Forest and Watershed Health (FWHP) Toolkit

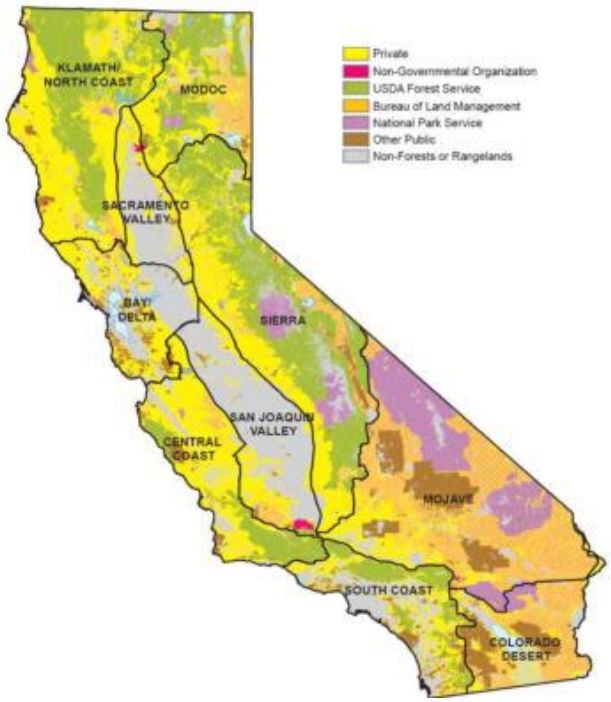
California National Disaster Resilience (NDR) Grant

Contents

Background

The National Disaster Resilience Competition (NDRC) was a national program administered by the U.S. Department of Housing and Urban Development (HUD) that provided Community Development Block Grant National Disaster Resilience (CDBG-NDR) funding totaling $1 billion to communities to rebuild in a more resilient way following major disasters. The grants were awarded competitively and were designed to promote risk assessment, planning, and the implementation of innovative resiliency projects, by addressing climate change issues to better prepare and mitigate the risk to communities from future extreme natural events. The State of California, through the Department of Housing and Community Development (HCD), received a $70 million CDBG-NDR grant to develop a pilot program to address wildfire risks in a rural community landscape. The program components include forest restoration and watershed health improvement, support for local economic development, and increasing individual and community resilience in the rural areas affected by the 2013 Rim Fire.

Through the Governor's Office of Planning and Research (OPR), Governor Jerry Brown selected the area impacted by the Rim Fire as the project area the State would build its application around for several reasons, not the least of which are that 48% of California's land mass is federal forest land and wildfire is a constant threat, and 60% of California's developed water supply comes from the headwaters and watersheds in the Sierra Nevada Mountain Range which is mostly federal forest land.



CAL FIRE's 2010 Ownership of Forest and Rangelands in California
[California Forests - Forest Research and Outreach (ucanr.edu)]

The Rim Fire

In 2013, the Rim Fire burned more than 257,000 acres of the Tuolumne River watershed, devastating the Stanislaus National Forest in Tuolumne County, a portion of Yosemite National Park, and numerous local communities. Covering an area more than five times the size of Washington, D.C., the Rim Fire was the third-largest wildfire in California's recorded history, and the largest wildfire in a predominantly coniferous landscape at that time.

This unprecedented fire event threatened access to clean drinking water for the San Joaquin Valley and San Francisco, resulted in significant impacts to local economies, and degraded air quality from central California to Montana. Since then, the scale and extreme severity of the Rim Fire has been eclipsed by other conflagrations within the State.

