; even the portions outside of Wilderness are relatively undisturbed and remote. Private lands and developments such as towns and roads line portions of most other rivers in the Sierra. The Clavey, although crossed by several roads, has remained relatively undisturbed because of its remoteness, rugged nature and its north-south geographic orientation. For much of its length, the Clavey runs perpendicular to the east-west trend of major roadways in its watershed.

The three action alternatives provide a range of levels of salvage treatment and road work ((EIS, Section 2.02, Alternatives), with an accompanying range of impacts. Impacts to water quality and wildlife habitat, and, to a lesser extent, scenery and recreation experience, are minimized and mitigated through the use of Management Requirements Common to All Alternatives and Best Management Practices (BMPs) (See Section 2.03 and Table 2.03-3). The effects of the proposed activities in the watershed on the aquatic habitat, wild and scenic values, wildlife habitat, and watershed functioning, as well as on other resources, are discussed in Chapter 3 Affected Environment and Environmental Consequences.

395. **Comment**: The Clavey River has been judged both Eligible and Suitable for Wild and Scenic status and thus must be managed to protect its Wild and Scenic Values (Section 12a of the Wild and Scenic Rivers Act). In addition, under WSRA, designated rivers "shall be preserved in free-flowing condition, and .... their immediate environments shall be protected for the benefit and enjoyment of present and future generations" (16 USC1271).

5298

Response: The Wild and Scenic Rivers Act of 1968 (Public Law 90-452) and The California Wilderness Act of 1984 directed management agencies to "protect and enhance" the Outstandingly Remarkable Values (ORVs) of the river corridors. In the later management plans (Stanislaus NF LMP and the Tuolumne Wild and Scenic River Management Plan), standards and guidelines were designed to recognize that long-term protection and enhancement of river values sometimes involved short-term impacts. In the Rim Fire Recovery Project, salvage and road development activities (construction, reconstruction, repair, and maintenance) are proposed in the Scenic segment only where they address the Purpose and Need elements for public safety, excessive fuels reduction, and protection of hydrologic function (Chapter 1.03, Purpose and Need). There are no activities proposed in any alternative in any of the Wild segments of the three Wild and Scenic Rivers. The purpose for salvage in the Scenic segments is not to meet the Purpose and Need element for recovering economic value. Salvage activities and road work in the Clavey WSR will have short term impacts, particularly on Scenic quality as viewed from and near the river. The trade-off is in the FS's ability to make roads and recreation sites safe from falling trees, thus allowing the reopening of the area to recreationists. Salvaging also allows the reduction of excessive fuel loading that remains after the fire. Not reducing the fuel loading greatly complicates the effectiveness of any future fire suppression efforts in the corridor, as well as increasing the adverse impacts of additional high severity fires in the future. With the exception of 0.2 miles of new road construction proposed in Alternative 1 for access to unit A01A, all road reconstruction, maintenance, and temporary use/reversion is for the purpose of access for necessary salvage as described above, or for the purpose of protecting hydrologic function and water quality. Thus there are long-term enhancements and protections provided to the river corridors, at the expense of short-term impacts to scenery and esthetic experience. The three action alternatives provide a range of levels of salvage treatment and road work; with an accompanying range of impacts (Chapter 2.02, Alternatives, and Chapter 3.12, Special Areas). Impacts to water quality and wildlife habitat, and, to a lesser extent, scenery and recreation experience, are minimized and mitigated through the use of Management Requirements Common to All Alternatives and Best Management Practices (BMPs) (Chapter 2.03 and Table 2.03-3).Chapter 3 Affected Environment and Environmental Consequences describes the effects of the alternatives on water quality, wildlife habitat, visual resources, and recreational experience.

Nothing in the proposed action or other alternatives would affect the free-flowing condition of the Clavey River.

396. **Comment**: The uniqueness of the Clavey and why it should be left alone…

5298

Response: Significant issues for this project were based on public comments on the Proposed Action (Alternative 1). These issues were used to develop alternatives to that alternative. One of the significant issues that was used to drive alternatives was that, "Proposed activities may . . . impact the outstandingly remarkable values and integrity of the Clavey River due to impacts from salvage logging." The unique characteristics of the watershed are described in the EIS Chapter 3.12 Special Areas/Wild and Scenic Rivers: Affected Environment:

The Clavey River is one of the longest remaining free-flowing streams in the Sierra Nevada. It is 47 miles from source to mouth, including both headwater forks, Bell and Lily Creeks. Free-flowing condition is an important value because little remains in the Sierra Nevada. From the Feather River on the north to the Kern River on the south, all but one (the Consumnes) of the 15 major rivers in the Sierra, are impounded. Of 90 major tributaries, only four streams greater than 40 miles are free-flowing with no impoundments or diversions from headwaters to mouth. The Clavey River contains all but one Sierra Nevada life zone within its watershed. Elevation ranges from 1,200 feet at its mouth to 9,200 feet at its headwaters, allowing for all life zones except true alpine. At its headwaters, sub-alpine forests of red fir, lodgepole, western white pine and mountain hemlock combine with mountain meadows and granite-bound lakes. All forest habitats are found as elevation decreases, ending with the California chaparral type at the mouth of the river. Within the Clavey's wide variety of high to low elevation vegetative types, one is truly unique: Bell Meadow, at 6,500 feet along Bell Creek, contains the largest stand of quaking aspen (110 acres) in the southern half of the Sierra Nevada.

Another feature of the Clavey River is its minimal development. It is almost entirely under federal ownership; even the portions outside of Wilderness are relatively undisturbed and remote. Private lands and developments such as towns and roads line portions of most other rivers in the Sierra. The Clavey, although crossed by several roads, has remained relatively undisturbed because of its remoteness, rugged nature and its north-south geographic orientation. For much of its length, the Clavey runs perpendicular to the east-west trend of major roadways in its watershed.

The effects of the proposed activities in the watershed on the aquatic habitat, wild and scenic values, wildlife habitat, and watershed functioning, as well as on other resources, are discussed in Chapter 3 Affected Environment and Environmental Consequences.

397. **Comment**: One aspect of the special nature of the Clavey is expressed in the LMP Wild and Scenic River Study as quoted in the Wildlife Section of the Wild and Scenic River Review: “Wildlife: a large tract of late seral stage forest habitat is centered on the Clavey River between Reed Creek and Road 3NO1. Five spotted owl SOHAs and two fisher reproductive units are located on or adjacent to the river, within 8,000 acres of older mature forest habitat. It is unusual to have this much older mature forest habitat at this elevation in the Sierra.” (W&SRVR, p. 7-1). (Note that the surrounding forest is included in the Value, not just the river corridor.) In addition, since the Wild and Scenic Study which is part of the Stanislaus Forest LMP was completed, more recent owl surveys found additional pairs of owls and acres of LSOG forest. (See maps p. 75 and 77 in CREP). Of course much of this landscape has burned, with varying degrees of severity. However the large burned and unburned trees have value both as present habitat and as contributors to the recovery in the future. Particularly as the excellent idea of a protected wildlife corridor connecting Yosemite, Bell Mountain and the Clavey is put into effect, as we suggested in our CREP recommendations. We strongly support designating this corridor.

5298

Response: The results of all the California spotted owl surveys that have been conducted within the Rim Fire perimeter are summarized in the EIS (Chapter 3.15 Wildlife/California Spotted Owl Affected Environment). Chapter 3.15 includes a discussion of habitat for and habitat elements important to the several species of wildlife. The effects on those species from the proposed activities are discussed in the environmental consequences for each species.

398. **Comment**: a) address the watershed of the Clavey, not just the Wild and Scenic corridor. b) “Immediate environments” for a river are clearly the watershed of the river, not just the area described in the DEIS: “The geographic extent of this analysis for direct and indirect effects is the Wild and Scenic River boundary a quarter-mile on either side of the high water mark of the rivers” (Wild and Scenic Rivers Draft Specialist Report, p.6.). We do not have to be hydrologists to know this truth, particularly given the W & S Values and unique qualities of the Clavey. Therefore the “Effects

Analysis Methodology" (Ibid. p. 5) is incorrect. The Values of the Clavey will not be protected by considering only the quarter-mile river corridor.

5298

Response: Wild and Scenic Rivers exist due to an act of Congress. The boundaries of the WSR are set by law, and the law requires that actions be analyzed to address their effects on the Outstandingly Remarkable Values of the Wild and Scenic River designation and corridor. The impacts in the Clavey River to watershed values such as hydrologic function, wildlife habitat and other resources are correctly addressed at the watershed scale in their respective sections (EIS Chapter 3 Affected Environment and Environmental Consequences).

Wilderness

399. Comment: a) Please do not open the Rim Fire areas to logging and road building. These are some of the best wilderness areas we still have to backpack and explore without the sights and sounds of motorized vehicles. b) Analyze impacts to all qualities of Wilderness character including undeveloped, natural, untrammeled, and primitive or unconfined recreation.

4281 4500 5412

Response: No salvage operations, hazard tree removal, or fuels reduction activities are proposed in any alternative to occur within any designated Wilderness area, and few units are proposed adjacent to these areas. In the EIS, the effects of management actions on wilderness character are evaluated using the four qualities defined in "Applying the Concept of Wilderness Character to National Forest Planning, Monitoring, and Management" (Landres et al. 2008): untrammeled quality, natural quality, undeveloped quality, and solitude or primitive and unconfined recreation.

400. Comment: Consider Wilderness impacts in treatments adjacent to Yosemite Wilderness.

4500 5412

Response: As stated in the EIS, "wilderness" as used in the EIS refers to the Emigrant Wilderness and Yosemite Wilderness. The impacts to each Wilderness of treatments adjacent to each are analyzed in the EIS (Chapter 3.12 Special Areas/Wilderness: Environmental Consequences).

401. Comment: Page 236: "In the geographic extent, visuals (project activity), noise and dust produced during ground based and helicopter operations may negatively disrupt the solitude qualities of Wilderness character. The amount of work proposed within a half mile of Wilderness is expected to be completed within a matter of weeks to months; therefore, negative effects to Wilderness solitude would be limited in duration. Additionally, trailheads would be closed during operational periods, which would greatly reduce potential effects to Wilderness experience. Effects of trailhead closures are discussed in detail in the Chapter 3.08 (Recreation)." This analysis only addresses opportunities for solitude, which is only one of 5 quality of Wilderness character. The removal of trees may affect the "untrammeled" quality as it is a human action that affects natural systems. Restoration of ecological systems and processes may result in beneficial impacts to the "natural" character of Wilderness. Consider soundscape impacts to Wilderness areas within Yosemite National Park.

4500 5412

Response: As stated in the EIS, "wilderness" as used in the EIS refers to the Emigrant Wilderness and Yosemite Wilderness. In the EIS, the effects of management actions on wilderness character are evaluated using the four qualities defined in "Applying the Concept of Wilderness Character to National Forest Planning, Monitoring, and Management" (Landres et al. 2008): untrammeled quality, natural quality, undeveloped quality, and solitude or primitive and unconfined recreation.

No salvage operations, hazard tree removal, or fuels reduction activities are proposed in any alternative to occur within any designated Wilderness unit. Restoration of naturally functioning ecological systems outside of the wilderness may benefit the Natural Quality of Wilderness character.

Wildlife

402. **Comment**: While the environmental consequences sections for the marten and the fisher suggest that neither alternative will contribute to Federal listing nor result in a loss of viability for either the marten or the fisher in the analysis area, the reduction in snag levels across 28,140 acres in Alternative 1 to 12 sq. ft. basal area contrasts markedly with the shift of all but 13,278 of those acres to at least 30 sq. ft. of basal area of snags, with 2,089 acres shifting to 100 to 120 sq. ft. of basal area of snags in Alternative 4 and 2,571 acres having full retention. This is a very significant difference in terms of action consequences between the two alternatives.

4467

Response: The Forest Service agrees that there are marked differences in the snag retention levels under the various alternatives. The differences in impacts on the marten and fisher under the alternatives was documented in the EIS (Pacific marten: Summary of Effects, and Pacific Fisher: Summary of Effects) and in the Terrestrial Biological Assessment, Evaluation, and Wildlife Report (Summary of Effects Analysis across All Alternatives for each species). This finding was used in making the determination that each of the alternatives may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten or the Pacific fisher.

403. **Comment**: A Modified Alternative 4 would be far more beneficial for not only the marten and the fisher, but also for the CA spotted owl and northern goshawk that benefit when prey have more snags and more large down logs left across the burned landscape.

4467

Response: The responsible official will consider this when making her decision.

404. **Comment:** For all of these at-risk wildlife species, the selection of CSERC's suggested Modified Alternative 4 would provide significantly higher habitat value, significantly less overall disturbance, and significantly greater refuge than Alternatives 1, 3, or 4 as now defined in the DEIS.

4467

Response: The responsible official will consider this when making her decision.

405. **Comment:** A Modified Alternative 4 that retains a minimum of 30 sq. ft. of basal area (including 6 large snags per acre and an average of 10 snags 14" dbh and larger per acre) across General Forest treatment acres would significantly improve the on-the-ground habitat value left after salvage logging treatments.

4467

Response: The Responsible Official will consider the proposed modifications when making her decision.

406. **Comment**: ...it is clear that Alternative 4 provides the highest benefits for CA mule deer out of the three action alternatives considered in the DEIS. While CSERC strongly supports biomass removal, fuels treatments, and other strategic actions to benefit oaks, deer movement, and shrub diversity, we also recognize that removing sawlogs may not be as essential in some portions of the winter deer range as areas closer to residential areas, family camps, and highway corridors. Accordingly, Modified Alternative 4 drops some salvage logging in deer habitat areas, while encouraging biomass removal treatments in those same units.

4467

Response: The Responsible Official will consider the proposed modifications when making her decision.

407. **Comment**: We strongly urge the creation of the four (4) mile wide Forest Carnivore Connectivity Corridor (FCCC), described in both Alternative 3 and 4, which lead from Yosemite national Park and the North Mountain Inventoried Roadless Area, westward to the Clavey River; we also strongly urge treatments to improve and allow for future maintenance of Critical Deer Winter Range.

5469

Response: All action alternatives include treatments to improve critical deer habitat (EIS Chapter 2.02: Alternatives Considered in Detail; Terrestrial Biological Assessment, Evaluation, and Wildlife Report, Sec. 4: Project Description). The treatment acreage varies by alternative. The Responsible Official is considering all alternatives, including, Alternatives 3 and 4, and their impacts equally. She will consider the Purpose and Need of the project, the most recent information, including the Forest Plan (USDA 2010a), resource reports, and input from interested parties in making her decision.

408. Comment: We recommend that the Final Environmental Impact Statement include the results of consultation with the United States Fish and Wildlife Service.

5464

Response: The Forest Service is currently in consultation with U.S. Fish and Wildlife Service. A Biological Opinion will be received from USFWS prior to implementation.

409. Comment: As proposed, none of the three action alternatives provides a secure level of protection for spotted owl, great gray owl, black backed woodpecker, northern goshawk, Pacific marten and fisher. While Alternatives 3 and 4 afford meaningfully more consideration than the currently preferred Alternative 1, they both fail to provide adequate buffer of protection for these at-risk species in light of the great uncertainty about their overall status and the risks that the proposed salvage logging poses.

5358

Response: All action alternatives provide protection of these species to varying degrees. The determination for each of the species is that each alternative may affect individuals, but is not likely to lead to a trend in Federal listing or loss of viability.

The Responsible Official is considering all alternatives, including the alternative under which no salvage harvest would occur (Alternative 2--No Action), and their impacts equally. She will consider the Purpose and Need of the project, the most recent information, including the Forest Plan (USDA 2010a), resource reports, and input from interested parties making her decision. She may decide to: (a) select the proposed action; (b) select one of the alternatives; (c) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (d) select the no action alternative, choosing not to authorize the Rim Fire Recovery project (EIS Chapter. 1).

410. Comment: The DEIS violates the Migratory Bird Treaty Act because logging in nesting season would result in the direct death of chicks that cannot yet fly in known nest locations, including direct mortality of cavity nesting species due to the cutting of trees, and direct mortality of shrub nesting species due to ground based equipment crushing or killing them.

5451

Response: The Rim Fire Salvage Project does not have any proposed action that directly intends to kill migratory birds. As part of the project, a Migratory and Landbird Conservation Report was conducted which documents that there could be an indirect effect of the project that could result in the potential harm to migratory birds. However, based on project timeframes and incorporated conservation measures as part of the proposed actions (i.e. PACs, LOP, retaining of snags and downed woody debris) the expected harm would be minimal and incidental to the proposed action.

Due to the timing of salvage to be conducted as early as possible to have the timber be economically viable to sell, salvage would begin in the fall and hopefully be completed prior to birds nesting in the spring. Should not all the salvage occur prior to the spring, the areas that are protected in PACs and the additional areas protected by LOP outside of the PACs, would provide additional protection as no salvage will occur within the PACs or within the LOP areas. The LOP areas (upwards of 1/4 mile from a PAC) are to protect breeding and nesting time periods which will also protect other nesting birds.

Removal of hazard trees could also impact migratory birds. The project proposes to remove hazard trees to protect human safety, thus any impact to migratory birds would be an indirect effect of the project. Road creation, both permanent and temporary, is to access the project area and any impact to migratory birds would be an indirect effect of the project. Both of these actions are to occur this fall, hence minimizing the risk to migratory birds breeding, nesting, and fledging.

411. Comment: Post-fire conditions serve as a refuge for rare and imperiled wildlife that depend upon the unique habitat features created by intense fire. These include an abundance of standing dead trees or “snags” that provide nesting and foraging habitat for woodpeckers and many other wildlife species, as well as patches of native flowering shrubs that replenish soil nitrogen and attract a diverse bounty of beneficial insects that aid in pollination after fire. Small mammals find excellent habitat in the shrubs and downed logs, deer and elk browse on post-fire shrubs and natural conifer regeneration, bears eat the berries often found in substantial quantities after intense fire, and morel mushrooms, prized by many Americans, spring from the ashes in the most severely burned forest patches. This post-fire habitat, known as “complex early seral forest,” is quite simply some of the best wildlife habitat in forests and is an essential stage of natural forest processes. Moreover, it is the least protected of all forest habitat types and is often as rare, or rarer, than old-growth forest, due to damaging forest practices encouraged by post-fire logging policies. While there remains much to be discovered about fire in our forests, the scientific evidence indicates that complex early seral forest is a natural part of historical fire regimes in nearly every conifer forest type in the western U.S. (including ponderosa pine and mixed-conifer forests) and that small and large patches of it occur.......Do the right thing: protect the post-fire habitat for wildlife.

4870

Response: The Forest Service agrees with the commenter's observations on the value of post-fire conditions to many species of wildlife. The Forest Service is proposing to salvage log approximately 20 percent of the area within the Rim Fire perimeter. Hazard trees would be removed from approximately 10 percent of the area. Thus, under this proposal 70 percent of the area that burned would retain all snags. The areas that are proposed for treatment would also provide habitat for many species. There would be a certain level of snag retention in the salvage treatment units.

412. Comment: Please be aware that the dead trees will be a huge part of the recovery of insects and other invertebrates.

5099

Response: The Forest Service agrees with the commenter that dead trees are needed by several species of invertebrates. Species such as the black-backed woodpecker forage on the invertebrates found in the trunks of burned conifers (EIS Chapter 3.15; Draft Terrestrial Assessment, Evaluation, and Wildlife Report, p. 128).

413. Comment: Snags are a valuable component to the future forest, and the large acreage of severely burned forest in the Rim Fire will not have any more new snags develop for a generation. So many snags should be left now per unit burn area. More snags should be left than the desired snag distribution that you want in the future, as there will be natural loss of snags.

5186

Response: The value of snags and downed logs is discussed in the EIS Chapter 3.15: Wildlife and throughout the Terrestrial Biological Assessment, Evaluation, and Wildlife Report. As stated in the EIS Chapter 3.15 and the Draft Terrestrial Assessment, Evaluation, and Wildlife Report (p. 31), "Snags may stand for decades and in time, may become future nest trees for spotted owl [and the other species that use snags for nesting] as the regenerating forest nears maturity." The EIS and the Draft Rim Fire Recovery Fire and Fuels Report further state, "Additional snag recruitment would be expected through delayed mortality in the few live trees per acre" in the areas of high burn severity (EIS Chapter 3.05; Draft Rim Fire Recovery Fire and Fuels Report, p. 15). Snags would develop as the forests mature. When the snags fall, they become coarse woody debris, which also serve as an important element in many species' habitat. The Draft Aquatic Sensitive Species Report (p. 41) notes that "Very long-term impacts to riparian and aquatic systems can also be observed and an example is the reduced recruitment of very large woody debris, trees that take several hundred years to attain large sizes." All these factors were taken into account in the development of snag retention levels. The Responsible Official will consider your recommendation when making her decision.

414. Comment: ...the DEIS does not adequately disclose or analyze reasonably foreseeable cumulative and connected effects from the large post-fire artificial planting and shrub removal project that the Stanislaus National Forest plans to propose soon (as stated by Forest Service officials in recent public meetings), including impacts to imperiled species that preferentially forage in montane chaparral, such as the California Spotted Owl (Bond et al. 2009), as well as impacts to numerous shrub-nesting bird species that are experiencing persistent, significant population declines in the Sierra Nevada, such as the Orange-crowned Warbler, Yellow Warbler, Chipping Sparrow, Brewer's Blackbird, and Wrentit (http://www.mbr-pwrc.usgs.gov/cgi-bin/atlasa12.pl?S15&2&12); nor does the DEIS address the harm to such shrub-nesting species (including direct mortality to chicks that cannot yet fly) that would be caused by tractor logging during nesting season.

5313

Response: No specific reforestation projects are proposed and it would be speculative to address reforestation at this time. The analysis of reforestation is thus beyond the scope of the Rim Recovery EIS. The Draft Migratory and Landbird Conservation Report for the Rim Fire Recovery Project states, "Tree falling and removal and prescribed burning could result in disturbance to birds during the nesting season (February to August), causing abandonment of nests and direct mortality to eggs and chicks as snags and hazard trees within green and burned forest are felled." When direct, indirect, and cumulative effects were analyzed, the report concluded, "Overall, the proposed action for the Rim Fire Recovery Project is not expected to have more than temporary disturbance-related effects to individual birds."

415. Comment: Using birds as an example, the following studies have documented the ecological value of severely burned forests for a number of species in different regions of the US: Raphael et al. (1987), Smucker et al. (2005), Kotliar et al. (2007).

5336

Response: The Forest Service agrees that severely burned forests have ecological value for a number of species, including several species of birds. The research by Smucker et al. was used in the analysis of the effects of the alternatives, as were several other studies and papers discussing the value of burned forests: Bond et al. (2002), Bond et al. (2009), Bond et al. (2010), Bond et al. (2013), Cahall and Hayes (2009), Clark (2007), Diffendorfer et al. (2012), Hanson and North (2008), Hutto (1995), Hutto (1998), Hutto and Gallo (2006), Koehler and Hornocker (1977), Koivula and Schmiegelow (2007), Lee et al. (2012), Lee et al. (2013), Lindenmayer et al. (2008), Long and Quinn-Davidson (2013), Roberts et al. (2011), Russell et al. (2007), Saab and Dudley (1998), Saab et al. (2007), Saab et al. (2011), Saracco et al. (2011), Schwab et al. (2006), Seavy et al. (2012), Spencer et al. (2008), Truex and Zielinski (2005), USDA (2013), Vierling et al. (2008). These papers are cited in the EIS and the Draft Terrestrial Assessment, Evaluation, and Wildlife Report.

416. Comment: In a study commissioned by the Forest Service and conducted in large higher-severity fire areas in the northern portion of the Sierra Nevada management region, scientists (Burnett, R.D., P. Taillie, and N. Seavy. 2010. Plumas Lassen Study 2009 Annual Report. U.S. Forest Service, Pacific

Southwest Region, Vallejo, CA.) concluded: "Once the amount of the plot that was high severity was over 60% the density of cavity nests increased substantially…[M]ore total species were detected in the Moonlight fire which covers a much smaller geographic area and had far fewer sampling locations than the [unburned] green forest…[A]reas burned by wildfire, especially those with older high severity patches, may in some cases support equal or greater landbird diversity and total bird abundance [than unburned forest]…It is clear from our first year of monitoring three burned areas that post-fire habitat, especially high severity areas, are an important component of the Sierra Nevada ecosystem…[P]ost-fire areas are not blank slates or catastrophic wastelands; they are a unique component of the ecosystem that supports a diverse and abundant avian community." Likewise, in a separate study also commissioned by the Forest Service and conducted in the Sierra Nevada, researchers 7 concluded that native fire-following shrubs are vitally important to biodiversity in complex early seral forest (CESF) created by high-intensity fire: "Many more species occur at high burn severity sites starting several years post-fire, however, and these include the majority of ground and shrub nesters as well as many cavity nesters. Secondary cavity nesters, such as swallows, bluebirds, and wrens, are particularly associated with severe burns, but only after nest cavities have been created, presumably by the pioneering cavity-excavating species such as the Black-backed Woodpecker.

5378

Response: Under all action alternatives some high severity burned habitat would remain untreated throughout the project area. As vegetation begins to recover in the untreated areas that burned at high severity, these areas would likely provide habitat to secondary cavity nesters, as well as ground and shrub nesters as the commenter suggests.

417. **Comment**: ...what is put forward in the DEIS as "mitigation" is not actually what it purports to be. By adding acreage to a PAC or HRCA, one does not actually add habitat to the landscape—the areas being added would have continued to exist as well—so the logged area is still a net loss, especially where logging would occur within the biological home ranges of 2014 owl detections. Further, HRCA "protection" is woefully inadequate.

5335

Response: When acreage is added to PACs or HRCAs, that acreage receives the protections given to those land allocations. The objectives for management of the lands outside those allocations are for the most part more diverse. Emphasis is not on managing for a particular species and its habitat needs. The results of future management may result in less than optimal conditions for California spotted owls on the lands outside PACs and HRCAs. Not only would the additional acreage not be treated in this project; it would be protected for the species over the long term.

418. **Comment:** Are animal migration corridors being improved?

5481

Response: Animal migration corridors are being improved under each action alternative with specific emphasis in Alternatives 3 and 4. Within Critical Winter Deer Range and adjacent to Yosemite National Park units were identified for salvage and/or biomass removal to achieve desired forage/cover ratios and to provide for deer passage and access. The acres to which these treatments would be applied vary by action alternative. Additionally, under Alternatives 3 and 4, the Forest Carnivore Connectivity Corridor would provide for long-term movement of wildlife from Yosemite National Park through the Stanislaus National Forest (DEIS Chapter 2.02: Alternatives Considered in Detail). As stated in the EIS Chapter. 3.15 and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report (p. 106), the "forest carnivore connectivity corridor is proposed to focus management activities associated with this project on re-establishing that connectivity so that fisher can disperse into and utilize the available suitable habitat on the Stanislaus National Forest. Portions of this corridor would also overlap important critical winter deer range." Further, the two documents (EIS Chapter. 3.15; Terrestrial

BA/E/Wildlife Report) state that "Deer would be able to navigate the winter range more effectively if this material [non-merchantable material] were removed."

419. **Comment**: We believe the recovery plan should do much more to avoid the negative impacts of large-scale industrial salvage logging, and do more to emphasize wildlife habitat restoration and the protection of the Tuolumne and Clavey watersheds.

4803

Response: The Responsible Official is considering all alternatives and their impacts equally. She will consider the Purpose and Need of the project, the most recent information, including the Forest Plan (USDA 2010a), resource reports and, input from interested parties in making her decision. She may decide to: (a) select the proposed action; (b) select one of the alternatives; (c) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (d) select the no action alternative, choosing not to authorize the Rim Fire Recovery project (EIS Chapter 1).

420. **Comment**: There will be wildlife impacts, and for this reason the Department would like to recommend that some specific targeted wildlife management and mitigation be incorporated into the Project. Listed below are potential mitigation measures that the Department recommends be included in the Project: 1) Snag creation adjacent to meadows throughout the forest in unburned areas currently not occupied by great gray owls to enhance the potential for future use by displaced owls. 2) Meadow Protection and Enhancement. Over time, some meadows had pine encroachment and were in the process of type conversion. There is currently an opportunity to maintain and enhance these meadows in a way that will result in long term habitat improvements. There are some meadows with a ring of small live trees around the meadow where the fire intensity was low and not sufficient to kill the encroaching trees. An opportunity exists where these meadows can be enlarged back to their original size. Therefore, the Department recommends that the meadows be considered specifically for their potential for restoration and enhancement. Decreasing the pine encroachment is desirable. Improving the potential water retention would decrease long term encroachment. 3) Planting of oaks in areas where fire intensity killed existing oaks. Replanting oaks will benefit wildlife and should be a component of the wildlife movement corridor management and diversity to sustain forest resilience.

5420

Response: Impacts to wildlife species are documented in the EIS, the Draft Aquatic MIS Report, the Draft Aquatic Sensitive Species Report, the Draft Aquatic T&E Report, the Draft Wildlife BE, the Draft Wildlife MIS Report, and the Draft Wildlife Migratory and Landbird Conservation Report. These measures do not mitigate direct or indirect effects on wildlife from the alternatives' actions. The measures are considered outside the scope of this analysis. There are management requirements common to all alternatives and specific to each of the action alternatives that do mitigate direct and indirect effects from the alternative's' actions. These include snag retention levels, downed woody debris retention levels, not salvaging in Protected Activity Centers (including those for great gray owl), flagging and avoiding current and historic nest trees under Alternatives 3 and 4 (including those of great gray owls).

421. **Comment**: On page 29, item 6a, it is projected that retaining large snags now in areas where the habitat was essentially obliterated by the fire, will result in a future old forest habitat that has higher than average numbers of snags. I respectfully disagree with that projection. By the time a forest is re-established and reaches a stage of maturity that qualifies as old forest habitat, those snags of today will more resemble soil than legacy snags or down logs. ..Trying to save lots now will not preclude the inevitable outcome of few to none left standing within 10 to 15 years.

4460

Response: Management requirement 6a under Alternative 3 on page 29 of the EIS states:

Snag retention in OFEA, HRCA and FCCC units: the intent is to retain legacy structure where it exists for long-term resource recovery needs (i.e., the development of future old forest habitat with higher than average levels of large conifer snags and down woody material). Retain all hardwood snags greater than or equal to 12 inches diameter at breast height (dbh). Retain an average of 30 square feet of basal area of conifer snags across each unit by starting at the largest snag and working down, with a minimum of four and a maximum of 6 per acre.

The value of snags and large downed woody debris for wildlife and analysis of the effects of retaining and removing snags in the short and long-term are discussed in the EIS in Chapter 3.15

422. Comment: The Rim Fire's standing dead trees comprise a major habitat element for species that have evolved to thrive in severely burned forests...These standing dead trees are extremely important habitat for fire-following, wood-boring insects...as well as for the wildlife species that forage upon those insects…Moreover, the dead trees provide essential substrates for a host of cavity-nesting vertebrates (Hutto 2006, Saab et al. 2007, personal observation during extensive research in burned forests in Lassen National Forest and Sequoia National Forest). this action would significantly harm snag-dependent species...Alternative 4 nonetheless proposes to log the substantial portions of pre-fire HRCAs in the Rim Fire area, leaving only 4-6 snags per acre in the logged areas, and thus rendering the HRCAs virtually useless for owls...Proposed retention standards of snags are woefully inadequate to meet the needs of Spotted Owls because studies show that owl foraging habitat in burned forests is associated with high levels of snags.

5336

Response: Standing dead trees comprise a major habitat element for species that have evolved to reproduce, shelter, and/or forage in severely burned forests. Saab et al. 2007, along with several other papers on the importance of snags to several species of wildlife, was used in the effects analysis.

Approximately 70 percent of the Rim Fire area would not be salvaged logged. This ground would retain all the snags created by the Rim Fire. (Hazard tree removal would occur on approximately 10 percent of the Rim Fire area.)

