Emergency Forest Restoration Teams: Lessons From the First Two Years

UC Cooperative Extension and Feather River Resource Conservation District staff lead landowners on a tour of private lands treated by the Plumas EFRT after the 2021 Dixie Fire, October 2022.

A report to the California Wildfire and Forest Resilience Task Force

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Executive Summary

In response to the increasing scale and severity of wildfire impacts to California forests, the 2021 California Wildfire and Forest Resilience Action Plan recommended the formation of Emergency Forest Restoration Teams (EFRTs) to provide forest restoration assistance to small private landowners, who often lack the funding, expertise, or time to apply for existing cost share programs or to undertake restoration work on their own. Three pilot EFRTs were developed in late 2021 in response to the Dixie, Tamarack and Caldor Fires. Funds from CAL FIRE and the U.S. Forest Service were delivered to local organizations in those fire footprints to develop new assistance programs for landowners affected by those fires. Two Resource Conservation Districts and a County were the local agencies that organized the EFRTs and developed and implemented the new assistance programs. Funds were used to hire contractors to remove dead trees and biomass when possible, process dead wood on site and plant conifer seedlings. The local lead agencies conducted environmental review and monitoring of project implementation. Funded by a grant from the U.S. Forest Service State, Private and Tribal Forestry, Region 5, the University of California Cooperative Extension investigated the challenges and successes of the first two years of those pilots by interviewing professionals involved with the programs. Based on the three case studies, we synthesized lessons learned from the programs to date.

A key facet of the EFRT model is to allow local flexibility in developing an assistance program to fit local ecological and social circumstances. As a result, each developed their programs somewhat differently. The lessons we learned from the three pilots are described below.

EFRTs were successful in delivering post-fire treatments: The EFRT model was effective at expediting forest restoration assistance to landowners. By the end of 2023, the three pilot programs collectively removed dead trees on over 2,500 acres and planted conifer seedlings on approximately 1,400 acres of moderate to severely burned private forest land. The Tamarack EFRT also seeded grasses, forbs, and limited shrubs on over 2,700 acres for arid forest ecosystem restoration.

Timely post-fire forest restoration required rapid funding and support*:* Special disaster relief funding from CAL FIRE and the U.S. Forest Service in 2021/2022 allowed EFRT work to begin much more quickly than competitive grants would have allowed. Timely mobilization of future EFRTs relies on the identification of rapid funding sources and programs that do not require definition of specific lands to be treated before funding is delivered. Additional funds and logistical support for organizations to plan and build capacity before a wildfire occurs would facilitate rapid response.

Prioritizing areas for treatment was crucial: The number of acres of forest land in need of restoration varied across the three EFRTs because of landownership patterns, fire severity and forest type. As the funding was limited and the need was great, each had to establish priorities for treatment. All pilots eventually prioritized treatment closer to affected communities with

smaller and more concentrated parcels. The goal was to reduce fuel loads around rebuilding communities while reestablishing forest stands that will be resilient to future fire.

Clear communication between EFRTs and landowners was essential to success: Residents who lost homes were displaced and so were difficult to reach. Others were unfamiliar with forest restoration practices or overwhelmed by the task of post-fire recovery. Some were confused and wary when approached by multiple agencies doing post-fire work. This required each EFRT to spend significant time communicating with landowners to ensure project success.

Integration with commercial salvage logging reduced woody material to be treated: Removing dead trees as sawlogs or other wood products reduced the amount of wood left onsite to be processed using public funds. One pilot integrated log sales within the EFRT projects, while the other two focused on dealing with non-commercial woody debris. Of these, one encouraged landowners to sell salvage timber and biomass prior to EFRT treatments and connected landowners with forestry professionals. Commercial sales were not feasible for the other because there were extremely limited markets nearby.

Permitting for post-fire restoration was complex; streamlining would increase EFRT efficiency*:* All three pilots used different environmental review pathways to permit their activities. Pilots that did not include commercial sales within projects permitted all treatments using California Environmental Quality Act (CEQA) exemptions. Programs including log or biomass sales permitted treatments under the Forest Practice Rules, but then had to complete an additional CEQA review for planting and herbicide application since these activities are not commercial and not covered by the Forest Practices Act.

The large scale of EFRT work led to some complexity in contracting for tree removal and other site preparation work: Five different contracting pathways were used by the three pilots. All three contracted with multiple operators for work in different geographic areas to increase the pace of work and allow for greater clarity in contract terms.

Collaboration with other agencies was key to successful implementation: Rapid development of a new local assistance program required local organizations to take on work with which they had limited or no experience. EFRT planning and implementation requires a variety of skills that can be found in key partnerships. Collaboration with other agencies can facilitate information sharing and a coordinated, efficient response.

Collaboration with individual cost share programs was inconsistent across the pilot EFRTs: For one EFRT, the Farm Services Agency's Emergency Forest Restoration Program (EFRP) funded thousands of acres of post-fire restoration. The EFRT coordinated treatment approaches and areas with EFRP work to benefit local landowners and increase the scale of treatments. In the other two pilots, the EFRP was not activated, but there was some collaboration with the Natural Resources Conservation Services programs to serve landowners not in the EFRT priority areas.

We hope that these lessons will prove valuable to future Emergency Forest Restoration Teams. This report concludes after two years of EFRT implementation while additional EFRT work continues. Future reports will assess additional components of EFRT implementation including effectiveness of forest restoration treatments and meeting landowner goals.

Introduction

The Purpose and Goals of this Report

This document reports on the successes and challenges of three pilot Emergency Forest Restoration Teams (EFRTs) developed in late 2021. EFRTs are a new collaborative approach to assisting non-industrial private landowners to restore their forests after high severity wildfires in California. The three pilot teams were formed to rapidly address the restoration needs of small landowners affected by the 2021 Dixie, Caldor, and Tamarack Fires.

Formation of EFRTs was recommended in the California Wildfire and Forest Resilience Action Plan (California 2021) developed by the California Wildfire & Forest Resilience Task Force. The Task Force was formed to address the wildfire crisis in the state through comprehensive and collaborative strategies involving federal, state, local, public, private, and tribal organizations. Recommendation 1.14 (page 17) in the plan says that: *CAL FIRE and other state agencies will explore the potential for developing emergency forest restoration teams to assist small landowners impacted by wildfires with funding and expertise to restore their properties and help prevent further damage to life, property and natural resources.*

Collaborating agencies including CAL FIRE, the U.S. Forest Service, the Natural Resources Conservation Service, the California Association of Resource Conservation Districts (CARCD), local Resource Conservation Districts and counties worked together starting in 2021 to develop the three pilot EFRTs discussed here. The goal of this report is to examine the administrative and implementation successes and challenges of these pilot projects and to make recommendations on the structure, process, and funding of EFRTs moving forward.

The University of California Cooperative Extension (UCCE) carried out an assessment of the EFRTs with funding from the U.S. Forest Service State, Private and Tribal Forestry, Region 5 as part of a funded post-fire forest resilience outreach and education program. We conducted interviews with a wide range of professionals involved in implementing the EFRT programs in each fire area (see Acknowledgements). Those interviewed included staff at local, state, and federal agencies, environmental consultants, foresters, and loggers. Based on these interviews, we assembled a case study of each fire. Conclusions and recommendations were developed from generalizing across all three case studies.

This report concludes after two years of implementation for each of the pilot EFRTs, though more work continues to be undertaken by the project implementors. Additional components of EFRT implementation will be assessed in future reports including effectiveness of the teams at achieving forest restoration and fuel reduction objectives, and effectiveness from the point of view of participating landowners.

Increasing Fire Severity in California Forests

California forests have experienced increases in the scale and severity of wildfires in the 21st century. Wildfires are larger, burning at higher severity (Williams et al. 2023) and now regularly

impact both urban areas and rural mountain communities. These fires have resulted in landscapes with patches of dead trees of unprecedented size. For example, the 2021 Dixie Fire burned four patches larger than 10,000 acres each, with the largest over 30,000 acres in size (USDA Forest Service 2022). This is orders of magnitude larger than experienced before fire suppression and climate change, when forests were adapted to frequent, low severity fires. Before Euro-American settlement (in around 1850), patches of dead trees caused by fire were more likely to range from a few acres to 250 acres (Safford and Stephens 2017). Contemporary communities and residents are now faced with novel post-fire problems including large areas of dead trees creating accumulating fuels, type conversion from forest to shrub fields, and burned communities.

Restoration Need in California Forests

California has 32 million acres of forest land. A recent reforestation strategy report (California Wildfire and Forest Resilience Task Force 2024) explored the need for reforestation after wildfires and the challenges to carrying it out at the scale needed. The report included an assessment that identified 1.5 million acres in need of reforestation treatments resulting from the 2019 to 2021 wildfire seasons. Treatments lag because of high cost and the lack of capacity for seed collection, nursery production, site preparation, planting and follow up treatments. The assessment states that, *"without active reforestation efforts, forest loss may be permanent in many locations because the current pace and scale of reforestation in California is not adequate to address this need."*

Reforestation in California is most successful when started quickly after a wildfire (Zhang et al. 2008) because it requires a series of time-consuming steps spread over multiple years (Stewart et al. 2020). These steps include seed collection, ordering and growing nursery stock, removing dead trees from the site and reducing woody debris, preparing the site for planting, and planting new seedlings. After planting, follow up treatments may be needed to release seedlings from competition by other vegetation, especially shrubs which typically regrow vigorously after high severity wildfires. Delayed tree planting often means that new seedlings have competition from other regrowing vegetation and so more resources will be needed to ensure their success.

Restoration Need for Small Private Landowners

While the need for restoration after wildfire is found across ownerships, the needs on private lands are unique for ecological, economic, and social reasons. Non-industrial private forest landowners, who own 22 percent of the forested land in California, frequently lack both the technical expertise to manage their property impacted by wildfire, and the assets or physical capacity to contract or perform the necessary post-fire restoration work. Of the seven million acres owned by small private landowners, 90 percent is in ownerships under 50 acres in size. Of the 75,000 landowners who own at least ten acres of forest land in the state, only seven percent rely on their woods for at least five percent of their income. Their average age is 65 and only 15 percent had received advice or information about care, management, or protection of their

woodland in the past five years. Only eight percent had a written forest management plan. (Butler et al. 2021).

A recent assessment of reforestation needs on private forest land (Pansing et al. 2024) found that 305,263 forested acres burned at high or moderate severity in wildfires between 2019 and 2021, affecting 18,440 parcels. Despite the need, landowner capacity to carry out reforestation treatments is typically low. Factors include economic feasibility due to the poor timber markets after wildfire. The merchantability of burned wood is highly uncertain, variable, and volatile after a large wildfire due to the large supply of dead wood on the landscape. Factors influencing marketability include local access to wood markets, project location and volume, variability in wood product quality and value, and transportation costs. For all these reasons it is rare that landowners can fund all the dead tree removal needed solely through the value of forest products. Landowners often lack the funds to pay for restoration practices out of their own pockets, especially as many have lost fire insurance or are under-insured against the loss of their home. They may also lack the expertise or time (Ingram et al. 2022) to implement post-fire restoration, as well as access to professionals that could assist. There is no requirement under the California Forest Practices Act to reforest private land after wildfire.

Current Programs in Place to Assist Private Forest Landowners after Wildfire

Direction from the California Wildfire & Forest Resilience Task Force in the Action Plan (California 2021) was to develop new Emergency Forest Restoration Teams to complement currently existing assistance programs. Existing programs are spread between local, state, and federal agencies and have various goals including removal of dead trees, watershed stabilization and reforestation after wildfire. All these programs have constraints that can limit their abilities to rapidly respond to landowner needs after wildfire, including limited and inconsistent funding and staffing. Programs available include:

The California Forest Improvement Program (CFIP) is a cost share program administered by CAL FIRE. This program supports forest management on private and public ownerships ranging from 20 to 5,000 acres in size by providing funds to cover from 75 to 90 percent of the cost of forestry activities up to a predetermined cap rate per acre. Common activities funded after fires include removing dead trees, replanting, and follow-up treatments such as controlling vegetation with planted seedlings and thinning. CFIP requires development of a forest management plan prior to the start of funded operations, but a mini management plan is acceptable for emergency post-fire activities.

The Environmental Quality Incentives Program (EQIP) is a cost share program administered by the USDA Natural Resources Conservation Service for working landscapes that can address fire preparation or damage, including fuel reduction, reforestation, erosion control and water quality protection often on parcels one acre or larger, or on smaller parcels with natural resource concerns. Neighbors can collaborate to meet acreage requirements.