Community Watershed and Resilience Program

In 2015, the State of California partnered with Tuolumne County and the United States Forest Service/Stanislaus National Forest (USFS/STF) to submit a NDRC grant application which was ultimately awarded in January of 2016. The application outlined the Community Watershed and Resilience Program (CWRP), a collection of innovative, scalable projects within specific program Pillars, which would holistically address impacts of the Rim Fire, increase wildfire resilience, and serve as replicable models for the Western United States and abroad. The three CWRP Pillars are:

- Forest and Watershed Health
- Biomass Utilization Fund
- Community Resilience Centers

Executive Summary

The Forest and Watershed Health (FWHP) pillar was designed to support healthy, resilient forests through fuels reduction, reforestation, biomass removal and other science-based investments to enhance and restore ecosystem health and services.

In the immediate aftermath of the Rim Fire, erosion control and road stabilization work intended to address short-term fire impacts was completed under the Burn Area Emergency Rehabilitation (BAER) program. The Forest and Watershed Health activities were then designed to build on this work with a focus on long-term goals for recovery and resilience. Historically, limited national forest budgets have made long-term forest stewardship very difficult. Thus, FWHP provided supplemental funds to enable watershed resilience via vegetation management site preparation, reforestation, and rangeland improvements within the fire impacted area.

The goal was to move away from a reactive model of forest management to one that is proactive, forward-looking, and takes an integrated approach to resilience. The pillar

components required an initial up-front investment to jump start forest health efforts and to address remnant fuels (dead brush and trees) that were left after the fire. After the initial investment, the objective of the FWHP was to implement a freestanding community and watershed resilience program for forest health that would be economically viable, scalable, and durable. Natural systems are dynamic; therefore, the approach requires long-term monitoring and adaptive management.

The FWHP encompasses five activities:

- **Fuel Reduction:** Removal of dead trees and brush to provide feedstock for a biomass energy and wood products facilities, where feasible,
- **Reforestation:** Planting resilient and diverse coniferous seedlings while protecting and promoting natural regeneration where it occurred on the landscape,
- **Noxious Weed Abatement**: Treatment of noxious weeds,
- **Fuel Break Expansion:** Developing and reconstructing strategically placed fuel breaks to provide community and forest resource protection,
- **Rangeland Infrastructure:** Reconstruction of rangeland infrastructure destroyed or damaged by the Rim Fire.

These activities were implemented in NDR-designated units throughout 154,530 acres of the Rim Fire burn area on the Stanislaus National Forest.

Purpose of Toolkit

The purpose of this toolkit is to offer insight and lessons learned from the unique relationship established between HCD and the USFS/STF to accomplish the Forest and Watershed Health Program activities.

Section 1: Partnerships

While the USFS/STF led the FWHP work, partnerships have been a critical component of the Pillar's success.

Sierra Nevada Conservancy (SNC)

SNC served as the project manager for the Forest and Watershed Health Pillar. SNC is a state agency experienced in managing complex projects with multiple funding sources and in developing innovative green infrastructure designs. SNC is an active partner and funder in restoration and forest management projects in the Sierra Nevada region and has been a recipient of federal funds in the past thus allowing them to understand the intricacies of the work being done by the USFS/STF while also being familiar with the reporting and compliance requirements of federal funding.

Yosemite Stanislaus Solutions (YSS)

USFS/STF engaged several collaborative groups representing a wide range of values and opinions during their planning and environmental review process. One group, Yosemite Stanislaus Solutions (YSS), includes a variety of local stakeholders, including timber industry, environmental groups, government agencies and others. 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. Rural communities in California can be reticent to State driven proposals and projects. Having YSS, a group made up of trusted community members, engaged in and in support of FWHP was critical to ensuring local public support of the work.

California Conservation Corps (CCC)

The CCC program provides training and education for at-risk young adults between the ages of 18 – 25, including a year of paid service to the State of California. During their year of service, Corpsmembers work on environmental projects and respond to natural and man-made disasters. The CCC served as an implementing partner for the FWHP by completing the majority of the Rangeland work. The Rim Fire resulted in significant impacts to rangeland infrastructure (fences, water troughs, gates, and cattle guards) which plays an important role in livestock management on public lands. An increased potential for livestock concentration in riparian areas was identified, which can result in undesirable impacts to water quality and sensitive ecosystems. The CCC crews worked with USFS to reestablish, repair, and construct ten rangeland fence projects totaling approximately 15.7 miles on the Stanislaus National Forest.