The effects of the different snag retention levels on snag-dependent species such as bald eagle, California spotted owl, great gray owl, northern goshawk and black-backed woodpecker were analyzed in the EIS (Chapter 3.15 Wildlife), the Terrestrial BA/BE/Wildlife Report (Sec. 8. Effects of the Project Alternatives), the Draft Wildlife MIS Report, and the Draft Migratory and Landbird Conservation Report. Based on the effects analysis for the California spotted owl, it was determined that each of the alternatives may affect individuals, but is unlikely to lead to a trend in Federal listing or loss of viability of the species.

The Responsible Official is considering all alternatives and their impacts equally. She will consider the Purpose and Need of the project, the most recent information, including the Forest Plan (USDA 2010a), resource reports, and input from interested parties in making her decision. She may decide to: (a) select the proposed action; (b) select one of the alternatives; (c) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (d) select the no action alternative, choosing not to authorize the Rim Fire Recovery project (EIS Chapter1). The snag retention levels to be followed will be addressed in her decision. The retention level of snags the Responsible Official selects may be in excess of that required by the Forest Plan direction (USDA 2010a). It will be appropriate to meet the Purpose and Need and adequately protect the landscape and all its components.

423. Comment: Specifically, leaving only 4-6 snags per acre in California spotted owl habitat (e.g., PACs and HRCAs) cannot be said to protect this species. Indeed, Lee et al. 2012 found that owl territories occupied after a fire lost occupancy once subjected to salvage logging, and Bond et al. 2009 found that the owls preferentially select unlogged high-severity patches for foraging habitat. Likewise, leaving only 4-6 snags per acre in Black-backed woodpecker habitat cannot be said to protect this species. Siegel et al. 2013 and numerous other studies (e.g., Hanson and North 2008, Tarbill 2010, Burnett et al. 2011, Seavey et al. 2012) find that the woodpeckers typically require at least 80 snags per acre. We find it particularly problematic that the DEIS does not appear to even reference or discuss the work done by Point Blue as to post-fire habitat (i.e., Burnett et al. 2010, 2011, 2012).

5451

Response: See discussion above relative to results and applicability of Lee et al. (2012) and Bond et al. (2009) relative to salvage logging and size of high-severity patches. The guideline to provide 4-6 snags per acre is not intended to protect CSO habitat as the primary management objective in proposed salvage areas. Rather, the purpose and need and proposed management objective in salvage areas for this project are outlines in the EIS Chapters 1 and 2. The snag retention guidelines are intended to maintain legacy structures that provide potential structural and functional benefit to owls and biodiversity into the future as the vegetation recovers.

424. **Comment**: Additionally, we recommend that more monitoring be established to resolve the seeming contradictions cited in the above excerpts from the DEIS, as well as the many areas still in question about the relative impact of salvage logging on wildlife habitat, both short-term and long-term.

5358

Response: The Responsible Official will consider your recommendations when making her decision. Scientists at the Pacific Southwest Research Station (PSW) developed a research agenda in collaboration with the Stanislaus National Forest and research partners at multiple universities and other government agencies. The research projects can be implemented as stand-alone projects, but they were designed as an integrated research approach, including integrated sampling design, treatment, data collection, and analysis elements. The research proposals are associated with Alternatives 3 and 4 and include assessing the response of California spotted owls to wildfire and salvage logging on the Rim Fire. The research proposals were presented in the EIS Appendix D and specific to California spotted owl.

425. **Comment:** Page 60: "Most perceived as negative effects to the visual resource (flush cut stumps, hand/machine piles, treatment edges, ground disturbance, and untreated slash) occurs during implementation. This initial phase is short term and does not represent the completed treatment. At the conclusion of treatment, visual signs of activity (i.e., cut stumps or track and tire marks) may still be evident but would dissipate over time. Evidence of burning on trees and ground features naturally occur in forests with wildfire regimes. "The first sentence seems to be missing some words or punctuation. This does not take into account our scoping comment "Trees that survived the Rim Fire, particularly in high severity areas, could be important habitat to wildlife species that cross the park-forest boundary, or that seasonally migrate from high elevations to low elevations."

4500 5412

Response: Green trees would not be removed unless they are deemed hazardous and have a target such as a road or facility. Minimal snag removal will occur along the fenceline between the Stanislaus National Forest and Yosemite National Park. We are coordinating with park staff and are incorporating Yosemite guidelines for snag removal along that shared fenceline. Analysis of the potential project effects to threatened, endangered, sensitive, and other species of concern (black-backed woodpecker and mule deer) are discussed in the EIS, Wildlife Chapter 3.15.

426. **Comment**: Failure to consult pursuant to the ESA as to federally listed frogs…ESA Section 7 Consultation is Required Due to Effects to ESA Listed Species. Section 7 consultation with the U.S. Fish and Wildlife Service is necessary as to the ESA listed frogs: the California red-legged frog, the Sierra Nevada yellow-legged frog, and the Foothill yellow-legged frog, given that the DEIS' Aquatic Wildlife section acknowledges that these species may be present in the project area, the analysis of impacts in the DEIS assumes presence, and the DEIS admits that the action alternatives would adversely affect these species. The "may affect" threshold is a low one and even if the Forest Service believes the effects of the action would be discountable (i.e., extremely unlikely to occur), the appropriate determination for the proposed action would be "is not likely to adversely affect," a determination that requires the Forest Service to initiate section 7 consultation.

5335

Response: The Forest Service initiated consultation in the fall of 2013. The Biological Assessment has been submitted to U.S. Fish and Wildlife service for review.

427. **Comment**: Alternative 1 does not have the provision to flag and avoid current and historic nest trees or trigger special coordination measures designed to promote nest tree protection for either the goshawk or the CA spotted owl.

4467

Response: Alternative 1 does not contain this provision. Alternatives 3 and 4 contain this provision.

428. **Comment**: Failure to take the requisite "hard look". For all of the above reasons, the DEIS fails to meet NEPA's "hard look" standard. This is especially true as to impacts to black-backed woodpeckers, spotted owls, and other wildlife that relies on post-fire forest.

5335

Response: The Forest Service has taken a hard look at the impacts on Region 5 Forest Service sensitive species (including spotted owls); threatened, endangered, proposed, and candidate species; and species of conservation concern (including black-backed woodpecker). The analysis is documented in the EIS in Chapter 3, Wildlife Chapter 3.15.

429. **Comment**: Public lands are not for the ENHANCEMENT of any wildlife populations; they are there for the maintenance of all populations, according to the NFMA. By law, our public lands are to be managed for the maintenance of the integrity of the larger system, within which we can allow multiple uses that are provided in the amounts and places that the NATURAL SYSTEM provides.

1

Response: As the commenter points out, the National Forest System lands are to be managed for multiple use (Multiple Use/sustained Yield Act of 1960). The act defines multiple use: "'Multiple use' means: The management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output." Thus the law allows the agency to emphasize management of certain resources over others on some lands within its jurisdiction.

430. **Comment**: Additional mitigations for enhancing wildlife habitat and corridors, sensitive plants and other ecological values that are included in Alt 3 and 4 are lacking in Alternative 1, the proposed alternative. This also doesn't make any sense. If these mitigations are needed to protect resources, then they are needed, regardless of which alternative is selected. NEPA requires avoidance or minimizing of all adverse effects, and the agency must "use all practicable means...to avoid or minimize any possible adverse effects" (40 CFR §1500.2(f)).

5449

Response: Alternative 1 includes management requirements to minimize or avoid adverse effects. (EIS Chapter 2)

431. **Comment**: Withdraw the logging plan, protect the snag forest habitat, withdraw plans to create artificial tree plantations and remove/reduce shrubs.

4210

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

432. **Comment**: I am opposed to logging the post fire in the Rim area and opposed to clearing snags or planting a tree plantation.

4216

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

433. **Comment**: No logging. Protect the habitat created by the Rim Fire.

4224

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

434. **Comment**: In light of the huge volume (550 to 650 million board feet of timber – an amount we are informed is greater than the annual cut on California's entire National Forest system) within 40,000 acres proposed for salvage and hazard logging, there is ample opportunity to reduce the risk to snag-dependent wildlife.

5358

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

435. **Comment**: We concur with the more specific recommendations of CSERC regarding modifications to Alternative 4 to responsibly provide for the needs of wildlife, particularly those already designated as sensitive species.

5358

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

436. **Comment**: Alternative 1 is consistently recognized by authors of the DEIS as providing insufficient retention of large snags and inadequate levels of down woody material that are consistent with occupied habitat for both the marten and the fisher.

4467

Response: Effects on marten and fisher were described on pages 347 through 360 and 362 through 373 of the DEIS, including a discussion of effects based on snag and down log retention. This discussion can also be found in EIS Chapter 3.15.

437. **Comment**: ...I believe excessive logging will…destroy wildlife habitat…

3946

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

438. **Comment**: Please, Forest Service, do not log some of the rarest and most important wildlife habitat on our public lands in the Sierras.

5147

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

439. **Comment**: This is the time to manage “for” all the things that occur ONLY in the numerous successional stages that precede old growth; this is not the time to be concerned about old-growth-dependent species!

1

Response: There are still forested stands within the Rim Fire perimeter that contain the structural components key to the species commonly referenced as old-growth dependent. The Purpose and Need "Enhance Wildlife Habitat" (EIS Chapter1) addresses needs of these species, as well as some species commonly referenced as early successional species. The project would not interfere with development of the successional stages that lead to old forest.

440. **Comment:** Areas should be designed to maximize the value of existing features and to maximize edge effect of both existing and created habitats, as well as to ensure connectivity for species movements and migrations.

5469

Response: The Rim Fire Recovery project would not affect these habitat features. Effects of all alternatives to wildlife are presented in the EIS Chapter 3 Wildlife Section 3.15.

441. **Comment**: Logging in old growth forests should not be allowed. More forest is needed to sustain animal habitat to prevent the mass extinction now taking place.

4208

Response: The project proposal includes salvage logging and hazard tree removal along existing low standard forest roads. Some units are in old forest. As explained in the EIS Chapter1, "Dead trees in salvage units will be designated for removal based on 'no green needles visible from the ground.” Some snags will be retained in each treatment unit. In the hazard tree removal, there may be trees removed with some green needles and which have the potential to land on the road if they fall. Approximately 70 percent of the Rim Fire area on National Forest System (NFS) land would be untreated under the alternative with the most acres treated (Alternative 3).

442. **Comment**: a) The primary reason to leave post-fire landscapes alone is to protect the wildlife species that depend on the unique conditions there. b) There is no need for human intervention to restore the Rim Fire area. Ecological restoration is occurring naturally. Large intense fires are restorative events that create unique habitats.

2 4237

Response: The Forest Service identified a goal to "bring these areas [the areas within the Rim Fire perimeter] back to a more historic heterogeneous structure where fire complements and sustains the system instead of destroying it" (EIS Chapter1). The EIS goes on to state, "The vast area of high severity burn is far larger than historic gap sizes would have been in the Sierra Nevada, setting up another severe fire scenario if not treated" (Chapter1). The Forest Service believes that treating approximately 30 percent of the area within the Rim Fire perimeter would move the landscape closer to the historic conditions. The remaining 70 percent would not be treated.

443. **Comment**: The Forest Service, in concert with the California Department of Fish and Wildlife, could develop the desired protocols [for post-project surveys of bird use in habitats exhibiting varying levels of fire impact]

5469

Response: Some avian surveys have been completed for the 2014 breeding season (California spotted owl, northern goshawk, and great gray owl). The Forest Service has developed a plan for surveying the area post-project and will include a variety of habitats subject to a variety of burn severity. There are standardized protocols which the Forest Service uses to survey for some bird species (for example, California spotted owl, northern goshawk, great gray owl). The Forest Service will work with the California Department of Fish and Wildlife, the U.S. Fish & Wildlife Service, and other agencies, researchers, organizations, and individuals with expertise in surveying for bird species of interest to develop protocols for these other species.

444. Comment: In general, the Tuolumne County Sportsmen, Inc. supports the proposal for treatments to remove timber and biomass from Rim Fire impacted areas. We strongly support the need for the Stanislaus National Forest to cooperatively work with biologists of the California Department of Fish and Wildlife in designing specific treatment areas and areas of retention for wildlife.

5469

Response: The Forest is working, and will continue to work, with the California Department of Fish and Wildlife, as well as other agencies, organizations, researchers, and individuals interested in wildlife management, to manage the Rim Fire area for the species which could occur there.

445. Comment: We are concerned that the fire not be allowed to result in large, monolithic blocks of habitat. We are also particularly concerned dead, downed material resulting from the Rim Fire will result in disastrous blockages of deer migratory routes.

5469

Response: The successional results of the Rim Fire, beyond those immediately following the fire, are outside the scope of the Rim Fire Recovery project.

The EIS Chapter 3.15 and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report (p. 141) address the concern over blocked movement corridors: “Deer would be able to navigate the winter range more effectively if this material [non-merchantable] were removed.” The amount of acres under which non-merchantable material would be removed varies by alternative.

446. Comment: A concerted effort should be made to locate, document and protect all springs and stringer meadows within the Rim Fire. Where possible, an effort can and should be made to insure year-round flow of those springs.

5469

Response: Many projects have occurred over the years in the Rim Fire area. As part of the environmental analysis for these projects, meadows, springs, and other special aquatic features have been located. For the Rim Fire Recovery, about 63 acres of meadows were identified within the Alternative 3 treatment units (the alternative with the most acres of treatment) (Draft Watershed Report). Removal of trees along meadow edges is not expected to affect meadows, as management requirements would be implemented. The Draft Watershed Report states "Road maintenance and reconstruction are proposed to ensure proper hydrologic function of roads within the project area." Thus, the activities would not interfere with the seasonal pattern of flow from these special aquatic features.

447. Comment: Vegetation should be prevented from choking out and eliminating stringer meadows. Where that process is presently occurring, undesirable competing plants should be removed.

5469

Response: The Forest Service concurs that the incursion of non-meadow vegetation into meadows needs to be examined. However, such an examination is outside the scope of this project.

448. Comment: a) Retain additional large snags on every acre - Snags are highly important to many species of wildlife. Over time, as snags fall over, they become down logs that help to hold soil and prevent erosion. Down logs also provide beneficial habitat for species that need cool, moist "homes" in the rotting logs. Whatever large snags are left now will likely be the only large logs on those acres for the next 50-100 years. b) Increase the number of large snags on treated acres to ensure sufficient habitat diversity for sensitive wildlife.

4297 4239

Response: The value of snags and downed logs for many species of wildlife is discussed in the EIS (Chapter 3.15: Wildlife) and throughout the Terrestrial Biological Assessment, Evaluation, and Wildlife Report.

Three factors should be considered when assessing the overall effect of the proposed snag retention levels: (a) large burned areas created by the Rim Fire would not be treated; under the alternative with the most acreage treated (Alternative 3), approximately 70 percent of the National Forest System lands in the project area would receive no treatment under this project; (b) the Management Requirements Common to All Action Alternatives (Chapter 2.03) include the following retention requirements: 1. All large hardwood snags greater than or equal to 12 inches dbh.; 2. A minimum of 4 snags (in the largest size class available) per acre averaged across ten acres in mixed conifer forest type.; 3. A minimum of six snags per acre in red fir forest type; (c) additional snags of various sizes and species will be recruited over time due to natural mortality.

The combined effect of these snag retention and recruitment measures will result in a mosaic of areas with low to high densities of snags, consisting of a variety of sizes, and occupying the project area both in the present and future.

449. Comment: Retaining snags at a rate of 12 sq. ft. basal area per acre across the 28,140 acres proposed for treatment would provide less than half of the level of snags that are documented to occur in occupied fisher habitat.

4467

Response: The snag retention would be less under Alternative 1 (Proposed Action) than under the other alternatives. As stated in the EIS Chapter 3.15 and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report for the Rim Fire Recovery (p. 107), retaining snags at a rate of 12 square feet per acre across the 28,140 acres proposed for treatment would provide less than half of that documented to occur in occupied fisher habitat. The documents state, "For example, occupied fisher habitat within the Kings River Fisher Project area contains an average of 24 square feet per acre basal area of snags in a variety of size classes (Thompson pers.comm.). Zielinski et al. (2004) reports an average of 44 square feet per acre basal area of snags present in the immediate vicinity of fisher rest sites. Although retaining snags at this level is not optimal for fisher, those retained would provide some potential resting and denning sites as well as habitat for prey sought by fishers" (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report) It was found that there would be a reduction in the quality of moderate and high capability habitat on about 12,898 acres (15 percent of the remaining suitable habitat within the analysis area) from implementation of Alternative 1 (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). Direct, indirect and cumulative effects on the fisher were used in making the determination that Alternative 1 may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the Pacific fisher.

450. Comment: Alternative 1 would provide far less than the level of large snags documented to occur in occupied marten habitat.

4467

Response: As stated in the EIS Chapter 3.15 and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report for the Rim Fire Recover, retaining snags at a rate of 12 square feet per acre across the 6,060 acres proposed for treatment under this alternative in moderate and high capability habitat would provide fewer than has been documented to occur in occupied marten habitats. The documents state, "Occupied marten habitat contains at least 16 square feet per acre of snags greater than or equal to 24" dbh (Freel 1991, Spencer 1983). Habitat quality would be reduced on 34 percent of moderate and high capability breeding habitat under Alternative 1; however, retained snags would provide some potential resting and denning sites for marten. The proposed retention rate would be adequate for foraging habitat utilized by marten. Although a reduction in breeding habitat quality is expected, the treated areas would continue to offer moderate and high capability foraging habitat for marten" (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). It was found that there would be a reduction in the quality of moderate and high capability habitat on about 4,224 acres (9 percent of the remaining suitable habitat within the analysis area) from implementation of Alternative 1 (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). Direct, indirect and cumulative effects analysis for the marten was used in making the determination that Alternative 1 may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten.

451. **Comment**: The proposed salvage logging units within 0.5 miles of the nest tree occur within approximately the 300 acre area to be managed as "target nesting stands." The reduction in habitat quality expected from the salvage operations is not consistent with habitat management in a BEMA. To be consistent with the forest plan and guidance on habitat management for bald eagle, units O08, O09, and O10B should be dropped from the action alternatives.

5438

Response: Forest Plan Direction for Bald Eagle states that when nesting bald eagles are found, implement suitable restrictions on nearby activities based on the Regional habitat management guidelines (USDA 2010a p. 43). Regional habitat management guidelines are provided by the National Bald Eagle Management Guidelines (USFWS 2007). As per USFWS 2007, the proposed activities in the action alternatives fall under Category C. Timber Operations. Under Category C, the following is required: 1) Avoid removal of trees within 330 feet of the nest at any time and 2) avoid timber harvest operations during the breeding season within specified buffers. The action alternatives are compliant with these requirements (Terrestrial Biological Evaluation p. 26, EIS Chapter 3.15). Units O08, O09, and O10B are not in areas managed as "target nesting stands".

452. **Comment**: …I'm particularly concerned about nesting habitat for Pileated Woodpeckers as well as other cavity nesting birds. The elusive Pileated does not like human disturbance.

5476

Response: The Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA 2007) states, "Species are selected as MIS because their population changes may indicate the effects of land management activities." The pileated woodpecker uses primarily the habitat component of snags in green forest. The MIS for that habitat component is hairy woodpecker. Thus effects to the pileated woodpecker can be inferred from the analysis of effects to the hairy woodpecker.

The terrestrial MIS Report came to the following conclusion:

Alternative 1 would minimally impact snags within hairy woodpecker habitat because dead trees would be removed primarily from areas that burned at high/moderate severity rather than green forest. Within salvage units, no green trees would be taken so CWHR [California Wildlife Habitat Relationship] types would not change. In hazard tree areas with green forest, hazardous trees would be removed, but CWHR types would not change and approximately 50 percent of this habitat is adjacent to burned areas that would recruit snags over the next several years. Although 19 percent of post-fire habitat would have a reduced capability to support the hairy woodpecker, that habitat would remain and have the capacity to regenerate snags over time. There would be no direct habitat reduction as a result of Alternative 1 and there would be no alteration to the existing trend in this ecosystem component

The conclusion was the same for the other two action alternatives (3 and 4).

Disturbance to nesting pileated woodpeckers would be mitigated to some extent by the implementation of Limited Operating Periods (LOPs) for California spotted owls, northern goshawks, and great gray owls (EIS, 2.03: Management Requirements Common to All Alternatives), although not all pileated nesting habitat would lie within areas subject to LOPs.

453. Comment: Failure to analyze and address impacts to post-fire shrub habitat…the Wildlife section does not contain any analysis of adverse impacts and cumulative effects (of hastening the decline of shrubs through removal of snags, artificial planting and direct shrub reduction/removal) to wildlife such as the Fox Sparrow, a Management Indicator Species that depends upon shrub habitat. Several fellow shrub-dependent species, which the Fox Sparrow represents, are experiencing long-term, consistent, statistically significant population declines in the Sierra Nevada, based upon Breeding Bird Survey data, including the Chipping Sparrow, Wrentit, Brewer's Blackbird, Yellow Warbler, and Orange-crowned Warbler (http://www.mbr-pwrc.usgs.gov/cgi-bin/atlasa12.pl?S15&2&12) ...Moreover, it is important to recognize the deficit of montane chaparral on the landscape and its value to wildlife (e.g., Nagel and Taylor 2005). Siegel et al. (2011) concluded that native fire-following shrubs are vitally important to biodiversity in complex early seral forest (CESF)...Similarly, Burnett et al. have found that shrub dominated landscapes are critically important wildlife habitat: "while some snag associated species...decline five or six years after a fire... [Species] associated with understory plant communities take [their] place resulting in similar avian diversity three and eleven years after fire..." (Burnett et al. 2012). Burnett et al. (2012) also noted that there is a five year lag before dense shrub habitats form that maximize densities of species such as Fox Sparrow, Dusky Flycatcher, and MacGillivray's Warbler...This suggests early successional shrub habitats in burned areas provide high quality habitat for shrub dependent species well beyond a decade after fire.

5335

Response: The Rim Fire Recovery Project is proposing to salvage fire-killed and hazard trees from within the Rim Fire Perimeter as described in Chapters 1 and 2 of the EIS. Planting and direct shrub reduction/removal is not part of the action alternatives. Further, a proposed action has not been developed for reforestation. Because planting and direct shrub reduction/removal is outside the scope of this project, these actions were not analyzed in the EIS.

The fox sparrow was selected as the MIS for shrubland (chaparral) habitat on the west-slope of the Sierra Nevada, comprised of montane chaparral (MCP), mixed chaparral (MCH), and chemise-redshank chaparral (CRC) as defined by the California Wildlife Habitat Relationships System (CWHR). The fox sparrow was considered but eliminated from detailed analysis based on the following rationale:

Fox sparrow will not be discussed in detail because the Rim Fire Recovery Project alternatives would not change acres of shrub habitat, ground shrub cover class, or shrub size class based on the existing condition. The project alternatives focus on salvage logging dead trees and removing hazard trees. The Rim Fire itself was the primary event responsible for changing acres of shrub habitat.

The yellow warbler was selected as the MIS for riparian habitat in the Sierra Nevada. This species is usually found in riparian deciduous habitats in summer (cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland). The yellow warbler was considered but eliminated from detailed analysis based on the following rationale:

Yellow Warbler will not be discussed in detail because the Rim Fire Recovery Project alternatives would not change riparian habitat acres, deciduous canopy cover, total canopy cover, or CWHR size class. Rim Fire Recovery Project alternatives would not alter canopy cover because the action alternatives propose removal of dead trees, and dead trees do not notably contribute to canopy cover. Some green trees could be removed if they were roadside hazards, but removal of green hazard trees would be minimal and would not change acres, size class, or canopy closure class of riparian habitat.

Under all action alternatives burned habitat would remain untreated throughout the project area and in the next several years when chaparral vegetation begins to recover, these areas may provide habitat to chaparral dependent species such as the fox sparrow. Based on the existing condition, shrub habitat would not be treated. The action alternatives are described in detail in the EIS Chapter 2 and effects analysis is addressed in EIS Chapter 3.

454. Comment: With regards to the potential for negative impacts on habitat for certain species, it must be considered that a temporary loss of habitat or a reduced level of habitat is a much better alternative than no action which in all likelihood will result in repeated significant future loss with the possibility of that loss being permanent or nearly so.

5409

Response: The analyses of the effects of the action alternatives on the quantity and quality of habitat for several species are presented in the EIS (Chapter 3.12), the Aquatic MIS Report, the Aquatic Sensitive Species Report, the Aquatic T&E Report, the Wildlife BE, the Wildlife MIS Report, and the Wildlife Migratory and Landbird Conservation Report. The effects of the alternatives on the possibility of future loss of different habitats are discussed in the EIS and the Rim Fire Recovery Fire and Fuels Report. They state, “Treatments under Alternative 1 would significantly reduce fire intensities and fire effects within the treated units” (EIS Chapter3.05; Draft Rim Fire Recovery Fire and Fuels Report). Alternatives 3 and 4 would have similar effects to a greater (in the case of Alternative 3, because more acres would be treated) or lesser (in the case of Alternative 4, because fewer acres would be treated) degree than Alternative 1. When considering the effects of the No Action Alternative (Alternative 2), the two documents state, “Fire effects under the No Action Alternative would result in higher stand loss as seen in the Rim Fire, with over 50 percent of the stand killed” (EIS Chapter3.05; Draft Rim Fire Recovery Fire and Fuels Report).

455. Comment: Features that may benefit some wildlife species will be in complete conflict with other species; therefore, in many cases it is necessary to plan for wildlife species guilds to topical areas.

5469

Response: A guild can be defined as “group or organisms that are ecologically similar in characteristics such as diet, behavior, or microhabitat preference, or with respect to their ecological role in general. The guild concept is similar to the Management Indicator Species concept, which is the approach the Forest Service uses to evaluate the effects on the myriad of species which occur on National Forest System lands. As the Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA 2007) states, "Species are selected as MIS because their population changes may indicate the effects of land management activities." The Rim Fire Recovery Wildlife MIS Report presents the analysis of effects on MIS for this project.

456. Comment: A wide array of diverse features would be incorporated into the management of forest wildlife. Those features should include, but not be limited to, snags (both soft and hard) in different sized, tree species and configurations; forest openings (large and small); down logs; diversity of vegetative forms; meadows and meadow linkage; thermal, feeding, resting, and escape cover; and riparian features.

5469

Response: A wide variety of features have been incorporated into the management of wildlife and these are described on pages 26-27, 29-33, 33-34, and 34-45 in the DEIS.

457. Comment: We ask that the DEIS be revised to include an evaluation of legacy structures lost to salvage operations, including estimates lost to hazard tree operations that were not included above, and the impacts that this loss has on species at-risk, habitat structure and ecological integrity.

5438

Response: The Forest Service considered large snags and large down logs as biological legacies in the post-fire environment and recognize that large snags and large down logs play important short-term and long-term ecological roles (see especially EIS Chapter 3, Wildlife Chapter 3.15 “habitat modification” sections for spotted owl, goshawk, marten, and fisher). Large snags and large down woody material were evaluated in relation to each of the alternatives for these species in the DEIS Chapter 3, Wildlife Chapter 3.15, and in the Draft Terrestrial Biological Evaluation and Wildlife Report (see especially Indicator 3 for spotted owl, goshawk, marten, and fisher)

458. Comment: We included in our scoping comments a review of recent research on owl use of burned forests and asked that these new findings about habitat quality be included in the analysis presented in the DEIS. Although some of this research was noted in the narrative of the biological evaluation (BE), no evaluation of current habitat conditions within the project area and no evaluation of the change in habitat condition resulting from the fire itself or the likely to result from salvage logging where disclosed in the BE or DEIS.

5438

Response: An evaluation of current habitat conditions for spotted owl was completed with technical assistance from Pacific Southwest Region (PSW) owl scientists. For the analysis, each PAC was evaluated within the Rim Fire boundary using several criteria. The three main criteria used were 1) acres of post-fire suitable habitat defined as CWHR 4M, 4D, 5M, and 5D (including class 6) burned at less than 75 percent basal area mortality, 2) percent of PAC within a 496 ac (200 ha) circle burned at high severity (defined as greater than 75 percent basal area mortality), and 3) percent of pre-fire suitable habitat burned at high severity. The results of this evaluation are graphically illustrated in the “pin graph” provided in the DEIS Chapter 3, Wildlife Chapter 3.15, and in the Draft Terrestrial Biological Evaluation and Wildlife Report. Details on individual sites are provided in the Terrestrial Wildlife Biological Evaluation Appendix. Based on proposed project activities, six indicators were chosen to provide a relative measure of potential environmental consequences under each alternative (DEIS Chapter 3, Wildlife Chapter 3.15, and in the Draft Terrestrial Biological Evaluation and Wildlife Report).

459. Comment: One of our biggest concerns is the uncertainty of the impact of the proposed logging. By way of example, the DEIS notes that “These sites (spotted owl Protected Activity Centers) burned primarily at high severity across the 200 ha analysis area, had nearly all pre-fire suitable habitat burn at high severity, and have small amounts of post- fire suitable habitat. It is clear that these sites have very low to no probability of continued occupancy. Thus, we concluded that it is appropriate to remove these sites from the conservation network." But later, under "habitat modification", the DEBE states: "Recent research indicates that prey species may be abundant and available in the post-fire environment. Work by Bond et al. (2009, 2013) indicates that owls preferentially select high-severity fire areas for foraging."

5358

Response: Bond et al. (2009) looked at habitat use by owls at four sites that experienced 9-11 percent high-severity fire. It is not appropriate to generalize results from a single, small limited to a narrow range of high-severity fire conditions to the range of conditions that occur in the Rim Fire where 80-100 percent of many owl sites burned at high severity, resulting in extensive patches of high-severity burn with little edge between high severity burn patches and other burned and unburned patches, and little post-fire suitable habitat.

460. **Comment:** This clause should include the use of a biologist from outside of the Forest Service based on approval from the Forest Service and qualifications of the biologist.

5424

Response:

461. **Comment**: I urge that any salvage work be sensitive to wildlife habitat.

4410

Response: Each action alternative describes management requirements to be followed that protect wildlife and wildlife habitat (EIS Chapter 2.03). In addition, Alternatives 3 and 4 include almost 4,000 acres of critical deer habitat where biomass and some commercial logs would be removed to aid in deer migration to and from these areas.

462. **Comment**: Also, some snags should be dropped now and left on site for habitat instead of being removed.

5186

Response: All existing large down logs would be left in place and any large trees that are not merchantable would also be left in place for down woody retention. The Soils, Watershed and Aquatics Management Requirements in EIS Chapter 2.03 address this issue.

463. **Comment**: ...we request that you assess impacts of post-fire logging on these important species of concern in terms of reductions in high quality early seral habitat caused by the project alternatives.

5313

Response: Impacts on early seral habitat are described in the EIS in Chapter 3, Wildlife Chapter 3.15, black-backed woodpecker.

464. **Comment**: Study upon study show that post fire habitats are not only important for species survival, but also for the regeneration of the ecosystem itself. Any recovery operation should be well thought out and carefully consider both the short and long term effects.

5411

Response: Short and long-term effects to species and their habitat are described in the EIS in Wildlife Chapter 3.15.

465. **Comment:** Several salvage units surrounding Ackerson Meadow should also be dropped to accrue benefits similar to those described for the Wilson Meadow area mentioned above. Units Q6, Q7, Q8, Q9, Q13, T22, T23, and T24 are all in close proximity to the suite of PACs around Ackerson meadow.

5438

Response: The Responsible Official will consider this recommendation while making a decision.

SPECIES

466. **Comment**: California spotted owl, great gray owl, goshawk, marten, and fisher are imperiled species facing habitat degradation or loss as a result of the action alternatives.

5438

Response: Project effects are analyzed and discussed in detail in the EIS Chapter 3, Wildlife Chapter 3.15, and in the Terrestrial Wildlife BE/BA and Wildlife Report.

467. **Comment**: The DEIS does not provide information on the effects of salvage in these areas that have high densities of legacy structures. Also, as can be seen from the table above, some of these areas with high densities of large legacy structures slated for salvage logging are often closely associated with historically or currently occupied owl sites. The direct benefit that these areas could provide to meeting life requirements for spotted owl and the site specific impacts likely to result from their removal are not discussed in the DEIS. We also note that spotted owl areas overlap significantly with

habitat areas, i.e., PACs, for northern goshawks and similar losses of legacy structures will affect this at-risk species.