The Emergency Forest Restoration Program (EFRP) is a program administered by the USDA Farm Services Agency that provides cost share funding to small private forest landowners for emergency measures carried out to restore land damaged by a natural disaster. Up to 75 percent of the cost to implement emergency conservation practices can be provided to landowners, with a maximum payment of $500,000. Landowners must request assistance during a finite enrollment period, after which funds are allocated for individual landowners in a specific fire.

The cost share programs described above provide valuable assistance to help some landowners restore their forests after some wildfires. However, each requires a landowner to apply individually to competitive funding pools. Agencies must carry out an extensive application, selection and implementation process for each landowner receiving funds. Those selected must identify, oversee, and pay the contractors working on their land. Competition for contractors can be very high after a large wildfire. Landowners must have the capacity to go through this process after a major life altering disaster and must have 10 to 25 percent of the overall cost in hand to pay contractors. Some landowners are not awarded funding. For those that are, the process can take a year or more before work starts.

EFRTs Take a Different Approach

The issues described above were a catalyst for the development of EFRTs. The goal was to develop new rapid, nimble, and adaptive forest restoration programs to be managed by a local lead agency. Funding would be delivered quickly and used to implement an area-wide approach, whereby the local agency would design and implement the treatments, rather than individual landowners. The lead agency would handle all contracting and oversee work. The local agency would enroll landowners and pay for the work, ideally without a requirement for landowner cost-sharing.

A recent analysis of landowners aided by a similar local reforestation assistance program (Waks et al. 2019) found that all the small private forest landowners who experienced the same high severity wildfire on the west slope of the Sierra Nevada in 2014 wanted to reforest their property. However, only a third felt they could have followed through with individual applications to the assistance programs described above. One third would have tried to do some of the work themselves, including piling and burning dead trees and planting over a prolonged period of time. The final third said they did not feel capable of either and would not have done any forest restoration treatments at all without the area wide-assistance program that was offered by a local agency. Although this approach was very helpful to assisting landowners within a burn footprint as a group, it also involved delays in implementation. This was because the local agency had to apply for competitive grant funds to implement the program, which caused significant delays.

The overall goal of the EFRT pilot programs, therefore, was to expedite forest restoration on private forestlands in the Dixie, Caldor and Tamarack burn footprints by delivering funding to local agencies to develop new landowner assistance programs. These new programs would be more rapid because funds would not have to be applied for by the individual landowner or

agency. New programs could also use an area-wide approach to help groups of landowners implement post-fire restoration treatments more quickly and for less cost.

Emergency Forest Restoration Team Implementation

The fire season in 2021 was extensive with large high severity fires occurring across the state. Collaborating agencies decided to pilot the EFRT concept on three 2021 wildfires with their available funds. Rapid funding of the EFRTs was made possible by special disaster relief funds available through the U.S. Forest Service and CAL FIRE in late 2021. The U.S. Forest Service was given the discretion to provide non-competitive funds to the EFRTs through Public Law 117-43 (Extending Government Funding and Delivering Emergency Assistance Act) which was passed in September 2021 and included supplemental disaster funding for California. CAL FIRE provided disaster relief funds in the form of Wildfire Resilience Block Grants. Funders chose the 2021 Dixie Fire which burned almost 1 million acres over a three-county area, the Caldor Fire which burned almost 221,000 acres in El Dorado and Amador Counties, and the Tamarack Fire which burned 68,000 acres in Alpine County and into Nevada. All three pilot EFRTs were established in the Sierra Nevada, where the potential for post-fire forest conversion to shrubs is high without active reforestation (Steel et al. 2022). Additionally, smaller EFRTs were later funded in other parts of the state.

The programs created by the three EFRTs varied by fire size, funding source and existing local capacity. The U.S. Forest Service provided funds to all three EFRTs and CAL FIRE provided funds to two of the three. The first funds to establish the new assistance programs were delivered in Winter 2022, soon after the wildfires were declared out. For the Dixie and the Caldor EFRT, funds were awarded to the local Resource Conservation District (RCD) to coordinate the team. For the Tamarack fire, funds were awarded to Alpine County, which has no RCD.

All three EFRTs had to establish a new program and community outreach strategy, identify, and enroll landowners, develop procedures and processes to prioritize treatments, carry out environmental review and compliance, develop contracts with foresters and loggers to implement the restoration work, monitor progress and pay contractors. Projects using public funding in California must comply with the California Environmental Quality Act (CEQA). When projects include the sale of logs or woodchips, permitting must comply with the California Forest Practices Act, which is functionally equivalent to CEQA. After enrollment, landowners were asked to sign Right of Entry agreements (ROEs) to allow the work to be done on their land.

In each location, the EFRTs interacted with other agencies also working to assist landowners affected by the fires. These included agencies offering the assistance programs described above as well as the California Office of Emergency Services (Cal OES) working with the California Department of Resources Recycling and Recovery (CalRecycle) and local governments to remove household hazardous waste and debris, as well as hazard trees at no cost to the landowner, once the landowner has signed a separate Right of Entry agreement. Tree removal under their Consolidated Debris Removal Program is limited to a defined scope that includes

dead and dying trees within falling distance of transportation routes and other public infrastructure. Additionally, local utility companies act after wildfire to remove dead and dying trees in powerline right of ways. The Cal OES and utility hazard tree programs have a narrow scope that leave dead trees on portions of private parcels.

Each of the locally developed Emergency Forest Restoration Teams developed assistance programs that were targeted to their local area and the post-fire conditions that existed after the specific fire they were funded to address. Each EFRT area also had a different mix of collaborating agencies and professionals, forest industry infrastructure and public and private lands. As a result, implementation processes developed by each EFRT were different in both subtle and important ways. The case studies included here describe characteristics of the three pilot programs including:

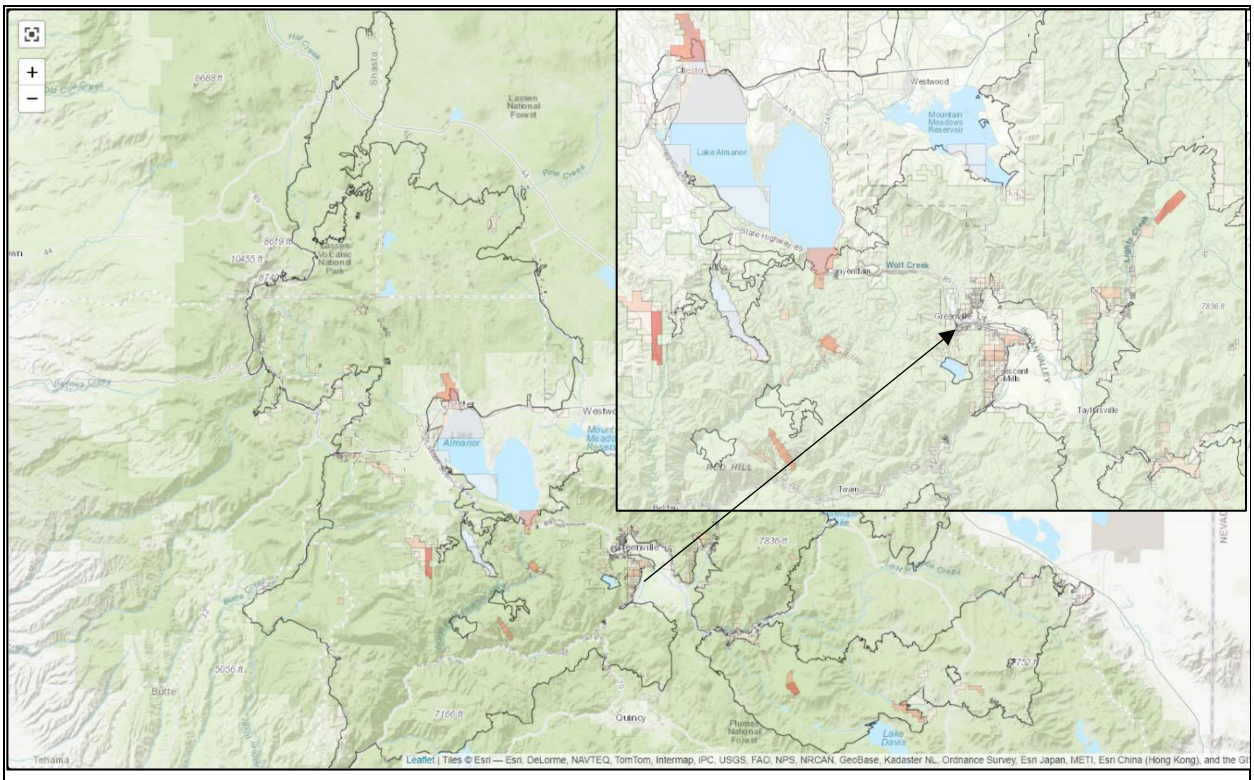
1) EFRT funding sources
2) Types of forest restoration practices funded
3) Prioritization of treatment areas
4) Landowner communication and enrollment
5) Integration with commercial salvage logging
6) Environmental compliance and permitting processes
7) Contracting mechanisms
8) Collaboration with other agencies
9) Integration with other small landowner assistance programs

The specifics for each EFRT are described in the individual case studies presented next. After we present the case studies, we examine how they are similar and different and what lessons can be learned from these three pilot projects to be used in development of future post-fire restoration initiatives.

Plumas Emergency Forest Restoration Team Case Study

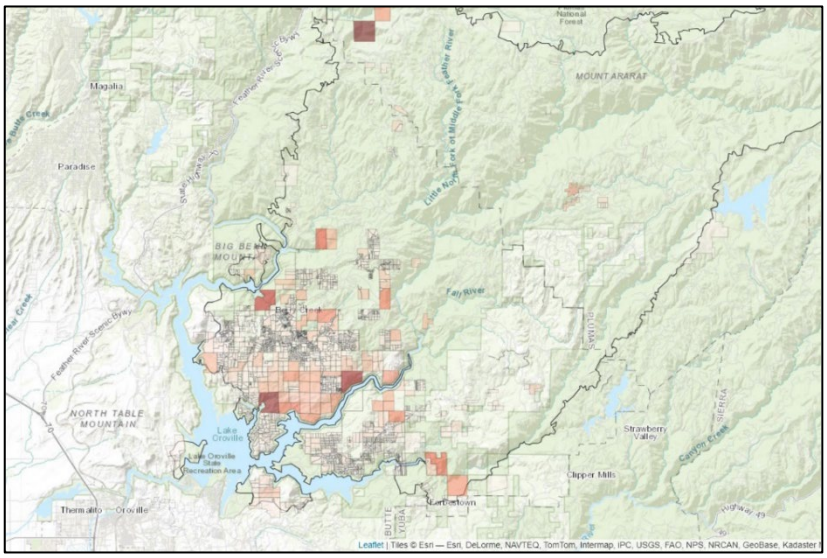
Description of Fire Impacts and Need

The 2020 and 2021 wildfire seasons in Plumas County were very active and included multiple fires that were complex in scope, scale, fire behavior, and impacts. Major fires in these years include the 2020 North Complex fires, the 2021 Beckwourth Complex fires, and the 2021 Dixie Fire. The largest of these, the 2021 Dixie Fire, burned 963,309 acres in three months across Plumas, Butte, Lassen, and Tehama Counties. Of these counties, Plumas County had the greatest loss of forests and communities. Over 31,000 acres of non-industrial private forestland burned in Plumas County. Plumas EFRT managers estimated that 19,730 acres of private land in Plumas County was burned at moderate to high severity[1]. The Dixie Fire alone destroyed a total of 1,311 structures, including nearly the entirety of the communities of Greenville, Indian Falls, and Canyon Dam, and led to a significant forest restoration need, including in the WUI surrounding communities.