Collaboration for Fuel Breaks Project

Originally, the proposed Pillar consisted of expanding a series of shaded fuel breaks in Tuolumne County on private and federal land (Bureau of Land Management [BLM]- and USFS/STF-administered land). The project was to be a collaborative effort conducted under the oversight of the SNC and HCD. The USFS/STF would implement the fuel break activity and the California Department of Forestry and Fire Protection (CAL FIRE) staff would provide support. While the Wyden Amendment authorizes the Forest Service to enter into cooperative agreements with willing participants for the protection, restoration, and enhancement of fish and wildlife habitat and other resources on non-National Forest Service lands, ultimately, the plan proved too challenging for USFS/STF contracting procedures to perform work on private land, thus, the private land work was moved entirely under CAL FIRE and funded with state budget while USFS/STF maintained responsibility for the BLM fuel breaks under the NDR grant. Still, the collaboration between USFS/STF, HCD, and CAL FIRE allowed the NDR funds to be leveraged with state funds resulting in a scope of work being completed that exceeded the original proposal.

Early Partner Engagement

To fulfil their responsibilities under the National Environmental Policy Act (NEPA), the USFS/STF completed two Environmental Impact Statements (EIS) and numerous decision memoranda related to actions needed for recovery from the Rim Fire of 2013.

The Rim Fire was both a federal and state declared disaster. As a result, the California Natural Resources Agency (CRNA) approved a waiver for the California Environmental Quality Act (CEQA) for activities related to recovery from the Rim Fire. Because the NEPA was so complete and to avoid redundant work, HCD requested approval to use the waiver from the fire emergency, and was granted an approval, as outlined in the Rim Fire Reforestation Final EIS, a portion of which was funded by HCD. HCD also sought to have CEQA waived for rangeland infrastructure projects in the Rim Fire burn area. Justification for the waivers included the fact that emergency conditions persisted nearly four years post Rim Fire thus creating an urgency for the work proposed by the FWHP. In both waivers, HCD and USFS/STF were required to update the California Department of Fish and Wildlife (CDFW) and tribal consultation with the proposed projects.

Early on in FWHP development, and as a condition of the waivers, SNC and the USFS/STF discussed the projects and the proposed use of the CEQA waiver with the (CDFW) and the Central Valley Regional Water Quality Control Board. These agencies raised no objections to the projects or the use or granting of the CEQA waiver provided that best management practices previously agreed upon by USFS/STF were followed. CDFW was then actively engaged in the development of the Rim Fire Reforestation EIS and continued to participate in reforestation projects in the Rim Fire area.

Additionally, tribal outreach was made to discuss the waivers and gain information on any potential concerns Tribes might have over the proposed work. None of the Tribes indicated any concerns or objections.

Section 2: Project Development

An event as large as the Rim Fire provided an opportunity to consider reforestation at a landscape scale, considering the many ecological processes, and functions that are desirable and sustainable for future forested conditions. The FWHP 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 are an important tool to protect this area from another extreme 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 was 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 approach included the reconstruction of rangeland infrastructure, installation of shaded fuel breaks, reduction of hazardous fuels and coarse woody debris, noxious weed abatement, and reforesting the burn scar with shade intolerant species on southern and southwestern slopes and more shade tolerant species on northern slopes.

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.

Section 3: FHWP by the Numbers

The overall objective of the FWHP was to create a fire resilient mixed conifer forest that contributes to an ecologically healthy and resilient landscape, rich in biodiversity in the Rim Fire Burn Area. The program consisted of five project areas all of which were strategically captured in the agreement between USFS/STF and HCD with measurable performance measures.