5438

Response: The Forest Service considered large snags and large down logs as biological legacies in the post-fire environment and recognize that large snags and large down logs play important short-term and long-term ecological roles (see especially EIS Chapter 3, Wildlife Section 3.15 “habitat modification” sections for spotted owl, goshawk, marten, and fisher) Large snags and large down woody material were evaluated in relation to each of the alternatives for these species in the EIS Chapter 3.15, Wildlife Section , and in the Draft Terrestrial Biological Evaluation and Wildlife Report (see especially Indicator 3 for spotted owl, goshawk, marten, and fisher).

468. Comment: As we will discuss in more detail below, we believe that the survey approaches being applied to detect sensitive raptors, including California spotted owl, northern goshawk, and great gray owl, are not adequate to detect breeding birds in the Rim Fire project area.

5438

Response: Surveys for California spotted owl, northern goshawk, and great gray owl have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Additionally, the survey coverage has been designed in coordination with species experts at PSW.

469. Comment: To date, two goshawks and six spotted owls have been found in habitat thought to be unsuitable to these species and we have heard that great gray owls have been located nesting in severely burned habitat. Surveys for these species should be extensive and should be completed to protocol prior to salvage logging. Surveys should not simply include the known protected activity centers (PACs), but should also include suitable habitat outside PACs in order to provide adequate protection and avoid unintentional destruction of active breeding areas. In addition, a buffered area around a PAC regardless of the perceived habitat suitability in that area should be surveyed to detect raptors that may have moved their territories to accommodate habitat changes resulting from the fire.

5438

Response: Surveys for California spotted owl, northern goshawk, and great gray owl have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Additionally, the survey coverage has been designed in coordination with species experts at PSW and the survey results described above are evidence of the effectiveness of our survey effort and Regional protocols. Where applicable based on survey results, PAC boundaries will be modified and/or PACs re-established per Stanislaus Forest Plan Direction to provide adequate protection of breeding areas.

470. Comment: For these reasons, pre-fire suitable habitat within 0.25 miles of any salvage logging unit should be surveyed, as required by the forest plan.

5438

Response: Surveys for California spotted owl, northern goshawk, and great gray owl have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Additionally, the survey coverage has been designed in coordination with species experts at PSW.

471. Comment: The race to salvage log in the Rim Fire is in conflict with completing the necessary surveys and analysis to protect at risk species and other sensitive resources. It is critical that we have current information about resource conditions in the project area prior to initiating salvage logging.

Conservation measures must also still be developed to address protection of habitat for sensitive aquatic and wildlife resources. This work must also be done prior to conducting salvage operations.

5438

Response: The Rim Fire Salvage project is conducting some surveys for species such as spotted owl and goshawk. Species that are being analyzed as part of the Biological Evaluations or Biological Assessment already have known locations, or are being analyzed as occupied if appropriate habitat is within the project area. The project is following the 2004 SNFPA Standard and Guideline #13 and 2010 Forest Plan Direction that states to "Design projects to protect and maintain critical wildlife habitat" and "Design projects to reduce potential soil erosion and the loss of soil productivity caused by loss of vegetation and ground cover". Standard and Guideline #16 states that "…salvage harvest are prohibited in PACs and known den sites…" Standard and Guideline #14 states to "generally do not conduct salvage harvest in at least 10 percent of the total area affected by the fire".

Outside of the specific surveys required as part of the 2010 Forest Plant Direction, no specific surveys are required unless the species is listed as threatened, endangered, proposed, or sensitive (TEPS) and a biological evaluation finds that it cannot modify the project to remove an adverse or questionable conflict and that the data is no sufficient to assess the significance (FSM 2672.43 Exhibit 01). Non-TEPS species do not require surveys. Existing known locations were considered occupied by the rare species and evaluated appropriately. The Biological Evaluations (aquatic, botanical and terrestrial wildlife) were able to remove any adverse conflicts, hence surveys are not required.

Carnivores

472. Comment: There are no significant issues or concerns identified in Section One of the document surrounding fisher habitat that seem to warrant development of [the proposed FCCC]...The proposal would add unnecessary complication to implementation of the overall project with dubious and really unquantifiable benefits that could not be just as easily achieved in association with the next scheduled revision of the Stanislaus National Forest Land and Resource Management Plan. There is really no rationale presented for why the amendment to the Forest Plan is needed and appropriate at this time and within this project proposal...Tying the FCCC to North Mountain...where there was nearly 100% mortality and there will be no high quality cover for fisher for decades is kind of a silly proposition...

4460

Response: Habitat fragmentation and loss of habitat connectivity has been identified as a significant risk regarding the maintenance of fisher in landscape and allowing them to disperse into and use suitable yet unoccupied habitat (USDA 2001).

Suitable habitat has been greatly reduced in the heart of the analysis area and connectivity between large tracts of habitat on the forest and currently occupied areas in Yosemite has been further reduced. This habitat fragmentation has reduced the likelihood of fisher moving through or dispersing into the area until natural vegetation recovery or forest management practices, such as planting, effectively re-establishes connectivity, EIS, Wildlife Chapter 3.15, fisher.

Therefore, a forest carnivore connectivity corridor (FCCC) is proposed to focus management activities associated with this project on re-establishing that connectivity so that fisher can disperse into and utilize the available suitable habitat on the Stanislaus National Forest. Objectives for this corridor are discussed in the EIS, Wildlife Chapter 3.15, fisher, and include salvage logging to provide opportunities for future management that may include re-establishing forested conditions suitable for fisher and other old forest associated species by planting. The return of forested habitat would be accelerated under active management such as planting of conifers. Management objectives in this corridor would complement OFEA and HRCAs management objectives at the larger landscape scale.

The Forest Plan Amendment proposed under Alternatives 3 and 4 would result in continued management of this area to benefit old forest associated species in the future, not only those objectives identified in this project. With the new land allocation, the FCCC would receive a higher priority for reforestation in the future, re-establishing habitat connectivity in the long-term.

473. Comment: CSERC staff has photographic evidence of marten presence that was provided to the Stanislaus National Forest when a marten was photographed at a CSERC-maintained camera station on August 24, 2006 in T3N, R18E, and NE1/4 SEC 30 one mile northeast of the Rim Fire boundary. In addition, based on the very minimal surveys that CSERC has done for furbearers within the Looney, Bourland, Reynolds watersheds, there is clearly high potential for additional furbearer sites. Highly suitable furbearer habitat now remains within that broad Hells Mountain to Clavey River corridor. Designating that belt of partially fragmented and partially suitable area as a second FCCC would result in far stronger assurance that suitable marten and fisher habitat is adequately managed for the next 20-30 years.

4467

Response: The CSERC sighting of marten near the Rim Fire boundary is included in the EIS Chapter 3.15 and in the Terrestrial Wildlife BE/BA and Wildlife Report. The area the commenter references does contain moderate and high capability habitat for fisher and marten post-fire. However, habitat connectivity in this area would not be compromised by implementing the action alternatives and therefore was not identified as an objective for this project.

474. Comment: Despite whatever decision is made for this Rim Fire Recovery EIS project, most of the proposed Tuolumne Canyon FCCC does not currently have mature green forest habitat nor will it possibly recover to a level of suitability for decades at the soonest.

4467

Response: The Forest Service concurs that the proposed FCCC does not currently have mature green forest habitat and it will take decades to recover to a suitability level utilized by forest carnivores. Our objectives include long-term goals for this area and have been clarified in the EIS Chapter 3.15, Wildlife, (Fisher) and Final Terrestrial Wildlife BE/BA and Wildlife Report.

475. Comment: If a goal of mitigation and long-term management benefit for furbearers is intended to be achieved with this project, then designating a second furbearer corridor across the upper belt from Hells Mountain to the Clavey River would provide high benefit for potentially surviving furbearers.

4467

Response: The Responsible Official will consider your recommendation when making her decision.

476. Comment: Failure to address the use of post-fire conifer forest by Pacific fishers…The Project Fails to Address the Use of Post-Fire Habitat by Pacific Fishers and Is Wrong as to Fisher Habitat. The DEIS's section on Pacific fishers ignores Hanson (2013) - the only study to ever empirically test the relationship between Pacific fishers and post-fire habitat with field data - and instead relies upon previous papers that have simply assumed that higher-severity fire removes fisher habitat. Hanson (2013) concluded that areas of high biomass and structural complexity (including...snags, downed logs, and shrubs) are important to Pacific fishers, and that post-fire logging is likely to harm fishers by removing most of the biomass and structural complexity in higher-severity fire areas. Further...Hanson (2013) concluded that areas of dense, mature/old forest that burn at higher-severity, and have not been subjected to post-fire logging, shrub removal, and artificial conifer plantation establishment, are suitable Pacific fisher habitat. Because the DEIS ignored the findings of Hanson (2013), the DEIS erroneously assumed that only areas dominated by larger live trees and moderate to high canopy cover are suitable fisher habitat, leading the DEIS to improperly minimize adverse effects of proposed logging to fishers...The DEIS (pp.367-368) also assumes, in the context of the analysis of impacts and cumulative effects to Pacific fishers, that conifer forest will not regenerate except in areas of low/moderate-severity fire and adjacent to the edges of high-severity fire areas. This assumption forms the basis for the DEIS's wrongful conclusion that post-fire logging and artificial planting will not harm fishers, and may benefit fishers.

5335

Response: Suitable fisher habitat has been defined in the EIS Chapter 3.15 and in the Terrestrial Wildlife BE. The agency considered Hanson et al. 2013 and added findings supported by the research (EIS Chapter 3.15, Terrestrial Wildlife BE). The publication investigated fisher use of burned and unburned habitat, not fisher use of salvage logged areas and fisher use of un-salvage logged areas; therefore, conclusions regarding post-fire logging effects to fisher cannot be drawn from this research.

In the analysis of no action, short-term benefits to fishers is discussed, including the potential for un-salvaged areas to provide foraging habitat in the EIS Chapter 3.15 and in the Terrestrial Wildlife BE. The negative long-term effects is addressed, which include the risk of loss of the existing suitable habitat from future wildfire based on the fuel loading expected under the no action alternative and corresponding analysis in the EIS Chapter 3, Fire and Fuels Chapter 3.05.

In the analysis, effects to suitable fisher habitat are measured based on the existing condition as defined and described in the EIS Chapter 3.15 and in the Terrestrial Wildlife BE. The existing condition in the Rim Fire Recovery project area is less than one year post-fire and does not mimic the existing condition presented in Hanson et al. 2013, vegetative conditions 10-12 years post-fire. The analysis concluded that areas not proposed for treatment would result in a potential increase in foraging habitat post-fire when vegetation has become re-established (EIS Chapter 3.15, Terrestrial Wildlife BE).

The analysis referenced in the EIS Chapter 3.15 is the discussion under Direct and Indirect Effects of the No Action Alternative. It did not conclude that conifer forest will not regenerate except in areas of low/moderate-severity fire and adjacent to the edges of high-severity fire areas. The EIS states "Because the ability of forests to regenerate after stand replacing fire is highly dependent on seed sources, forested conditions are likely to re-establish only within mixed severity burn patches and the edges of high severity patches (Crotteau et al. 2013). It is likely that areas that burned at high severity would be dominated by herbaceous and shrub vegetation and shade tolerant conifer species such as white fir and incense cedar in the future. A consequence of shrub dominance is the reduced likelihood that forested conditions would return naturally for many decades. Not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of forest conditions. Thus, suitable denning and resting habitat would be delayed under this alternative resulting in long-term negative effects to fishers." EIS Chapter 3.15.

477. Comment: We also ask that the desired condition to retain woody as small as 3" diameter be explained in more detail. What is the biological purpose of retaining this small size debris for forest carnivores? If the purpose is to meet soils or watershed standards, then what are the downed wood habitat management goals in the FCCC for forest carnivores?

5438

Response: There is no discussion in the DEIS or Terrestrial Wildlife BE pertaining to benefits of retaining downed wood as small as 3 inches in diameter for wildlife, nor is this size class of downed wood considered to be beneficial to fisher or marten. The EIS (Chapter 2) includes very specific wildlife management requirements pertaining to snag and downed wood retention for the different alternatives.

478. Comment: CSERC supports the snag retention levels for the FCCC units as proposed in Alternative 4. However, with all due respect to the good intentions of the "Tuolumne River canyon" FCCC, the value of that corridor is far less critical and logical than managing a more northern forest carnivore connectivity corridor that stretches from the Cherry Bluffs roadless area across the north side of Hells Mountain and stretching west across the Reynolds Creek, Little Reynolds Creek, Lost Creek, Looney Creek, Bourland Creek, and Clavey River watersheds in a similar wide connectivity corridor for fisher/marten utilization in the near term and long term.

4467

Response: The Responsible Official will consider your recommendation when making her decision.

479. Comment: Page 32, Figure 2.02-1: Forest carnivore connectivity corridor map is illegible. Difficult to ascertain if connectivity is being maintained.

4500

Response: A new, larger figure showing the forest carnivore connectivity corridor has been incorporated in the EIS Chapter 3.15, Wildlife section on Fisher.

480. Comment: …the so-called "forest carnivore connectivity corridor (FCCC)" in Alt. 3 & 4 is anything but that. Instead of protecting the corridor, the DEIS seeks to intensively log it pursuant to outdated notions of snag retention (e.g., 4 to 6 conifer snags per acres [sic]). There is no basis to assume that 4 to 6 conifer snags per acre is adequate for fisher habitat in the future, and more importantly, there is no basis to assume that salvage logged areas will provide habitat to the south of Cherry Lake considered to have low/no probability for fisher occurrence according to Spencer et al. 2010 (Proposed FCCC map on page 54 of the Rim Recovery DEIS). And the FCCC does not encompass mature forest on the west side of Cherry Lake that burned with low or moderate severity during the Rim Fire. This second area west of Cherry Lake is considered high probability for fisher occupancy (Spencer et al. 2010). The emphasis on habitat protection for forest carnivores in the proposed FCCC should therefore a) actually protect the post-fire habitat presently available, and b) not just focus on low quality habitat areas.

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Response: The FCCC was not based on the snag retention guidelines presented under the action alternatives. The basis for the proposed FCCC can be found in the EIS Chapter 3.15 and in the Terrestrial Wildlife BE. The document clarifies how the models presented in Spencer and Rustigan-Romsos (2012) were used in concert with finer scale data to identify an area that could benefit fisher in the long-term. The effects analysis pertaining to snags and snag retention requirements proposed under each alternative and conclusions can be found in the EIS in Chapter 3.15 and in the Terrestrial Wildlife BE.

Spencer et al. 2010 is an “in press” article available on line in December 2010 but published in 2011; therefore, we will refer to the publication as Spencer et al. 2011. The agency concurs that Spencer et al. 2011 did not identify the proposed FCCC area as part of a fisher habitat core area with a high probability of fisher occupancy. Spencer et al. 2011 modeled total above-ground biomass of trees, latitude-adjusted elevation, and annual precipitation averaged across 5 km^2 moving windows to identify large areas of suitable fisher habitat. The core areas were limited to contiguous polygons greater than 2,500 hectares having greater than or equal to 0.4 PPO (Predicted Probability of Occupancy). Thus, suitable habitat available at smaller scales than 2,500 ha would not have been captured in this modeling effort. This and other models presented in Spencer and Rustigan-Romsos (2012), a more recent publication that built on Spencer et al. 2011, as a starting point. Finer scale data available was used to look at opportunities for future management actions, such as conifer planting and long-term fire and fuels management. The placement of the FCCC is designed to provide connectivity (dispersal and resting/denning habitat) for the long-term between where fishers that currently reside in Yosemite National Park and large areas of suitable habitat in the Clavey River watershed (EIS Chapter 3.15, Terrestrial Wildlife BE). The Clavey River Watershed includes a core habitat area with high probability of fisher occupancy as identified by Spencer et al. 2011 and Spencer and Rustigan-Romsos 2012. A new map was created that added the pre-fire suitable habitat using CWHR and the STF vegetative database to the data presented in the EIS, which shows the potential future vegetation across a large portion of the FCCC based on pre-fire conditions (EIS Chapter 3.15, Terrestrial Wildlife BE). This new map better illustrates the concept of restoring and improving connectivity in the proposed Forest Carnivore Connectivity Corridor.

Based on existing condition, the area west of Cherry Lake contains suitable fisher habitat and is part of an area where the probability of fisher occupancy is considered high as discussed in Spencer et al. (2011) and Spencer and Rustigan-Romsos (2012). Because implementation of the action alternatives would not impact habitat connectivity in this area, it was not identified as part of the purpose and need for this project. Further, 71-72 percent of currently suitable fisher habitat would remain untreated under the action alternatives.

481. **Comment**: We see the current location of the FCCC as misplaced because the expected vegetation type that would dominate the area does not have a high likelihood of supporting fisher or marten movement.

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Response: The current location of the FCCC was selected based on a variety of factors including landscape level modeling, potential natural vegetation, on-the-ground knowledge of habitat suitable for fisher, land ownership, and other management priorities (EIS Chapter 3.15). The models referred to in Spencer and Rustigan-Romsos were landscape models that averaged the existing condition of environmental variables at 5 km^2 (Spencer et al. 2011, Zielinski et al. 2010) and 10km^2 (Davis et al. 2007) moving windows. The core areas were limited to contiguous polygons greater than 2,500ha having greater than = 0.4 PPO of fishers. Thus, suitable habitat available at smaller scales than 2,500 ha would not have been captured in these modeling efforts. The least cost corridors were also based on existing condition, and modeled connectivity between the habitat core areas described above. These models were used as a starting point to identify general landscape location and also used finer scale data available to look at project related influence on potential re-establishment of mature forest conditions. The placement of the FCCC is designed to provide connectivity (dispersal and resting/denning habitat) for the long-term between where fishers that currently reside in Yosemite National Park and large areas of suitable habitat in the Clavey River watershed (EIS Chapter 3.15, Terrestrial Wildlife BE). The EIS clarifies how the models presented in Spencer and Rustigan-Romsos (2012) were utilized in concert with finer scale data to identify an area that could benefit fisher in the long-term (EIS Chapter 3.15, Terrestrial Wildlife BE). A new map was created which shows the potential vegetation across a large portion of the FCCC based on pre-fire data (Figure 6 in Terrestrial Wildlife BE Appendix) to better illustrate the concept of restoring connectivity in the designated Forest Carnivore Connectivity Corridor. The agency concurs that the entire proposed corridor does not have dense forested habitat or the capability of being managed for dense forested conditions in its entirety. The objective for this corridor is to re-establish forested conditions where they occurred before the Rim Fire and promote a mosaic of plant communities to provide for dispersal opportunities between Yosemite National Park, North Mountain, and the Clavey River drainage.

482. **Comment**: As recommended by Spencer and Rustigian-Romsos (2012) the FCCC would be best established to the north to include the mature forest on the west side of Cherry Lake that burned with mixed severity (Figure 2).

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Response: Based on existing conditions, the least cost corridor for fisher movement from Yosemite National Park to the northern portion of the Clavey River Watershed is the location identified by Spencer and Rustigan-Romsos (2012) as displayed in figure 2 of the comment letter. This connectivity would not be compromised by implementing the action alternatives and therefore has not been identified as an objective for this project.

483. Comment: We ask that the FCCC be moved north to a location that includes the southern end of Cherry Lake since this area provides the most likely area that fishers would use for movement and provides the most direction linkage to lands capable of supporting high quality habitat on the national forest and national park.

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Response: The agency concurs that the area to the north is important for habitat connectivity. However, there are few proposed units in that area. Thus, habitat connectivity in that area would not be greatly influenced by implementing the action alternatives and therefore was not identified as an objective for this project.

Bats

484. Comment: The Forest Service sensitive species Townsend's big ear bat (TBEB) was not addressed in the BE. This species should have been evaluated because the presence of this species has been documented on the Groveland Ranger District.

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Response: The Townsend's big-eared bat is a Region 5 Forest Service Sensitive species and has been documented to occur within the project area (Terrestrial Wildlife BE page 4-5). All documented occurrences of Townsend's big-eared bats in the vicinity of the Rim Fire were in caves, mines, and bridges (Bridgman pers. comm., CDFW 2014a, Pierson and Fellers 1998, Pierson et al. 2001). One maternity colony has been documented on the STF system lands, Bower Cave; about three miles west of the fire perimeter. No caves, mines, or bridges would be impacted by implementation of the action alternatives. As concluded in the Terrestrial Wildlife BE, detailed analysis for this species is not warranted.

485. Comment: We ask that you evaluate the potential impacts of the proposed salvage operations on Townsend's big eared bat with respect to disturbance from salvage operations, reduction in cover due to the loss of snags that may be removed near to caverns, rock faces and other sites used for roosting, and the removal of large diameter snags that may be used for roosting.

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Response: Townsend's big-eared bat foraging habitat is generally described as forested stands, meadows, and the edges of these habitats. The Townsend's big-eared bat is most often associated with and dependent upon buildings, caves or abandoned mines, and bridges for roosting (Kunz and Martin 1982, Pierson et al. 2001, Philpott 1997, USDA 2001). All documented occurrences of Townsend's big-eared bats in the vicinity of the Rim Fire were in caves, mines, and bridges (Bridgman pers. comm., CNDDB database, Pierson and Fellers 1998, Pierson et al. 2001). One maternity colony has been documented on the STF system lands, Bower Cave; about three miles west of the fire perimeter. Although documented to occasionally use basal hollows of trees in coastal forest dominated by redwood, Douglas fir, and California bay (Fellers and Pierson 2002), this has not been documented in the Sierra Nevada. Snags are not considered typical roosting habitat for this species and a reduction in snag habitat has not been identified as a significant threat to this species (Philpott 1997, Region 5 species account). Significant threats identified for this species include White Nose Syndrome, renewed mining, mine reclamation, recreational caving, and loss of building roosts, bridge replacement, and human disturbance at these roost sites (Philpott 1997, Region 5 species account). No buildings, caves, or abandoned mines are in close proximity to treatment units, thus would not be impacted by this project. Bridges are present in the project area and are not expected to be impacted by treatments. Project activities would occur during daylight hours, thus no effects are expected to night roosting bats in the project area. No change in the distribution of foraging habitat is expected from project implementation. No change in foraging success is expected from project implementation. Because no measureable effects to Townsend's big-eared bats are expected from project implementation, no additional analysis for this species is warranted. According to

CEQ Guidelines, Section 1502.2, (a) Environmental impact statements shall be analytic rather than encyclopedic and (b) Impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues, there should be only enough discussion to show why more study is not warranted. We analyzed all species and predicted project effects in proportion to their significance in the EIS Chapter 3, Wildlife Chapter 3.15 and the Terrestrial Wildlife BE/BA and Wildlife Report.

486. Comment: In an important study recently published, Buchalski et al. (2013) recorded significantly more passes per night for bats (as an index of activity) in very large patches of high-severity burned forest one year post-fire in the McNally Fire in the Sequoia National Forest. This was the first study to document response of bats to fires of different severities in the Sierra Nevada. The figures below (from Figure 2 of Buchalski et al. 2013) show bat activity relative to unburned riparian control stands for the fringe-tailed myotis (A) and the pallid bat (D). . . Studies in other regions have reported similar increased use of high severity burned forests by bats. . . High-severity burned sites had almost five times the biomass of zoobenthic insects than low-intensity burned sites. High-severity sites also had highest number of emerging adult aquatic insects, more than 3 times more than low-severity burned and 2 times more than unburned. The frequency of bat echolocation calls was significantly greater in high-severity burned sites than in unburned sites . . . proposed post-fire salvage logging would remove or severely reduce most of the habitat features created by high-severity fire which are potentially important to bats (e.g., snags for roosting, and flowering shrubs, which are important for flying insect prey).

5336

Response: Buchalski et al. 2013 did report bat activity was either equivalent or higher in burned stands than in unburned stands of mixed-conifer forest. Additionally, pallid and fringed myotis had activity levels significantly greater in high severity burned stands when compared to unburned stands. High severity burned stands are defined in Buchalski et al. 2013 as vegetation burn severity greater than 90 percent loss of canopy. All action alternatives would result in the retention of habitat that burned at high severity. Specifically, 7,066 acres (34 percent) , 7,752 acres (37 percent), and 8,923 acres (43 percent) of high severity burned habitat would remain untreated under Alternatives 1, 3, and 4 respectively. We present high severity burned habitat acreage as burned areas that resulted in greater than or equal to 90 percent basal area mortality. These areas would continue to offer the post-fire habitat features that may benefit foraging bats such as increased prey availability as well as snag habitat for roosting. Project effects are analyzed in detail for both the pallid bat and fringed myotis and are presented in the EIS Chapter 3, Wildlife Section 3.15.

Black-Backed Woodpecker[12]

487. Comment: a) Without salvage logging in the Rim Fire burned area, within the Stanislaus National Forest there would be enough suitable habitat to support 39 pairs of black-backed woodpeckers. Under Alternative 1, 17,461 acres of suitable black-backed woodpecker habitat would be removed, retaining only 10,156 (37%) of suitable habitat. The remaining suitable habitat is predicted to support a density of 16 pairs (41% of modeled pairs) of black-backed woodpeckers. Alternative 1 results in the least amount of habitat retention for black-backed woodpeckers and the lowest predicted pair density. b) I am disappointed the Forest Service plans to log some of the rarest and most important wildlife habitat on public lands in the Sierras. Burned areas provide critical sanctuary to many animals including black-backed woodpeckers. These birds are the first to arrive after a fire and create homes for other wildlife that arrive soon after. If left unlogged, post fire forests teem with wildflowers, shrubs, and regenerating trees, as well as hummingbirds, woodpeckers, deer and many other animals. c) Beetle-infested stands provide the ideal (and possibly only productive) habitat for

[12] We incorporate, by reference, the Clarification of the Black-backed Woodpecker Conservation Strategy, which addresses the misrepresentation of the Conservation Strategy in comments submitted for the Rim Fire Recovery Project (Craig 2014).

some woodpecker species. d) Salvage logging and fire suppression are especially detrimental to the black-backed woodpecker. e) Burned forests regenerate. It may take a while but this area will bounce back. In the meantime, these burned trees provide food sources and homes to woodpeckers and other birds that rely on forest habitat. The Stanislaus National Forest will thrive on its own, even after fires - but not after mass scale logging. f) There will be tens of thousands of acres of dead forest left untouched by any salvage activities to provide blacked-backed woodpecker habitat. The EIS needs to better highlight that there will be abundant snag habitat in the uncut areas and the final decision should consider scaling back the excessive snag retention in the harvest units.

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Response: Alternative 1 would result in the least amount of habitat retention for black-backed woodpeckers and the lowest predicted pair density which is discussed in the EIS Chapter 3.15, Wildlife section on, black-backed woodpecker.

The analysis in the EIS (Chapter 3.15, black-backed woodpecker) indicates that under the action alternatives between 15,261 and 17,461 acres or 55 to 63 percent of suitable black-backed woodpecker habitat would be removed from National Forest System lands. Conversely, between 10,156 and 12,356 acres of suitable habitat or 37 to 45 percent of suitable black-backed woodpecker habitat would be retained on National Forest System lands under the action alternatives. Maps displaying the amount and distribution of suitable black-backed woodpecker habitat by alternative can be found in the Terrestrial Wildlife BE Appendix.

488. Comment: a) To protect black-backed woodpecker nests, surveys or species specific LOPs should be added to all action alternatives. b) I support Alternate 4 with modification: Black-backed Woodpecker (BBWO) habitat available in Alternate 4 will be by my calculation as 11,900 acres or 44% of the total approaches adequate (44% calculated from data in Management Indicator Species MIS report page 10). This area will probably attract and serve this species to increase its number over a number of years. Even with this good forecast, the DEIS says no effort will be made to prevent loss of BBWO during salvage (p 17). However, the deliberate destroying eggs or young in active nests would seem to have a big impact on the total number of these birds over the time that salvage will last since the number of BBWO will be low in the first two years of salvage in 2015 and 2016. I ask that a wildlife inspector look for cavity nests as part of the logging crew during the nesting period of two or three months each year. Trees found with active cavities could be marked to become part of the snag inventory to be left in that acre of salvage. Please discuss this potential problem and benefit in the EIS. Increased snag retention is discussed (p 23 DEIS) in reference to wildlife habitat enhancement, but does not address leaving trees as snags during nesting time. c) The DEIS (p. 384) acknowledges that the Black-backed Woodpecker Conservation Strategy (Bond et al. 2012), commissioned and co-authored by the Forest Service itself, recommended that no post-fire logging be allowed in suitable Black-backed Woodpecker habitat during nesting season (May 1st through July 31st), yet there are no provisions in the Proposed Action, or the other action alternatives, to apply this recommendation (DEIS, pp. 25-27, and 43). d) This means that, even if logging begins after nesting season in 2014, in the nesting seasons of 2015 and 2016, Black-backed Woodpecker chicks could be directly killed by logging before they are developed enough to fly away, and chicks not directly killed may be killed by starvation due to nest abandonment caused by post-fire logging adjacent to nest sites in the middle of nesting season. e) Prohibit logging in moderate/high-severity fire areas in nesting season, as recommended by the Forest Service’s own scientists (Bond et al. 2012) to avoid compounded impacts to Black-backed Woodpeckers and the many other avian species represented by this management indicator species of post-fire habitat. f) Failure to follow the Conservation Strategy for the Black-Backed Woodpecker…the Forest Service Wrongly Ignored Guidance Regarding Black-backed Woodpecker Conservation…the project does not comport with the Forest Service's own guidance on this species - the Conservation Strategy, including the conservation recommendations to avoid post-fire logging in nesting season and to avoid post-fire logging patches larger than 2.5 hectares in size (Bond et al. 2012). The Forest Service is obligated to follow its own guidance and here did not. In fact, the DEIS does not ever adequately explain why it fails to follow its own guidance. The effects and cumulative effects to Black-backed of failing to follow the Conservation Strategy are not analyzed in the DEIS.

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Response: The purpose of the conservation strategy for the black-backed woodpecker "is to provide a roadmap for conserving Black-backed Woodpeckers in California through informed management." (Bond et al. 2012, p. 1). It seeks to summarize known information about the species, recommends management approaches for conservation, and suggests future research priorities (pp. 1-2). It is not Forest Service guidance or direction, and it is not a regulatory document. Thus the Forest Service is not legally bound to follow the recommendations in the strategy. We incorporate by reference a clarification letter provided by Diana Craig, co-author of the Black-backed Woodpecker Conservation Strategy, which addresses the misrepresentation of the Conservation Strategy in the comments above (Craig 2014).

Moreover, by its very nature, the Black-backed Woodpecker Conservation Strategy only considers one species. However the FS has to balance multiple priorities, objectives, uses, and species in its activities as a multiple use agency. And, at times, certain management objectives are in tension, if not direct conflict, with one another. For example, through this Project, the Forest seeks to reduce fire hazard by removing burned trees. Yet, the Forest also wishes to conserve burned forest habitat for the black backed woodpecker and other species. The Forest has tried to strike a reasonable balance between these two goals at the landscape level, but it is simply impossible to fully achieve both of these goals on each and every acre. To some extent, the need to balance multiple priorities is acknowledged by the Conservation Strategy itself (Bond et al., p. 44), which says that "Wildfire in forested environments is sometimes followed by the removal of dead or dying trees, in pursuit of one or more of many possible management goals. Commonly referred to as 'salvage' or 'salvage logging', it may be done to capture the economic value of wood products or for other reasons...Other reasons for post-fire snag removal include: mitigating hazards associated with roads, trails, administrative sites, and/or other sites where people may find themselves in unacceptably hazardous situations. Reducing hazards in areas where accelerated restoration of forested environments is desired for multiple reasons, including, for example, wildlife habitats that would otherwise be delayed without prompt reforestation actions. Reducing long-term fuel levels that could subject developing forest trees to intense heat and resultant mortality."

The Conservation Strategy was used in the development of the alternatives and in the analysis of the effects of those alternatives (EIS Chapter 3.15 Wildlife/Black-backed Woodpecker: Environmental Consequences; Terrestrial BA/BE/Wildlife Report).