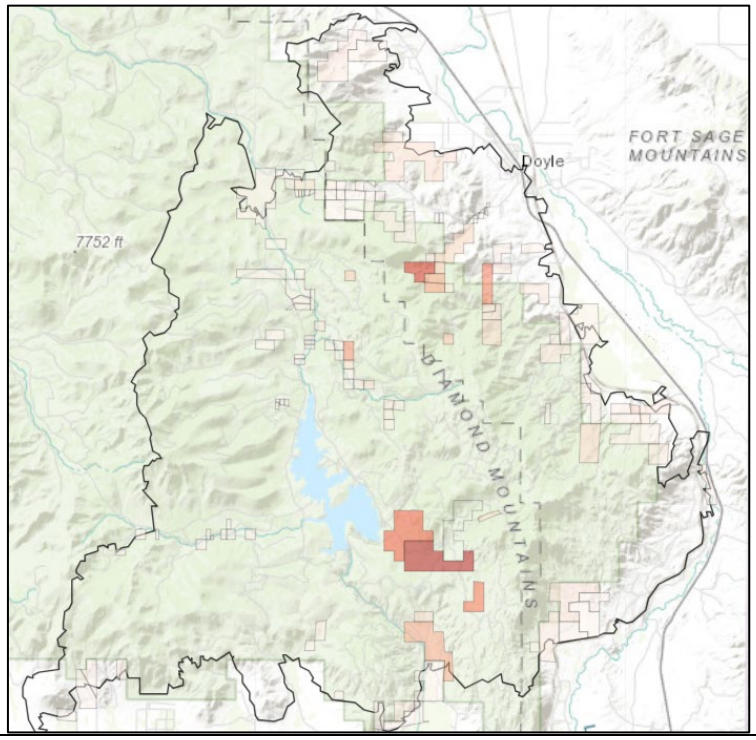


(a) Dixie Fire

[1] Based on U.S. Forest Service Rapid Assessment of Vegetation Condition after Wildfire (RAVG) data



(b) North Complex Fire



(c) Beckwourth Complex Fire

Figure 1. Fire perimeters with parcels with moderate to high severity fire impacts highlighted in shades of orange and brown. (a) Dixie Fire perimeter (left) and a close-up of areas with greatest impact on private forestlands, including the Greenville area (right). (b) North Complex fires, and (c) Beckwourth Complex fires. Parcels with moderate to high severity fire impacts are highlighted in shades of orange and brown. Public lands are shaded green.

Plumas County Ecological Conditions and Fire History

Plumas County straddles the crest of the northern Sierra Nevada from the western slope to the eastside transition to the Great Basin. Most of this area falls within the Feather River watershed, including vast forests which floristically capture the transition of the northern Sierra Nevada to the southern Cascades. These forests are primarily low to mid-elevation, dry mixed conifer ranging in elevation from 2,000 to 7,500 feet and are adapted to frequent low severity fire.

Since 2000, Plumas County has been impacted by large and often severe wildfires, including an increasingly common trend of re-burns. High severity fire effects create post-fire fuel profiles that drive subsequent high severity fire (Coppoletta et al. 2016). Some of the most notable wildfires in the past quarter century and their size in acres are:

- 2000 Storrie: 55,261
- 2007 Antelope Complex: 22,902
- 2007 Moonlight Fire: 64,997
- 2008 Canyon Complex: 47,680
- 2012 Chips: 75,431
- 2018 Camp Fire: 153,336 acres
- 2019 Walker: 54,612
- 2020 North Complex: 318,935
- 2021 Beckwourth Complex: 105,670
- 2021 Dixie: 963,309

Cumulatively, these fires have resulted in concerning rates of forest loss across all ownerships. Between 2017 and 2021, 64 percent of the Plumas National Forest (PNF) burned, with half of the conifer forests impacted burning at high severity. This resulted in over 200,000 acres, 17 percent of the PNF, burning in high severity patches which are not expected to regenerate.

Social Conditions

Approximately 19,130 people live in Plumas County (United States Census Bureau 2023). The population is aging with 32 percent aged 65 years old or older. About 12 percent of residents live in poverty. Ten percent of the population are people of color, three percent of whom are Native American. Ten percent are Hispanic or Latino. As of 2020, the county had a Social Vulnerability Index (SVI) of 0.40 (low to medium vulnerability) (Agency for Toxic Substances and Disease Registry 2022). Demographic data from the Plumas County Census tracts affected by major 2020-2021 wildfires is shown in Table 1.

Fire	SVI	<150% federal poverty level (%)	65 years or older (%)	Minority (%)
2021 Dixie Fire	0.21	9	33	5
	0.56	25	23	21
	0.52	27	32	23
	0.37	16	34	11
	0.30	13	49	13
2021 Beckwourth Complex	0.56	25	23	21
2020 North Complex	0.39	16	16	23
	0.21	9	33	5
	0.52	27	32	23

Table 1. Demographics within the Plumas County Census tracts affected by fires within the scope of the Plumas EFRT (Pansing et al. 2024). The Social Vulnerability Index (SVI) is calculated using multiple measures of socioeconomic status, household

composition and diversity, minority status and language, and housing and transportation, and ranges from 0 (low vulnerability) to 1 (high vulnerability).

Forest Industry

In 2021 and 2022, a total of 558 million board feet of timber were harvested from private and tribal lands collectively in Plumas County, while 54 million board feet were harvested from federal lands (University of Montana 2022). The two largest wood products facilities in Plumas County are the Sierra Pacific Industries Mill in Quincy and the Collins Pine Mill in Chester. These mills have been in operation for decades and have a collective capacity to process over 250 million board feet of timber per year (R. Tompkins, personal communication, December 15, 2023). In late 2021, J&C Enterprises – a local licensed timber operator, opened a wood products campus in Crescent Mills in partnership with the Sierra Institute. This wood products campus, in the heart of the Dixie fire footprint, includes a small sawmill that processes lumber for local use, a storage facility for woodchips used in local energy production, and a firewood facility. The region is also within marginal economic hauling distance of wood processing facilities in California's Central Valley and biomass facilities on the eastern side of the Sierra Nevada. There are twelve registered professional foresters located in Plumas County (CAL FIRE 2024).

Formation of the Plumas EFRT

The Plumas Emergency Forest Restoration Team (EFRT) was formed in fall 2021 to restore private forest lands in Plumas County burned in the 2020 North Complex Fire and the 2021 Dixie and Beckwourth Complex fires (Figure 2). The Feather River Resource Conservation District (RCD) was selected as the lead agency, along with a coalition of partners including the Plumas County Fire Safe Council, the Sierra Institute, the Maidu Summit Consortium, and an advisory panel including Cal Fire, Plumas County, the Natural Resources Conservation Service (NRCS), the U.S. Forest Service, and UC Cooperative Extension.

Scope of Work: The Plumas EFRT proposed to treat 2,558 acres of private land between 2022 and 2025, including managing dead trees for site preparation and fuel reduction, planting seedlings, reducing brush competition, and monitoring treatment effectiveness.

Funding: In winter of 2022, CAL FIRE granted the Plumas EFRT a direct non-competitive Wildfire Resilience Block Grant award of $8.3 million. This funding stipulates that projects must be a minimum of three acres in size. U.S. Forest Service State and Private Forestry granted the EFRT a non-competitive award of $2.5 million in spring of 2022. Both awards were made possible by special disaster relief funding.

In summer 2023, the EFRT was awarded additional funds through competitive grants. The EFRT received a CAL FIRE Forest Health grant of $2.5 million to continue planting and herbicide application, and an $8.5 million Community Wildfire Defense grant from the U.S. Forest Service to fund the continuation of all EFRT activities, with an increased emphasis on fuels reduction on moderate to low severity properties. Additionally, the non-profit organization One Tree Planted provided $245,568 to purchase 306,960 seedlings.

EFRT Partner Roles: The RCD is responsible for overall EFRT coordination, landowner communication, contract management, project management, and CEQA compliance. Three

Registered Professional Foresters (RPFs), under contract with the RCD, planned, permitted, and oversaw tree removal and site preparation projects. The Plumas Fire Safe Council arranged and managed a contract intended to cover the bulk of tree removal and other site preparation work. The RCD took over this contract in late 2023. The Maidu Summit Consortium acted as a tribal liaison providing traditional ecological knowledge and was served by the EFRT on Maidu lands. Sierra Institute assisted with biomass utilization and informal community outreach. UC Cooperative Extension advised and provided technical assistance for implementation and monitoring.

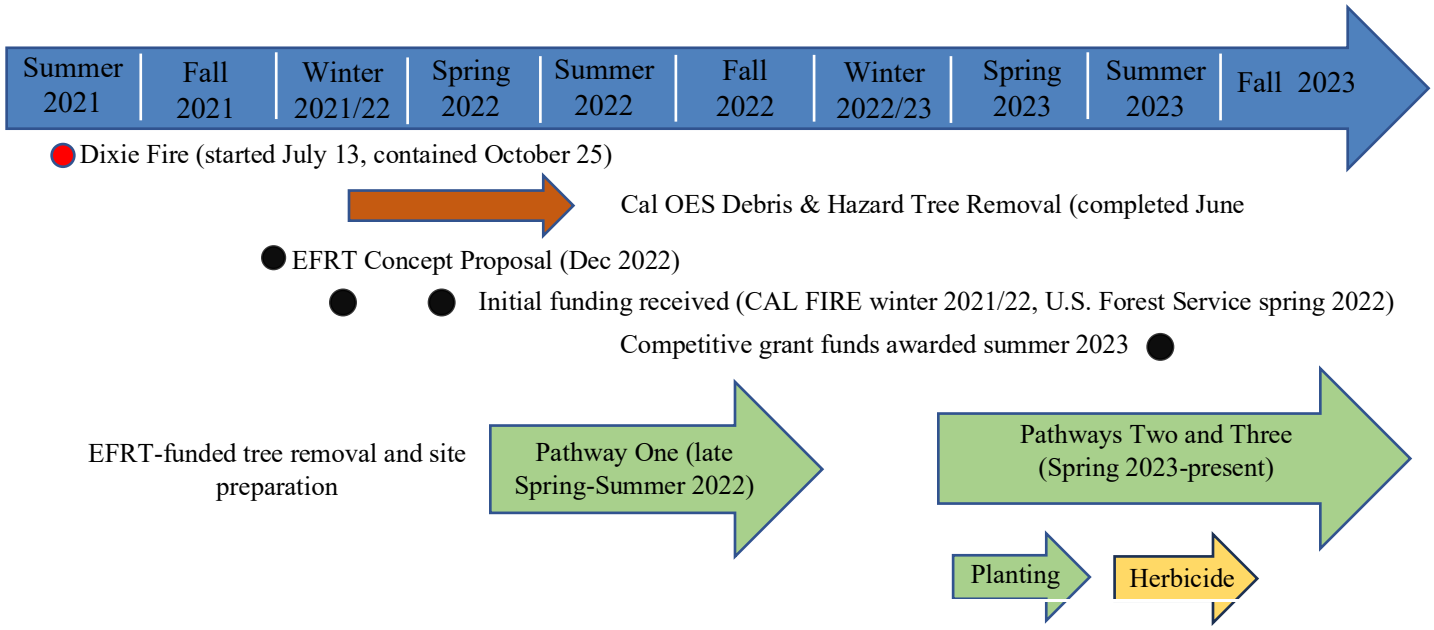


Figure 2. Timeline of Plumas EFRT funding, formation, and implementation. EFRT tree removal and site preparation took place under three contracting pathways. Pathway One was an amendment to an existing work contract to pay local operators already doing tree removal work around the town of Greenville. Pathway Two was a contract for the bulk of EFRT tree removal and site preparation awarded to a single operator. Pathway three funneled EFRT funds to the Maidu Summit Consortium, who hired contractors to complete tree removal and site preparation on Maidu land.

Landowner Communication and Enrollment

The RCD conducted some outreach to enroll landowners early in the EFRT program, including presentations at meetings for community groups including the Dixie Fire Collaborative and Friends of Warner Valley. Word of mouth alone produced a high level of interest in the program. Information about the program flowed between landowners and from local licensed timber operators (LTOs), from NRCS and UC Cooperative Extension referrals during post-fire landowner assistance interactions, and from landowner interactions with the Sierra Institute and other organizations active in the community.

Once the RCD had identified priority areas for treatment as described below, they conducted outreach to enroll residents with land in priority areas who had not yet expressed interest. Some

landowners displaced by the fire could not be reached, and the RCD encountered some wariness and confusion from those who had already experienced hazard tree removal by the California Office of Emergency Services (Cal OES) and Pacific Gas and Electric Company (PG&E). Many landowners had difficulty distinguishing between programs and their scopes of work. Careful and extensive communication from the RCD served to reassure many of the program's purpose and intentions.

Outreach was paused once costs were forecasted to exceed the secured funding. As of the end of 2023, 335 landowners were enrolled in the EFRT program, totaling 15,345 acres.

Following enrollment, consistent communication with landowners was ongoing. Landowner desires to retain individual trees, woodchips, firewood, or logs were considered in project planning, and landowners were kept informed of project timelines and progress.