Reforestation

This activity included planting native conifer seedlings (grown from seed collected on or adjacent to the forest and within specific elevation bands) and any necessary site preparation required to minimize competing vegetation to promote seedling survival. Site preparation included activities designed to reduce fuel loads at planting sites to lessen the impacts of future fire within the plantations, and to reduce competition from existing vegetation to enhance seedling survival. This included fuels reduction through biomass removal, machine piling, and/or hand falling and piling along with burning piles; mastication; or manual herbicide application. USFS/STF also collected cones as needed for ongoing reforestation efforts in the Rim Fire area; and managed contracts in-house work crews, also known as force account labor, for thinning, hand grubbing, control burns and/or chemical release treatments to control competing vegetation and promote tree growth. The targeted acreage for this activity was dependent on costs and ranged from 3,500 to 4,500 acres. The total acres accomplished for reforestation: Fuels Reduction/Site Prep is 7,620 acres including 1,375 acres of biomass removal. Total acres planted was 7,945 including 1,915 acres of interplanting to ensure higher numbers of trees became established after some units had poor success rates. A total of 2,743,894 seedlings (majority Ponderosa Pine, with Sugar Pine, Douglas Fir and Incense Cedar) were planted. In addition, all the natural regeneration that occurred within units was protected and promoted.

Fuels Reduction and Biomass Removal

This work was critical to ensure reforestation sites within the Rim Fire had a minimal amount of fuel prior to planting so that when future fires (either prescribed or natural) come through these areas most of the young trees will survive. Total acreage varied based on final costs but targeted a range of 3,600 to 4,600 acres. The activity included locating areas with excessive fuel loading where dead trees and brush impedes reforestation efforts and created a long-term fuels hazard. To the extent possible, USFS/STF identified areas where biomass removal and reforestation activities would overlap on the same footprint to leverage funding and efforts. This activity also included the cutting, skidding, chipping and/or hauling of the biomass material to local biomass facilities along with piling of non-merchantable material. A few years following the fire, the material was fairly rotten and difficult to cut, skid, and haul for removal due to structural deterioration making biomass removal often cost prohibitive. Still, a total of 20,586 tons of biomass was removed across 1,375 acres, no live trees were removed. Onsite piling and burning was only done when hauling was economically or operationally infeasible. This was primarily in areas that were on relatively gentle slopes with access and sufficient larger dead timber shortly after the fire occurred. A total of 7,620 acres of biomass treatment/fuel reduction work was completed with NDR funds. Along with this fuels reduction, 750 acres of fuel breaks were completed. Most of the fuels reduction work was done through piling of standing and down dead wood and the piles were burned.

Rangeland Infrastructure

Rangeland infrastructure including fences, water troughs, corrals and cattleguards play an important role in livestock management on public lands. Post fire, there was a concern regarding an increased potential for livestock concentration in riparian areas, which could result in undesirable impacts to water quality and sensitive ecosystems. The reconstruction of rangeland improvements was accomplished in collaboration with grazing permittees. In total, nearly 14 miles of fencing was either improved or built new. Other rangeland infrastructure that was installed: 1 corral; 3 cattle guards; 1 water trough with solar pump. In addition, the California Conservation Corps had 44 members participate with the rangeland improvements.

Noxious Weeds Removal

The goal of this FWHP activity was to eradicate noxious weed populations through hand pulling, burning and herbicide treatments. This work aimed to mitigate the potential ecological and economic impact from invasive plant species whose introduction and/or spread was facilitated by the Rim Fire suppression, post-fire activities and the post-fire landscape. The treatment areas fell within Rim Reforestation units and critical deer winter range. Through burning, manual, and chemical treatments 3,042 acres of invasives were treated, with 1,600 acres of those being retreatments. Populations of noxious weeds always need follow up treatments due to seed stored in the soil.