489. **Comment**: a) We asked in our scoping comments that a limited operating period for nesting BBWO be adopted for all salvage operations. The action alternatives do not adopt this recommendation. There is little discussion about this recommendation, and the action alternatives fail to evaluate the consequences of not adopting the recommendation. b) If breeding black-backed woodpeckers are not protected the first three to five years post-fire (by habitat avoidance or with a multi-year limited operating period), then the project is likely to directly kill BBWO nestlings in felled trees and indirectly kill nestlings and fledglings by nestling starvation.

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Response: A limited operating period (LOP) is a seasonal period during which Forest Service management operations must be limited to reduce disturbance to threatened, endangered, or Forest Service Sensitive wildlife species during the breeding season (collectively referred to as TES). LOPs are designated in Forest Plan direction for TES species and as appropriate, through consultation with USFWS for threatened or endangered species.

The black-backed woodpecker is not a TES species in Region 5. The black-backed woodpecker was evaluated by subject matter experts for the potential inclusion on the Region 5 Forest Service Sensitive Species list (final list updated on July 3, 2013), but the evaluation did not result in adding this species to the Regional Foresters Sensitive Species list (July 3, 2013 Letter from Regional Forester), Terrestrial Wildlife BE Appendix. There is currently no law, regulation, or policy requiring LOPs for black-backed woodpeckers. Therefore we do not have a limited operating period in place for black-backed woodpeckers and do not believe an LOP is necessary.

Potential direct effects are considered to be short term and will only affect treated areas. Harvesting of fire-killed trees would occur throughout the year including time periods that are outside the black-backed woodpecker breeding season. Retained snags in treated areas would continue to provide cavity and foraging substrates. Untreated areas that burned at high severity and are suitable black-backed woodpecker habitat would be left intact, providing nesting and foraging habitat for black-backed woodpeckers, maps are available in the Terrestrial Wildlife BE Appendix. Specifically, between 10,156 and 12,356 acres (37-45 percent) of suitable habitat would be retained, available and distributed throughout the project area under the action alternatives. We considered habitat characteristics important to black-backed woodpecker as described in the Conservation Strategy (Bond et al. 2012) and the recent Tingley et al. (2014) model when determining specific retention areas for black-backed woodpeckers. Detailed analysis of the potential direct, indirect, and cumulative effects to black-backed woodpeckers were analyzed for each alternative and are available in the EIS Chapter 3, Wildlife Chapter 3.15, black-backed woodpecker.

The Executive Summary of the Conservation Strategy (page 1) clearly explains that “Interest in the conservation status of the black-backed woodpecker in California, the species’ sensitivity to some post-fire forest management actions, and the lack of synthesized information from California for this species, spurred the development of this Conservation Strategy.”

The Conservation Strategy is not a legally binding, agency policy or a regulatory document; moreover it was not designed to constrain the Forest Service in its actions and activities. It seeks to summarize known information about the species, recommends management approaches for conservation, and suggests future research priorities (Bond et al. 2012). Moreover, by its very nature, the black-backed woodpecker Conservation Strategy only considers one species. However the Forest Service has to balance multiple priorities, objectives, uses, and species in its activities as a multiple use agency. And, at times, certain management objectives are in tension, if not direct conflict, with one another. For example, through this Project, the Forest seeks to reduce fire hazard by removing burned trees; yet, the Forest also wishes to conserve burned forest habitat for the black backed woodpecker and other species. The Forest has worked to strike a reasonable balance between these two goals at the landscape level, but it is simply impossible to fully achieve both of these goals on each and every acre. To some extent, the need to balance multiple priorities is acknowledged by the Conservation Strategy itself (Bond et al. pg. 44), which says that “Wildfire in forested environments is sometimes followed by the removal of dead or dying trees, in pursuit of one or more of many possible management goals. Commonly referred to as ‘salvage’ or ‘salvage logging’, it may be done to capture the economic value of wood products or for other reasons...Other reasons for post-fire snag removal include:

- mitigating hazards associated with roads, trails, administrative sites, and/or other sites where people may find themselves in unacceptably hazardous situations,
- reducing hazards in areas where accelerated restoration of forested environments is desired for multiple reasons, including, for example, wildlife habitats that would otherwise be delayed without prompt reforestation actions,
- and reducing long-term fuel levels that could subject developing forest trees to intense heat and resultant mortality.”

- We incorporate by reference a clarification letter provided by Diana Craig, co-author of the Black-backed Woodpecker Conservation Strategy, which addresses the misrepresentation of the Conservation Strategy in the comments above (Craig 2014).

490. Comment: a) By responding in some degree to the concern about BBWO and leaving snag forest habitat untouched, Alternative 4 is one significant step closer to the science workshop consensus that evolved from diverse interests meeting in Sacramento to discuss general Rim Fire themes of salvage logging, road treatments, fuel treatments, and associated reforestation and restoration actions. CSERC's Modified Alternative 4 proposal significantly addresses some concerns that have been raised about project impacts to suitable habitat for black-backed woodpecker. b) Rather than attempt to provide the numeric difference of additional modeled pairs retained or additional total suitable habitat post treatment, what is inarguable is that Modified Alternative 4 would leave unlogged at least 7 square miles of high severity burned conifer forest. c) Using the woodpecker as a key indicator for other species and values that can benefit from snag forest retention, it is clear that Modified Alternative 4 is significantly more valuable for resources than any of the three Forest Service action alternatives. d) Based on our review of the project objectives and impacts to resources, we suggest that additional units be dropped from the Rim salvage project in order to improve conservation of sensitive resources. We suggest that 126 units totaling 10,422 acres be dropped to improve habitat conditions for sensitive raptors and BBWO, reduce watershed disturbance and impacts, increase retention of legacy structures, support the development of complex early seral stages, and eliminate costly treatments.

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Response: The impacts to black-backed woodpeckers have been analyzed and displayed in the EIS Chapter 3.15, black-backed woodpecker section. The Forest Supervisor will consider the proposed modifications of Alternative 4 when she makes her decision.

491. Comment: a) The DEIS (p. 46) claims that developing an alternative that conserved enough habitat to provide for 75% of the predicted nesting pairs was not viable since economic and fuel objectives could not be met. We disagree, in part, with this assessment and offer that additional key habitat areas which have a high potential contribution to support this species can be dropped from the salvage project and still meet objectives to address fuels, road improvements and economic outputs. Specifically, not removing burned trees in 9 units would conserve an additional 1,325 acres of higher value BBWO and support an estimated 2-3 pairs of BBWO. b) The DEIS (p. 46) acknowledges that a group of scientists were commissioned by the Forest Service to produce a consensus recommendation on minimum conservation measures for Black-backed Woodpeckers in the Rim fire area on the Stanislaus National Forest, and that these scientists recommended that a minimum of 75% of the Black-backed Woodpecker pairs on the Stanislaus National Forest portion of the Rim fire be retained, with their home ranges unlogged (Tingley et al. 2014). However, the Forest Service did not fully consider this as an action alternative, stating that this scientific recommendation "does not meet the purpose and need to capture the economic value since most of this habitat includes the largest and most dense stands of dead trees within the burn" (DEIS, p. 46). This contradicts the conservation recommendations of the Forest Service's own Black-backed Woodpecker Conservation Strategy, which states: "Black-backed Woodpeckers will likely benefit most from large patches of burned forest being retained in unharvested condition…[P]atches retained to support Black-backed Woodpeckers should incorporate areas with the highest densities of the largest snags to provide foraging opportunities…". c) Retain, unlogged, sufficient suitable habitat to meet the standard of > 75% of Black-backed Woodpecker pairs retained on the Stanislaus National Forest portion of the Rim fire, as recommended by the Black-backed Woodpecker expert panel commissioned by the Forest Service (see DEIS, p. 46). d) The DEIS also acknowledges up to 64% of black-backed woodpecker habitat and up to 59% of the predicted black-backed woodpecker pairs would be eliminated by the proposed salvage logging project (DEIS p. 386). A US Forest Service organized group of scientists recommended that a minimum of 75% of black-backed woodpecker pairs within the Rim Fire area be retained (DEIS p. 46). e) Failure to follow the workshop recommendation to protect enough Black-Backed Woodpecker habitat to maintain at least 75% of the modeled pairs…The DEIS (p. 386) states that under the Proposed Action, 63% of the suitable Black-backed Woodpecker habitat, and 59% of the modeled pairs, would be removed by logging on the Stanislaus National Forest portion of the Rim fire (the project area). Alternatives 3 and 4 are little better - Alt 3 removes 54% and Alt 4 removes 46% of the modeled pairs (see also attached maps showing overlay of Alt 4 units on modeled BBWO habitat)...any loss, let alone a 46-59% loss, is significant for such a rare species that currently has very little habitat on the Sierra landscape...the Forest Service should adhere to the scientific recommendation from the Rim Fire workshop to protect enough habitat to maintain 75% of the modeled black-backed woodpecker pairs...The DEIS violates NEPA...by failing to take a hard look at the impacts and cumulative effects of refusing to incorporate the recommendations of Tingley et al. (2014) (the recommendation that at least 75% of the Black-backed pairs on the Stanislaus National Forest portion of the Rim fire be retained)...

5438 5313 5324 5335

Response: The analysis indicates that between 55 and 63 percent of suitable black-backed woodpecker habitat as defined in the EIS, would be removed under the action alternatives (EIS Chapter 3.15) within the Stanislaus National Forest. The analysis also indicates that between 41 and 54 percent of modeled black-backed woodpecker pairs, would be retained under the action alternatives (EIS Chapter 3.15) within the Stanislaus National Forest. Within the entire footprint of the Rim Fire, between 77 and 81 percent of modeled black-backed woodpecker pairs would be retained under the action alternatives.

The Tingley et al. (2014) model is the result of an ad hoc group of scientists that worked together (combining data, knowledge, and resources) to create a black-backed woodpecker model. The group was not commissioned by the Forest Service, but the Forest Service welcomed their input and participation and invited them to present their findings at a meeting held at McClellan Conference Center in Sacramento in February, 2014. They provided a tool for modeling the expected density of black-backed woodpeckers. The model combines black-backed woodpecker occupancy probability data with expected black-backed woodpecker density given snag basal area to model the expected woodpecker density on a burned landscape as a continuous surface.

The model is useful in evaluating management alternatives and the Tingley et al. 2014 model in was used in all alternatives of the DEIS and we reported the modeled number of pairs associated with each alternative (thus we used the science associated with the model). Our analyses based on the Tingley model are included in the BE appendix, as well as EIS Chapter 3.15, black-backed woodpecker section, and show that we considered retention areas and units based on their value to black-backed woodpeckers. Thus the habitat suitability map that Tingley et al (2014) created to test different management scenarios was utilized in our analysis.

Tingley et al. (2014) also note that the expected density of woodpeckers resulting from the model should not be misconstrued as known density, and that the modeling process does not currently allow for propagation of uncertainty. “Thus, while the density layer for the Rim fire estimates habitat for a total of 42 pairs of black-backed woodpeckers on US Forest Service land, the true number may be either higher or lower to an unknown degree. Consequently, we suggest that managers use the density estimates to examine the relative benefits of retaining one patch of forest versus another, as relative value should scale proportionally.[pg. 4]” We utilized this approach in the EIS.

The white paper prepared by Tingley et al. 2014 does not specify a threshold value of modeled black-backed woodpeckers (or black-backed woodpecker pairs). However, in a presentation given by members of the ad hoc group in Sacramento, CA in February, 2014, the group recommended using the model to test different management scenarios and the group recommended a 75 percent threshold. A rationale for selecting the 75 percent threshold was not provided or analyses in the Tingley et al. (2014) paper, or in other literature, to support or explain this recommendation. The recommendation is not binding on the agency through NEPA, NFMA, or any other authority.

Nonetheless, we did utilize the habitat suitability map that Tingley et al (2014) created to test different management scenarios and we analyzed the feasibility of retaining 75 percent of the modeled pairs (as part of the Terrestrial Wildlife BE Appendix as well as Chapter 2.04 of the EIS part D). Our feasibility analysis included weighing multiple objectives within an interdisciplinary context. In contrast, the ad hoc group was solely focusing on conservation recommendations related to the black-backed woodpecker, and its recommendations did not attempt to balance the numerous other issues and needs associated with the Rim Fire Project, such as reducing fire hazard, increasing public safety, promoting reforestation in the area, improving future fire-fighting capacity, etc. In fact Tingley et al. (2014) acknowledged that other objectives may exist; they note that "In reality, other competing land management objectives may preclude retaining some of the best habitat; our black-backed woodpecker density model (Fig 4) allows managers to make quantitative predictions about the number and proportion of expected black-backed woodpecker pairs that are predicted to be conserved or lost under any particular scenario of post-fire forest management." The Forest Service weighed the group's recommendations in light of the agency's multiple use mandate and the numerous other needs and goals within the project area and informed the deciding official.

492. Comment: a) I am disappointed the Forest Service plans to log some of the rarest and most important wildlife habitat on public lands in the Sierras. Burned areas provide critical sanctuary to many animals including black-backed woodpeckers. These birds are the first to arrive after a fire and create homes for other wildlife that arrive soon after. If left unlogged, post fire forests teem with wildflowers, shrubs, and regenerating trees, as well as hummingbirds, woodpeckers, deer and many other animals. b) Complex early seral forest habitats created after intense fires are important and valuable for many species and should be protected. Wood boring beetles that colonize a burned area and lay eggs provide food sources for the black-backed woodpecker currently being considered as an endangered species due to lack of complex early seral forest.

3 4331

Response: Of the 154,530 acres that burned in the Rim Fire on the Stanislaus National Forest System lands, between 43,518 and 45,652 acres under the action alternatives are proposed for treatment. Approximately 70 percent of National Forest System lands within the Rim Fire perimeter would not be treated under the action alternatives and would continue to provide habitat for a wide variety of wildlife species such as spotted owls, northern goshawks, woodpeckers, and deer. Detailed analysis of project effects to threatened, endangered, and Forest Service Sensitive Species, as well as, black-backed woodpecker and mule deer are in the EIS Chapter 3.15.

493. Comment: Whatever scale of activities are chosen, the implementation will present a unique opportunity to set up suites of treatment A, treatment B, and no treatment on similar sites. This will allow the USFS and collaborators to collect sufficient amounts of data to address some of the questions regarding post-fire recovery and restoration. The scale of these sets of treatments can be much larger than what can typically be fit on a USFS research forest or on a University research forest. In Appendix D: Research, the authors correctly note that research into key questions should be part of the overall plan. In addition to the valuable research proposed on p.470-471 regarding the effectiveness of previous fuels treatments, there are other opportunities to initiate larger scale units that would be of the scale necessary to provide insight into landscape-scale challenges. For example, on page 473, the proposed research plots are proposed to only be 5 acres in size. Given the extensive area burned within the perimeter of the Rim Fire, replicated plots of 50 or 500 acres will be operationally feasible and would provide considerable more insight into processes, such as habitat utilization by birds and mammals that operate at more than a limited number of 5 acre sites. Without understanding of processes at the scale of actual use of habitats by various wildlife species, we may continue to be forced to depend on 'guesses'. For example the Tingley et al (2014) modeling of black backed woodpecker habitat used in this report appears to assume a worst-case scenario that treatment of any acre will reduce utilization to zero. This may or may not be the case but we will only learn more by applying experiments with good statistical designs. Suites of treatments would allow a testing of this hypothesis as well as some of the other hypotheses being proposed to guide the restoration. The UC Center for Forestry has invested considerable resources into understanding the many processes that go on in managed forests where fire is an ever-present feature. We suggest that expanding the physical scale of the experiments and the number of collaborating parties would be a valuable addition to the Rim Fire Recovery.

5419

Response: Seven research studies in the Rim Fire area are part of Alternatives 3 and 4.

494. Comment: Retain smaller diameter snags (approximately 14 inches in diameter at breast height) near green tree islands, near intact forest borders, at elevations higher than 5,000 feet for black-backed woodpecker habitat.

4500 5412

Response: Under the action alternatives, between 10,156 and 12,356 acres of burned forest considered suitable for black-backed woodpeckers would be retained across the project area. Some of the suitable habitat (all size classes of snags) that will be retained is adjacent to green forest and intact forest borders at elevations higher than 5,000 feet. Maps are available in the Terrestrial Wildlife BE Appendix that display suitable black-backed woodpecker habitat in relation to treatment units for the action alternatives. Suitable habitat for black-backed woodpeckers, as defined in the EIS, includes burned forest with greater than 50 percent basal area mortality at all elevations in CWHR size classes 3, 4, and 5. (EIS Chapter 3.15 black-backed woodpecker).

495. Comment: Leaving aside their use by black-backed woodpeckers, do the burnt trees have additional value for restoration of the ecosystem? Do they have value in retaining moisture or soil productivity for future vegetation (whatever that vegetation may be)?

5298

Response: Standards for retention of downed logs address soil quality productivity standards. The standards are listed in the EIS Chapter 3.11 Soils.

496. Comment: a) The lack of sufficient Black-backed Woodpecker conservation recommendations will likely further jeopardize Black-backed Woodpecker populations, making listing under the ESA more likely, especially given that the Rim fire is an important source population for this species, as the other fires in the central Sierra Nevada are now getting too old to provide high quality Black-backed Woodpecker habitat. Indeed, the U.S. Fish and Wildlife Service, on April 9, 2013, already determined that such listing "may be warranted," largely due to the Forest Service's refusal to inadequate regulatory mechanisms to prevent further threats to Black-backed Woodpeckers and their habitat. b) The Forest Service's refusal to implement, or even fully consider, the Black-backed woodpecker conservation recommendations will likely further jeopardize Black-backed woodpecker populations, making listing under the ESA more likely, especially given that the Rim fire is currently likely the most important source population for the species, as the other fires in the central Sierra Nevada are now getting too old to provide high quality Black-backed woodpecker habitat.

5313 5335

Response: We used the Tingley et al. (2014) model to map all action alternatives to show suitable black-backed woodpecker habitat would be retained and is distributed across the project area (Terrestrial Wildlife BE Appendix). The model combines black-backed woodpecker occupancy probability data with expected black-backed woodpecker density given snag basal area to model the expected woodpecker density on a burned landscape as a continuous surface using the latest available information about black-backed woodpecker habitat needs, as well as the latest data on black-backed woodpecker. During alternative development, we used this model to prioritize leave areas for black-backed woodpeckers under Alternative 4. Specifically, we identified 2,571 acres of the highest quality black-backed woodpecker habitat within the project area for retention under Alternative 4, (EIS Chapter 3.15. Figure 3.15-5).

High severity burned habitat within retained California Spotted Owl and Northern Goshawk PACs will provide large patches of suitable habitat for black-backed woodpeckers throughout the project area. Further, snag retention within treatment units would continue to provide foraging and nesting substrates for black-backed woodpeckers. It also was our intent that snag retention within RCAs would ameliorate potential adverse project effects on habitat loss and fragmentation by providing corridors throughout the project area, connecting areas that provide potentially suitable black-backed woodpecker habitat. Thus, black-backed woodpecker habitat, suitable for nesting and foraging, will remain present throughout the RIM Project area after project implementation and under any of the action alternatives. Although the retention and continued availability of suitable black-backed woodpecker habitat throughout the project area will not eliminate negative impacts of the action alternatives to black-backed woodpeckers, it will mediate these effects to some extent.

The importance of the Rim Fire as a source population for black-backed woodpeckers is not known. While the Rim Fire was the largest fire in the Sierra Nevada in 2013, other fires also occurred in that year to the north (Tahoe NF) and to the south (Sierra NF), as well as numerous fires that occurred in the previous year throughout the Sierra Nevada (and including the Stanislaus NF) which will provide new habitat for black-backed woodpeckers. In fact, there is approximately 69 percent of suitable black-backed woodpecker habitat that remains untreated and available to black-backed woodpecker throughout California, EIS, Wildlife Chapter 3.15, black-backed woodpecker. This percentage accounts for the suitable black-backed woodpecker habitat proposed for removal in the Rim Fire Recovery Project.

A consortium of environmental groups including the John Muir Project, the Center for Biological Diversity, the Blue Mountains Biodiversity Project, and the Biodiversity Conservation Alliance filed a petition (Hanson et al. 2012) to list the Oregon/California and Black Hills (South Dakota) populations of the black-backed woodpecker as Threatened or Endangered under the federal Endangered Species Act. The U.S. Fish and Wildlife Service prepared a 90-day finding indicating that the petitioned action may be warranted based on the information provided by the petitioners listed above; therefore when funds become available, they will initiate a review of the status of the two populations to determine if listing either or both the Oregon Cascades-California population and the Black Hills population as either subspecies or Distinct Population Segments is warranted (Federal Register 2013b).

The comment submitted by the Center for Biological Diversity and John Muir Project "Indeed, the U.S. Fish and Wildlife Service, on April 9, 2013, already determined that such listing "may be warranted," largely due to the Forest Service's refusal to inadequate regulatory mechanisms to prevent further threats to Black-backed Woodpeckers and their habitat" is inaccurate. The USFWS has not yet completed their status review of the two populations put forth in the petition submitted by the John Muir Project, the Center for Biological Diversity, the Blue Mountains Biodiversity Project, and the Biodiversity Conservation Alliance; therefore, has not confirmed causal factors that may or may not warrant listing this species as threatened or endangered under ESA.

The black-backed woodpecker was recently considered for listing under the California Endangered Species Act by the California Fish and Game Commission. The California Fish and Game Commission ("Commission"), at its November meeting in La Quinta, California, made a finding pursuant to Fish and Game Code section 2075.5, that the petitioned action to add the black-backed woodpecker (Picoides arcticus) to the list of threatened or endangered species under the California Endangered Species Act ("CESA") (Fish & G. Code, § 2050 et seq.) is not warranted. (See also Cal. Code Regs., tit. 14, § 670.1, subd. (i).) The Commissions conclusion that the black-backed woodpecker was based on the following summary (Bonham 2013):

- The lack of an apparent range retraction or changes in distribution within the range.
- The episodic cycles of high density occurrences (i.e., prey invasion, high woodpecker productivity, prey decline, and woodpecker dispersal) and the lack of current data on the cycle's impact on the long-term viability of California's black-backed woodpecker population.
- The lack of data concerning the role of green forest on the species but its apparent use as habitat.
- The trending increase in fire frequency, size, and severity as compared to the early and mid-20th century.
- Uncertainty regarding the magnitude of the threat posed to black-backed woodpeckers by post-fire salvage logging.
- Lack of logging on approximately 80 percent of severely burnt USFS forest habitat since 2003 (i.e., 87,200 acres).
- The ongoing long-term monitoring of the species as an MIS.
- Black-backed woodpecker populations in California are not geographically isolated from populations in adjacent states.

Having considered these factors, the Department concluded that the best available scientific information available to the Department does not indicate that the black-backed woodpecker's continued existence is in serious danger or is threatened by any one or any combination of the following factors found in relevant regulation: present or threatened modification or destruction of black-backed woodpecker habitat, overexploitation, predation, competition, disease, or other natural occurrences or human-related activities. (Cal. Code Regs., tit 14, § 670.1 (i)(1)(A)). Therefore, based upon the best scientific information available to the Department, listing the black-backed woodpecker as threatened or endangered is not warranted.

Moreover, the IUCN Red List of Threatened Species evaluated the black-backed woodpecker as a species of "Least Concern" in 2012 (http://www.iucnredlist.org/details/22681181/0). IUCN provided justification for this evaluation as follows: "This species has an extremely large range, and hence does not approach the thresholds for Vulnerable under the range size criterion (Extent of Occurrence less than 20,000 km2 combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). The population trend appears to be stable, and hence the species does not approach the thresholds for Vulnerable under the population trend criterion (greater than 30 percent decline over ten years or three generations). The population size is extremely large, and hence does not approach the thresholds for Vulnerable under the population size criterion (less than 10,000 mature individuals with a continuing decline estimated to be greater than 10 percent in ten years or three generations, or with a specified population structure). For these reasons the species is evaluated as Least Concern". Under the Nature Serve conservation ranking system, the species has been categorized as secure at the global scale and apparently secure at the national scale. The black-backed woodpecker was evaluated by subject matter experts for the potential inclusion on the Region 5 Forest Service Sensitive Species list (final list updated on July 3, 2013), but the evaluation did not result in adding this species to the Regional Foresters Sensitive Species list (July 3, 2013 Letter from Regional Forester), Terrestrial Wildlife BE Appendix.

Approximately 37 to 45 percent (10,156 to 12,356 acres) of suitable black-backed woodpecker habitat within the RIM Fire boundary would not be treated under the action alternatives (EIS Chapter 3, Wildlife Chapter 3.15, black-backed woodpecker). The RIM Project as well as other proposed projects within the analysis area [i.e., RIM Fire Roadside Hazard Tree Removal] would result in a reduction in habitat availability and distribution, and potentially a reduction in the amount of woodpeckers the analysis area could potentially support. Habitat retention and snag retention mitigations in the RIM Project are expected to at least partially buffer local populations from loss or modification of suitable black-backed woodpecker habitat associated with the RIM Project. Under any action alternative, there will be more habitat available than the pre-fire condition RIM Project MIS report, Snags in Burned Forest Ecosystem Component (black-backed woodpecker).

497. Comment: The DEIS's reference (p. 381) to a stable population distribution in the Sierra Nevada for black-backed woodpeckers is also misleading, especially from a conservation perspective. Distribution is in no way synonymous with viability, or a stable population trend. A species like the woodpecker, which uses ephemeral habitat, can be "distributed" but still be at extremely low population numbers, and be vulnerable to extinction. Indeed, the best available population estimate shows the population to be extremely low (Hanson et al. 2013), and its overall burned forest habitat to be extremely minimal (under 200,000 acres [Howell et al. 2014]).

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Response: For Management Indicator Species (MIS), the Forest Service has chosen to measure the population distribution of MIS species while also monitoring the amount of each MIS habitat type. The BBWO is an MIS species for snags in burned forest habitat and the Rim Fire Recovery MIS report includes information on the population distribution and habitat availability data. While population distribution may not be a perfect proxy for population viability, or stability, it does provide some indication about the health of the population as a whole since a contracting range might be a cause for concern. We are not implying a stable population trend based on the population distribution data in the DEIS. There are not clear data about the total population numbers of the species, so population distribution provides an indication of how the population is doing. Even if a species was widely distributed at low numbers that is not a clear indication that the population is at risk and a lack of population viability cannot be inferred. There is nothing in NEPA or NFMA that requires the agency to disclose the population trend of the black-backed woodpecker or prove that the agency is maintaining the viability of the species.

In some cases we also collect information on relative abundance or probability of occupancy of MIS (in addition to population distribution). A recent report (Siegel et al. 2014) summarizes the MIS monitoring of BBWOs across the ten Sierra Nevada national forests and found that (page 2) “At this time there is no evidence of a temporal trend in occupancy rates during the five years (2009-2013) we have been monitoring black-backed woodpeckers on National Forests in California, or of a broad scale change in the species’ distribution in California. Although the distribution of the species appears to change slightly from year to year, black-backed woodpeckers remain present across their historic range in California.” Thus, there is no evidence of a downward trend in the population and the available evidence provides some indication of a stable population; there is no documented decline in occupancy rates. Population distribution at the macro level remains stable and is in line with the historic range of this species, distribution maps are available in the Terrestrial Wildlife BE Appendix. The commenter has not identified any other data indicating a downward trend in the species’ population.

498. Comment: Failure to adequately protect Black-Back [sic] Woodpecker habitat from intensive salvage logging (see attached maps showing extensive overlap of Alt 4 salvage units in BBWO habitat; see also attached Excel document showing relationship between Alt 4 units and BBWO habitat)...The DEIS Fails to Adequately Analyze Impacts to the Black-backed Woodpecker....In 2013, new findings were issued showing the importance of post-fire snag density for creating high quality woodpecker habitat...[Siegel et al. (2013)]...The DEIS (p. 383) cites Siegel et al. (2013) for the proposition that Black-backed Woodpeckers forage on snags of all sizes. This is misleading because

Siegel et al. (2013), at page 49-50, found that Black-backed Woodpeckers preferentially forage on larger snags, significantly more than expected based on availability...the project would have significant, or potentially significant, impacts and cumulative effects to Black-backed Woodpeckers.

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Response: Analyses presented in the EIS reflect a transparent assessment of potential project effects on black-backed woodpeckers and their habitat. We considered the best available science while developing alternatives and when assessing potential project effects (EIS Chapter 3, Wildlife chapter 3.15, black-backed woodpecker; Draft Terrestrial Biological Evaluation and Wildlife Report; Draft Terrestrial BE Appendix, Draft Rim Recovery MIS Report). Additionally, we examined the relationship between proposed treatments and black-backed woodpecker habitat on a unit by unit basis and this detail can be found in the Terrestrial BE Appendix.

The EIS Chapter 3.15 cites Siegel unpublished data from an ongoing study at two recent fire areas on the Lassen National Forest. These data suggest that black-backed woodpeckers forage on all available size classes of snags. We cite Siegel et al. 2013 in considering habitat criteria used in this analysis and recognize that Siegel et al. 2013 found black-backed woodpeckers preferentially selected larger snags for foraging in a study of three fire areas in the Sierra Nevada. This is also mentioned in the Conservation Strategy for the black-backed woodpecker in California that we referenced.

499. Comment: a) Numerous studies on post high-severity fire salvage logging have documented adverse effects on the Black-backed Woodpecker and other cavity nesting bird species (e.g., Hutto and Gallo 2006, Hutto 2006, Hanson and North 2008, Cahall and Hayes 2009, Saab et al. 2007, 2009, 2011). These studies indicate a thriving and unique bird community within severely burned forests, one that is damaged by post-fire salvage logging. The Black-backed Woodpecker is likely one of the biggest "winners" in the post-fire forest....b) Perhaps the greatest controversy regarding the impact of the proposed salvage logging has to do with the black-backed woodpecker. While clearly this is a complex subject on which the science is neither complete nor agreed upon, we believe that all three action alternatives fall short of the seeming consensus science recommendation from the two days of science forums in regards to the percent of modeled woodpecker pairs that should be retained. Given that the black-backed woodpecker is recognized as an indicator species, its treatment will have a ripple effect involving a number of similarly dependent species.

5336 5358

Response: Analyses presented in the EIS reflects a transparent assessment of potential project effects on black-backed woodpeckers and their habitat. We considered the best available science while developing alternatives and when assessing potential project effects (EIS Chapter 3, Wildlife Chapter 3.15, Black-backed Woodpecker; Biological Evaluation and Wildlife Report; Rim Recovery MIS Report). We note that all the action alternatives include retention of post-fire habitat in varying amounts and locations by alternative to balance multiple objectives. We considered a range of alternatives that addressed multiple objectives including black-backed woodpecker habitat. Alternative 4 specifically identified areas for full retention of post-fire forest but all action alternatives considered the purpose and need to reduce fuel loadings in the post-fire environment. The long-term benefits of reducing fuel loads include reducing potential fire effects and the facilitation of continued fire and fuels management. Overall, taking no action would not reduce potential future surface fuels or predicted fire effects (EIS Chapter 3.05, Fire and Fuels).

500. Comment: In particular, the rare Black-backed Woodpecker, which depends on larger patches of recent higher-severity fire occurring in dense, mature conifer forest, and is highly sensitive to even partial salvage logging, would be greatly impacted by proposed postfire logging (Hanson, C. T., and M. P. North. 2008. Postfire woodpecker foraging in salvage-logged and unlogged forests of the Sierra Nevada. Condor 110:777–782). The U.S. Fish & Wildlife Service determined that post-fire salvage logging on national forest lands is a key factor in the recent decline of this species. Moreover, in the fall of 2012, the Forest Service produced the Black-backed Woodpecker Conservation Strategy (Bond, M.L., R.B. Siegel, and D.L. Craig. 2012. A Conservation Strategy for the Black-backed Woodpecker (Picoides arcticus) in California—Version 1.0. The Institute for Bird Populations, Point Reyes Station, California, For: U.S. Forest Service, Pacific Southwest Region, Vallejo, CA.) that this logging proposal contradicts. In order to conserve populations of this woodpecker and reduce further risks to its populations, the Conservation Strategy recommended that: a) the high quality Black-backed Woodpecker habitat should be identified after fire and should not be salvage logged; b) salvage logging should not occur during nesting season, while chicks are in the nest and cannot fly away; and c) where logging does occur, logged patches should not be > 2.5 ha. However, none of these recommendations are incorporated in your salvage logging proposal, which is of particular concern given that the largest tract of existing woodpecker habitat in the Sierra is on the Stanislaus National Forest within the Rim fire, and the current proposal would remove most of it.