Project and Landowner Prioritization

The RCD did not establish criteria for early landowner enrollment, accepting all who expressed interest in the early months of the program, believing that available funding could accommodate the need. It soon became clear, however, that landowner and project prioritization would be necessary due to the high volume of applicants, limited funding, and the pace at which work could be completed. The RCD then focused on enrolling landowners in areas prioritized for treatment. Priority areas were:

Around destroyed communities: Areas around communities including the burned town of Greenville where heavy post-fire fuels would increase future fire risk to the rebuilding community, were prioritized.

Clustered properties: Properties that were near or adjacent to each other were prioritized. Bundling parcels streamlined project planning and permitting, made treatments more efficient, and made it possible to treat smaller parcels that would otherwise not meet the minimum 3-acre requirement of the CAL FIRE funding.

To achieve contiguous treatments in the WUI around Greenville, the RCD treated a small parcel of private industrial timberland within the matrix of non-industrial private land, utilizing funds secured through a separate grant program. Attempts were made to work across federal boundaries to achieve contiguous treatments in these areas, but local Forest Service capacity was hampered by the scale of recent fire impacts and the lack of completed NEPA analysis.

Federal lands with Special Use Permits: The RCD also prioritized treating federal lands with special use permits, including a Boy Scout camp, because of its economic and cultural value to the community. Federal lands with special use permits would likely not be treated by other means because these lands fall outside of the purview of county hazard mitigation programs and the Forest Service has limited capacity to include these in their post-fire restoration plans.

Tribal lands: About 400 acres of Tasmam Koyom land managed by the Maidu Summit Consortium burned. The EFRT provided funding for a professional forester's permitting and

oversight, and for mechanical site preparation. A cost share agreement was established with the American Forest Foundation, also funded by U.S. Forest Service Region 5 through 2022 disaster funds, to provide $500/acre toward site preparation on Maidu lands, lowering costs to the EFRT.

Treatments

Treatments funded and implemented by the Plumas EFRT to date include removal of dead trees and logging slash/debris from each project site to the greatest extent possible, leaving some woody material onsite for soil stabilization. Site preparation was followed by planting of conifer seedlings and then treatment with herbicide to reduce competing vegetation and improve seedling success. Some treatments have been completed using only grant funds while others included sale of merchantable material to offset costs.

Removal of merchantable material: During the development of this project, capacity of the timber market to accept fire killed logs was uncertain and fluctuating. Treatments were designed to remove merchantable sawlogs and/or woodchips wherever possible. Sawlogs were delivered to mills in Quincy, Burney, Shasta Lake, Yreka, and Weaverville depending on mill capacity, delivered log rates, and transportation costs. Wood chips were delivered to biomass facilities at Sierra Pacific Industries in Quincy, Anderson (Shasta Sustainable Resource Management), and Honey Lake (Greenleaf Power) when feasible, dependent on capacity and transportation costs. Sawlog, firewood, and chip products whose value could not balance the cost of transportation to other facilities were taken to the wood products campus in Crescent Mills. Both saw logs and wood chips were sold from approximately 1,015 acres under the EFRT, while the remainder of acres had only wood chips and/or firewood removed.

Treatment of sub-merchantable material: Dead trees and other woody material that could not be sold were treated and left onsite. Much of the sub-merchantable material was masticated, while some was chipped and spread.

Planting and competition control: Conifer seedlings were planted where site preparation was completed. Following planting in 2023, a single herbicide treatment was applied where the landowner approved. Outreach efforts encouraged landowners to accept early herbicide treatments because of the low cost and proven effectiveness of early herbicide application at reducing shrub competition. Approximately half of the landowners who were offered herbicide release treatment in the first year of planting gave permission for it to be used. No alternative brush control (such as hand grubbing) was offered.

Green thinning: In some locations, where stands of live trees remain within project boundaries, some thinning of living trees was done to reduce future fire risk and to improve forest health. These types of treatments have been a minimal part of the program thus far.

Tribal lands: Treatments on the Tasmam Koyom property vary somewhat from standard EFRT treatment protocols. The Maidu Summit Consortium board voted against herbicide use on any of their lands. However, alternative competition control methods such as manual release (thinning and grubbing) and the use of tree mats were under consideration as of the end of 2023. The

EFRT will continue to provide technical assistance, but financial support is limited to site preparation and tree planting.

Project Permitting

The RCD used the California Forest Practices Act to permit the commercial component of projects. For planting and herbicide application, which are not commercial activities, the RCD had to complete additional CEQA permitting.

Tree Removal and Site Preparation (CAL FIRE Permits): Most tree removal and site preparation activities were permitted via a CAL FIRE Emergency Notice, required when dead trees and other forest products are removed and sold. Other permits used were a Forest Fire Prevention exemption and an exemption for production of firewood for sale. When tree removal and site preparation was permitted under these CAL FIRE permits, the RPF who filed the report completed the cultural resource reporting requirements.

In addition to a CAL FIRE Emergency Notice, RPFs filed a Category 2A Notice of Intent with the Central Valley Water Board for watercourse crossings that could potentially discharge sediment into streams, and a 1600 permit with the California Department of Fish and Wildlife.

Planting and Herbicide Use (CEQA): Planting and herbicide application required additional CEQA documentation. The RCD filed a Section 15269a CEQA Statutory Exemption under a declared emergency to cover planting and herbicide application. Under a CEQA Exemption, a cultural resource report is required and must be completed by a certified archaeologist. However, the RCD was able to use the archaeology reports filed by the forester as part of the CAL FIRE permit for tree removal on the same piece of land.

Projects on Forest Service Land: Post-fire restoration activities on federal lands must comply with National Environmental Protection Agency (NEPA) guidelines. The EFRT undertook restoration activities on National Forest lands where there was an existing NEPA decision. Though additional permitting was not required, consultation and collaboration with Forest Service staff was critical to developing task orders and operational logistics.

Contracting

Tree Removal and Site Preparation: The RCD followed multiple contracting routes to implement treatments on private lands in Plumas County as quickly and thoroughly as possible (Figure 3). Contracts allowed for licensed timber operators (LTOs) to sell logs when possible. These log sales offset the LTO's costs for tree removal and hauling, while EFRT funds facilitated site preparation for planting, including clearing unmerchantable trees and other woody biomass. Adaptations in contracting throughout the life of the EFRT have allowed work to progress in different parts of the county in a timely manner.

Pathway One – Amendment to an Existing Contract: While the Plumas EFRT program was still in development, some landowners in the Greenville area started hiring local operators to remove their fire-killed trees. In spring 2022, the RCD began funding this work by paying an LTO and a

mastication operator already working with landowners to complete EFRT tree removal and site preparation. The RCD was able to amend a pre-existing contract with one of the operators, who then subcontracted with the other operator, rather than re-soliciting bids for the work as required by the RCD's by-laws. This first phase allowed the RCD to expedite work by leveraging local contractors and their relationships with landowners.

Under this amended contract, the operators planned, permitted, and implemented tree removal and site preparation activities. The RCD ensured that EFRT program standards were met and paid the operators at rates based on the reimbursement rates of the CFIP and EQIP programs, with additional payments for removal of woodchips from the site.

Work under this amended contract continued through 2023 in the Greenville area, while work contracted under Pathway Two was completed in other areas. Having multiple contractors complete treatments in different geographical areas increased the pace of EFRT treatments. Under this amended contract, treatment on about 240 acres was completed in 2022, and an additional 344 acres was completed in 2023.

Pathway Two – Single Award IDIQ Contract: In fall 2022, The Plumas Fire Safe Council (FSC), a sub-awardee to the RCD for EFRT funds, awarded an Indefinite Delivery/Indefinite Quantity (IDIQ) contract to a single operator for $1.25 million for work through December 2025. The contract is an agreement for tree removal and other site preparation on parcels yet to be identified. The contract defines a per-acre pay rate for each type of work (mastication, hand thinning, chipping, etc.) at three levels based on low, moderate, and high complexity of workload. The IDIQ contract is amended with site specific information including maps, site conditions, and other considerations as projects are prepared by the RCD-contracted RPFs. The operator may sub-contract with other operators to complete the project.

A single operator was chosen to reduce contract administration work, and leaving the parcels undefined allowed work to begin before all projects were fully identified and prepared. This also allowed for additional landowners to be included as they were enrolled. The main contractor selected subcontracted with a Licensed Timber Operator (LTO) for forest product removal until he received an LTO license in late 2022. Though the contract was active by summer 2022, project work did not begin until Spring 2023 due to early snowfall, heavy snowpack, delays in cultural resource reports and licensing issues. By the end of 2023, 607 acres of tree removal and site preparation was completed under this contract.

Pathway Three: The RCD also awarded EFRT funds to the Maidu Summit Consortium (MSC), who contracted with operators to complete tree removal work and site preparation on the Tasmam Koyom land. EFRT funds covered a portion of the per-acre cost for this work, while the American Forest Foundation paid for the remainder through funds granted by the U.S. Forest Service. Contractors hired by the MSC completed 207 acres of site preparation in 2022 and 188 acres of site preparation in 2023.

Planting and Herbicide Contractors: The RCD awarded a single contract for planting in spring 2023 and a separate contract for herbicide application in summer 2023.

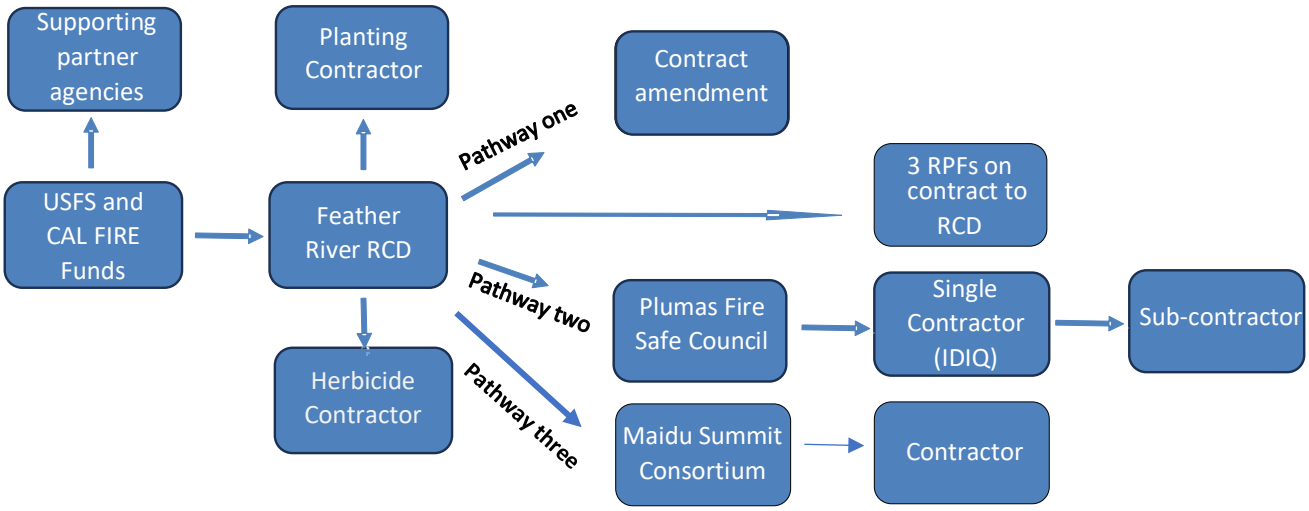


Figure 3. Flow of Plumas EFRT funds from the U.S. Forest Service (USFS) and CAL FIRE through multiple contracting pathways.

Progress and Future of the Plumas EFRT

The RCD reports that the EFRT is on track to reach the goal of treating 2,558 acres over three years. Tree removal and other site preparation has been completed on a total of 1,586 acres to date (Table 2). In spring of 2023, 730 acres were planted, including some parcels on which tree removal and other site preparation was completed outside of the EFRT program (by Cal OES/FEMA and by landowners using insurance funds and personal savings). Herbicide was applied where landowners agreed, on approximately half of the planted parcels.

	Tasmam Koyom	Federal Lands with Special Use Permit	Private Lands	Total Site Preparation
2022	207	0	240	447
2023	188	57	894	1,139
Total to date	395	57	1,134	1,586

Table 2. Acres prepared for planting to date.

With additional funding awarded in 2023, the RCD will continue to provide reforestation assistance to private landowners in Plumas County. The RCD hopes to expand the proportion of parcels receiving herbicide treatments to increase planting success.