Fuel Break Expansion
The fuel break expansion activity increased the width and treated hazardous fuels and dead trees on existing fuel breaks to reduce the threat of loss to life, property, and resources. The fuel break expansions were within and adjacent to the Rim Fire footprint and designed to protect adjacent communities and from the risk of future wildfires. This expansion activity took place on public lands and private property. USFS/STF was responsible for contracting out all expansion work on public lands (including BLM). CAL FIRE was responsible for contracting out or performing all expansion work on private lands using state funds. 750 acres of Fuel Breaks were completed for this project.

Section 4 : Administrative Tools

The CDBG- NDR grant created an opportunity to fund resiliency work in the forest that would otherwise not have been possible. However, having the USFS, a federal entity, attempt to operate under their own federal processes while also meeting HUD requirements presented unique challenges to the grant.

Federal Regulations
The Federal Acquisition Regulation (FAR) and the Code of Federal Regulations (CFR) are both significant regulations in the context of federal government contracts and grants. The FAR governs the procurement and contract administration processes for all executive agencies of the federal government including the United States Forest Service. 2 CFR 200 is the section of the CFR that dictates uniform administrative requirements, cost principles, procurement, and audit requirements for federal awards. All HUD grantees are required to meet the standards of 2 CFR 200 however, being a federal entity the USFS was already obligated to follow the FAR upon their NDR award from HCD. In addition, HUD requires grantees to comply with certain labor standards including Davis-Bacon and Related Acts, Section 3, and Women and Minority Owned Enterprise (WBE/MBE) which do not apply across all federal entities. As a result, the USFS was not positioned to observe some of the HUD regulatory requirements and, HUD doesn't have authority to impose regulations on other federal entities.

Ultimately the following language was agreed upon for the standard agreement between HCD and USFS, however it did take time to determine a compliant path forward.

USFS will ensure compliance with Section 3 regulations, federal prevailing wage regulations and Federal Acquisition Regulations (FAR) for procurement. As a federal agency, USFS does not need to comply with Women and Minority Owned Enterprise (WBE/MBE) compliance. USFS will provide HCD with executed copies of all contracts awarded for this NDR work.

Additionally, the grant administration requirements were challenging for the USFS since the HUD requirements were new for them, and they have centralized procurement and human resources for staff billing. Putting together invoices for reimbursement requests

that met the HUD requirements for documentation, required the USFS spend many hours pulling data and gathering documents/information from people who do not work anywhere near the Stanislaus National Forest.

It is critical to build time into project timelines when engaging with a federal entity like the USFS. Determining how competing federal agency requirements will be addressed, met, and monitored is time consuming and requires multiple agency level approval by both entities.

Contracting
A lack of flexibility to execute contracts quickly due to federal procurement requirements, and reduced work force in the USFS contracting unit created delays, further impacting timely implementation of the work. As a result, USFS/STF, SNC, and HCD coordinated on the following strategies to avoid delays. The goal was to have contracts submitted 8 to 10 weeks before the proposed start work date (in the past contracting could turn around contracts in 4-6 weeks). Unfortunately, a change in the amount and type of seedlings coming from the nursery and damaged roads required the USFS to shift the acres/units being planted multiple times. Changing acres/units after a contract has been submitted complicated the process for contractors knowing what to bid on which created short delays as well. Still, realizing that contracting with federal funds takes time and factoring that into timelines to the furthest extent possible leads to less delays and more opportunity for flexibility if needed.

Section 5 : Key Takeaways and Lessons Learned

Timelines
Federal grants, while an incredible opportunity to implement much needed projects, often come with administrative requirements that result in longer project timelines. In addition, the design of the NDR program as a competitive grant led to awards being made and projects being implemented long after the qualifying Rim Fire occurred. The impacts of implementing this type of forest work while also meeting federal funding requirements, resulted in a delayed project start. As a result, fewer acres of biomass could be removed due to natural decay. The delay also created significantly more brush growth that had to be shredded/masticated before planting could occur. Thicker brush then ended up being more expensive to machine work acres and relied more heavily upon pile burning to dispose of the additional excess fuels. When considering future federal funding, timelines and budgets should be adjusted to account for such considerations.