5378

Response: We acknowledged the black-backed woodpecker is a Management Indicator Species (MIS) representing the ecosystem component of snags in burned forests and that post-fire salvage logging is a risk factor to this species (EIS Chapter 3, Wildlife Chapter 3.15, black-backed woodpecker; Biological Evaluation and Wildlife Report; Rim Recovery MIS Report). We analyzed and disclosed the environmental consequences of implementing the various alternatives to black-backed woodpecker using the following indicators: 1) amount of suitable habitat modified, and 2) predicted pair density retained as a proportion of modeled pairs under the Environmental Consequences section of the EIS and the Terrestrial Biological Evaluation and Wildlife Report. These criteria were chosen to supplement information provided in the MIS report by identifying and analyzing potential effects to the black-backed woodpecker related to expected densities within the project area. While the Rim Recovery MIS Report focused on the relationship of project-level habitat impacts to bioregional scales, the effects analysis in the Biological Evaluation and Wildlife Report focused on the relative value of different proposed management units by alternative within the Rim Fire area based on habitat quantity and quality (Tingley et al. 2014).

We specifically considered and discussed recommendations in the Conservation Strategy for the black-backed woodpecker in California in the EIS, (Chapter 3.15 black-backed woodpecker section): Consistency with Conservation Strategy and in the Terrestrial Biological Evaluation and Wildlife Report. We analyzed post-fire habitat quality for black-backed woodpecker, and identified units in Alternative 4 specifically for the retention of high-quality black-backed woodpecker habitat (EIS Chapter 3.15 Black-backed Woodpecker section; Terrestrial Biological Evaluation and Wildlife Report; Terrestrial BE Appendix). We incorporate by reference a clarification letter provided by Diana Craig, co-author of the Black-backed Woodpecker Conservation Strategy, which addresses the misrepresentation of the Conservation Strategy in the comments above (Craig 2014).

We discussed black-backed woodpecker habitat within the Rim Fire in context to the Sierra bioregion in the Terrestrial Biological Evaluation and Wildlife Report and we referenced a regional analysis that analyzed the amount of burned suitable black-backed woodpecker habitat on National Forest in California from fires occurring from 2006 through 2013 (i.e. including the Rim Fire). This analysis showed that approximately 69 percent of black-backed woodpecker habitat on all lands (NPS, USFS, Private), and 79 percent of black-backed woodpecker habitat on National Forest in California will remain untreated.

We conclude that analyses presented in the EIS reflect a transparent assessment of potential project effects on black-backed woodpeckers and their habitat. We considered the best available science while developing alternatives and when assessing potential project effects.

501. Comment: a) Without salvage logging in the Rim Fire burned area, within the Stanislaus National Forest there would be enough suitable habitat to support 39 pairs of black-backed woodpeckers. Under Alternative 1, 17,461 acres of suitable black-backed woodpecker habitat would be removed, retaining only 10,156 (37%) of suitable habitat. The remaining suitable habitat is predicted to support a density of 16 pairs (41% of modeled pairs) of black-backed woodpeckers. Alternative 1 results in the least amount of habitat retention for black-backed woodpeckers and the lowest predicted pair density. b) Alternative 1 is expected to contribute cumulatively to effects on black-backed woodpeckers (Page 386).

4467

Response: The same statement is made in the Draft Terrestrial Biological Assessment, Evaluation, and Wildlife Report. The Draft Wildlife MIS Report states, "The reduction in black-backed woodpecker habitat [under Alternative 1] . . . within the analysis area would not alter the existing trend in black-backed woodpecker habitat, nor would it lead to a change in the distribution of black-backed woodpeckers across the Sierra Nevada bioregion."

502. Comment: Numbers and arguments over percentages fail to address the significant expansion of suitable habitat for black-backed woodpecker under all alternatives.

4467

Response: The agency concurs with the commenter that the amount of suitable black-backed woodpecker habitat has increased as a result of the Rim Fire (". . . it is reasonable to assume that there were very few acres, if any, of burned forest suitable for black-backed woodpeckers prior to the Rim Fire" [Terrestrial Biological Assessment, Evaluation, and Wildlife Report]), and that all the alternatives retain a portion of this habitat (EIS; Terrestrial Biological Assessment, Evaluation, Wildlife Report, Wildlife MIS Report).

503. Comment: New scientific evidence suggests that there may be a genetic distinction between the eastern Oregon Cascades population of the Black-backed Woodpecker and the California population (Siegel et al. 2013). While the degree of this distinction is still being analyzed, this new information indicates that the combination of the current post-fire logging projects presents potentially serious unknown and uncertain risks by severely reducing and fragmenting suitable habitat in a population that may be even smaller and more isolated than previously assumed. The fact that there may be a genetic distinction between Oregon and California (Siegel et al. 2013) indicates that the discontinuities and gaps in habitat between the two populations are already significant.

5336

Response: The commenter is referencing preliminary genetic analysis of Black-backed Woodpeckers *(Picoides arcticus)* from Lassen and Plumas National Forests, presented in Siegel et al. 2013. No conclusions regarding genetic distinction between Oregon and California black-backed woodpecker populations can be drawn from these preliminary results. More data was collected during the 2013 field season and analyses are on-going (Rodney Siegel pers. comm.).

California Spotted Owl (CSO)

504. Comment: Alternative 1 fails to adequately protect or mitigate for negative effects to California Spotted Owls caused by salvage logging within the remaining suitable habitat.

4467

Response: The EIS (Chapter 3.15, Wildlife, California Spotted Owl) and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report (Effects of the Project Alternatives: California Spotted Owl) discuss the effects of Alternative 1 on the California spotted owls. One of the purposes of the project ("Enhance Wildlife Habitat" [EIS Chapter 1) is to reduce potential negative impacts to wildlife species of concern. The project was designed with that purpose in mind. Several management requirements would further protect the spotted owl (e.g., snag retention levels, limited operating periods, requirements for surveys). The analysis of impacts was used in the making the determination that all the alternatives may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

505. Comment: Alternative 1 has no provision to protect current or historic nest trees even though nest tree loss is known to affect CA spotted owl abundance and distribution: “The risk factors identified as potentially affecting California spotted owl abundance and distribution are: nest site loss and disturbance, loss of habitat and habitat elements, especially large snags and large down woody material (DEIS page 299).”

4467

Response: As the commenter points out, Alternative 1 does not include a management requirement to flag and avoid current or historic nest sites within suitable post-fire PACs. (Both Alternatives 3 and 4 do have this management requirement to protect the nest trees from treatments besides salvage logging.) The Terrestrial Biological Assessment, Evaluation, and Wildlife Report for the Rim Fire Recovery includes a management requirement for all alternatives as follows: "Do not salvage harvest within PACs unless a biological evaluation determines that the areas proposed for harvests were rendered unsuitable by the Rim Fire for the purpose they were intended" (EIS Chapter 1). The project was designed to avoid PACs that were not rendered unsuitable. Therefore this management requirement was not needed, and doesn't appear in the EIS. Most, but not all, current and historic nest trees would be protected through this requirement. The EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report state, "it is likely that approximately 14 percent of spotted owl territories could be negatively affected by nest tree loss" These findings were used in the making the determination that all the alternatives may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

506. Comment: If Alternative 1 is selected another 14% (five more PAC’s) of spotted owl territories would be negatively affected by nest tree loss on top of the ten territories that were already burned at high severity and removed as PAC’s in an area that has been identified to be important for the conservation of the species.

4467

Response: There is a possibility that 14 percent of the spotted owl territories would be affected negatively by nest tree loss (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). These findings were used in making the determination that all the alternatives may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

507. Comment: Alternative 1 fails to mitigate for the loss of 2,015 more acres of owl habitat due to hazard salvage treatments within suitable PACs, “This would result in a potential net loss of 2,015 acres of owl habitat and possibly influence continued occupancy probabilities (Seamans and Gutierrez 2007) in approximately 50 percent of spotted owl territories (pages 302-303).”

4467

Response: The commenter is correct that Alternative 1 does not mitigate hazard tree removal treatment overlap with PACs, which could result in a potential net loss of 2,017 acres (EIS Chapter 3.15, Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The direct, indirect, and cumulative effects of each alternative, including the effects of not mitigating hazard tree removal treatment overlap with PACs, were used to determine that each of the alternatives, including Alternative 1, may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the spotted owl.

508. Comment: Unlike Alternative 1, Alternative 4 would mitigate for the habitat loss due to overlap with roadside hazard treatments by adding acreage to the PAC equivalent to the treatment acres as per Forest Plan Direction (USDA 2010a p. 185).

4467

Response: The commenter is correct that there is a management requirement in Alternative 4 stating that "Where roadside hazard treatments are within PACs and HRCAs, add acreage to the PAC and/or HRCA equivalent to the treated acres of the most suitable habitat available" (EIS Chapter 2; Terrestrial Biological Assessment, Evaluation, and Wildlife Report for the Rim Fire Recovery). Alternative 3 has the same management requirement. The Responsible Official is considering all alternatives, including Alternatives 3 and 4, and their impacts equally. She will consider the Purpose and Need of the project, the most recent information, including the Forest Plan (USDA 2010a), resource reports, and input from interested parties such as yourself in making her decision. She may decide to: (a) select the proposed action; (b) select one of the alternatives; (c) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (d) select the no action alternative, choosing not to authorize the Rim Fire Recovery project (EIS Chapter 1).The selected alternative will comply with Forest Plan Direction.

509. Comment: Retaining more large conifer snags and large down woody material would benefit the CA spotted owl and provide valuable information for the PSW research project to address questions related to salvage logging intensities/spotted owl occupancy and use of post-fire environments.

4467

Response: The analysis of the direct, indirect, and cumulative effects of each of the alternatives presented in the DEIS, including the effects of different snag retention levels, was used to make the determination that each of those alternatives may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl. Since October of 2013, the Forest has worked with researchers from the Pacific Southwest Forest and Range Experiment Station (PSW) and from other organizations and institutions in designing research studies in the Rim Fire area. The proposed treatments match what PSW required for their study design.

510. Comment: Alternative 1 has 0.9 miles of new permanent road construction, with a total of 35 project road miles that intersect and fragment PAC’s (page 304). Alternative 4 is better for the CASPO as it drops the 0.9 miles of new permanent road and has less than 30 project road miles.

4467

Response: The commenter is correct that Alternative 4 drops the new road construction, including that intersecting PACs. The direct, indirect, and cumulative effects of each alternative were used to determine that each of the alternatives, including Alternative 1, may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the spotted owl. The Responsible Official is considering all alternatives and their impacts equally. She will consider the Purpose and Need of the project, the most recent information, including the Forest Plan (USDA 2010a), resource reports, and input from interested parties such as yourself in making her decision. She may decide to: (a) select the proposed action; (b) select one of the alternatives; (c) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (d) select the no action alternative, choosing not to authorize the Rim Fire Recovery project (EIS Chapter 1).

511. Comment: Alternative 1 fails to mitigate for habitat loss caused by tractor and helicopter landings in five – CA spotted owl PAC’s.

4467

Response: The commenter is correct. As the EIS (p. 306) and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report state, "This would result in a minimal amount of potential net loss of spotted owl habitat on 10 acres across 5 PACs" (emphasis added).

512. Comment: There is no provision in this alternative to mitigate habitat loss caused by landing construction by adding acreage to the PAC. This would result in a minimal amount of potential net loss of spotted owl habitat on 10 acres across 5 PACs (page 306).

4467

Response: The commenter is correct that there would be an estimated loss of 10 acres across 5 PACs in the project area under Alternative 1, and that there is no provision to add acreage to the affected PACs to compensate for that loss. As the commenter points out, this amount is considered minimal (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The effects of this minimal habitat loss were considered when making the determination that Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the spotted owl.

513. Comment: Alternative 1 fails to mitigate for any disturbance, loss of habitat (nest trees, large conifer snags, down woody material) within CA spotted owl PAC's caused by the proposed action.

4467

Response: No salvage logging is proposed in any PACs that have been retained in the conservation network. (As discussed in the FDEIS [Chapter 3.15 and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report, 10 PACs have been removed from the network because they have very low to no probability of continued occupancy due to the small amount of post-fire habitat.) There would be a minimal loss of habitat due to landing construction (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The acreage proposed for hazard tree removal treatment under Alternative 1 is 2,017 (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). Within that area, there is a possibility that nest trees would be removed, and the number of large snags would be reduced, potentially to zero. (The removal of the hazard trees would provide a safer environment for public use and the administration of affected roads, which is critical [EIS Chapter 1]). It is likely that approximately 14 percent of spotted owl territories could be affected by nest tree loss (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). Habitat components such as nest trees and large snags would be retained in the remaining PAC acreage. There would be an incidental loss of downed woody material in PACs. The following management requirement is common to all action alternatives, including Alternative 1: maintain a LOP [Limited Operating Period] prohibiting vegetation treatments, new construction, blasting, landing construction, and helicopter flight paths within ¼ mile of a protected activity center during the breeding season for California spotted owls (March 1 through August 31) unless surveys conducted by a Forest Service biologist confirm non-nesting status (EIS Chapter 2; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). As both the EIS (Chapter 3.15) and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report state, "The potential for disturbance is minimized by the implementation of Limited Operating Periods (LOPs) as a management requirement." Further protection from disturbance is provided by the requirement to designate newly constructed permanent routes within PACs as blocked Level 1 or Level 2 and gated year round (EIS Chapter 2; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The management requirement to " conduct surveys in compliance with the Pacific Southwest Region's survey protocols to establish or confirm the location of the nest activity center for spotted owl" (EIS Chapter 2; Terrestrial Biological Assessment, Evaluation, and Wildlife Report) would address the movement uncertainty following such a large-scale disturbance event. If new activity centers are found, appropriate actions can be taken as outlined in the Stanislaus National Forest, Forest Plan Direction (USDA 2010a). The effects analysis of the management requirements, in combination with that of all other direct, indirect, and cumulative effects, was used in making the determination that each of the alternatives, including Alternative 1, may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the spotted owl (EIS, Terrestrial Biological Assessment, Evaluation, and Wildlife Report).

514. Comment: The cumulative contribution of short and long-term effects on spotted owls would be less under Alternative 4 than Alternative 1 because Alternative 4 would better protect nest trees, retain more large conifer snags and down woody material, and result in less fragmentation of PAC's.

4467

Response: The agency agrees that the negative direct and indirect effects on the spotted owl would be greater under Alternative 1 than under the other alternatives (EIS, California Spotted Owl: Summary of Effects; Terrestrial Biological Assessment, Evaluation, and Wildlife Report, California Spotted Owl: Summary of Effects Analysis Across All Alternatives). The effects analysis was used when making the determination that Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the spotted owl (EIS, Terrestrial Biological Assessment, Evaluation, and Wildlife Report).

515. Comment: Page 53: For California Spotted Owl, alternative 1 'may affect individuals and is likely to result in a trend toward federal listing or loss of viability'. Conversely, page 307 states "The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species".

4500 5412

Response: There was an error on Page 53 of the DEIS and in the Draft Terrestrial Assessment, Evaluation, and Wildlife Report. The statement on Page 307 of the DEIS is correct: The cumulative contribution under Alternative 1 may affect individual territories but is not expected to affect the viability of the California spotted owl. The EIS and the Final Terrestrial Assessment, Evaluation, and Wildlife Report show the correct determination.

516. Comment: We believe that giving up on 10 of 46 spotted owl Protected Activity Centers, on the basis that they can no longer sustain owls, requires compensating mitigation, such as retaining more high severity burn areas for their foraging value. As the two science forums underscored, protecting some areas near or adjacent to PACs is necessary to provide a viable home for owls.

5358

Response: Assuming that the 10 PACs referenced are those that burned at 80-100 percent high-severity within the surrounding 500 acre (200 hectare) circles. Surveys are being used to determine post-fire occupancy. These are sites that have little post-fire suitable habitat. It is uncertain if these sites can provide for long-term owl occupancy, whether there is salvage logging or not. No data or studies are available to indicate if implementation mitigation the commenter suggests will be successful. Significant information gaps exist regarding the ability of owls to occupy sites that experience 80-100 percent high-severity fire, particularly over the 1-2 years following the fire.

517. Comment: …Retain, unlogged, the pre-fire California Spotted Owl PACs and HRCAs, as recommended by owl experts (see DEIS, p. 46).

5313

Response: The project is maintaining all pre-fire California spotted owl PACs and HRCAs where the stand replacing event did not remove habitat elements necessary for spotted owls to breed and nest. The project is surveying all pre-fire PAC areas and if territorial spotted owls are found, and it was an area not maintained as a PAC, then a new PAC and HRCA will be created (2004 SNFPA p. 37 and p.39; 2010 Forest Plan Direction). Hence, all territorial spotted owls will have a PAC and a HRCA.

518. Comment: …even species thought to occur only in mature and old-growth forests also utilize severely burned forests for foraging - including the California Spotted Owl. Available evidence form existing scientific studies indicates that Spotted Owls may actually be quite resilient to most fires, and even benefit from it, if their territories are not salvage logged...[Bond et al. 2009, Bond et al. 2002, Roberts 2008, Lee et al. 2012., Lee et al. 2013, Bond et al. 2013]. Spotted owls often remain in PACs [Protected Activity Centers] with severely burned forests, and often utilize severely burned forests for foraging....the preponderance of scientific data, including the results from 2014 breeding-season Spotted Owls surveys in the Rim Fire...contradict the Forest Service's assumptions that owls do not use high-severity burned areas, and thus render the agency's approach fatally flawed....once again I am forced to make the...request - that the Forest Service refrain from assuming severely burned forests are unsuitable...

5336

Response: Bond et al. (2009, 2013) are cited to support the general statement that CSOs preferentially select high-severity fire areas for foraging. This telemetry study was conducted on seven individual owls from four owl sites across a four month study period four years after the McNally Fire on the Sequoia NF. A total of 301 telemetry foraging locations were collected, of which 37 (12 percent) were in High-Severity burned vegetation. Of note, the four owl sites sampled contained 11 percent high-severity burned vegetation at the scale of the foraging range (Bond et al. 2009) and an average of 9 percent high-severity burned vegetation at the scale of the home range (Bond et al. 2013). CSOs in this study showed evidence for selection of all burned areas (low, moderate and high severity) for foraging with strongest selection for high-severity burned patches within 1.5 km of site centers, although high uncertainty (high standard errors) indicated variability in selection among study owls. Further, presence of an edge between different fire-severity classes was positively-related to selection, suggesting that edges between different severity classes were important. Care should be taken drawing general conclusions to the Rim Fire from Bond et al. (2009, 2013). First, Bond et al. (2009) had a limited sample size of owls (7) from only four owl sites. Second, the four owl sites in the study only experienced 9-11 percent high-severity fire, whereas many owl sites in the Rim Fire had much greater proportion of their area burn at high severity. Third, owls showed selection for foraging in low and moderate severity burned patches as well. Further, the patch size and amount of edge between high-severity patches and other burn severity classes is likely important as indicated by Bond et al. While owls did use high-severity patches and edges between high-severity and other burn severity classes, it is not known how owls use habitat for foraging in fire areas where 80-100 percent of the core area burned at high severity and where patch sizes of high severity are large, with smaller associated edge/area ratios. The early-seral post-fire vegetation created post-fire does support early-successional small mammal species such as woodrats and gophers used by CSOs. However, it is unknown if owls use the interior of the larger high-severity patches or if it is the edge of high-severity to other burn severities and vegetation types that are important for owl foraging.

The recent scientific literature supports the claim that CSOs are resilient to most fires that span a range from low-moderate severity to mixed-severity including high-severity. However, there is limited information on owl response to fires that burn greater than 50 percent of the site at high severity, and specifically when 80-100 percent of the core area burns at high-severity. Bond et al. (2009) was limited to 4 owl sites that averaged 9-11percent high-severity burn. Roberts (2008) and Roberts et al. (2011) reported no difference in CSO occupancy rates at 16 unburned (owls detected at 8/16 sites) compared to 16 burned sites (owls detected at 11/16 sites). Sample areas were 3.75 km2 and burned sites contained an average of 14 percent high-severity burn, with a maximum of 46 percent high severity. Generally, their survey sites burned at low-moderate severity (Roberts et al. 2011). Although no statistically significant differences were reported for differences in occupancy or owl density between burned and unburned sites, small sample sizes may have affected the statistical power to detect biologically meaningful differences as occupancy and density in burned areas was lower than unburned sites. Occupancy in burned sites was 0.50 (se equals 0.13) in burned versus 0.69 (se equals 0.12) (Roberts et al.

2011). Similarly, owl density was 0.15 (se equals 0.04) in burned sites and 0.21 (se equals 0.04) in unburned sites (Roberts et al. 2011).

Lee et al. (2012) compared owl occupancy at 41 burned sites from 6 fires across the Sierra Nevada to occupancy at unburned control sites. Based on a 1000-acre circular area (equivalent to an HRCA; PACs are 300-acre areas) around the best pre-fire detection location, with an average of 700 acres (plus or minus 275 acres) of suitable habitat. Average loss of suitable habitat to high-severity fire was 32 percent (plus or minus 23 percent), so in all but 9 sites, the loss of suitable habitat to high-severity fire was less than 50 percent. At 8 sites that lost greater than 50 percent of their suitable habitat, 37 percent had no detections. That would suggest that increasing amounts of high severity fire is likely to affect owl occupancy when greater than 50 percent of the suitable habitat is lost. At the very least, the small sample size of 8 sites with significant habitat loss is too small to support a general blanket statement that high severity fires that affect 80-100 percent of owl core areas have not reduced owl occupancy in the Sierra Nevada. The paper does not provide information on the probability of occupancy as a function of salvage logging, suitable habitat lost or remaining post-fire.

The recent scientific indicates that CSOs are resilient to low-moderate and mixed severity fire. However, significant uncertainty exists regarding whether owls can persist over time in sites that experience a large proportion of high-severity fire (such as the 80-100 percent high severity burn that occurred in the Rim fire). Recent studies have few if any sites where the proportion of high severity burn within owls sites was greater than 50 percent. Post-fire surveys in the Rim Fire have documented owls in some sites that have experienced 80-100 percent high-severity fire within core areas. However, owl occupancy in the first year post-fire may be a short-term function of high site fidelity and residual canopy cover provided by dead trees and canopy foliage. It is unknown if these sites will continue to support owls in subsequent years.

519. Comment: Scientists have found that mixed-severity fire followed by postfire salvage logging reduced occupancy of Northern Spotted Owls in southwestern Oregon (Clark et al. 2013) and California Spotted Owls in southern California (Lee et al. 2013). Similarly, salvage logged areas in the Sierra Nevada have strongly tended to reduce spotted owl occupancy (Lee et al. 2012). Postfire logging also removes vital biological legacies, reducing important habitat structures for regrowing forests...Salvage logging should not be conducted in ay burned PACs [spotted owl Protected Activity Centers] or within 1.5 km of core areas (Bond et al. 2009).

5336

Response: In terms of salvage logging, little information is available to separate the confounding effects of high-severity fire and salvage logging. Lee et al. (2012) do not provide information on have any data pertaining to the question of occupancy responses to logging post-fire. They report that 7 out of 8 sites occupied immediately post-fire were later unoccupied following salvage logging within 2 years of the fire. However, it is not possible to attribute change in owl occupancy solely to salvage logging as other factors such as the amount of high-severity fire, remaining suitable habitat and delayed responses by owls due to site fidelity may have influenced owl response.

Clark et al. (2013) compared owl site occupancy in burned and salvaged landscapes to unburned landscapes (20-100 territories, thousands of acres). They did not explicitly test the effects of salvage logging; rather it was combined with high severity fire as a source of habitat loss in treatment landscapes. They point out an increase in the rate of decline in occupancy during a time when salvage logging was occurring in a treated landscape (Timbered Rock, 2002-2006), but salvage logging was not analyzed as a separate effect, and the decline could just as readily been a function of delayed territory abandonment (relaxation of site fidelity) in response to loss of habitat from the fire.

Lee et al. (2013) is the first study to examine the separate effects of fire severity and salvage logging on CSOs. They conducted the study in the mountains of southern California and compared CSO occupancy at 97 unburned sites to 71 sites that were burned/no salvage or burned/with salvage. Sites were 500 acres in size and contained an average of 263 acres (sd equals 60 acres) of suitable habitat. An average of 23 percent of suitable habitat burned at high severity within the 500 acre burned sites. Lee et al. (2013) found no overall statistically significant effects of fire or salvage logging on owl occupancy dynamics. Although not statistically significant, results suggested evidence of a potential threshold where extinction thresholds did not differ at between unburned and burned sites when 0-124 acres of forested habitat burned, but that extinction probability increased as a function of the amount of habitat that burned at high severity above 124 acres. Of the 71 burned sites in the study, 75 percent had less than 124 acres of suitable habitat burn at high-severity. Of the sites where greater than 124 acres of suitable habitat burned at high severity, extinction probability was significantly greater in burned versus unburned sites. Both colonization and extinction parameters were correlated with the amount of habitat within the 500 acre core area. Taken together, results indicated that the relationships among amount of suitable habitat burned at high severity and extinction and colonization probabilities resulted in significant differences (standard errors did not overlap) in owl occupancy probabilities at sites where greater than 124 acres of suitable habitat burned at high severity. Salvage logging reduced owl occupancy an additional 0.054 at burned sites. Mean annual occupancy owl site occupancy was 0.346 at unburned sites, 0.239 at burned sites and 0.185 at burned/salvage logged sites between 2004-2010 (Lee et al. 2013).

Little information is available to disentangle the confounded effects of high severity fire and salvage logging on owl occupancy. This is a glaring information need, particularly at owl sites that experience 50-100 percent high severity wildfire as occurred in the Rim Fire. Care should be used in drawing general conclusions from the Lee et al. (2013) study relevant to specific amounts of habitat, fire and salvage logging associated with owl occupancy dynamics to the Rim Fire. The Lee et al. (2013) study was conducted in southern California vegetation types that differ from the vegetation types occupied by owls within the Rim Fire and Sierra Nevada. However, their results suggest important patterns that may be relevant to the Rim Fire. Their results indicate that owl occupancy dynamics were influenced by amounts of suitable habitat and amounts of high severity burn and document increasing negative effects of high severity fire as amounts increase beyond a threshold. Importantly, a threshold was identified whereby high severity fire effects were not observed at low amounts of high severity burn but increased as the proportion of high severity burn increased beyond a threshold. It is reasonable to hypothesize that similar thresholds may exist for owls that occupy forests in the Sierra Nevada. However, recent studies do not include many owl sites that burned at greater than 50 percent high-severity, particularly sites that burned at 80-100 percent high-severity such as observed in the Rim Fire, Thus, it is unknown if thresholds exist above which high-severity fire may reduce post-fire occupancy in the Sierra Nevada.

520. Comment: Moreover, HRCAs should not be logged. Because they are important foraging areas for owls based on the best available science. Alternative 4 nonetheless proposes to log the substantial portions of pre-fire HRCAs in the Rim Fire area...and thus rendering the HRCAs virtually useless for owls....All…HRCAs should be surveyed for at least 2 years post-fire (Lee et al. 2012)…California Spotted Owls cannot survive in PACs alone, and therefore, HRCAs must also be protected. The Rim Fire Recovery project proposes to massively log the HRCAs thus rendering them unsuitable as owl habitat. At least 34 HRCAs will be harmed by salvage logging...Even if a PAC itself is not logged, many are surrounded by logging which would render the HRCA unsuitable and, in turn, reduce the suitability of the associated PAC.

5336

Response: The Alternative 3 and 4 snag retention management requirement in units within HRCAs, Old Forest Emphasis Areas (OFEAs), and the proposed Forest Carnivore Connectivity Corridor (FCCC) was developed with the intent to retain legacy structure where it exists to provide short-term and long-term habitat values for spotted owl and other mature forest associated species as described in the Terrestrial Biological Evaluation/Wildlife Report and EIS. While removal of snags in portions of HRCAs may lower the habitat quality of portions of the project area, those portions of home range core area will be treated in Alternatives 3 and 4 under the proposed research study as described in the DEIS. Increasing research suggests that California spotted owls can occupy landscapes that experience low-moderate severity and mixed-severity wildfire. However, uncertainty persists regarding thresholds where the amounts and patch sizes of high severity wildfire affect California spotted owl occupancy within the post-fire landscape. Further, post-fire salvage-logging introduces additional effects that are poorly understood and can interact with amounts of post-fire habitat to affect California spotted owl occupancy and habitat use patterns. The PSW research project is designed to address these questions related to salvage logging intensities and spotted owl occupancy and use of post-fire environments. This research will provide information to better understand the effects of wildfire and salvage-logging on spotted owl and serve as an empirical basis for informing future management decisions, including how best to designate spotted owl HRCAs to encompass the best habitat available (Keane, pers.comm.), Thus, the PSW research is expected to benefit California spotted owl conservation by addressing the uncertainty related to thresholds of effect as described in Appendix D of the EIS and in the Terrestrial BE and Wildlife Report under environmental consequences for spotted owl.

The boundaries of the HRCAs may be adjusted as research results and survey data become available.

521. Comment: Based on the Alternative 3 project description, the Department is unclear if avoidance measures will be employed in the event that a CSO, GGO, or NOGO detection is made at a previously undocumented and/or unrecognized location within the Project area. Known SCO, GGO and NOGO activity centers and historic nesting sites were destroyed or significantly impacted during the Rim Fire. Displacement from activity centers and nesting sites may increase the potential for CSO, GGO and NOGO detections in previously undocumented and undetected locations. The Department recommends inclusion of avoidance measures in the EIS addressing the protection of CSO, GGO, and NOGO in the event of detection, from March 1 through August 15, and that the measures be implemented throughout the life of the Project. It is recognized that the majority of the Project area is impacted to the degree that territories are not likely to occur in heavily burned areas. Habitat islands with live trees should be considered as potential displacement areas, and surveyed if occurrence is adjacent to a treatment area. The Department also advises that areas exhibiting key habitat characteristics for CSO and/or GGO nesting, foraging, and dispersal, within or in the vicinity of Project-related activities, be surveyed for by a qualified biologist prior to Project-related activities. The Department requests notification of any CSO. GGO, or NOGO detections as a result of surveys or observations made during Project-related activities.

5420

Response: Surveys have been and will be conducted prior to and during project implementation to ensure protection of California spotted owl, northern goshawk and great gray owl, as per Stanislaus Forest Plan Direction using Region 5 Forest Service protocols.

The following was included in the EIS Chapter 2, to protect these sensitive species:

5. Ensure consistency with Forest Plan and Regional Conservation strategies for terrestrial wildlife. Protected Activity Centers (PACs) apply to spotted owls, goshawks, and great gray owls.

b. Maintain a LOP prohibiting vegetation treatments, new construction, blasting, landing construction, and helicopter flight paths within ¼ mile of a protected activity center during the breeding season for California spotted owls (March 1 through August 15), northern goshawks (February 15 through September 15), great gray owls (March 1 through August 15) and within 0.5 miles of the known bald eagle nest (January 1 through August 31) unless surveys conducted by a Forest Service biologist confirm non-nesting status.

c. Conduct surveys in compliance with the Pacific Southwest Region's survey protocols to establish or confirm the location of the nest activity center for spotted owl, great gray owl and goshawk.

522. **Comment**: The portion of the project relating to remapping CASPO PACs and habitat is important given the DEIS's discussion of the number of PACs that were burned through. It is inappropriate to leave areas set aside for this use that no longer meet habitat needs. Identification of suitable and occupied habitat needs to be as accurate as possible so that constraints on management are applied in the best manner.