Role of State and Federal Cost Share Programs

Other forestry assistance programs were used by landowners affected by wildfires in the 2020-2021 seasons in Plumas County.

Environmental Quality Incentives Program (EQIP): The EQIP Catastrophic Fire program is a dedicated pool of EQIP funds for post-fire recovery. Six landowners affected by the Dixie Fire applied for the program, but none were funded. Funding was awarded to two landowners affected by the 2020 North Complex Fire, one for 225 acres and another for 60 acres. The latter was partially completed using EQIP funds and partly addressed by the EFRT. The NRCS office in Quincy aided in outreach for the EFRT program.

California Forest Improvement Program (CFIP): Four projects were funded by CFIP in the 2020 North Complex Fire footprint, for a total of approximately 400 acres. No landowners affected by the Dixie and Beckwourth Complex fires received CFIP funding.

Emergency Forest Restoration Program (EFRP): An Emergency Forest Restoration Program (EFRP) was not initiated by the Farm Services Agency (FSA) for the Dixie Fire.

American Forest Foundation: The American Forest Foundation's My Sierra Woods project provided funds for thinning live trees in the Greenville area prior to the 2021 Dixie Fire. Immediately following the fire, funds remaining within this program were available for some landowners to pay for tree removal work. This included those who were slated to receive treatment under the program before the fire, and others located in a similar area. These funds were all spent by early spring 2022.

Challenges Encountered by the Plumas EFRT

Lead Agency Readiness: The Feather River RCD had not implemented a project of this scale and complexity prior to the EFRT, and taking on the program required them to build strategies and reestablish work priorities to quickly respond to landowner needs after wildfire. Challenges were encountered determining appropriate pathways to permit work and creating a landowner agreement to cover the operator and the RCD's liability.

Costs and Capacity: Project costs were underestimated in early EFRT planning, and money did not go as far as expected due to inflation, increasing fuel prices, and higher than expected bids.

Prioritization and Enrollment: Lack of prioritization and landowner enrollment criteria at the program onset led to difficulties in planning and implementation, requiring that the RCD set priorities and adjust landowner expectations after work had begun.

Landowner Communication: Some landowners in priority treatment areas could not be reached due to displacement by the fire, and others were confused and overwhelmed following their experience with hazard tree removal programs. The RCD invested significant time in building trust and understanding with these landowners.

Permitting: Permitting for EFRT projects was complex because of requirements triggered by public funding, and the multiple jurisdictions overseeing commercial and non-commercial projects. The pathway to permit projects was not straightforward, requiring that the RCD find novel strategies.

Project Complexity: Projects became complex when multiple landowners were bundled into a single project to increase efficiency and satisfy minimum acreages required by the CAL FIRE grant. Tracking individual treatment requests and scheduling meetings with individual landowners was challenging.

Contract Scope and Complexity: Development of a single Indefinite Delivery/Indefinite Quantity (IDIQ) contract for the bulk of EFRT tree removal and site preparation presented challenges. The undefined nature of the contract made determination of a per-acre rate for various types of work difficult. This was addressed by setting variable pay rates for work at different levels of complexity. This opened the door to ongoing negotiation with contractors for work in specific locations.

Given the large geographic scope, the urgent need for recovery work, and licensing issues with the contractor chosen, awarding a large contract to a single contractor covering the bulk of tree removal and site preparation activities made it difficult to complete work at the desired pace early in the contract, even though sub-contracting was allowed.

A mixture of commercial and non-commercial work within EFRT project contracts allowed the contractors to leverage wood product sales with some flexibility. However, tracking the profit from wood products while under contract for EFRT work made for complex and time-consuming accounting.

Markets: Limited markets for saw logs, firewood, and woodchips reduced the amount of wood products removed from EFRT projects. The smaller size of many of the projects (under 10 acres) made commercial operations less efficient and more costly. Bundling contiguous parcels of varying ownership alleviated this limitation to some degree.

Landowner Preferences: Some landowners chose not to allow herbicide use to control shrubs competing with trees planted on their land, which is likely to reduce the success of planting.

Cultural Resources: Under both permitting systems (a CAL FIRE Emergency notice for tree removal and a CEQA Emergency Exemption for planting and herbicide use), it was necessary to avoid any identified cultural resource sites, leaving significant areas untreated.

Factors Aiding Plumas EFRT Success

Partnerships: Including several local organizations in the EFRT increased the reach of landowner outreach and communication. Appointing the Fire Safe Council as a contract administrator increased program capacity by spreading the workload and utilizing their experience with such work.

Local timber operators were also key partners in EFRT work. Local operators were the first point of contact for many landowners seeking assistance, providing information to the landowners about their options for tree removal and quickly removing trees in this area via the EFRT and other funds. Pre-existing relationships between local LTOs and RPFs facilitated project development, and their respective connections with local mills facilitated forest product sales.

Collaborative funding: Multiple funders have made the scope of the EFRT program possible, including funds from One Tree Planted and the American Forest Foundation. The scale of EFRT impact would not have been possible without these extra funds.

Contracting: The ability of the RCD to contract on a project-by-project basis with an operator of the landowner's choice enhanced the program's initial success and outreach. Accommodating landowners' choices of contractors increased landowner comfort and trust in the turmoil of post-fire recovery. This early strategy also lent credibility to the program, allowing for immediate implementation of projects.

Later in the project, supporting the work of two contractors in two different geographical areas under multiple contracts was efficient and led to a rapid pace of work.

Commercialization of Wood Products: Projects to date have included a commercial component, whether this includes the sale of saw logs, wood chips or both. Commercial sales reduced the amount of woody material to be processed on site, and allowed for permitting under the Forest Practices Act rules, a process that allows cultural resource reports to be completed by the project RPF rather than a more costly and rare professional archaeologist.

Caldor Emergency Forest Restoration Team Case Study

Description of Fire Impacts and Need

The Caldor Fire burned 221,835 acres across portions of El Dorado, Amador, and Alpine Counties between August and October 2021. Caldor EFRT managers estimate that approximately 6,900 acres of non-industrial private forest land burned at high or moderate severity within El Dorado County[2] during the fire. The greatest concentration of private acres burned at higher severities was in and around the community of Grizzly Flats, on the western slope of the Sierra Nevada in El Dorado County (Figure 4).

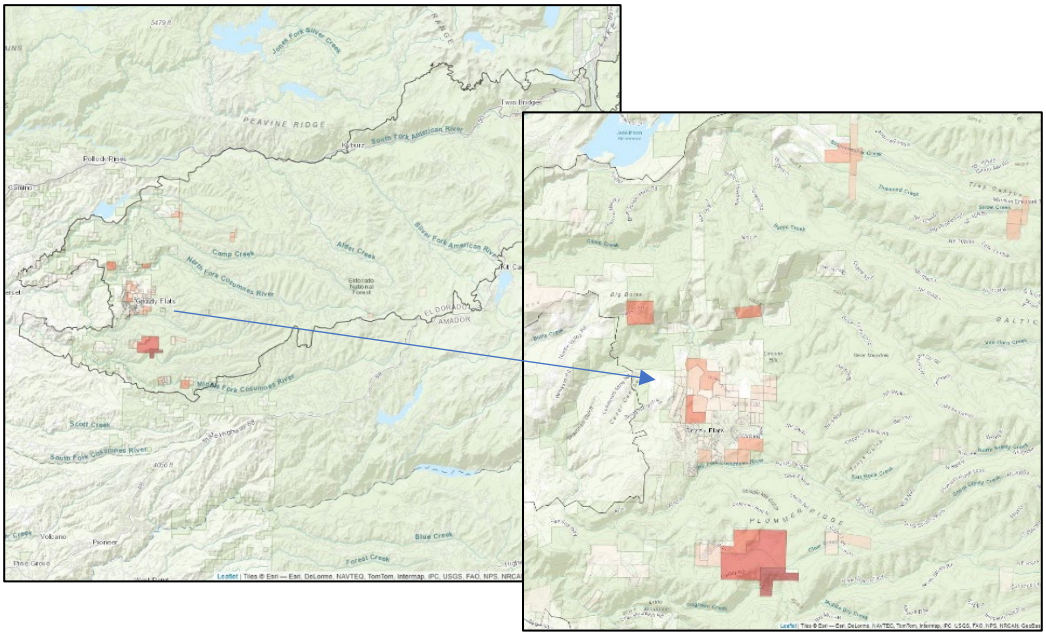


Figure 4. Map of the Caldor Fire (left) and an enlarged map of the Grizzly Flats area (right) where high severity fire impacts to private lands are concentrated. A total of 1,005 structures were destroyed in the Caldor Fire, concentrated in the town of Grizzly Flats. Parcels with moderate to high severity fire impacts are highlighted in shades of orange and brown. Public lands are shaded green.

El Dorado County Ecological Conditions and Fire History

El Dorado County spans a portion of the western slope of the central Sierra Nevada, from the foothills starting at about 700 feet elevation to the Sierra crest reaching 10,800 feet near Lake Tahoe. Approximately 48 percent of the total land area is owned by the public, primarily national forest. The destroyed town of Grizzly Flats sits just below 4,000 feet and is 90 percent bordered by Eldorado National Forest lands. The topography within Grizzly Flats is affected by String Canyon Creek, and the community is bordered by the North, Steely and Middle forks of the Consumnes River. The predominant vegetation type is Sierran mixed conifer, with interspersed chaparral and meadows.

[2] Based on soil burn severity data from U.S. Forest Service Burned Area Emergency Response (BAER) assessment.

Major fires on the west slope in El Dorado County since 2000 include the 2004 Fred's fire (7,700 acres), which burned over portions of the 1992 Cleveland Fire area (22,485 acres), the 2014 King Fire (97,717 acres) and the 2014 Sand Fire (4,240 acres).

Social Conditions

The population of El Dorado County is approximately 192,000 (United States Census Bureau 2023). 23 percent of the population is aged 65 or older. Approximately seven percent of the population lives in poverty, 13 percent are people of color (one percent Native American), and 14 percent are Hispanic or Latino. As of 2020, El Dorado County had a low vulnerability SVI score of 0.23 (where 0 is the lowest and 1 is the highest) (Agency for Toxic Substances and Disease Registry 2022). As of 2022, Grizzly Flats was located within a census tract with a population 31 percent aged 65 or older and 14 percent racial minority. Fifteen percent of the population has a household income less than 150 percent of the federal poverty level, and the population received an SVI score of 0.20 (Pansing et al. 2024).

Forest Industry

There are no sawmills or biomass facilities currently operating in El Dorado County, and few within a reasonable hauling distance. Sierra Pacific Industries operated a sawmill in the town of Camino in El Dorado County until 2009, and currently operates mills in Lincoln, CA (Placer County, 65 miles from Grizzly Flats) and in Sonora, CA (Tuolumne County, 85 miles from Grizzly Flats). A new sawmill was under construction by Tahoe Forest Products over the Sierra crest in Carson City, Nevada, 100 miles from the town of Grizzly Flats. Timber harvested from restoration activities at the Sierra-at-Tahoe ski resort was transported to that mill site, 44 miles away. Biomass from those activities was transported to a facility in Woodland (Yolo County, 110 miles from the ski resort). There are 33 Registered Professional Foresters (RPFs) based in El Dorado County and the surrounding counties of Amador, Placer, and Sacramento (CAL FIRE 2024). In 2021 and 2022, 135 million board feet of timber were harvested from private lands, and 134 million board feet were harvested from national forest lands, the majority in 2022 (University of Montana 2022).

The U.S. Forest Service operates a nursery in Camino, CA. The El Dorado Resource Conservation District sources seedlings from this nursery for restoration projects and makes seedlings available to private landowners through a partnership with the nursery.

Formation, Structure and Funding of the EFRT

A working group for the Caldor Emergency Forest Restoration Team (EFRT) was formed in September 2021 and monthly meetings were attended by the Natural Resources Conservation Service (NRCS), the California Office of Emergency Services (Cal OES), Eldorado National Forest, El Dorado County, Caltrans, the Central Valley Regional Water Quality Control Boad, El Dorado County Water agency, local fire safe councils, private industry, and others. In 2022, the Caldor EFRT began work to restore forests on private lands burned in the 2021 Caldor Fire (Figure 5). The El Dorado Resource Conservation District (RCD) was chosen as the lead agency

for the EFRT, led by the District Manager. To respond to the demands of the EFRT, the RCD hired four additional staff members: a program manager, an office manager, a field operations manager, and a community engagement specialist. A team of three Registered Professional Foresters (RPFs) is under contract with the RCD to develop EFRT treatment prescriptions, coordinate regulatory compliance, oversee treatment implementation, and monitor treatment success.