Climate Change

Climate change has also made reforestation exponentially harder with planting windows more narrow and harder to predict. Initial implementation saw a record drought resulting in lower-survival rates of seedlings which resulted in the need to replant acres more than initially predicted. The lack of spring rains combined with earlier hot temperatures killed most of the early planted trees. Then the final couple of years saw planting aided by spring storms and atmospheric rivers. In the spring of 2023, the spring weather caused multiple road failures from mudslides to major roads damaged or completely lost. Lack of access to many units planned for planting resulted in later than planned start dates and the need to change planting locations. These limited locations were chosen using what unit acres were available (open roads) that had initial or recent site preparation, either mechanical or chemical within in the last 2-3 years that had not been planted or could be replanted due to poor survival from earlier plantings. NDR funds could not be used to repair roads, thus requiring the USFS to find other dollars to fund the road work or postpone areas that had been treated for fuels reduction and planting site preparation for a future spring.

It must be noted that the FWHP response to the Rim Fire made it the first Mega Fire to go through a focused reforestation at this scale. The Rim Fire created more unknowns and tested older methodologies for reforestation that, while successful in the past, did not work at this larger scale. In the face of unpredictable spring weather patterns, earlier hotter temperatures, and more severe storms future plantings will continue to be challenging.

Fire Severity Mapping

High severity fires do more than just consume most of the fuels, they can turn soils hydrophobic, repelling water. The high severity areas from the Rim Fire also had a lack of nutrients needed for seedlings and killed much of the fungal/mycorrhizal that normally live in the soils aiding in healthy reforestation. Fire severity maps from the fire were compared with survival/stocking percent of what was planted to the areas that burned mild to moderate versus high severity. Although not exact science, the units that needed most of the replanting due to low success/survival rates were mostly in the high severity burn areas. Looking forward, the areas where trees grew well should always be considered while also knowing that these areas burn extremely hot and will be more costly and less effective in successful reforestation. Thus, in the future, it might be wise to choose high severity as the last units in a project. By planting the high fire severity units last it helps allow nature to recover some of the nutrients, organics, carbon, and fungi needed for water and nutrient retention from the early succession plants that come in after fires.

Next Steps : Where Do We Go From Here

What was intended to serve as a model for the Western United States can now, in the face of climate change, provide applicable goals throughout fire prone areas of the United States. While financing may remain a challenge, the successes of the FWHP can be used to support and document the need to invest in forest management, mitigation, and sustainability, and provide an approach to follow.

Long Term Planning

While the length of the NDR grant led to continuity challenges and the regulatory requirements resulted in some delays, the use of block grant funding and the multi-year approach facilitated by FHWP allowed USFS to project out goals for landscape level forest recovery and mitigation, and apply lessons learned in the pilot to future season of work with the guarantee of funding. This type of long-term planning typically isn't feasible within annual budgets but is a critical tool for successful reforestation and mitigation efforts. The successes of FWHP are testament to, when possible, taking a long-term planning approach with committed funding available to address projected needs.

Feasibility, Replicability, and Long-Term Resilience

FWHP was designed as a pilot project to demonstrate a sustainable model for maintaining forest and watershed health and community resilience. By piloting a move from a reactive model to one that is proactive, FWHP offers an example other forest systems can refer to when considering resilience strategies. Reevaluating initial prescriptions and adaptive management are critical and, with the initial investment by NDR, USFS/STF is poised to build on the Pillar's accomplishments and successes. The funds provided through the National Disaster Resilience Competition have also helped develop the capacity, partnerships, and a trained local workforce to undertake this work and have been strategically leveraged to promote future investment and ongoing fuels and forest management with the overarching goals of working toward forests and watersheds that are healthy, sustainable, and adaptable.