5431

Response: Forest Plan direction requires that, after a stand-replacing event such as the Rim Fire, habitat conditions be evaluated to determine if there is sufficient suitable habitat remaining, and if there are opportunities for re-mapping to better encompass suitable habitat (USDA 2010a). The post-fire PAC evaluation was completed with technical assistance from Pacific Southwest Region Research Station (PSW) owl scientists. Originally ten PACs were retired and the boundaries of the remaining PACs were redrawn, based on that evaluation (EIS Chapter 3.15: Wildlife/California Spotted Owl: Affected Environment). Surveys for California spotted owl have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Based on those surveys, six PACs have been re-established (EIS Chapter 3.15: Wildlife/ California Spotted Owl: Affected Environment). As new information is obtained, the agency will follow Forest Plan direction: "As additional nest location and habitat data become available, boundaries of PACs are reviewed and adjusted as necessary to better include known and suspected nest stands and encompass the best available 300 acres of habitat" (USDA 2010a).

523. **Comment**: The DEIS, however, does not divulge the location of active nest and roost sites that would be logged. During scoping, scientists urged the Forest Service to retain the pre-fire California Spotted Owl PACs/HRCAs, especially if they remain occupied by spotted owls after the fire. However, the Forest Service has not incorporated this, or even fully considered it, in any action alternative, stating that this scientific recommendation "does not meet the purpose and need to capture the economic value since most of this habitat includes the largest and most dense stands of dead trees within the burn." (DEIS, p. 46).

5313

Response: As stated in the 2010 Forest Direction (p.183-184) and the BE (p. 27), "…after a stand-replacing event, evaluate habitat conditions within a 1.5 mile radius around the activity center to identify opportunities for re-mapping the PAC. If there is sufficient suitable habitat for designating a PAC within the 1.5 mile radius, the PAC may be removed from the network." If the PAC is removed, the HRCA would be removed as well. The Forest further worked with PSW research to determine the likelihood that a spotted owl would remain on the landscape focusing on the remaining available habitat and the intensity of the burn within these locations (BE p.27-29). Spotted owl surveys are being completed for all of the original PAC locations within the Rim Fire, including those retired due to the high percentage of acreage killed in the fire. At the time the DEIS was released in May, these surveys were not yet completed. The 2010 Forest Plan Direction (p. 43) states, if territorial owls are documented based on the Forest Service California Spotted Owl protocol (i.e. nest found, 2 or more detections at a single roost site), a PAC would be created. Owl surveys have been completed for all the retired PACs. Six new PACs have been established in the best available habitat, as defined in the 2010 Forest Plan, encompassing spotted owl detections (e.g., nest of roost sites). The purpose of the PAC is to protect the nesting and roosting sites in order to provide the quality habitat needed for the owls to successfully breed. Thus even if a PAC was removed based on the stand replacing event and unlikely continued occupancy, as described in the draft BE in consultation with PSW species experts, if spotted owls remain on the site, the PAC would be re-established (2010 Forest Plan Direction p. 36-37 and p. 185-186). No salvage logging will occur in the location of active nests or roost sites or within PACs.

524. Comment: The Forest Service's decision in this regard is directly contrary to the recommendations in the January scientist letter, and scoping comments from spotted owl scientist Monica Bond. The reason for the scientific objections to the Forest Service's dropping of PACs/HRCAs or portions of PACs/HRCAs is that the elimination of protections from these areas is predicated upon the assumption that higher-severity fire areas are not suitable habitat for California Spotted Owls and, ostensibly, removal of such habitat will not have any significant adverse effect on the owls, as suggested in the DEIS, and the separate public roads EA (USDA 2014). However, this assumption is contradicted by the current science for California Spotted Owl use of burn areas:

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Response: Only those PACs that had stand-replacing events were removed. However, if territorial spotted owls are found during surveys, then a PAC would be established. The Forest worked with PSW Research Station scientist, John Keane, in defining probability that spotted owls would remain on the landscape following the fire based on fire severity, loss of suitable habitat and amount of suitable habitat post fire (draft BE; EIS Chapter 3.15). Only those PACs that were in high severity fire areas and had minimal post fire suitable habitat were removed from the PAC network.

Roberts and North (2012, GTR-237, p. 66) stated: "Clark (2007) observed 23 northern spotted owls using all types of fire severity in southern Oregon. However, within burned areas, owls strongly selected low-severity or unburned areas with minimal overstory canopy mortality. In this burned landscape, owl high-use areas were characterized by lower fire severity and greater structural diversity. Clark (2007) also found that postfire salvage logging reduced owl habitat quality. In contrast, Bond et al. (2009) followed seven owls (three pairs and an individual) using a 4-year-old burned forest in southern Sierra Nevada and found higher than expected owl foraging in high-severity burn areas. The study, however, is limited by its small sample size, brief period of study (12 weeks) and nonrandom owl selection".

Incorporated by reference, Keane (2014 p. 448; EIS Chapter 3.15, draft BE p.26) states "Lee et al (2012) concluded that the proportion of high-severity fire (an average of 32 percent of suitable vegetation burned within analysis area) had no effect on postfire occupancy by spotted owls in the Sierra Nevada, although the amount of high-severity fire was not included in models of occupancy, colonization, and extinction and was only qualitatively assessed relative to burned sites".

Incorporated by reference, Keane (2014 p. 448) further expanded (not in Keane 2013 version) that "Recently, Lee et al. (2013) found no statistically significant effects of wildfire or salvage logging on California spotted owls in the mountain of southern California. Although not statistically significant, occupancy rates declined by 0.062 in burned sites in the first year after wildfire, and postfire salvage logging reduced occupancy by an additional 0.046 relative to burned sites without salvage logging. Differences in occupancy between unburned versus burned and burned-salvage logged sites increased over time. Colonization was positively associated, and extinction negatively associated, with the amount of suitable habitat within 203-hectare core areas around owl sites, and extinction probability was significantly higher when greater than 50 hectares of suitable habitat burned at high severity within burned sites compared to unburned sites (Lee et al. 2013)".

Although we anticipate foraging to continue throughout all burn severities as stated in Clark (2007) and Bond et al. (2009), the PAC was developed to protect nesting and roosting areas. We anticipate that only those PACs that are not in high severity burn areas to still function as PACs. However, should surveys find territorial spotted owls in those areas being surveyed that are pre-fire PACs, then those PACS will be re-established per the Standards and Guidelines in the 2010 Forest Direction (p. 43).

Alternatives 1, 3, and 4 have a determination of "may affect individuals", whereas Alternative 2 has a "will not affect" determination.

525. Comment: § owls preferentially select unlogged high-severity fire areas for foraging (Bond et al. 2009);

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Response: As defined in Bond et al. 2009, we anticipate foraging to occur in all burned severities. As incorporated from Keane (2014 p. 448; draft 2013, p. 10-11), "Bond et al. (2009) reported that owls nested and roosted in unburned or low- to moderate-severity patches of forest, and, after four years after fire, they foraged selectively in high-severity burn patches that were located within larger home-ranges that generally burned at low to moderate severities. Patches of early-successional vegetation recovering from high-severity fire may provide access to early-successional associated prey, such as woodrats and gophers, within the mosaic of mixed fire severity landscapes". This is similar to Keane (2014 p. 445) where "habitat fitness potential values (indicating high quality habitat) were highest for habitat conditions containing mature forest interspersed with a mix of other vegetation types" (citing Dugger et al. 2005, Franklin et al. (2000), Olson et al. 2004). Hence, nesting and roosting is associated with areas of none, low-, or moderate burn severities whereas foraging can be determined to be in all levels of burn severity.

526. Comment: § reproduction is 60% higher in unlogged mixed-severity fire areas than it is in unburned mature forest (Roberts 2008);

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Response: Roberts (2008; p.15) "generally, survey areas burned at a low to moderate fire severity". Further, Roberts (2008, p. 20) states "the similarity in the habitat components between burned and unburned sites in ordination space indicated that low to moderate severity fire did not fundamentally change the structure of California spotted owl habitat across mixed-conifer forests of Yosemite".

"When I summed the mean reproductive success (total fledglings observed/years of survey effort) across burned and unburned sites and divided by the number of sites with owl pairs, I estimated 60 percent greater reproductive output at the burned sites "(Roberts 2008; p.18). Roberts (2008; p.26) "cautions that my results are relevant to forests that are not confounded by the effects of logging where large aggregations of residual downed coarse woody debris create spatially continuous fuel loads and extremely flammable environments.

Roberts (2008) work did not address logged and unlogged lands of mixed fire severity.

In the areas of territorial spotted owl occupancy, PACs are either in existence or will be created based on the 2010 Forest Plan Direction. PACs are for protection of nesting and roosting structures. Placement of a LOP on the projects (2010 Forest Plan Direction, Standard and Guideline) will further protect any nesting or breeding spotted owl from disturbance. No salvage logging is occurring within a PAC outside the WUI (2010 Forest Plan Direction, Standard and Guideline). The project has provided protection for spotted owls to breed and nest. Many of the existing PACs have areas of mixed-severity fire, thus, breeding and nesting will be able to occur with project implementation.

Furthermore, the project provides for a reduction of fuels by salvage logging outside the PACs thus it is predicted to lower the risk of reburn in the project area. FWS (2006; p29897) states "Catastrophic wildfire appears to be the greatest potential threat to the California spotted owl, and fuels-reduction treatments are a necessary measure to reduce that threat". Hence, reduction of fuels will help prevent an additional catastrophic fire event which is a risk to spotted owls

527. **Comment**: § home range size is similar in mixed-severity fire areas to the sizes in unburned mature conifer forest (Bond et al. 2013);

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Response: Bond et al. (2013, p. 123) did find that "the mean size of a home range in the McNally Fire area was 402ha, similar to that in the unburned study areas". However, data is from one season of study four years following a fire, with a small non-random sampling as compared to the demography study areas of the unburned study areas that had multiple years of data, larger sample sizes and collected in a random distribution. Bond et al. (2013, p. 120) clarified "We could not quantify home-range size vigorously as a function of diet, habitat, or other factors because our sample of owls and the length of our study were not sufficient".

The project follows the Standards and Guidelines in the 2010 Forest Plan Direction. Spotted owl PACs are in place (USDA 2004 p. 37) which will match the site fidelity of the spotted owls to their nesting/roosting areas as found important in Berrigan et al. (2012) cited in Keane 2014, then Keane 2013 which was incorporated by reference in the BE p. 28 and EIS Chapter 3.15). At least a minimum number of snags and downed woody debris will remain for habitat structures and for prey (Standards and Guidelines, 2010 Forest Plan Direction) within the salvage areas. No salvage will occur within the PACs (Standard and Guidelines #16 2004 SNFPA and 2010 Forest Plan Direction). LOPs will be placed for protection of the critical breeding and nesting season to reduce disturbance to spotted owls (Standard and Guideline, 2010 Forest Plan Direction). Hence all these actions will provide habitat elements and will reduce disturbance to known territorial spotted owls.

The project did analyze any potential changes due to the effects of the fire and with the proposed project in the BE (p. 31-32) and EIS (Chapter 3.15) including the work of Bond et al. 2013, and in the incorporation of Keane 2014 (then Keane 2013 in BE p. 28 and EIS Chapter 3.15). The project does not modify any assumptions of change of home range size by reducing it, or the analysis area, hence full consideration for the viability of spotted owls on the project area was considered.

528. **Comment**: § mixed-severity fire areas, averaging 32% high-severity fire effects, do not reduce California Spotted Owl occupancy and, in fact, occupancy is slightly higher in mixed-severity fire areas than it is in unburned mature forest (Lee et al. 2012);

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Response: All PACs will be maintained except those that are retired due to wildfire caused stand replacing events.

This was considered within the analysis of effects to California spotted owls. Incorporated by reference, Keane (2014 p. 448; draft 2013 p.10, EIS Chapter 3.15, draft BE p.26) states "Lee et al (2012) concluded that the proportion of high-severity fire (an average of 32 percent of suitable vegetation burned within analysis area) had no effect on postfire occupancy by spotted owls in the Sierra Nevada, although the amount of high-severity fire was not included in models of occupancy, colonization, and extinction and was only qualitatively assessed relative to burned sites".

529. **Comment**: § even most territories with >50% high-severity fire remain occupied post-fire (Lee et al. 2012);

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Response: This was considered within the analysis of effects to California spotted owls. Incorporated by reference, Keane (2014 p. 448; draft 2013 p.10, EIS Chapter 3.15, draft BE p.26) states "Lee et al (2012) concluded that the proportion of high-severity fire (an average of 32 percent of suitable vegetation burned within analysis area) had no effect on postfire occupancy by spotted owls in the Sierra Nevada, although the amount of high-severity fire was not included in models of occupancy, colonization, and extinction and was only qualitatively assessed relative to burned sites". However, since the amount of fire was qualitatively addressed, there would be a concern in utilizing information since the exact number of what is an acceptable level of high severity fire.

All PACs will be maintained except those that are retired due to wildfire caused stand replacing events. If territorial spotted owls are found during protocol surveys, any PAC that was retired would be re-established based on the 2010 Forest Direction (p. 43).

530. Comment: § post-fire logging significantly reduced occupancy of burned territories (Lee et al. 2012); 5313

Response: Spotted owl PACs will not be salvaged logged (2010 Forest Plan Direction). Only those PACs that were negatively impacted by the stand-replacing event were removed from the spotted owl PAC network and was supported by the analysis in the Wildlife BE and consultation with PSW species experts. Surveys are occurring, even in the areas that were removed from PAC network. Should territorial spotted owls be found, new PACs will be drawn to incorporate the habitat elements needed for spotted owls (2010 Forest Plan Direction). Since spotted owls show site fidelity (Berrigan et al. 2012 – in Keane 2014/Keane 2013 incorporation by reference, BE p. 26, EIS Chapter 3.15), no salvage activity in the PAC will provide for protection of the spotted owls. This is also supported by Lee et al. 2012 (p. 799) in referencing that they "…found no significant effect of fire on occupancy dynamics for up to 7 years post-fire and for the vegetation conditions of the sites in our study".

In the area where salvage logging is proposed, snags and downed woody debris would be maintain at least to a minimum level defined in the (2010 Forest Plan Direction). LOP are also in place to provide protection to any nesting or breeding spotted owl (2010 Forest Plan Direction).

Data analyzed by Lee et al. (2012, p.795) "did not encompass all Spotted Owl sites and surveys in the Sierra Nevada during our study period but rather consisted of a subset of survey data that had been provided to the regional office of the USFS and that met our criteria for inclusion".

Lee et al. (2012, p. 800) states "post-fire logging (e.g., salvage logging) may have affected rates of occupancy of the burned sites we studies. We did not have spatially explicit data on post-fire logging, but it occurred within 2 years after the fire near at least eight of our 41 burned sites. Seven of the eight sites that were later logged were occupied by California Spotted Owls after the fire but none of the eight sites was occupied after logging. Thus post fire logging may have adversely affected rates of occupancy of the burned sites, but our sample size was too small for this effect to be included as a covariate".

Based on the protection provided to the PAC, LOPs in place to protect disturbance to breeding and nesting, and because snags and downed woody debris will remain in the salvage areas, protection to the spotted owl is provided by the proposed actions of this project.

531. Comment: § in the Moonlight fire of 2007 on the Plumas National Forest, there were 9 California Spotted Owl sites actually occupied by pairs prior to the fire (occupancy data provided by the Plumas National Forest), and all lost occupancy following extensive post-fire logging on adjacent private timberlands (and, later, on national forest lands), which began in the summer of 2007, just days and weeks after the fire occurred, indicating that post-fire logging, not fire, was the cause of lost occupancy (DellaSala et al. 2010) (the remaining occupied territory was the only one with no post-fire logging within 1.5 km);

Response: Della Sala et al. (2010) states "…nest stands lost in the Moonlight Fire were located adjacent to private lands that experiences extensive post-fire logging, indicating that perhaps logging, rather than fire, could be the cause of decline in owl occupancy". This reference was in the "Letter to the Editor" section, not peer-reviewed, and did not include analysis or qualitative evidence that could be used in the project analysis.

On the Moonlight Fire on National Forest System lands, the 2004 SNFPA standards and guidelines were followed as they are prescribed on the Rim Fire Salvage (project title). Since protections will be in place by utilizing Standards and Guidelines (2010 Forest Plan Direction p. 36-37 and p. 185-186), should territorial spotted owls be occupying areas, PACs will be created and protections put into place. As stated in incorporation of Keane (2014 p.441; draft 2013 p. 5, EIS Chapter 3.15, draft BE p.26) and incorporating the references of Conner et al (2013) and Tempel and Gutierrez (2013), "the factors driving these population trends are not known" (p. 441 Keane 2014).

532. Comment: § in mixed-severity fire areas, spotted owls select areas with the highest total conifer basal area—live trees and snags combined, indicating that high snag basal area is important to owls in higher-severity fire areas (Roberts 2008); and

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Response: Spotted owls PACs, which provide for breeding and nesting spotted owls, will not be salvage logged as part of this project (2010 Forest Plan Direction). Snags and downed woody materials will be treated as defined in the 2004 SNFPA (2010 Forest Plan Direction) and at least a minimum number will remain on the landscape.

Roberts (2008; p.15) "generally, survey areas burned at a low to moderate fire severity". Further, Roberts (2008, p. 20) states "the similarity in the habitat components between burned and unburned sites in ordination space indicated that low to moderate severity fire did not fundamentally change the structure of California spotted owl habitat across mixed-conifer forests of Yosemite". Roberts (2008, p. 1-2) states "the best model for owl reproductive success included total basal area (positive effect)…"

PACs will be maintained across the project area. It territorial spotted owls are found outside the PACs, PACs will be created (2010 Forest Plan Direction), or modified to include the known location (2010 Forest Plan Direction). Since the PACs will not be salvage logged, and known territorial or nesting spotted owl areas are protected within PACs, and areas outside of PACS will be treated to reduce the risk of reburn, thus the spotted owl will be protected for within the project area.

533. Comment: § current demographic data indicate that California Spotted Owl populations are declining where logging (including mechanical thinning and post-fire logging) is allowed, such as on most national forest lands, and private lands, while the one area with stable populations is Sequoia/Kings-Canyon National Park, which has no logging (Conner et al. 2013, Tempel and Gutiérrez 2013, Tempel et al. 2014).

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Response: As stated in incorporation of Keane (2014 p.441; draft 2013 p. 5, EIS Chapter 3.15, draft BE p.26) and incorporating the references of Conner et al (2013) and Tempel and Gutierrez (2013), "the factors driving these population trends are not known" (p. 441 Keane 2014).

FWS (2006, p. 29897) found that "Catastrophic wildfire appears to be the greatest potential threat to the California spotted owl, and fuels-reduction treatments are a necessary measure to reduce that threat". Keane (2014), incorporated by reference (DEIS p.283, draft BE p.26) states "Eighty-five percent of known California spotted owl sites occur in moderate- or high-risk fire areas in the Sierra Nevada"(p.438). The Rim Fire Recovery project is to reduce the amount of reburn within the project area, hence reducing the further loss of suitable habitat for spotted owls.

534. Comment: The DEIS's proposal to log in pre-fire spotted owl PACs and HRCAs is even harder to understand given the fact that the Forest Service knew, when the DEIS was released in mid-May of 2014, that many of these territories are occupied in 2014.

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Response: Spotted owl PACs will be maintained, except for those retired due to the stand-replacing event. Activities in the PACs are to follow the 2010 Forest Plan Direction (2010 Forest Plan Direction p. 36-37 and p. 185-186). This includes "…outside of the WUI defense zones, salvage harvests are prohibited in PACs…" Hence no salvage logging will occur in the location of active nests or roost sites in PACs.

To provide public safety along roadsides, hazardous trees will be removed from the project area, including in spotted owl PACs. Acres of hazard trees per post-fire suitable PACs are located in the BE as Table 4 for Alternative 1 (BE p. 33-34) and Table 10 for Alternative 3 and 4 (BE p.39-40). The same tables in the EIS are located as Table 3.15-4 for Alternative 1 (EIS Chapter 3.15) and Table 3.15-10 for Alternative 3 and 4 (EIS Chapter 3.15).

535. Comment: ...data released by the Forest Service on June 5, 2014 shows that 70% of the pre-fire PACs are occupied in 2014 (a level of occupancy that is generally higher than average California Spotted Owl occupancy in unburned mature/old forest in the central Sierra Nevada; Tempel and Gutiérrez 2013), and 75% of these are pairs.

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Response: Tempel and Gutierrez (2013) are referencing the Eldorado California Spotted Owl Demography Study area which is situated on the Eldorado and Tahoe National Forests and is significantly north of the Stanislaus National Forest. Information of occupancy cannot be directly compared as they are geographically separate locations. The Eldorado Demography Study is also 37 percent non-Forest Service lands; hence activities such as private resident development and private timber company harvest could have an impact on the occupancy of that study area. The Stanislaus National Forest PACs are not in the same juxtapositions, hence a secondary reason that the occupancy rates could be modified. Third, 2014 appears to be a higher than normal breeding year for spotted owls on the demography study areas in California (Krueger, personal communication).

PACs will not be salvage logged in outside of the WUI defense zones (2010 Forest Plan Direction. Limited operating periods are in place (2010 Forest Plan Direction) to protect the nesting spotted owls from disturbance.

536. Comment: 60% of the PACs that the Forest Service eliminated after the Rim fire are occupied—and half of those are pairs.

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Response: Surveys were occurring at the time of the DEIS release. Based on the 2010 Forest Direction (p. 43), if territorial owls are documented based on the Forest Service California Spotted Owl protocol (i.e. nest, 2 or more detections at a single roost site), a PAC would be created. Thus even if a PAC was removed based on the stand replacing event, if spotted owls remain on the site, the PAC would be reinstated and be afforded the same protections (2010 Forest Plan Direction p. 36-37 and p. 185-186). This includes Standard and Guideline, "…outside of the WUI defense zones, salvage harvests are prohibited in PACs…" Hence no salvage logging will occur in the location of active nests or roost sites in PACs.

537. Comment: Especially in light of this information, we are troubled by documentation of your current roadside logging under the separate EA, including removal of trees that could not possibly hit the road, clearcutting several hundred feet from roads, and removal of live trees—including old-growth trees—that do not appear to meet any of the hazard tree criteria. Many of these roads go through spotted owl territories that we now know are occupied.

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Response: The Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region were used in implementation of the Rim Fire Hazard Trees EA (43032). The potential hazard of a tree is determined by a combination of the Failure Impact (Target) and the Failure Potential (Defect). As explained in the guidelines:

- The failure impact, integrates the likelihood of impact, the amount of damage if failure occurs, and the value of the target (monetary or possibility of injury or death).
- The failure potential is an estimate of the likelihood that the defective tree or tree part will fail during the season when the target is present. Determining the tree failure potential requires an evaluation of the defects and the failure potential of the defect for the tree species involved (USDA 2012, pp. 18-19).

It is often difficult to determine the condition of a dead or dying tree once it's been felled. In addition, during logging operations, when trees are inadvertently damaged they will be removed because they have become unstable and are unlikely to persist.

The direct and indirect effects of the Rim Fire Hazard Trees EA on spotted owl territories which were still considered part of the conservation network prior to the 2014 surveys were discussed in the EA. PACs which were retired and then reestablished based on the 2014 survey results (EIS Chapter 3.15/California Spotted Owl: Affected Environment) were redrawn to include the best available green habitat around the detections. The effects of the hazard tree removal in green areas within the reestablished PACs are considered cumulative to the direct and indirect effects of the Rim Fire Recovery project. The cumulative effects analysis for the recovery project can be found in the EIS (Chapter 3.15/California Spotted Owl: Environmental Consequences).

538. **Comment**: The Forest Service's reluctance to implement key California Spotted Owl conservation recommendations from top spotted owl researchers will result in cumulative loss of owl habitat that may further jeopardize California Spotted Owl populations, making listing under the ESA more likely.

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Response: The Forest Service is implementing the Stanislaus National Forest, Forest Plan Direction (USDA 2010a). The Stanislaus National Forest, Forest Plan provides for the viability of the California spotted owls by placing standards and guidelines on forest activities to provide protection to the spotted owl as well as move the forest towards the desired conditions. These desired conditions include specific actions for spotted owls PACs and HRCAs (2010 Forest Plan Direction). This projects has utilized peer-reviewed literature in analyzing the impacts to the California spotted owls, as shown in the Biological Evaluation and EIS.

539. **Comment**: **...**the DEIS does not adequately address the studies discussed above regarding active spotted owl use of mixed-severity fire areas or the high potential for post-fire logging to cause loss of occupancy; nor does the DEIS divulge the high proportion of pre-fire spotted owl PACs that have been found to be occupied in 2014 by Forest Service wildlife surveyors. These are serious flaws in the DEIS, sufficient to necessitate a supplemental environmental analysis under the National Environmental Policy Act. Footnote 1: We incorporate our scoping comments by reference into these comments on the DEIS.

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Response: The EIS (Chapter 3.15) and BE both show incorporation by reference of Keane 2014 which includes recent literature on spotted owls and use of the landscape following wildfires. Surveys are occurring to determine occupancy of spotted owls in PACs. Should territorial spotted owls be found, PACs will be delineated and protection will be applied in terms of LOP, no salvage logging in PACs, and retention of snags and downed woody debris as directed in the Stanislaus National Forest, Forest Plan Direction (USDA 2010a).

540. **Comment**: "The DEIS Fails to Adequately Analyze the Science Addressing California Spotted Owls and Their Burned Forest Habitat And Fails to Appropriately Protect Owls and Owl Habitat. The DEIS and Wildlife Biological Evaluation (BE) fail to adequately analyze or incorporate the most recent science regarding California spotted owls (""CSO"") in the Sierras (see, e.g., attached Bond comments [#5336], which we fully incorporate by reference into these comments). The Forest Service instead continues to rely on outdated information as to the current status of the CSO in the Sierras as well as to what constitutes suitable habitat. Moreover, the DEIS fails to address the impacts, especially the cumulative impacts, of the extensive salvage logging proposed (in all action alternatives) in, adjacent to, or very near to PACs and HRCAs. Merely protecting a PAC from salvage logging, which the DEIS does not even accomplish, is grossly insufficient given the fact that PACs are just a small portion of an owl's overall home range. The DEIS (p. 301) states that "[p]ost-fire salvage logging may adversely affect rates of owl occupancy (Lee et al. 2012)" and the DEIS (p. 316) admits that 26 CSO Protected Activity Centers (PACs) are within 0.25 miles of proposed logging and 5 are within logging units, yet the DEIS (pp. 315-317) then inexplicably concludes that the action alternatives would not adversely affect the viability of the spotted owl or result in a trend toward listing under the Endangered Species Act. Not only is this conclusion at odds with the facts found, but also the DEIS fails to disclose the fact that the current demographic data clearly concludes that California spotted owls are declining in population; thus the analysis of impacts and cumulative effects is fundamentally flawed. The recent literature on California spotted owl demographics on the Sierra National Forest and throughout the range (Connor et al. 2013, Tempel and Gutierrez 2013, and Tempel et al. 2014) show a serious problem—i.e., a clear population decline—one that the DEIS is ignoring in its analysis and conclusions by failing to address these studies at all. The DEIS and BE must therefore be redone. The cumulative effects analysis is unequivocally incomplete without considering the best available science on the status of the species in the study area and throughout its range. This is especially so given that Conner et al. (2013) found declining California spotted owl populations in all of the study areas that are primarily on national forest lands, which have been and continue to be impacted by mechanical thinning and post-fire logging, while the one study area in protected forest (no logging) on the Sequoia/Kings-Canyon National Park, was the only area with stable or slightly increasing populations, indicating that Forest Service forest management is contributing to a downward population trend. This was ignored in the DEIS and as a result, the DEIS's conclusions as to impacts to owls are erroneous."

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Response: The EIS (Chapter 3.15) and BE both show incorporation by reference of Keane 2014 which includes recent literature on spotted owls and use of the landscape following wildfires. Further analysis in the BE and in the EIS Chapter 3.15 document effects of burned forest on prey availability and residual habitat components. Surveys are occurring to determine occupancy of spotted owls in PACs. Should territorial spotted owls be found, PACs will be delineated and protection will be applied in terms of LOP, no salvage logging in PACs, and retention of snags and downed woody debris as directed in the Stanislaus National Forest, Forest Plan Direction (USDA 2010a).

The Rim Salvage Project is following the Stanislaus National Forest, Forest Plan Direction (USDA 2010a). Specific direction requires a LOP "prohibiting vegetation treatments within approximately one quarter of a mile of the activity center during the breeding season under Alternative 1 and within approximately one quarter of a mile of the protected activity center during bredding season under Alternatives 3 and 4, unless surveys confirm that California spotted owls are not nesting". The "owl activity centers are designated for all territorial owls based on: (1) the most recent documented nest site, (2) the most recent known roost site when a nest location remains unknown, and (3) a central point based on repeated daytime detections when neither nest or roost locations are known". "PACs are delineated to (1) include known and suspected nest stands and (2) encompass the best available 300 acres of habitat in as compact a unit as possible".

Both the BE and the EIS Chapter 3.15 incorporate recent relevant science in the analysis for the project. Based on the direction in the 2010 Forest Plan Direction, suitable habitat for owls is defined by stand structure and CWHR types that utilized the best science. To date, the information on best available science on suitable habitat definitions were defined in the BE and EIS Chapter 3.15. Analysis for the impacts to the PACs and HRCAs was within both the BE and EIS (Chapter 3.15).

The BE and the EIS did state that the spotted owl may be impacted, but that the project (all action alternatives) would not lead towards federal listing or a loss of viability at the plan level. There is no inference to the entire population or the decline that may be occurring on the demography studies. By providing protection to all known breeding and nesting owls in terms of an LOP, no salvage logging within the PAC, and retaining habitat elements across the landscape. No loss of individuals should occur based on the projects activities (Standards and Guidelines in USDA 2010a). The BE and EIS (Chapter 3.15) clearly states that due to all protection in place, "…make it highly improbable that death or injury would occur as a result of project activities". Spotted owls are expected to forage across the project area, hence disturbance while feeding due to noise could occur, thus the "may affect individuals" (BE) is documented. The project described as implemented should not lead to a loss of viability at the plan level nor trend the species towards federal listing.

In Keane (2014 – incorporated by reference), results show that there are realized population changes citing Connor et al. (2013) and Tempel and Gutierrez (2013). However, "the factors driving these population trends are not known" (Keane 2014 p.441). Tempel 2014 cited in the FEI, Chapter 3, Wildlife Section 3.15, Spotted owl). These documents were considered in the analysis and presented in the EIS.

541. **Comment**: Wrongful retirement of ten pre-fire PACs despite presence of owls in six of the PACs (3 singles and 3 pairs), and despite best available science showing owl use of unsalvaged, severely burned forest…Illegal redrawing of pre-fire PACs and HRCAs to facilitate intensive salvage logging (see attached maps showing redrawn PACS and original PACs)… In the Rim fire hazard tree EA and Decision Notice (DN)—long before post-fire California spotted owl surveys had even been concluded (and regardless of the results of any post-fire occupancy surveys)—the Forest Service mis-applied the provisions of the 2004 Sierra Nevada Forest Plan Amendment to declare a) 10 California spotted owl PACs lost ("rendered unsuitable") to fire, eliminating these PACs (USDA 2014a, p. 62), and b) 8 spotted owl PACs and associated HRCAs were "re-mapped" (USDA 2014a, p. 66), allowing the dropped PACs or portions of PACs to be logged. As of June 5, 2014, however, several weeks before the 2014 (one year post-fire) surveys for California spotted owls were complete, surveys that have been completed to date confirm postfire, and pre-logging, occupancy of California spotted owl in the Rim fire in 32 out of 46 (70%) of the pre-fire PACs...Of the PACs that the Forest Service eliminated entirely from the PAC network, 60% are occupied—half of them pairs. The following are the data supplied by the Forest Service regarding the results of 2014 Rim fire occupancy by spotted owls as of June 5, 2014 [commenter then presented the preliminary survey results of surveys regarding occupancy of 46 PACs in the project area].