The RCD received $2.5 million in non-competitive funds for the EFRT from a CAL FIRE Wildfire Resilience Block Grant in February 2022, and an additional $2.5 million in non-competitive disaster assistance funds from the U.S Forest Service State and Private Forestry in March 2022. Additionally, approximately $50,000 in NRCS funding previously awarded to the RCD was redirected to Caldor EFRT work. The RCD applied for an additional $7 million CAL FIRE Forest Health Grant in early 2023 but was not funded. In November 2023, the RCD was awarded additional non-competitive funding from U.S. Forest Service State and Private Forestry in the amount of $6.5 million.

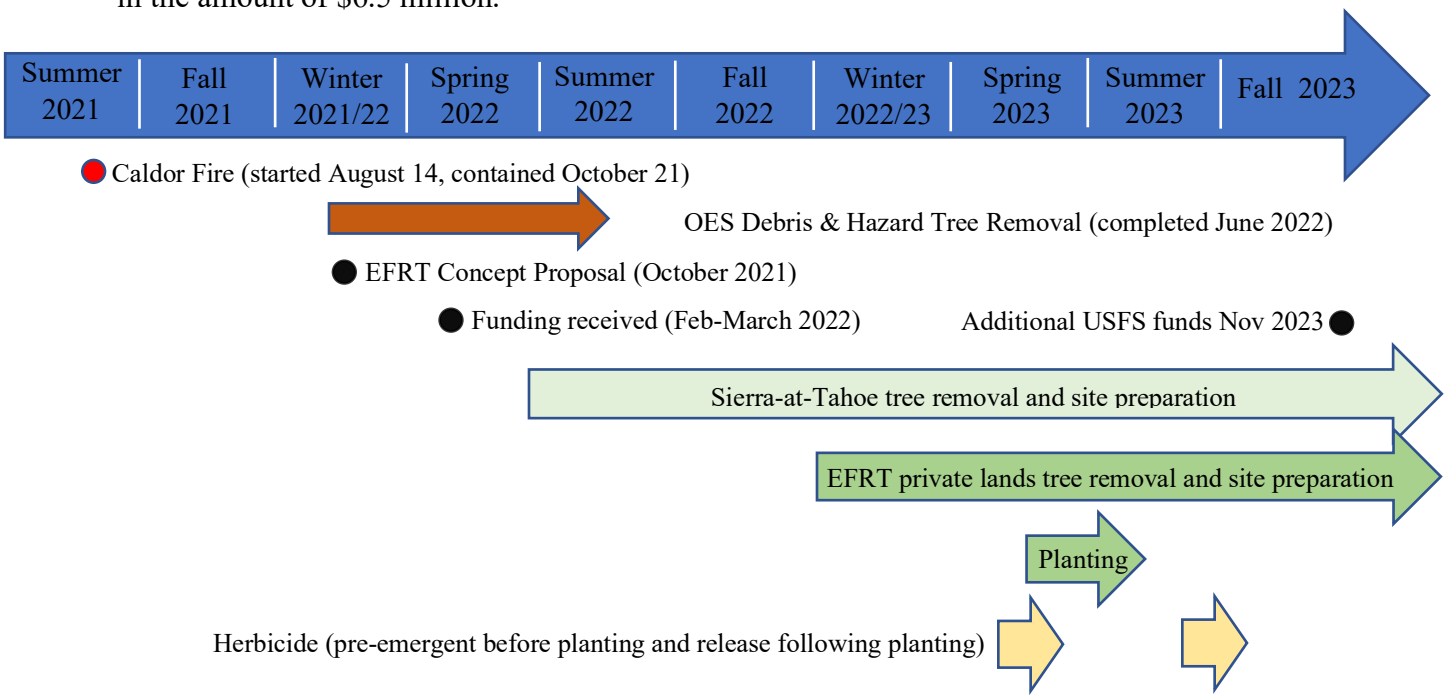


Figure 5. Timeline for Caldor fire EFRT formation and work completed to date.

Landowner Communication and Enrollment

In Fall 2021, the El Dorado RCD held in-person public meetings most Saturdays at a local, unburned community center to engage with Grizzly Flats area landowners. At these meetings, the RCD listened to landowner concerns and needs and provided information about the EFRT program and the treatments it would fund. The RCD encouraged landowners who had merchantable dead trees on their land to contact a RPF to coordinate salvage logging before they participated in the EFRT program, as the EFRT did not include commercial sales within its

projects on private lands. The EFRT assisted landowners in commercial sales by forming a biomass utilization team of RPFs and industry experts to investigate the markets, by connecting private RPFs to those markets, and by connecting RPFs to landowners when necessary.

Public meetings helped the RCD build a landowner contact database for program communication and information exchange and provided a means of reaching more landowners through word of mouth. Many in the Grizzly Flats area lost homes, and those who attended meetings were a point of contact for neighbors who had left the area. The meetings were also a platform for Cal OES and El Dorado County to talk to landowners about the hazard tree removal work they were doing in the fire area. Meetings were an important opportunity to help landowners distinguish between the different agencies and programs being offered to them and to clarify the scope of each, though one-on-one communication was often required to provide further clarification.

The RCD's collaboration with Cal OES and El Dorado County helped them to ensure that restoration efforts were not duplicated, and to learn which landowners were engaged with the Cal OES hazard tree program and might be interested in the EFRT program as well. However, neither Cal OES nor El Dorado County could share landowner contact information with the RCD due to confidentiality requirements.

The RCD mailed hundreds of Right of Entry (ROE) requests to landowners in the Grizzly Flats area for whom contact information was available. These ROE agreements allowed EFRT contractors to complete treatments on private land. As of the end of 2023, 110 landowners had signed ROE agreements for work on 1,521 acres.

Many landowners were overwhelmed by managing the multiple aspects of fire recovery including relocation, insurance claims, and the many steps to rebuilding. Being approached by multiple agencies with different post-fire programs led to confusion. This led the RCD to invest considerable time into landowner outreach and communication to clarify the program intent and address landowner concerns.

In fall 2022, the RCD hired a staff member to oversee communications with the enrolled landowners. This communications manager provided regular updates about program progress to landowners awaiting treatment and communicated with those actively receiving treatment. The communications manager also ensured that landowners' special treatment requests were considered in project planning.

Project and Landowner Prioritization

Caldor EFRT priorities were guided by the program's funding sources and by the restoration needs posed by the Caldor fire, including forest restoration, fuels reduction around rebuilding communities, and support for community economic recovery.

Prioritizing EFRT Work: The RCD prioritized fuel reduction and planting within a 2,400-acre area in and around the town of Grizzly Flats. This area was prioritized because of high severity fire effects and many burned homes. The RCD delineated five geographic zones, the two of

highest priority being the town of Grizzly Flats itself, and the area immediately surrounding the town. The larger parcels surrounding the town of Grizzly Flats were the first to receive treatment. This area was a priority to reduce the risk from high fuel loads surrounding the rebuilding community. Many of these landowners chose to work separately with an RPF to sell logs prior to EFRT treatments, so EFRT work began on each parcel after a Notice of Completion of commercial activity was filed with CAL FIRE.

The many small, burned parcels within Grizzly Flats were the second priority for the EFRT. Early collaborative meetings about post-fire restoration around Grizzly Flats gave the RCD access to real-time tracking of Cal OES tree removal work which helped them identify where work remained to be done and avoid redundancy.

Treating Federal Lands: The Caldor Fire burned across 166,808 acres of the Eldorado National Forest, severely damaging the Sierra-at-Tahoe ski resort, which has a Special Use Permit to operate on national forest land. The resort was closed for the winter of 2021/22, and El Dorado County estimated that this closure led to a loss of $43.5 million in revenue within the county. While developing the EFRT program, the RCD was asked by the U.S. Forest Service to manage dead tree removal at the ski area. The Forest Service offered the RCD a Caldor-wide stewardship agreement and funding via an emergency allocation to coordinate tree removal there. The RCD chose to take on this project because of the important economic role the ski resort plays as the second largest employer in El Dorado County. The RCD was able to begin dead tree removal on the resort in summer and fall of 2022 and a portion of the resort reopened for the 2022/2023 winter ski season. Additional work done during the summer and fall of 2023 allowed for the entire resort to reopen for the 2023/2024 season. 22.5 million board feet of timber was sold to Sierra Forest Products before construction of their new mill began in Carson City, providing a supply to get the mill started. The RCD reports that the Sierra-at-Tahoe work did not delay their work on private lands, because much of the EFRT work in the Grizzly Flats area had to wait for hazard tree work and commercial tree removal to conclude.

The stewardship agreement between the U.S. Forest Service and the RCD also included funding to remove dead trees on national forest leaseholds along the Highway 50 corridor that have private cabins on them, and along associated access roads.

Treatments

Treatments on private lands: By design, Caldor EFRT treatments did not include any commercial timber operations on private lands. The RCD encouraged and assisted landowners to work independently with RPFs to sell what trees they could prior to EFRT funded work because they had successfully used a similar strategy after the 2014 King Fire. Some landowners coordinated their own commercial timber harvest of larger trees killed by the Caldor Fire. In total, 554 acres of the private lands treated by the EFRT were salvage logged prior to EFRT treatments. EFRT treatments included cutting remaining dead trees, processing their biomass,

soil ripping, planting conifers, and applying herbicide to minimize brush competing with planted trees.

Tree and biomass treatment: Parcels that were logged before EFRT funded treatments had fewer standing dead trees remaining than unlogged parcels, which typically had many. However, whether a commercial logging operation had taken place on a parcel or not, a large volume of woody material had to be processed on site to reduce fuels and prepare the site for planting.

Standing dead trees were felled, piled, and burned along with branches and other woody material. Some landowners requested that logs be left for processing into firewood or lumber using a personal mill, but many logs were piled for burning. Material not combusted in burn piles was sometimes masticated to reduce its size. In a few cases where only small trees and brush remained on site, mastication was the only method used to treat the woody material. Treatment specifications required that masticated material left on site not exceed a depth of four inches.

Soil treatments: On many properties, and not near streams, soil was ripped on contour to an approximate depth of 18 inches to break up soil compaction to allow for better water and root penetration, and to reduce erosion. Ripping incorporated residual material into the soil to some degree.

Planting and brush control: Native conifer seedlings were planted in the spring of 2023 on parcels where tree removal and other site preparation treatments were complete. Except near water supply systems within Grizzly Flats, herbicide was applied before planting to suppress competing vegetation, and following planting to release tree seedlings from competition. On some parcels, tree removal and other site preparation was completed in 2023, but planting was not possible due to lack of seedlings. Shrubs were treated with herbicide on these parcels as well, as larger shrubs the following year might impede planting efforts, and control of larger brush would require more intensive herbicide applications at a higher cost. A second herbicide application may be implemented (as long as EFRT funds are available) to release seedlings from competition. To ensure success of conifer planting, landowners must agree to chemical brush control on their property to be eligible for tree removal and planting.

Project Permitting

The use of state funds for EFRT projects necessitated that the RCD file California Environmental Quality Act (CEQA) documentation. A single scope of work was written, and a single Class 4 Categorical Exemption filed under CEQA, to cover all post-fire restoration activities, including dead tree and woody biomass treatment, soil ripping, planting, and herbicide application.

An Environmental Protection Plan (EPP) covered Cal OES hazard tree removal in the Grizzly Flats area and was accepted by the U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife, the Water Board, California Fish and Wildlife, and other regulatory agencies. While EFRT activities were not strictly governed by this EPP, the RCD adopted relevant environmental protection and avoidance measures laid out in the EPP. This helped to substantiate the use of a Categorical Exemption under CEQA for EFRT activities.

Under CEQA, a cultural resource survey of areas to be treated must be completed by a certified professional archaeologist. To satisfy this requirement for EFRT treatments on many parcels, the RCD was able to use cultural resource reports generated by two other sources: 1) where a parcel had undergone Cal OES hazard tree removal, the RCD was able to utilize cultural resource reports filed by Cal OES; and 2) where landowners had sold fire-killed trees under a CAL FIRE Emergency Notice prior to EFRT treatments, the RCD was able to use the cultural resource report filed by the RPF under the timber harvesting permit for the same parcel. Where no cultural resource review had been done, the RCD hired a professional archeologist to complete the review.