5335

Response: At the time of the DEIS, surveys to determine if spotted owls were still present on the landscape were occurring. As stated in the 2004 SNFPA (p.35), 2010 Forest Direction (p.183-184) and the BE (p. 27), "…after a stand-replacing event, evaluate habitat conditions within a 1.5 mile radius around the activity center to identify opportunities for re-mapping the PAC. If there is sufficient suitable habitat for designating a PAC within the 1.5 mile radius, the PAC may be removed from the network." If the PAC is removed, the HRCA would be removed as well. The Forest further worked with PSW research to determine the likelihood that a spotted owl would remain on the landscape focusing on remaining available habitat and intensity to burn (BE p.27-29). However, all the PACs whether predicted to be unoccupied following the stand replacing event or not, are being surveyed. Based on the 2004 SNFPA (p.35) and 2010 Forest Direction (p. 43), if territorial owls are documented based on the Forest Service California Spotted Owl protocol (i.e. nest, 2 or more detections at a single roost site), a PAC would be created. Thus even if a PAC was removed based on the stand replacing event, if spotted owls remain on the site, the PAC would be reinstated and be afforded the same protections (Standards and Guidelines #13-17, and 71-82) (2004 SNFPA)(2010 Forest Plan Direction p. 36-37 and p. 185-186). This includes Standard and Guideline #16, "…outside of the WUI defense zones, salvage harvests are prohibited in PACs…" Hence no salvage logging will occur in the location of active nests or roost sites in PACs.

Standard and Guideline #71 (2004 SNFPA) and 2010 Forest Plan Direction (p. 185) states that "PACs may be re-mapped during project planning to avoid intersections with treatment areas, provided that the re-mapped PACs contain habitat of equal quality and include known nest sites and important roost sites." (Unknown if this occurred – Forest to clarify next sentence). When the forest remapped the PACs, they did so to maximize the remaining suitable habitat for spotted owls. OR No re-mapping of the PACs was done as part of this project.

542. **Comment**: Failure to adequately protect California spotted owl habitat, including both PACs and HRCAs, from intensive salvage logging (see attached maps showing extensive overlap/adjacency of Alt 4 salvage units in pre-fire PACS and HRCAs; see also attached Excel document showing relationship between Alt 4 Units and CSO PACs/HRCAs)...Failure to ensure the viability of California spotted owls…The DEIS Violates NFMA by Failing to Ensure Viable Populations of California Spotted Owls...Forest Service Manual (FSM), Amendment 2600-2005-1…Section 2670.12, states…"Departmental Regulation 9500-4. This regulation directs the Forest Service to: 1. Manage 'habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species.'" This requirement pertains with special force to Forest Service Sensitive Species, and Section 2670.22 states that following requirement for Sensitive Species: "Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands." The Forest Service must also not take actions that would contribute to a trend towards federal listing under the Endangered Species Act. FSM Section 2670.32. The... (Stanislaus Forest Plan) and the 2004 Sierra Nevada Forest Plan Amendment likewise require the Forest Service to maintain viable populations of spotted owls and other Sensitive Species. However, the DEIS fails to divulge that California spotted owl populations are declining, as discussed above, and fail [sic] to determine the quantity and quality of habitat necessary to maintain viable populations of the owl, or whether the Project would push owl populations below a critical viability threshold and, therefore, violated the Forest Service's own forest plans, regulations and NFMA. Footnote 12: Increased sedimentation is expected despite having designed Alternative 3 to address sensitive watersheds.

5335

Response: As stated in the EIS (Chapter 3.15 Wildlife), "the factors driving these population trends are not known". As further discussed in Keane (2014, p. 449-452), ecological stressors such as barred owl range expansion, changes in local weather and regional climates based on climate change, disease and contaminates, and human recreation and disturbance are factors that may be impacting the occupancy rates, and thus population demographics, of the California spotted owl.

The risk factors to the species abundance and distribution was further stated to include nest site loss and disturbance and loss of habitat and habitat elements (EIS Chapter 3.15 Wildlife, California Spotted Owl, Affected Environment).

The concern to the species is the catastrophic wildfire that occurred in 2013 which modified a large area. This project is salvaging trees only outside of PACs. LOPs would be in place protectying owls during the breeding season (March 1 through August 31) and retaining downed woody debris and snags. All of these actions will provide protection to the PAC by reducing potential reburn outside the PAC, and providing for habitat elements suitable for spotted owls. It will further move the area towards he desired conditions for the HRCAs.

Forest Service Manual is out of date in some sections, such as 2670.12. Department Regulations 9500-004 was updated in 2008. The following would be most applicable now:

Departmental regulation 9500-004 directs Department agencies to: (1)Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species"; (2) Avoid actions "which may cause a species to become threatened or endangered"; (3) Consult "as necessary with the Departments of the Interior and/or Commerce on activities that may affect threatened and endangered species": and (4) Not "approve, fund or take any action that is likely to jeopardize the continued existence of threatened and endangered species or destroy any habitat necessary for their conservation unless exemption is granted pursuant to subsection 7(h) of the Endangered Species Act of 1973, as amended."

543. Comment: "...the 2004 Amendment (p. 31 of ROD) states that management direction under the Plan requires the Forest Service to maintain viable, well-distributed populations of old forest species, including Spotted Owls, across the Sierra Nevada, and it is well established in the science that the PACs alone are wholly insufficient to maintain viable populations, as discussed above. Further, the 2004 Amendment (p. 49) requires the Forest Service to "[a]void PACs to the greatest extent possible", which the Forest Service would violate if HRCAs are logged (i.e., logging immediately adjacent to PACs, and creating isolated islands of habitat, would not be avoiding PACs to the greatest extent possible). The 2004 Amendment (p. 54) also requires the following: Conduct surveys in compliance with the Pacific Southwest Region's survey protocols during the planning process when proposed vegetation treatments are likely to reduce habitat quality in suitable California spotted owl habitat with unknown occupancy. Designate California spotted owl protected activity centers (PACs) where appropriate based on survey results." The Forest Service is violating the plan's provisions regarding both surveying for owl occupancy (by not conducting full surveys to protocol, by not surveying habitat with unknown occupancy, and by not surveying within the broader area surrounding pre-fire PACs…The DEIS action alternatives would all violate the forest plan by failing to establish PACs/HRCAs around 2014 detection locations that are not currently within PACs, by logging in these occupied areas that are required to be protected by the forest plan, and by logging in PACs and HRCAs. Moreover, the phrase ""rendered unsuitable"" on p. 53 of the... (2004 Sierra Nevada Forest Plan Record of Decision) must be interpreted in the context of (a) the fact that these areas are occupied by spotted owls (and, thus, suitability is most strongly indicated by the owls themselves) - ad (b) the fact that current science establishes that unlogged high-severity fire areas in mature conifer forest comprise suitable California spotted owl habitat (Bond et al. 2009). "

5335

Response: The project is in compliance with the 2004 Sierra Nevada Forest Plan Amendment (USDA 2004) and Stanislaus Forest Plan Direction (USDA 2010a). Surveys are being conducted in compliance with Forest Service protocols in 2014 for this project. PACs, if not currently designated, will be designated if territorial spotted owls are found (USDA 2010a, p. 18), Forest Plan Direction is being followed for Salvage logging following wildfire.

As stated in the Federal Register, "Catastrophic wildfire appears to be the greatest potential threat to the California spotted owl, and fuels-reduction treatments are a necessary measure to reduce that threat" (EIS, Federal Register 2006, p 29897). The purpose of the project is to reduce the threat of reburn (EIS Chapter 3.05 Fire and Fuels) and hence will provide for protection of the remaining habitat elements that are necessary for spotted owls (EIS Chapter 3.15 Wildlife, California Spotted Owl, Environmental Consquences).

As Bond et al. (2009), foraging in unlogged high-severity fire areas were found on a higher than average level than would be expected. The Forest Service expects that spotted owls will continue to forage in high-severity areas. Clark (2007) observed northern spotted owls using all types of fire severity areas in southern Oregon.

This project acknowledges that spotted owls will be impacted with the "may affect individuals" determination (EIS Chapter 3.15, Wildlife, California Spotted Owl, Summary of Effects). The project, in following Forest Plan Direction (USDA 2010a), provides for reducing the impacts to nesting and breeding by implementing a LOP surveying to determine occupancy, no salvage logging in the PACs outside the WUI, and retaining snags and downed woody debris. All these actions will provide for protection of existing habitat elements that the spotted owl utilizes and it will move the area towards the desired conditions stated in the Forest Plan Direction (USDA 2010a, p. 185).

544. **Comment**: This revision to the survey approach is necessary to avoid disturbing nesting raptors and to avoid salvage logging within their PACs as directed by the forest plan. If the survey approaches and avoidance of salvage logging in PACs is not undertaken as outlined above (and described in more detail for each species below), then we expect the Forest Service to conclude, based on their own rationale applied to Alternative 1, that the selected action would lead to a trend toward federal listing for each of these raptors.

5438

Response: Surveys for California spotted owl, northern goshawk, and great gray owl have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Additionally, our survey coverage has been designed in coordination with species experts at PSW and the survey results you describe (the two goshawks and six spotted owls found in habitat thought to be unsuitable to these species, and great gray owls located nesting in severely burned habitat) are evidence of the effectiveness of our survey effort and Regional protocols. Where applicable based on survey results, PAC boundaries will be modified and PACs re-established per Stanislaus Forest Plan Direction to provide adequate protection of breeding areas.

There was an error in Table 2.05-3 of the DEIS (Comparison of Alternatives: Summary of Effects) and in the Draft Terrestrial Assessment, Evaluation, and Wildlife Report. The statements in the body of the DEIS (Chapter 3.15) are correct: The cumulative contribution under Alternative 1 may affect individual territories but is not expected to affect the viability of the California spotted owl, great gray owl, and northern goshawk. The EIS and the Final Terrestrial Assessment, Evaluation, and Wildlife Report show the correct determination.

545. **Comment**: Post-fire logging in the Rim Recovery project is a major concern because a significant number of pre-fire PACs and HRCAs contain salvage logging units. For example, the proposed action would harvest over 4,200 acres within PACs (see analysis in our scoping comments).

5438

Response: Except for roadside hazard treatments, no post-fire salvage logging will occur in PACs. Alternatives 3 and 4 include the following management requirement: where roadside hazard treatments are within PACs and HRCAs, add acreage to the PAC and/or HRCA equivalent to the treated acres of the most suitable habitat available.

546. **Comment**: The Forest Service is required under the forest plan to protect spotted owl territories burned by wildfire unless the habitat has been rendered unsuitable within 1.5 miles of the activity center: (USDA Forest Service 2004, p. 40) using this direction, ten spotted owl PACs in the Rim Fire area were retired, according to the Rim Recovery DEIS (Wildlife Appendix). However, survey results we received on June 5, 2014 indicate that single owls or pairs were detected at six of the owl sites

slated for retirement. Based on these results, we believe that retirement of the PACs with detections is premature and retirement of PACs without detections is questionable.

5438

Response: Surveys for California spotted owl are being conducted to Regional protocols. These surveys include retired PACs. Where applicable based on survey results, retired PACs will be re-established per Stanislaus Forest Plan Direction (USDA 2010a).

547. **Comment**: The action alternatives currently propose to salvage log within the PACs proposed for retirement. For at least the six sites with detections, this means that the alternatives are not likely in compliance with the forest plan, since salvage logging is prohibited in PACs:

5438

Response: Surveys for California spotted owl are being conducted to Regional protocols. These surveys include retired PACs. Where applicable based on survey results, retired PACs will be re-established per Stanislaus Forest Plan Direction.

548. **Comment**: The question that should be answered is: Will the PAC be shifted or re-established within the home range core? If the entire 300-acre PAC has experienced a high intensity burn (70 to 80 percent mortality), then the PAC is no longer functional. However, an assessment of the home range core area should be completed to determine whether there is the potential for the PAC to shift or be re-defined within the home range core area in the future.

5438

Response: Forest Plan Direction (USDA 2010a) requires that following a disturbance event such as the Rim Fire, specialists evaluate habitat conditions to determine whether there is sufficient suitable habitat remaining in the PAC after the event or if there are opportunities for re-mapping the PAC to better encompass suitable habitat. Wildlife biologists from the Stanislaus National Forest, with the technical assistance of Pacific Southwest Region (PSW) researchers, evaluated each PAC within the Rim Fire boundary using several criteria. The three main criteria used were 1) Acres of post-fire suitable habitat, 2) Percent of PAC within a 496 acre (200 hectare) circle burned at high severity, and 3) Percent of pre-fire suitable habitat burned at high severity. The results of this evaluation are graphically illustrated in the "pin graph" provided in the EIS Chapter 3, Wildlife Chapter 3.15, and in the Final Terrestrial Biological Evaluation and Wildlife Report. Details on individual sites are provided in the Terrestrial Wildlife Biological Evaluation Appendix. Based on results of this analysis, and as described in the EIS Chapter 3, Wildlife Chapter 3.15, and in the Final Terrestrial Biological Evaluation and Wildlife Report, sites were retired, left intact, or re-mapped to encompass habitat of better quality where possible. Where applicable based on survey results, retired PACs will be re-established per Stanislaus Forest Plan Direction (USDA 2010a).

549. **Comment**: However, if there are portions of the PAC that have remained green, the remaining suitable habitat within the defined PAC and adjacent home range core area should be surveyed to determine occupancy.

5438

Response: Surveys for California spotted owl are being conducted to Regional protocols. These surveys include all portions of pre-fire PACs.

550. **Comment**: In the absence of surveys to confirm non-occupancy of a PAC rendered unsuitable by a catastrophic stand-replacing event, you must maintain the PAC and follow the standards and guidelines detailed on pages A-34 and A-35 for limited operating period, fuel treatments, and new roads and other developments. In addition, when activities are planned within or adjacent to a PAC and the location of the nest site or activity center is uncertain, you must conduct surveys to establish or confirm the location of the nest or activity center (Appendix A, page A-34).

5438

Response: Surveys for California spotted owl are being conducted to Regional protocols. These surveys include retired PACs. Where applicable based on survey results, retired PACs will be re-established per Stanislaus Forest Plan Direction (USDA 2010a).

551. Comment: We ask that you not allow salvage logging within the existing PAC or within a circular area of 500 acres surrounding the activity center until status can be confirmed. When status is confirmed as occupied, we expect that a PAC with HRCA will be delineated around the activity center. We also ask that any decision for this salvage logging project specifically state the process that will be applied to the delineation of new PACs and the retirement of PACs in order to ensure that a reappearance of birds in the second year of surveys or the appearance of birds in unexpected locations is not ignored.

5438

Response: Forest Plan Direction requires that as new information becomes available, boundaries of PACs and HRCAs are reviewed and adjusted as necessary to better include known and suspected nest stands and encompass the best available habitat. We are conducting surveys to Regional protocol and where applicable based on survey results, PAC boundaries will be adjusted and retired PACs will be re-established per Stanislaus Forest Plan Direction.

552. Comment: For these reasons, salvage operations and the removal of burned trees within the more focused habitat areas for spotted owls, e.g., HRCAs, should be avoided in order to minimize territory abandonment by owls. Furthermore, the initial decision to retire certain PACs should be abandoned and salvage logging avoided in these historic PACS and HRCAs to provide the least disturbed or degraded habitat to meet life requirements.

5438

Response: Forest Plan Direction requires that as new information becomes available, boundaries of PACs and HRCAs are reviewed and adjusted as necessary to better include known and suspected nest stands and encompass the best available habitat. We are conducting surveys to Regional protocol and where applicable based on survey results, PAC boundaries will be adjusted and retired PACs will be re-established per Stanislaus Forest Plan Direction.

553. Comment: Because goshawks (as well as other raptors) are behaving in this landscape in ways that are unexpected to many biologists, it is essential that the retirement of PACs not follow a standard paradigm that clearly does not fit the Rim Fire landscape. More thorough surveys on the landscape need to be completed for this species.

5438

Response: The Forest Plan Direction (USDA 2010a) allows for retirement of a PAC after a stand replacing event when habitat elements no longer are present.

Surveys for goshawks have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Where applicable based on survey results, PAC boundaries will be modified and/or PACs re-established per Stanislaus Forest Plan Direction to provide adequate protection of breeding areas. We will make adjustments to treatment units to protect breeding areas per the Stanislaus Forest Plan Direction.

554. Comment: Based on the actual use of burned habitat for nesting by northern goshawk we believe that it essential for their protection that existing PACs not be retired and that surveys of suitable habitat outside of PACs be completed. Furthermore, since our understanding of what constitutes suitable habitat is now being challenged by the significant use of burned landscapes for nesting, it is critical that surveys of existing PACs be extended outside the PAC about 0.3 mile in order to mirror the 1 km search radius (about 0.6 mile radius covering about 725 acre) noted in the 2006 survey guide (Woodbridge and Hargis 2006).

5438

Response: The project follows the Forest Plan Direction (USDA 2010a). That direction states for the goshawk, “PACs may be removed from the network after a stand-replacing event if the habitat has been rendered unsuitable as a northern goshawk PAC and there are no opportunities for re-mapping the PAC in proximity to the affected PAC”.

As stated in the Forest Plan Direction (Ibid), “Goshawk PAC are delineated to (1) include known and suspected nest stands, and (2) encompass the best available 200 acres of forested habitat in the largest contiguous patches possible, based on aerial photography. Where suitable nesting habitat occurs in small patches, PACs are defined as multiple blocks in the largest best available patches within 0.5 miles of one another. Best available forested stands for PACs have the following characteristics: (1) trees in the dominant and co-dominant crown classes average 24 inches dbh or greater; (2) in westside conifer and eastside mixed conifer forest types, stands have at least 70 percent tree canopy cover; …Non-forest vegetation (such as brush and meadows) should not be counted as part of the 200 acres”. Additionally, “As additional nest location and habitat data become available; PAC boundaries are reviewed and adjusted as necessary to better include known and suspected nest stands and to encompass the best available 200 acres of forested habitat”.

Goshawk surveys in the Sierra Nevada are to follow the protocol 2000 protocol. Surveys for goshawks have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Where applicable based on survey results, PAC boundaries will be modified and/or PACs re-established per Stanislaus Forest Plan Direction to provide adequate protection of goshawk breeding areas.

Woodbridge and Hargis (2006, p. 2-4) state “Although most alternate nests are grouped within a forest stand or cluster of adjacent forest stands, a search radius of 1 kilometer (0.6 mile) is required to locate 95 percent of alternate nests used over a period of several years (Reynolds et al. 2005)”. The 2000 protocol for goshawk surveys allows for the search of alternative nests. Thus this project’s surveys are meeting the concern expressed in this comment.

Forest Plan Direction (USDA 2010a) places an LOP “prohibiting vegetation treatments within approximately ¼ mile of the nest site during the breeding season unless surveys confirm that northern goshawks are not nesting. If the nest stand within a protective activity center (PAC) is unknown, either apply the LOP to a ¼-mile area surrounding the PAC, or survey to determine the nest stand location”.

Forest Plan Direction (Ibid) further requires a minimum number of snags and downed woody debris to remain across the project area and prohibits salvage harvest in the PACs. Combined with the above requirements, territorial goshawks should be protected and continue on the landscape following project implementation.

555. Comment: If the survey approaches and avoidance of salvage logging in PACs is not undertaken as outlined above, then we expect the Forest Service to conclude, based on their own rationale applied to Alternative 1 that the selected action would lead to a trend toward federal listing.

5438

Response: Please see response to Comment 579 prohibits salvage logging within PACs (2010 Forest Plan Direction). An LOP would be placed, “prohibiting vegetation treatments within approximately ¼ mile of the nest site during the breeding season unless surveys confirm that northern goshawks are not nesting. If the nest stand within a protective activity center (PAC) is unknown, either apply the LOP to a ¼-mile area surrounding the PAC, or survey to determine the nest stand location” (USDA 2010a). Direction (Ibid) requires the Forest to “design projects to protect and maintain critical wildlife habitat”. Hence it would not be expected that a nest tree would be removed, except for an extremely low likelihood that a nest tree is not detected during surveys and is not already within a PAC.

This project would not trend goshawk towards federal listing as the breeding and nesting are being protected, known nest trees are protected within the PAC, no salvage logging will occur within the PAC, and habitat characteristics (snags and downed woody debris) will remain across the project area following the implementation.

556. Comment: Thus, we have presented information that suggests that a significant number of owl sites are affected, and that both the quality and quantity of habitat is affected.

5438

Response: Environmental consequences for spotted owl are evaluated in the EIS Chapter 3, Wildlife Chapter 3.15, and in the Final Terrestrial Biological Evaluation and Wildlife Report. Based on proposed project activities, six indicators were chosen to provide a relative measure of potential environmental consequences to each owl site and the project as a whole.

557. Comment: All PACs/HRCAs should be surveyed for at least 2 years post-fire. . . . The only way to determine whether those severely burned areas are unsuitable or whether PACs should be retired or re-drawn is to survey the sites for at least 2 years and to radio-track the spotted owls in the area to determine habitat use. . . It is only after at least 2 years of post-fire protocol-level surveys that nonoccupancy can be inferred (Lee et al. 2012). The simulation results in Lee et al. (2012) showed that the number of sites surveyed affected the estimability, bias, and power to detect an effect of fire on occupancy. If, for example, the Forest Service conducted 5 surveys on 50 sites (a close approximation of the 6-survey protocol for the 46 Rim Fire sites), estimates of initial occupancy would be biased low and estimates of local colonization and extinction rates would be biased high compared with surveying 100 sites (see Figure 6 on page 799 of Lee et al. 2012). Detectability from Forest Service surveys was just 0.55 (compared with 0.698 at demographystudy sites). . . I suggest conducting at least 2 years of surveys in all of the Rim Fire's burned PACs to properly determine occupancy status, before salvage-logging projects are designed.

5336

Response: Surveys for California spotted owl have been and will continue to be conducted to Regional protocols. Survey coverage has been extensive and includes known protected activity centers (PACs) and areas outside of PACs as per protocol. Additionally, our survey coverage has been designed in coordination with species experts at PSW. Where applicable based on survey results, PAC boundaries will be modified and/or PACs re-established per Stanislaus Forest Plan Direction to provide adequate protection of breeding areas. Based on the effectiveness of our survey efforts thus far, we have re-established six PACs within the project area. We will make adjustments to treatment units to protect breeding areas Stanislaus Forest Plan Direction.

PACs that were retired based on our analysis described in the DEIS and in close proximity to treatment units were surveyed using the one year Regional protocol in order to establish occupancy status. As mentioned above, those surveys resulted in the re-establishment of six PACs within the project area. All other PACs are being surveyed using the two year protocol. Adjustments to boundaries based on survey results will follow Stanislaus Forest Plan Direction.

Deer

558. Comment: Deep-tilling of areas associated with the Jawbone Winter Range should be strictly prohibited. In that vicinity, there are huge areas occupied by various forms of Brodiaea, a plant very strongly associated with Native American occupation. Brodiaea have high value to foraging deer during the spring months, prior to migration.

5469

Response: The Forest Service agrees with your observations on the value of species of Brodiaea. However, there is no deep tilling proposed in this project under any of the alternatives.

559. Comment: a) Bear Clover is extremely heavily used by deer in late January and early February, just before new sprouts on other foraging plants start to appear. Conifer type conversion of Bear Clover stands on critical deer winter range should not be considered. b) Where it is deemed desirable to plant conifers within the critical deer range for thermal and escape cover, the increased time expended form planting until harvest, resulting from Bear Clover retention, should be considered an acceptable cost of doing business.

5469 4467

Response: The Forest Service agrees with the commenter's observations on the value of bear clover to mule deer. There is no treatment of bear clover proposed in this project under any of the alternatives. If a restoration/reforestation project is later proposed, the best available science will be used to analyze all effects of any proposed treatments, including the treatment of bear clover

560. Comment: Removing hardwood aggregates would negatively affect wintering deer.

4467

Response: The commenter is correct in stating that removal of hardwood aggregates would negatively affect wintering deer. The DEIS (pp. 396-397) and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report state, "Hardwood aggregations are important in holding areas, areas where deer 'hold up' for a few days to several weeks until conditions such as weather cause them to continue on with their migration (Bertram 1977). Holding areas are often areas with a dominant hardwood component. Deer often put on significant fat reserves in these holding areas essential to help get them through the tough winter months. Hardwood aggregations on the winter range are important because the acorns provide the greatest potential to maintain fat reserves." The documents further state, "The removal of any potential aggregations of hardwoods under this alternative [Alternative 1--hardwood aggregations would be retained under the other alternatives] would have a negative effect on deer. Because it is not known how many aggregations may be affected, the extent of adverse impacts is unknown."

561. Comment: Treatments within the Rim Fire are critical in the Tuolumne Deer Herd winter range and migration corridors. Maintaining migratory corridors for wildlife is an important element that needs to be conserved throughout the Stanislaus National Forest. Although the proposed action will provide benefits through many of the known corridors, not all the migratory corridors are known or included in treatments. Left untreated, the jackstrawed trees can result in a barrier to migratory wildlife and impact the survival and ultimately the remaining populations utilizing the area. Therefore, the Department recommends the Forest Service conduct ongoing monitoring of the wildlife populations to assess if additional site-specific treatments may be needed in the future. Currently the Department has store-on-board global positioning system collars on 50 adult female deer within the Rim Fire area. The data from these collars will be valuable for assessing the use areas, migration corridors, and effects of the completed actions. The Department can provide information to the Forest Service on specific known movement corridors. Follow-up actions to assess and evaluate the proposed action should be considered as many of the provisions proposed are not well documented and could be used in future post-fire decisions.

5420

Response: The Forest Service has and will continue to work with California Department of Fish and Wildlife to assess wildlife habitat needs on National Forest System lands.

562. Comment: ...the statement under Alternative 2, no action, Cumulative effects that “The short-term beneficial impacts to deer such as increased early successional habitat would be outweighed by the long-term negative impacts” is not supported by any scientific data. Deer habitat has been declining for half a century, correlating to loss of habitat from fire suppression, logging and conversion of early successional forest to tree plantations, and the widespread use of herbicides to kill deer foods. This was documented by the CDFG 1998 deer status report and in Loft and Smith (1999).

5449

Response: Analysis and scientific data are presented in the EIS under the species and habitat account in Chapter 3, Wildlife Chapter 3.15. The chapter describes habitat elements critical to deer survival and persistence across a given landscape. Alternative 2 would result in the greatest risk of further habitat loss and this assessment is supported by data and analysis presented in the EIS Chapter 3, Fire and Fuels Chapter 3.05 and Wildlife Chapter 3.15.

563. Comment: The winter range carrying capacities of both the Tuolumne and the Yosemite deer herds have been seriously diminished due to the fire, and there is need to emphasize habitat improvement over both deer herd winter ranges. The potential for added deer losses thru blocked migration routes (from rotting timber falling and becoming jack-strawed over deer trails, which leads to entrapment and heavy depredation) is very real.

5471

Response: One of the Purpose and Needs of the project is to enhance wildlife habitat (EIS Chapter 1.03). The EIS identifies the necessity to treat areas within critical winter deer range for removal of salvage and non-merchantable material "to achieve desired forage and cover ratios and deer migration access to critical winter range" (EIS Chapter 1.03). To meet that need, units were identified within Critical Deer Winter Range and adjacent to Yosemite National Park for salvage and/or biomass removal to achieve desired forage/cover ratios and to provide for deer passage and access. The units and acreage vary by action alternative (EIS Chapter 2.02: Alternatives Considered in Detail). In coordination with CDFW, migration pinch points within the project area were identified. Treatments are proposed within critical winter range for both the Tuolumne and Yosemite deer herds under all action alternatives.

Great Grey Owl (GGO)

564. Comment: Alternative 1 fails to adequately protect or mitigate for negative effects to GGOs caused by salvage logging in nesting habitat within PACs.

4467

Response: The Terrestrial Biological Assessment, Evaluation, and Wildlife Report for the Rim Fire Recovery includes a management requirement for all alternatives as follows: "Do not salvage harvest within PACs unless a biological evaluation determines that the areas proposed for harvests were rendered unsuitable by the Rim Fire for the purpose they were intended". The project was designed to avoid PACs that were not rendered unsuitable. Therefore this management requirement was not needed, and doesn't appear in the DEIS or the EIS. Nesting habitat within great gray owl PACs would not be affected by salvage logging.

565. Comment: Alternative 1 has no provision to protect current or historic nest trees even GGOs even though nest site loss and disturbance is a risk factor affecting abundance and distribution.

4467

Response: The commenter is correct that there is no provision to protect current or historic nest trees. As stated in the EIS (Chapter 3.15) and the Terrestrial Biological Assessment, Evaluation, and Wildlife Report, "Potentially two known historic nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units." The analysis of the direct, indirect, and cumulative effects of each of the alternatives presented in the EIS, including the effects of not protecting current or historic nest trees, was used to make the determination that each of those alternatives may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

566. Comment: Alternative 1 fails to mitigate for the loss of 201 acres of roadside hazard salvage treatments within GGO PACs.

4467

Response: As the commenter points out, there is no provision in Alternative 1 to mitigate treatment overlap of 201 acres by adding equivalent acreage to the affected PACs (EIS Chapter

3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The analysis of the direct, indirect, and cumulative effects of each of the alternatives presented in the EIS, including the effects of not mitigating for the potential loss of 201 acres, was used to make the determination that each of those alternatives may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

567. Comment: Alternative 1 and 4 both fail to mitigate for new permanent road in the Drew Meadow PAC, "placement of the new permanent road in the Drew Meadow PAC would partially go through a surviving group of green trees, potentially lowering capability of suitable roosting and nesting habitat for great gray owl (page 321)." Green trees should not be removed to add more roads in a GGO PAC.

4467

Response: The placement of a new road in the Drew Meadow PAC would partially go through a surviving group of green trees (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The analysis of the direct, indirect, and cumulative effects of each of the alternatives presented in the DEIS, including the effects of potentially lowering capability of suitable roosting and nesting habitat by placing the road in that PAC, was used to make the determination that each of those alternatives may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

568. Comment: Alternative 1 fails to mitigate for the loss of nest trees or net habitat loss and may contribute cumulatively to short and long-term effect on great gray owls. The cumulative impacts of Alternative 4 would be less than Alternative 1.

4467

Response: There is no provision to protect current or historic nest trees or to mitigate potential habitat loss under Alternative 1. All the alternatives contribute to the short and long-term effects on great gray owls (EIS Chapter 3.15: Wildlife/Great Gray Owl: Environmental Consequences; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). These two documents show that the cumulative impacts of Alternative 4 would be less than of Alternative 1. The effects analysis for both alternatives, as well as for Alternatives 2 and 3, was used to determine that each of these alternatives may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

569. Comment: Failure to protect great grey owls, a state listed endangered species…The DEIS fails to adequately analyze great grey owls. The DEIS fails to divulge the fact that Great Gray Owls have been detected in 2014 in the project area, fails to divulge the location of such detections, and fails to disclose the adverse effects of proposed logging in the biological home ranges of these owls. This fails to satisfy NEPA's hard look standard, and also necessitates production of a supplemental DEIS.

5335

Response: The results of the 2014 surveys were not available at the time the draft EIS and Draft Terrestrial Biological Assessment, Evaluation, and Wildlife Report were prepared. The effects on great gray owls were discussed in the DEIS (Chapter 3.15: Wildlife/Great Gray Owl: Environmental Consequences and Great Gray Owl: Summary of Effects) and the Draft Terrestrial Biological Assessment, Evaluation, and Wildlife Report. A supplemental EIS is not warranted because of the following: (a) the scope of the project remains the same; (b) the new information does not result in any dramatic shift in the expected effects of the project and alternatives; (c) the NEPA regulations and process contemplate that new information and/or changed circumstances will arise between the preparation of a draft and final EIS and that such material is legitimately addressed in the EIS and Response to Comments; and (d) if supplementation were required every time there were new information or changed circumstances on the Rim Fire, the EIS would never be completed (and so recovery would not proceed), since there is likely to be new information from and changing conditions in the project area for years to come.

570. Comment: Page 54: For Great Gray Owl, alternative 1 'may affect individuals and is likely to result in a trend toward federal listing or loss of viability'. Conversely, page 321 states "The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species".