There are many historic and indigenous cultural sites in the Grizzly Flats area due to widespread historic mining, logging, and Native American occupation and uses. Under the CEQA Categorical Exemption, the RCD had to avoid restoration activities in locations where such cultural resources were present. In some cases, tribal consultations led to agreements to carefully remove trees by hand within or adjacent to Native American prehistoric sites to protect them from potential damage resulting from their inevitable fall later, and from future fire risk posed by accumulating fuels.

Contracting

Pathway Four - Contracting by geographic zone: The area proposed for treatment on private land in and around Grizzly Flats was divided into geographical zones and the number of acres of each treatment type was defined (tree removal, piling and burning, mastication, soil ripping) within those zones. Operators were asked to bid on work in each zone, proposing a per-acre cost for each category of work (Figure 6).

Three Licensed Timber Operators (LTOs) were awarded contracts with a dollar cap, based on funding availability. With additional funding awarded in late 2023, the funds in those contracts were increased so that more acres could be treated. Subcontractors were hired by the three primary contractors to increase the pace and scale of work.

The RCD's three contracted RPFs were responsible for designing treatments and environmental compliance, and for ensuring that project standards and environmental protections were met.

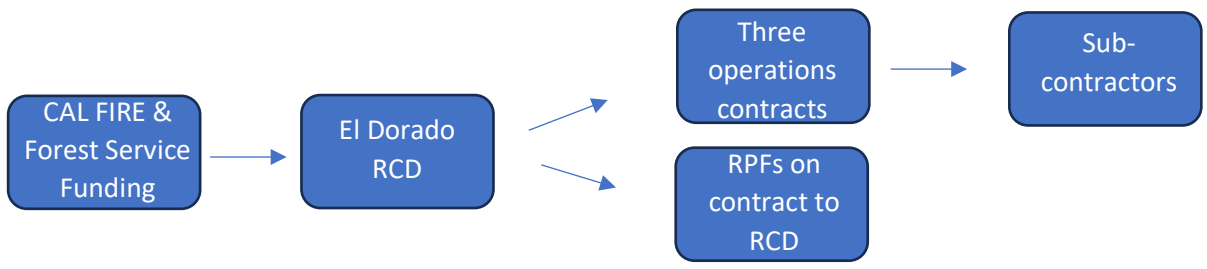


Figure 6. Flow of Caldor EFRT funds through contractors

Progress and Future of the Caldor EFRT

The EFRT completed site preparation on a total of 803 acres and conifer planting on 479 acres by the end of 2023. Goals for the EFRT moving into 2024 include the removal of hazardous trees and fuels on over 3,000 new acres of private lands, continued plantings and competing shrub control, and monitoring and evaluation of EFRT treatments. The RCD is also considering the possibility of treating larger outlying parcels within the Caldor Fire perimeter.

Role of State and Federal Cost Share Programs

Environmental Quality Incentives Program (EQIP): The Natural Resources Conservation Service (NCRS) awarded eight EQIP contracts within the Caldor Fire encompassing a total of 255 acres and $600,000 in funding. None of the projects are within the Grizzly Flats area. NRCS did not outreach to affected landowners in the Grizzly Flats area in the first year after the fire because the EFRT program offered assistance there with no cost share requirement, though landowners were free to apply for EQIP Catastrophic Fire funding at any time. Landowners can continue to apply for these funds, which are available for five years after a fire. For some parcels that did not fall within the geographic scope of the EFRT, RCD-contracted foresters wrote forest management plans using a separate funding source to help landowners qualify for NRCS funding.

California Forest Improvement Program (CFIP): No landowners affected by the Caldor fire received CFIP funding for forest restoration.

Emergency Forest Restoration Program (EFRP): An Emergency Forest Restoration Program (EFRP) was not initiated by the Farm Services Agency (FSA) for the Dixie Fire.

Challenges Encountered by the Caldor EFRT

Lead Agency Readiness: Despite the El Dorado RCD's experience with using grants to restore private land after the 2014 King fire, it was a challenge to quickly build capacity to address post-Caldor fire restoration needs on private and federal lands at this scale. Before the fire occurred, the RCD had a work plan in place that encumbered all staff time. Developing a landowner assistance program meant pivoting to a new scope of work with the same staff and four additional staff hired to assist with the EFRT.

Timing: EFRT treatments did not begin in Grizzly Flats until late 2022, though treatments proceeded before this for landowners who chose commercial salvage logging after the fire. The RCD first completed forest restoration treatments in 2022 on the Sierra-at-Tahoe project to wait for the commercial tree removal and Cal OES hazard tree removal within and around the town.

Costs and Capacity: A gap in funding caused a delay in program work during summer 2023, as the original EFRT funds did not cover the intended scope of work in and around Grizzly Flats. The RCD submitted a proposal for a CAL FIRE Forest Health Grant in 2023 to continue EFRT work but was not selected, though other restoration efforts addressing the Caldor Fire were

funded. Additional direct funding provided in late 2023 by the U.S. Forest Service State and Private Forestry allowed for work to continue.

Landowner Communication and Enrollment: Reaching landowners to inform them about the EFRT program and to establish Right-of-Entry (ROE) agreements was difficult. Many landowners lost homes in the fire and moved out of the area, while some others were not full-time residents before the fire. Enrollment was further challenged by landowner confusion and wariness in the face of a multi-agency post-fire response. Extensive landowner outreach served to overcome this challenge.

Permitting: Treating cultural resource sites including mining excavations and pilings was not possible under the CEQA process followed by the RCD. More detailed cultural resource surveys that might have allowed for treatment of those sites would have been very costly and time-consuming. As a result, dead trees left standing on these sites increase residual fuel loads and may pose a risk to infrastructure and cultural resources as they fall.

Markets: Variable and limited markets for timber and other woody biomass reduced the number of trees that could be removed through salvage logging prior to EFRT restoration work. This meant that even where logging had occurred, significant material remained on site to be treated by the EFRT.

Treatments: Seedling availability was limited in 2023 due to a problem with seedling viability at the Placerville nursery. The RCD did not receive the volume of seedlings desired, and many of those received were small. This led to delays in planting and increased the need for pre-planting competition control. Surveys began in 2023 to assess seedling success.

Factors Aiding Caldor EFRT Success

Prioritization: Prioritizing the area around Grizzly Flats, and further prioritizing phases within that area, led to efficiency in program planning and operations and facilitated clear messaging to landowners. It also allowed for clear communication with the NRCS's EQIP landowner assistance program. Communication of these priority areas to the NRCS's EQIP allowed that program to focus outreach elsewhere.

Partnerships and Collaboration: Early communication with other agencies doing tree removal work after the fire facilitated EFRT program planning, project scoping and permitting. Partnership with Cal OES gave the RCD access to information and documents that significantly increased program efficiency. Communication with tribal consultants allowed for hand felling of some dead trees near some prehistoric cultural sites to protect them while reducing fuel loads.

Permitting: Access to the Environmental Protection Plan (EPP) that covered Cal OES hazard tree removal helped the RCD develop treatment guidelines and helped to substantiate a CEQA determination of no significant impact of EFRT activities. Access to some archaeological and biological reports associated with other post-fire activities in the Grizzly Flats area reduced the cost and workload of the EFRT.

Contracting: Awarding multiple contracts for site preparation work for different zones around Grizzly Flats allowed for efficiency in getting the work done. Defining areas to be treated and a single per-acre cost by treatment type led to clarity in contracting.

Outreach: Clear communication with landowners was key to the success of the program. Despite the challenges in reaching landowners and the wariness of some to public programs, the RCD received signed ROE agreements from most landowners within the highest priority areas. Having a staff member dedicated to landowner communication seems to have increased the quality and efficiency of landowner relations. RCD outreach efforts also encouraged and assisted landowners in commercial log sales prior to EFRT treatments, reducing the amount of material that had to be treated onsite by the EFRT.

Tamarack Emergency Forest Restoration Team Case Study

Description of Fire Impacts and Need

The Tamarack Fire burned 68,637 acres in California and Nevada from July to October 2021. While the majority of the acres burned were on federal lands, just under 7,700 acres of private lands in California's Alpine County were also impacted, and three homes were burned. EFRT managers estimated that approximately 4,234 acres of private forest land in Alpine County burned at moderate to high severity[3] (Figure 7).

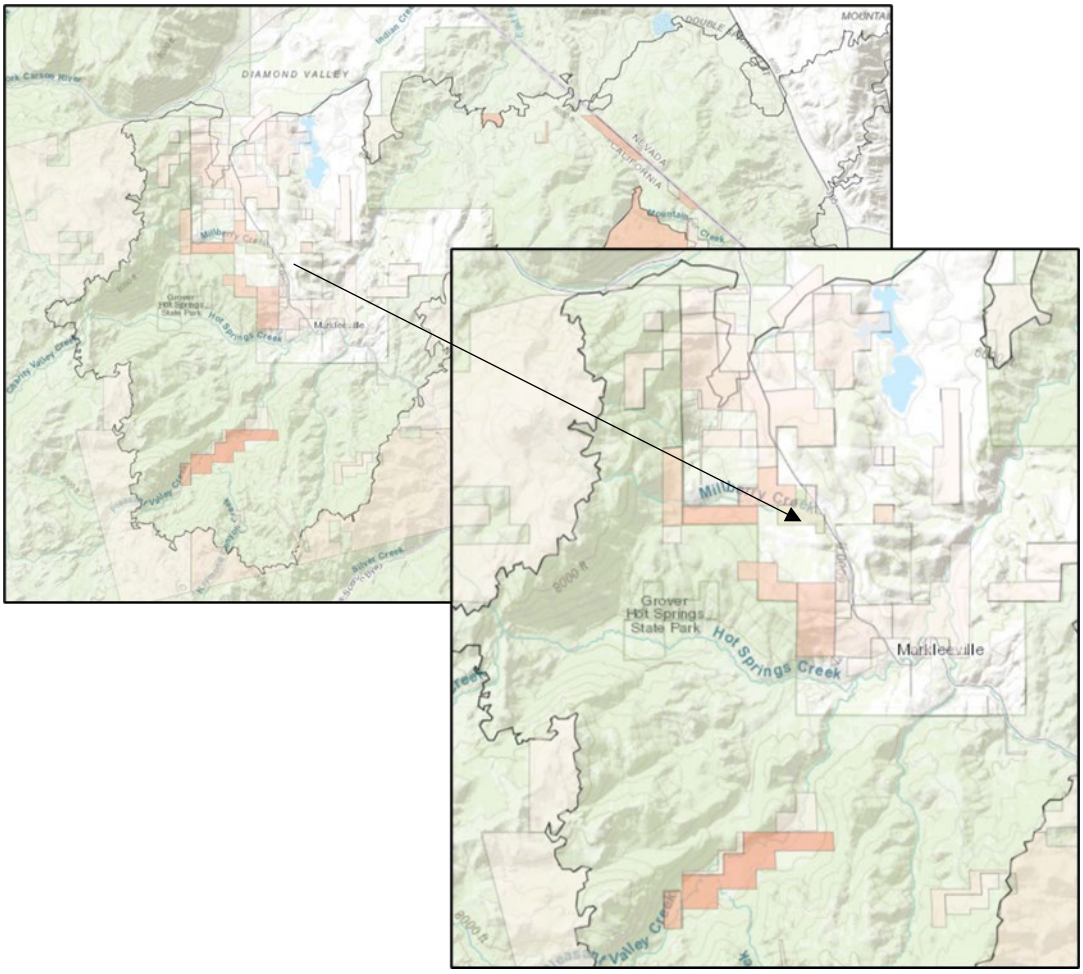


Figure 7. Map of the Tamarack Fire (left) and a close-up of the Markleeville area (right), where fire effects to private lands were concentrated. Parcels with moderate to high severity fire impacts are highlighted in shades of orange. Public lands are shaded green.

[3] Based on soil burn severity data from U.S. Forest Service Burned Area Emergency Response (BAER) assessment.

Alpine County Ecological Conditions and Fire History

Alpine County spans the crest of the Sierra Nevada in far east central California. The County covers 723 square miles of land, with prominent vegetation communities including sagebrush/bitterbrush, eastside pine, Sierra mixed conifer, perennial grassland, montane chaparral, pinyon-juniper, and true fir. These forests are located on the very eastern flank of the Sierra Nevada range and floristically and ecologically include some Great Basin influence. As a result, forest and rangeland management practices are quite different from the rest of the Sierra Nevada mixed conifer forests. Approximately 95 percent of Alpine County's land area is owned by the public and administered by the U.S. Forest Service and Bureau of Land Management.