4500 5412

Response: There was an error on Page 54 of the DEIS and in the Draft Terrestrial Assessment, Evaluation, and Wildlife Report. The statement on Page 321 of the DEIS is correct: The cumulative contribution under Alternative 1 may affect individual territories but is not expected to affect the viability of the great gray owl. The EIS and the Final Terrestrial Assessment, Evaluation, and Wildlife Report show the correct determination.

Northern Goshawk (NOGO)

571. Comment: Alternative 1 may contribute cumulatively to short and long-term effects on northern goshawk, while a modified Alternative 4 would not incrementally add to other actions and affect the viability of northern goshawk.

4467

Response: The commenter is correct that Alternative 1 would contribute cumulatively to the effects on northern goshawk (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). All alternatives, including Alternative 4, would also contribute cumulatively to the effects to varying degrees (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report), although the contribution from the other alternatives would be less than from Alternative 1. The analysis of the direct, indirect, and cumulative effects of each of the alternatives presented in the EIS was used to formulate the determination that each of those alternatives (including Alternative 1) may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

572. Comment: Alternative 1 fails to adequately protect or mitigate for negative effects to goshawk caused by salvage logging to nesting habitat within PACs.

4467

Response: As the commenter points out, there is no provision in Alternative 1 to mitigate treatment overlap of 653 acres by adding equivalent acreage to the affected PACs (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The analysis of the direct, indirect, and cumulative effects of each of the alternatives presented in the DEISEIS, including the effects of not mitigating for the potential loss of 653 acres under Alternative 1, was used to make the determination that each of those alternatives may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

573. Comment: Alternative 1 fails to mitigate for 653 acres of roadside hazard salvage treatments within goshawk PACs.

4467

Response: As the commenter points out, there is no provision in Alternative 1 to mitigate treatment overlap of 653 acres by adding equivalent acreage to the affected PACs (EIS Chapter 3.15; Terrestrial Biological Assessment, Evaluation, and Wildlife Report). The analysis of the direct, indirect, and cumulative effects of each of the alternatives presented in the EIS, including the effects of not mitigating for the potential loss of 653 acres under Alternative 1, was used to make the determination that each of those alternatives may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

574. Comment: Alternative 4 will better protect the viability of the goshawk as it has 16,975 acres of salvage units that would be managed for old forest condition with high levels of large conifer snags and large down woody material. Another 2,089 acres would have low intensity salvage treatment as part of the PSW research project, and 2,571 acres would be dropped from salvage treatment.

4467

Response: The determinations for all alternatives as to the effects were the same: the alternatives may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk. The Responsible Official is considering all alternatives, including Alternative 4, and their impacts equally. She will consider the Purpose and Need of the project, the most recent information, including the Forest Plan (USDA 2010a), resource reports, and input from interested parties in making her decision. She may decide to: (a) select the proposed action; (b) select one of the alternatives; (c) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (d) select the no action alternative, choosing not to authorize the Rim Fire Recovery project (EIS).

575. **Comment**: Failure to protect goshawks and goshawk PACs despite known presence of goshawks in or near retired goshawk PACs…The DEIS Fails to Adequately Analyze Goshawks. The DEIS fails to divulge the fact that Goshawks have been detected in 2014 in the project area, fails to divulge the location of such detections, and fails to disclose the adverse effects of proposed logging in the biological home ranges of these goshawks. This fails to satisfy NEPA's hard look standard, and also necessitates production of a supplemental DEIS.

5335

Response: The results of the 2014 surveys were not available at the time the draft EIS and Draft Terrestrial Biological Assessment, Evaluation, and Wildlife Report were prepared. Surveys are currently being conducted according to Region 5 protocols and, where applicable, PAC boundaries will be modified and/or PACs re-established per STF Forest Plan Direction. The effects on goshawks were discussed in the DEIS (Chapter 3.15: Wildlife/Northern Goshawk: Environmental Consequences and Northern Goshawk: Summary of Effects) and the Draft Terrestrial Biological Assessment, Evaluation, and Wildlife Report. A supplemental EIS is not warranted because of the following: (a) the scope of the project remains the same; (b) the new information does not result in any dramatic shift in the expected effects of the project and alternatives; (c) the NEPA regulations and process contemplate that new information and/or changed circumstances will arise between the preparation of a draft and final EIS and that such material is legitimately addressed in the EIS and Response to Comments; and (d) if supplementation were required every time there was new information or changed circumstances on the Rim Fire, the EIS would never be completed (and so recovery would not proceed), since there is likely to be new information from and changing conditions in the project area for years to come.

576. **Comment**: Page 54: For Northern Goshawk, alternative 1 'may affect individuals and is likely to result in a trend toward federal listing or loss of viability' in regards to Northern goshawk. Conversely, page 321 states "The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species".

4500 5412

Response: The statement on Page 321 of the DEIS is correct: The cumulative contribution under Alternative 1 may affect individual territories but is not expected to affect the viability of the northern goshawk. The EIS and the Final Terrestrial Assessment, Evaluation, and Wildlife Report show the correct determination.

577. **Comment**: Indeed, for example, you acknowledge that regarding northern goshawks the proposed action "may affect individuals and is likely to result in a trend toward federal listing or loss of viability." Similarly, for California spotted owl the proposed action "may affect individuals and is likely to result in a trend toward federal listing or loss of viability."

5279

Response: There was an error in the DEIS and in the Draft Terrestrial Assessment, Evaluation, and Wildlife Report. The analysis of the direct, indirect, and cumulative effects of Alternative 1 was used to make the determination that the alternative may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk and the California spotted owl. The EIS and the Final Terrestrial Assessment, Evaluation, and Wildlife Report show the correct determination.

578. Comment: Northern Goshawks have been documented using burned areas during larger-scale bird surveys in burned and unburned forests. . . Kennedy and Fontaine (2009) summarized results from fire and fire surrogate studies in ponderosa pine forests of the southern Rocky Mountain and plateau and sky-island regions of Arizona and New Mexico, and reported that Northern Goshawks responded positively to high-intensity fires 4–9 years postfire, and did not respond to the conditions created by moderate or low-intensity fire. The authors surmised that the fire-created large-diameter snags that could be used by goshawks for nesting, and that several species of woodpecker eaten by goshawks increase in high-intensity fire. It was not known why goshawks did not increase in low- and moderate-intensity burned sites because other important prey species increased in these burns . . . While the fire may have reduced nesting habitat, it also may have increased foraging habitat.

5336

Response: We agree with the commenter that the Rim Fire did result in reducing the availability of nesting habitat as well as creating potential foraging habitat. For example, many prey species utilized by goshawks are present in post-fire environments (Wildlife BE, page 71). All potential project effects are discussed in detail in the EIS Chapter 3, Wildlife Section 3.15. Potential project effects include the removal of snags during salvage harvest and hazard tree removal. Under all action alternatives, snags would be retained across treatment areas. Additionally, areas that burned at high severity would be retained and would provide potential foraging habitat as vegetation begins to recover in the understory.

Pollinators

579. Comment: The DEIS failed to analyze the impacts on pollinators, including the sensitive species Western bumble bee (Bombus occidentalis).

5449

Response: Of the 94 collection records for the western bumble bee on Pacific Southwest National Forests: the Angeles (one record), Eldorado (2), Klamath (15), Lake Tahoe Basin Management Unit (7), Lassen (8), Modoc (3), Plumas (21), Sequoia (1), Shasta-Trinity (25), Six Rivers (5) and Tahoe (6) national forests, only three are from National Forest System lands since 2000: two on the Plumas, and one on the Lake Tahoe Basin Management Unit (Hatfield 2012). This species was evaluated in 2012 to be included on the Region 5, Regional Foresters Sensitive Species list. Because there are no records of this species on the Stanislaus National Forest, it was not proposed to be added to this forests sensitive species list. For this reason, it wasn't included in the Draft Terrestrial Biological Assessment, Evaluation, and Wildlife Report. The commenter states, "There is a record [of the western bumblebee] at Lake Eleanor on the border with the Rim Fire (Thorp et al 1983, Scott Hoffman Black pers. comm.)." The commenter further states that, in personal communication with Thorp (the lead author on the article cited) and Black, "Although the Eleanor Lake record in Tuolumne County is the only published record for the Stanislaus NF, experts agree that there are few records because bumble bees were not historically well documented (Thorp and Black, personal communication)." The presence of the species within the analysis area for the Rim Fire Recovery has not been documented to date, but the project area is within the historic range of the western bumblebee.

The historic range of the western bumblebee included northern California, Oregon, Washington, Alaska, Idaho, Montana, western Nebraska, western North Dakota, western South Dakota, Wyoming, Utah, Colorado, northern Arizona, and New Mexico. Also included in its historic range were the Canadian provinces of Alberta, British Columbia, Saskatchewan, and the Yukon Territory (Evans et al. 2008). Evans et al. state, "Since 1998, B. occidentalis has declined most dramatically from western and central California, western Oregon, western Washington, and British Columbia. Although absent from much of its former range, B. occidentalis is still found in isolated areas, primarily in the Rocky Mountains" (Ibid., pp. 19-20).

B. occidentalis require habitats with rich supplies of floral resources that bloom continuously from spring to autumn (Evans et al. 2008). As generalist foragers, they do not depend on any one flower type (Xeres Society 2014). Western bumble bees have been observed taking nectar from a wide variety of flowering plants (Evans et al. 2008). Bumble bees often forage in open, disturbed habitats (Schweitzer et al. 2012).

Solitary queens start colony initiation in the early spring. When the queen emerges from hibernation she selects a nest site, which is often a pre-existing hole (for example, an abandoned rodent hole) (Thorp 1983; Andrews 2010), usually 6 to 18" underground. This is followed by production of workers, and then by production of queens and males (Evans et al. 2008). If nectar and pollen resources are adequate, the colony will produce males and new queens from about June to October, depending on the species, latitude and elevation (Schweitzer et al. 2012). The new queens dig holes in which they will hibernate through the winter. Suitable sites for overwintering include mulch, rotting logs, or loose soil (Ibid.) The rest of the colony, including the old queen, workers, and males, die out (Andrews 2010; Schweitzer et al. 2012).

Most species of bumblebee probably travel no more than 600-1,700 m (1/3 – 1 mi) from their colonies to forage (DeVore 2009, Osborne 1999, Wolf and Moritz 2008). It is presumed that shorter foraging trips are both safer and more energy-efficient (Schweitzer et al. 2012). The emerging consensus is that bumble bees need nesting and foraging habitat in relatively close proximity without dispersal barriers between them (Ibid.).

There are several threats which face bumblebees and are leading to their decline: commercial bumblebee rearing, habitat alteration, insecticides, invasive plants and insects, and global climate change (Evans et al. 2008; Andrews 2010). The only effect the proposed activities could have on the bumblebee would be in terms of habitat alteration. Bumble bees are threatened by many kinds of habitat alterations that may fragment or reduce the availability of flowers that produce the nectar and pollen they require, and decrease the number of abandoned rodent burrows that provide nest and hibernation sites for queens (Andrews 2010). The proposed activities would not affect the food supply or the number of abandoned rodent burrows.

Conservation and Management of North American Bumble Bees (Schweitzer et al. 2012) gives management recommendations which focus on "providing suitable nesting and foraging habitat in close proximity during the annual period of bumble bee activity" (p. 3). The following are applicable based on the proposed project activities:

- Provide habitat for nesting and overwintering sites.
- Leave unplowed, undisturbed areas with logs and clumps of grass where bumble bees can find nesting and overwintering sites.
- Assure continuity of nectar and pollen resources when bumble bees are active from spring to late summer.
- Increase abundance and diversity of wild flowers, suitable garden flowers, crops, and even weeds to improve bee density and diversity.

Less than 30 percent of the acreage in the Rim Fire area would receive treatment under any of the alternatives. Although not documented to occur on the STF, there would still be habitat for nesting and overwintering sites such as logs and clumps of grass. None of the activities would affect the continuity of nectar resources and the quantity and diversity of pollen sources within the treatment units. Further, there is no broadcast burning proposed under any of the alternatives, so nest and overwintering sites would not be affected.

To summarize, there would be no direct or indirect effects on the western bumblebee. Therefore, there would be no cumulative effects on the species.

580. **Comment**: ...interruption of successful seed germination now, as a result of salvage logging activities, will impact future generations of forest development long into the future.

5449

Response: Under all action alternatives, less than 30 percent of the Rim Fire area would be treated, providing for undisturbed seed germination throughout the project area.

581. **Comment**: It is the responsibility of the FS to respond to the best available and latest science, to limit impacts during these crucial first few years so that pollinator mutualisms can proceed in a naturally evolving forest ecosystem. This will ensure abundant seed is allowed to return to the forest floor as nature has designed.

5449

Response: Under all action alternatives, less than 30 percent of the Rim Fire area would be treated, providing habitat to pollinators that occur in the project area and allowing for the pollinator mutualism the commenter referenced.

Other

582. **Comment**: On page 479 there is a typographical error, I think. A date reads March 31, 2105 where I think it should read March 31, 2015.

4460

Response: The date was corrected in the EIS.

583. **Comment**: The Rim Fire was a perfect fire. It burned in a way that serves as an example of how our forests have burned for millennia. I am concerned that you and other line officers on the Stanislaus have not been up to the leadership task of educating the public to that fact. The forest just got restored!

1

Response: The Forest Service is conducting active educational programs with local schools, including elementary schools and Columbia College. Teacher training on the role and effects of fire is taking place. There are several volunteer projects, in which the volunteer groups are educated as to the role of fire while they provide a valuable service to the agency and the public. The size, severity, scope and scale of the Rim Fire was outside the scale of natural variation of fires in this ecosystem type. Many areas within the Rim Fire burned in a mosaic pattern of small patches of high severity with larger areas of low to moderate severity, similar to historic fires. Unfortunately, the contiguous patches of dead trees (thousands of acres in size) are not how Forests burn under natural conditions.

584. **Comment**: a) The Forest Service should use this opportunity to educate the public about the critical role fire plays in the Sierras. The service could explain why it is important to protect severely burned forests in order to maintain biodiversity and ecosystem integrity. b) Failure to properly educate the public about burned forests and to accurately describe the Rim Fire area…The Rim Fire Must Be Appropriately Described. It is essential to provide the public and decision-makers with adequate and accurate information about forest fires. The Forest Service, however, continues to present a one-sided view that intense fire is ecologically harmful and something to be outright avoided....The DEIS...does almost nothing to provide the public with an understanding of the ecological benefits of the Rim Fire and instead portrays it only in an unenlightened, negative way so as to justify logging and other actions. This is not scientifically valid, and just as importantly, wrongly deprives the public of an adequate understanding of the situation.

5335 3 4331 4411

Response: The EIS provides discussion concerning both beneficial and adverse effects of the fire on multiple resources in Chapter 3.

585. Comment: a)...the EIS does not actually evaluate the potential noise impacts on Camp Tawonga associated with logging trucks, machinery being used to remove and treat hazard trees (e.g. chain saws), as well as helicopter noise associated with tree removal. All that the EIS currently provides is that the Camp "will experience temporary negative effects from noise." (DEIS, p.172.) . b) The road segments identified in Section C above are all within close proximity of Camp Tawonga. In particular, any activities on those that are within 1 mile of Camp Tawonga will have significant noise impacts on Camp Tawonga. These impacts must be evaluated by reference to decibel level, duration, and timing, and feasible mitigation measures must be evaluated-such as timing of Project activities to avoid the Camp's busy season of May through September.

5414

Response: Close coordination and cooperation between Camp Tawonga, the Forest Service, and salvage contract and other operators led by the Groveland District Ranger during the 2014 Rim Hazard Tree Project implementation will continue to address safety and operational timing issues specific to Camp Tawonga.

It is our goal to conduct operations in the Camp Tawonga area in an expedient manner. The EIS (Chapter 3.08) states: Activities are planned on NFS land adjacent to privately owned Camp Tawonga (Table 3.08-3). The camp will experience temporary negative effects from noise, dust, and increased traffic associated with the cutting and removal of trees. It should take 30 days or less to log and haul the dead timber on tractor units within 1 mile of the camp. In addition, appropriate safety procedures related to traffic management requirements will be included in all Timber Sale contracts.

586. Comment: We encourage the Forest Service to vigorously defend the EIS from all efforts to delay implementation through legal challenges because even the slightest delay will cost the US taxpayers in reduced timber salvage revenue and increased restoration costs.

5109

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action. While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

587. Comment: Suspend livestock grazing for at least several years after fire in burned watersheds, until vegetation recovery has occurred (Beschta et al., 2004; Karr et al. 2004).

5313

Response: Livestock grazing management does not address the Purpose and Need of the project (EIS Chapter 1.03 Purpose and Need). Thus, it is outside the scope of the project.

As explained in the EIS (3.07 Range/Affected Environment), Forest Plan Direction provides standards and guidelines designed to provide for resource conservation and sustainable use of rangelands. The Forest Service, in its annual pre-season meetings with livestock grazing permittees, considers the existing and anticipated conditions of each individual allotment for that season. Adaptive management strategies may be used to adjust the management of a particular allotment at that time. Range monitoring is conducted as needed to ensure that the grazing management strategies meet objectives for desired conditions. The Forest Service recognizes that post-fire administration of grazing allotments will require more frequent travel to and from key areas within the affected allotments.

588. Comment: This area should be left as is and studied. With a fire of this size the information from the research would be enormous. It's the perfect opportunity to learn for future fires.

4505

Response: Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action.

While such information can be used by the decision maker in arriving at a decision, it cannot be used to improve the environmental analysis or documentation.

589. Comment: I know it is not a part of this EIS, but it is my deepest hope that the Forest Service grant the city of Berkeley another lease, so we have a chance to rebuild the Camp. It was my introduction into how important the forest is, and it would be good if future generations of city dwellers got a similar invitation.

4625

Response: The Forest Service appreciates the importance of the forest to residents of urban areas. The Forest Service is working closely with Berkeley Camp on this issue. However, renewal of the permit does not address the Purpose and Need of the project (EIS Chapter 1.03 Purpose and Need). Thus, it is outside the scope of the project.

590. Comment: This Forest Service report bases these figures on errors in the tabulation of acreage in the FACTS database. The FACTS database shows the acreage of all post-fire activities, including where several different activities (e.g., salvage logging, piling/burning of fuels, logging road skid trails, artificial reforestation, etc.) occur on the same acreage. As such, unless multiple actions on the same acreage are eliminated from the analysis, the result is a dramatic overstatement of the overall acreage burned, which results in a dramatic understatement of the proportion of Blackbacked Woodpecker habitat that has been salvage logged. Using the very same criteria used by the Forest Service's document with regard to forest type/structure and fire years, and using the comprehensive Fire and Resource Assessment Program (FRAP) database, which includes the total acreage of all fires on all lands in each year in California (http://www.frap.fire.ca.gov/), only 274,497 acres burned (all severities) on Forest Service lands in the selected forest types/structures from 2005–2012, not 784,432 acres, and only 140,370 acres of moderate/highseverity fire occurred in these years in the selected forest types/structures, not the 428,546 acres reported by the Forest Service document. Thus, because of this basic error, the Forest Service document seriously underestimated the proportion of moderate/high-severity fire areas that are salvage logged, and improperly minimized adverse impacts, and cumulative effects, to Blackbacked Woodpeckers.

5336

Response: The analysis the commenter if referencing was updated by the Regional Office in April 2014 and is hereby incorporated by reference and available in the project record. This data is also presented in the EIS Chapter 3, Wildlife Section 3.15, Black-backed woodpecker and the Wildlife BE.

The commenter is correct in stating the FACTS database shows the acreage of all post-fire activities, including where several different activities occur on the same acreage. Following is a description of how the Regional Office analyses avoided double counting acres while using the FACTS database.

The amount of burned habitat removed or altered due to post-fire timber management activities (referred to as "treated") is as follows: The FACTS GIS data layers include information on any tree/snag removal treatments that have occurred on Forest Service lands related to fire salvage or hazard tree removal. We overlaid the FACTS layers for completed projects with the burned area layers to determine areas that burned and were subsequently treated, in order to calculate the area with post-fire tree removal. We included any FACTS treatment types in which standing trees were removed (e.g. salvage timber removal, hazardous tree removal, etc.) but do not double-count any repeat treatments to the same area.

The current analysis differs from the previous analysis as follows:

- The current analysis uses Basal Area Mortality greater than or equal to fifty percent.
- Underlying vegetation data used in the current analysis was the CalFIRE Fire and Resource Assessment Program (FRAP) data set, updated in 2006. This data is presented at 30 meter pixel size.

- The current analysis presents data covering 2006-2013.
- Results presented below reflect the modified approach taken by the Regional Office in the updated 2014 Regional Analysis for Black-backed Woodpeckers in California Using Burned Forested Habitat.

The table below displays the amount of burned suitable Black-backed Woodpecker habitat that has been subsequently treated (tree removal) or untreated (no tree removal) within the range of the Black-backed Woodpecker in California from fires occurring in 2006-2013 where the fire severity resulted in 50 percent or greater basal area loss. Treated acres from the 2013 fires are estimated based on proposed salvage work occurring in 2014 on 16,154 acres in suitable Black-backed Woodpecker habitat. Data are broken down by landowner (Forest Service, National Park Service, and Other) or summed for "all" lands. See text for methods and assumptions.

Ownership	Treated[a]	Untreated	Total	Percent Treated
NFS lands	37,727	143,096	180,823	21
NPS[b]	0	25,665	25,665	0
Other[c]	36,763	0	36,763	100
All lands[d]	74,490	168,761	243,251	31

[a] Treated values include 16,154 acres that burned in 2013 and are proposed for treatment in 2014.
[b] For NPS lands we assumed no burned acres were treated. Only fires that burned on both NFS and NPS lands are included (see text) so we likely underestimate untreated acres.
[c] For Other lands we assumed that all of the burned acres were treated.
[d] For All lands we summed values for NFS, NPS, and Other lands.

The commenter presents acres of burned habitat on Forest Service lands between 2005-2012, while the updated analysis conducted by the Regional Office presents acres of burned habitat on Forest Service lands between 2006-2013. Thus the acreages would not be expected to match between the two analyses. The updated Forest Service analysis described herein does not: underestimate the proportion of moderate/high severity fire areas that are salvage logged, improperly minimize adverse impacts, or cumulative effects to black-backed woodpeckers.

Table F.01-1 List of Respondents: Unique and Master Forms

ID	Type	Timely	Last	First	Organization
1	Unique	Yes	Hutto	R	
2	Unique	Yes	Artley	Dick	
3	!master CBD form	Yes	Mick	Rick	
107	Unique	Yes	Carter	Linda	
3000	Unique	Yes	Trumbull	Perry	
3218	Unique	Yes	Cohen	Jonathan	
3570	Unique	Yes	Grisso	Glenn	
3623	Unique	Yes	Brink	Steve	
3863	Unique	Yes	Berger	Alexander	
3875	!master CHG form	Yes	Salvan	Alberto	
3925	Unique	Yes	Eakle	Pete	
3928	Unique	Yes	Sozzi	Ashley	
3946	Unique	Yes	DeGrazio	John	
4128	Unique	Yes	Carpenter	V.	
4129	Unique	Yes	n/a	n/a	
4133	Unique	Yes	Harrison	Christa	
4138	Unique	Yes	Bryce	Bradford	
4140	!master EII form	Yes	Riddle	Carolyn	
4141	Unique	Yes	savary	carol	
4208	Unique	Yes	Tek	Leon Aqua	
4210	Unique	Yes	Snyder	Todd	
4216	Unique	Yes	n/a	n/a	
4237	Unique	Yes	stevenson	nan	
4239	!master CSC form	Yes	Mealy	Cynthia	
4251	Unique	Yes	Garrett	Tudy	
4254	Unique	Yes	Payne	Ed	
4255	Unique	Yes	Wallerstein	Beatrice	
4281	Unique	Yes	Sigourney	Edward	
4297	Unique	Yes	King	Cynthia	
4318	Unique	Yes	Perez	Idalia	
4351	Unique	Yes	Parker	Robert	
4397	Unique	Yes	Bramlett	Katie	
4400	!master UNK form	Yes	Brenard	Michelle	
4410	Unique	Yes	Collins	Bill	
4414	Unique	Yes	Frates	Alison	
4429	Unique	Yes	Sowers	Janet	
4431	Unique	Yes	Walsh	S	
4441	Unique	Yes	Sanders	Tracy	
4444	!master BTC form	Yes	Richard	Sheng	
4458	Unique	Yes	Tune	Mary	
4460	Unique	Yes	Aldrich	Andy	
4467	Unique	Yes	Buckley	John	CSERC
4469	Unique	Yes	Herrick	Jocelynn	
4479	Unique	Yes	Putney	Jessica	
4481	Unique	Yes	Olson	Jerry	
4498	Unique	Yes	Rosenfield	Jonathan	
4500	Unique	Yes	Neubacher	Don	YNP
4505	Unique	Yes	Scott	Joseph	
4513	Unique	Yes	jackson	jarrett	

ID	Type	Timely	Last	First	Organization
4514	Unique	Yes	Merrilees	Craig	
4516	Unique	Yes	Mullenholz	John	
4521	Unique	Yes	Bojones	Jim	
4524	Unique	Yes	Schriebman	Judy	
4539	Unique	Yes	Hutchins	Tim	
4562	Unique	Yes	Doolittle	Sally	
4576	Unique	Yes			
4588	Unique	Yes	Cardoso	Kim	
4625	Unique	Yes	Smith	Jay	
4630	Unique	Yes	Bornholtz	Karin	
4640	Unique	Yes	Schoenberger	Richard	
4652	Unique	Yes	Frizzell	Julianne	
4703	Unique	Yes	Weber	Gregg	
4739	Unique	Yes	Wulff	Deanna Lynn	
4741	Unique	Yes	Joinville	Joan	
4797	Unique	Yes	Robinson	Susan	
4803	Unique	Yes	Barker	Bradley	Sierra Club
4825	Unique	Yes	Kubose	Adrienne	
4834	Unique	Yes	Gaguine	Alexander	
4855	Unique	Yes	Trott	Chris	CTB
4870	Unique	Yes	Jenefsky	Cyd	
4893	!master CFB form	Yes	bradley	hebe	
4937	Unique	Yes	Wolff	Jade	
4952	Unique	Yes	Lorelli	Jeffrey	
4978	Unique	Yes	Nelson	David	
5070	Unique	Yes	Partin	Tom	AFRC
5075	Unique	Yes	Neal	Peter	
5099	Unique	Yes	macniven	margaret	
5100	Unique	Yes	Moore	Chris	OARS
5104	!master STW form	Yes	Reynolds	Duane	
5176	Unique	Yes	Ferris	Scott	Berkeley
5186	Unique	Yes	Hunt	Larry	
5201	Unique	Yes	Lukas	David	
5212	Unique	Yes	Black	Lindsay	
5217	Unique	Yes	Neubacher	Don	YNP
5278	Unique	Yes	Elton	Wally	
5285	Unique	Yes	Maybury	John	
5298	Unique	Yes	Little	Charles	
5300	Unique	Yes	greene	c	
5313	Unique	Yes	Hanson	Chad	EII
5322	Unique	Yes	Eddy	Deborah	
5323	Unique	Yes	PETROSKY	Mary	
5324	Unique	Yes	Halsey	Richard	CCI
5335	Unique	Yes	Augustine	Justin	
5336	Unique	Yes	BOND	MONICA	
5337	Unique	Yes	Augustine	Justin	
5338	Unique	Yes	Augustine	Justin	
5339	Unique	Yes	Augustine	Justin	
5340	Unique	Yes	Augustine	Justin	
5341	Unique	Yes	Augustine	Justin	
5342	Unique	Yes	Augustine	Justin	

ID	Type	Timely	Last	First	Organization
5343	Unique	Yes	Augustine	Justin	
5344	Unique	Yes	Augustine	Justin	
5346	Unique	Yes	Augustine	Justin	
5347	Unique	Yes	Augustine	Justin	
5348	Unique	Yes	Augustine	Justin	
5349	Unique	Yes	Augustine	Justin	
5350	Unique	Yes	Lara	Julie	
5351	Unique	Yes	Augustine	Justin	
5352	Unique	Yes	Augustine	Justin	
5353	Unique	Yes	Augustine	Justin	
5357	Unique	Yes	Maxim	Logan	
5358	Unique	Yes	Koepele	Patrick	TRT
5360	Unique	Yes	Carabas	Robert	
5363	Unique	Yes	Wolff	Ralph	
5373	Unique	Yes	Hackamack	Bob	
5375	Unique	Yes	Eidt	Jack	WHP
5377	Unique	Yes	Augustine	Justin	
5378	Unique	Yes	Augustine	Justin	
5379	Unique	Yes	Simsiman	Theresa L.	AW
5384	Unique	Yes	Augustine	Justin	
5397	Unique	Yes	Casanova	Glen	
5401	Unique	Yes	Kanter	Julie	
5405	Unique	Yes	Amador	Don	BRC
5407	Unique	Yes	Jensen	Jerry	
5409	Unique	Yes	Fleming	Melinda	TuCARE
5412	Unique	Yes	Sanderson Port	Patricia	USDI
5414	Unique	Yes	Harris	Arielle	
5419	Unique	Yes	Stewart	William	
5420	Unique	Yes	Single	Jeffrey R.	CFWS
5421	Unique	Yes	Stortroen	Sherry	
5424	Unique	Yes	Waverly	Matt	SPI
5426	Unique	Yes	Gedney	John	CalTrans
5427	Unique	Yes	Pedro	Craig	TC
5428	Unique	Yes	Nickell	Lauren	
5429	Unique	Yes	Ramirez	Tim	SFPUC
5431	Unique	Yes	Kessler	John	
5436	Unique	Yes	Crook	Shaun	
5438	Unique	Yes	Britting	Susan	SFL
5439	Unique	Yes	Zimmerman	Lee	
5444	Unique	Yes	Granat	Amy	CORVA
5445	Unique	Yes	Byles-Daly	Merry	
5447	Unique	Yes	Daly	Maggie	
5448	Unique	Yes	blewett	jeff	CA4WDC
5449	Unique	Yes	Parker	Vivian	CNPS
5453	Unique late	Yes	Hirsch	Robb	
5461	Unique	Yes	Pickett	Dave	AMA
5464	Unique	Yes	Goforth	Kathleen	US EPA
5469	Unique	Yes	Phelan	James	TCS
5470	Unique	Yes	GAISER	DICK	TCFB
5471	Unique	Yes	Maddox	James	
5478	Unique	Yes	Fouts	Jerry	AMA

ID	Type	Timely	Last	First	Organization
5479	Unique	Yes	Keye	WILLIAM	CFK
5481	Unique	Yes	Claunch	ALAN	
5517	Unique late	No	WILSON	KAREN	
5518	Unique late	No	Day	Kevin	TMWTC

AFRC	American Forest Resource Council
AMA	American Motorcycle Association
BRC	Blue Ribbon Coalition
BTC	Berkeley-Tuolumne Camp
CA4WDC	California Association of 4 Wheel Drive Clubs
CalTrans	California Department of Transportation
CBD	Center for Biological Diversity
CCI	California Chaparral Institute
CEQ	Council on Environmental Quality
CFB	California Farm Bureau
CFK	CA Forest Keepers
CFWS	California Fish and Wildlife Service
CHG	Change.org
CNPS	California Native Plant Society
CORVA	California Off Road Vehicle Association
CSC	CSERC
CSERC	Central Sierra Environmental Resource Center
CTB	CT Bioenergy
EII	Earth Island Institute
EPA	Environmental Protection Agency
JMP	John Muir Project
MDR	Merced Dirt Riders
SFL	Sierra Forest Legacy
SFPUC	San Francisco Public Utilities Commission
SHPO	State Historic Preservation Officer
SPI	Sierra Pacific Industries
STW	Stewards of the Forest
TC	Tuolumne County
TCFB	Tuolumne County Farm Bureau
TCS	Tuolmne County Sportsmen
TMWTC	Tuolumne Me-Wuk Tribal Council
TRT	Tuolumne River Trust
TuCARE	Tuolumne County Alliance for Resources and Environment
UNK	Unknown
USDI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
WHP	Wild Heritage Planners
YNP	Yosemite National Park