The most significant wildfires in the area over the past few decades include the 2015 Washington Fire (17,000 acres) and the 1987 Acorn Fire (6,500 acres).

Social Conditions

Alpine County is the least populated of any California county, with a resident population of 1,141 (United States Census Bureau 2023). Most of the population lives near or in the east side communities of Markleeville and Woodfords (in the vicinity of the Tamarack Fire), while the rest live on the west slope in two ski resort areas, Kirkwood and Bear Valley.

Twenty five percent of the population is aged 65 or older, and 16 percent lives in poverty. Thirty-one percent of the population are people of color, 23 percent of whom are Native American or Alaska Natives, with the Woodfords Washoe Tribal community contributing significantly to this number. Thirteen percent of the population is Hispanic or Latino (United States Census Bureau 2023). Alpine County has a Social Vulnerability Index (SVI) of 0.50 (Agency for Toxic Substances and Disease Registry 2022), indicating a medium to high level of vulnerability (the index ranges from 0-1, with 1 being the highest level of vulnerability).

The census tract within Alpine County that experienced moderate-high severity effects from the Tamarack Fire had an SVI of 0.36. Twenty five percent of its population is age 65 or older, 19 percent is of a racial minority, and 14 percent has a household income less than 150 percent of the poverty level (Pansing et al. 2024).

Due to a small population and correspondingly small county infrastructure, Alpine County does not have a Resource Conservation District.

Forest Industry

There are few mills within a reasonable hauling distance of Alpine County. The closest mills are in Sonora, California, approximately 125 miles from Markleeville in Tuolumne County, and Loyalton, CA, approximately 100 miles away in Sierra County. The Loyalton mill has been operational only intermittently due to forest product market conditions.

In 2021 and 2022, 2.2 and 3.1 million board feet, respectively, were harvested from private lands in Alpine County, with no timber harvested on state or federal lands in either year (University of

Montana 2022). Timber harvested in these two years represents 92 percent of all the timber harvested from private lands in Alpine County in the past two decades. Similarly, over the past 20 years, the U.S. Forest Service has harvested less than one million board feet per year from public lands in the county. Consequently, without a robust local forest management industry, there are few natural resource professionals such as LTOs, RPFs, and archaeologists practicing in this county. There are no registered professional foresters in Alpine County, and 33 in the surrounding counties of Tuolumne, Calaveras, Amador, and El Dorado combined (CAL FIRE 2024).

Formation of the EFRT

The Tamarack EFRT was formed in 2022 to address impacts to private lands from the 2021 Tamarack Fire (Figure 8). In the absence of a local Resource Conservation District, Alpine County was chosen by funders to be the lead agency for the EFRT.

Scope of Work: The EFRT proposed to treat private lands in Alpine County that were affected by the Tamarack Fire. This included funding activities on lands where no treatment had yet been undertaken and funding a continuation of restoration activities on lands treated using the Farm Service Agency (FSA) Emergency Forest Restoration Program (EFRP).

Funding: Alpine County was directly awarded non-competitive disaster assistance funding from the U.S. Forest Service State and Private Forestry totaling just over $1.8 million in January 2022.

EFRT Partner Roles: Primary members of the EFRT include a program director employed by Alpine County, a project manager contracted to the County, and an environmental consultant (Figure 9). The program director managed grant funding and reporting and oversaw the contracts under which the program manager and environmental consultant worked. The program manager was responsible for overseeing and certifying the work of the environmental consultant and subcontractors. The environmental consultant participated in project planning along with the project manager and the rest of the EFRT. The consultant permitted projects, oversaw subcontractors to complete treatments, and completed some of the restoration work.

Alpine Forest Health Community Working Group: Concurrent with the EFRT, a Forest Health Community Working Group was formed to provide a forum for multiple stakeholders to collaborate on strategies for post-Tamarack Fire restoration work and for managing area forests for health, resilience and fire safety going forward. The working group included members of the EFRT, plus other community stakeholders including the Alpine Biomass Collaborative, the Alpine Watershed Group, the Alpine Fire Safe Council, CAL FIRE, the U.S. Forest Service, and residents.

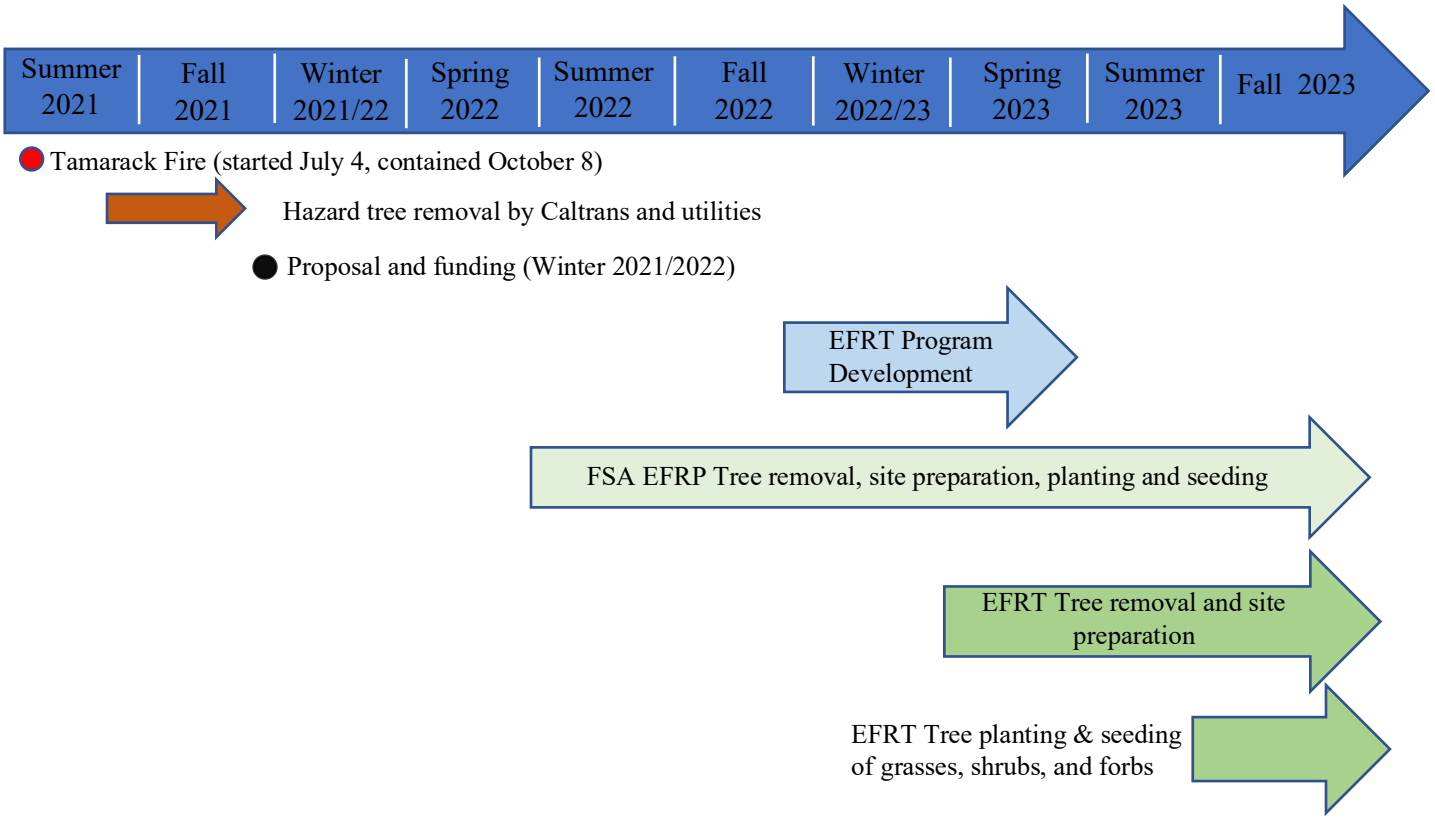


Figure 8. Timeline of Tamarack fire EFRT planning and implementation

Role of the Emergency Forest Restoration Program

The Emergency Forest Restoration Program (EFRP) administered by the USDA Farm Services Agency (FSA) was the first program used to address post-Tamarack Fire restoration needs on private lands. When ERFT funds became available, local managers were able to coordinate treatment practices and implementation between the two programs to achieve a larger and more cohesive landscape level effect.

Local landowners were able to use the EFRP by working with the FSA office in Yerington, Nevada. Staff from FSA and the Minden, Nevada office of the Natural Resources Conservation Service began outreach at public meetings in the Markleeville area in October 2021. Information about available programs also flowed between landowners and from the EFRP's Technical Assistance provider, Nevada Environmental Consulting, LLC., a private environmental services firm. Enrollment in the EFRP was offered for a period of approximately four months, ending February 2, 2022.

Eighteen landowners enrolled. The program provided a 75 percent cost share up to a maximum payment of $500,000 to landowners who experienced damage to their forest lands from wildfire. The program supported a range of forest restoration activities. A total of approximately $4,371,881 was committed to landowners in the Tamarack fire footprint to support restoration. This allowed for approximately 3,000 acres of dead tree removal and biomass processing

(chipping, mastication, piling and burning), plus conifer planting and seeding of forb, grass, and shrub species on two larger landholdings. Some EFRP projects were still in progress as of the end of 2023.

The EFRP is designed to rely on a technical assistance (TA) provider to assess restoration needs on lands proposed for treatment, assist in project planning, and certify practices completed using grant funds. When capacity allows, the U.S. Forest Service funds technical assistance through a state forestry agency based on an interagency agreement in place between FSA and the U.S. Forest Service. In California, TA is most often provided by a Resource Conservation District (RCD), absent in Alpine County. The local environmental consultant, Nevada Environmental, was already working with a large landowner on an EFRP project in the Tamarack Fire perimeter. They offered to provide TA for all landowners who applied for EFRP funds. They were also hired by Alpine County as a general contractor to help prepare and manage EFRT projects.

Landowner Communication and Enrollment

In late 2021, a coordinated outreach effort was organized by Alpine County, the U.S. Forest Service, Bureau of Land Management (BLM), Natural Resources Conversation Service (NRCS), and FSA to facilitate a broad community conversation about post-fire restoration. These conversations helped managers to gauge community views on post-fire restoration and provided a venue for educating landowners about best practices for post-fire forest management.

Formal landowner outreach began in December 2022. Program managers mailed materials providing information about the program to all private landowners in western Alpine County who were affected by the Tamarack Fire (approximately 100). Managers also emailed an online survey offering enrollment in the program. All landowners whose restoration needs fell under the scope of the EFRT were accepted, and ten received assistance from the EFRT. Some had already received some assistance from the EFRP.

Project and Landowner Prioritization

Managers projected that EFRT funds would be able to serve all interested landowners with forestland damaged by the fire for two reasons. 1) The number of private parcels and landowners affected by the Tamarack Fire in Alpine County is relatively small (especially compared to the number affected by other major wildfires in the same year such as the Dixie and Caldor Fires); and 2) The EFRP had already been used to treat many of the largest parcels.

The EFRT prioritized projects on lands that had not received any restoration funding from the EFRP. These were mostly smaller residential parcels (about a half-acre in size) where dead trees threatened homes and other structures. However, the EFRT was also able to fund additional restoration practices on larger parcels where EFRP projects had already been undertaken.

EFRT funds were also used to remove dead trees on 68 acres of county land near the airport's runway.

Treatments

The EFRT provided funding for additional restoration activities on land that was treated under the EFRP (generally larger parcels) and provided a full suite of treatments on parcels that did not receive EFRP funds.

Tree Removal and Site Preparation via the Emergency Forest Restoration Program (EFRP): The EFRP funded dead tree removal and biomass processing on some larger parcels surrounding Markleeville, including mastication, chipping, piling and burning, or firewood donation to the community. From two larger properties treated in 2021, saw logs were sold to the Sierra Pacific Industries Mill in Sonora, CA (over 1 million board feet) and to a mill in Loyalton (about 70 thousand board feet). Limited aerial seeding for grasses, forbs, and shrubs, and conifer seedling planting was funded by the EFRP.

Tree Removal and Site Preparation via the Emergency Forest Restoration Team (EFRT): On parcels where an EFRP project had not occurred, ERFT funded the cutting of dead trees. To the extent possible, trees were processed into firewood for donation to the community. Some biomass was masticated or chipped and broadcast onsite and some logs were arranged on slope contour for erosion control. Additional biomass was piled for burning.

EFRT funds were also used to reduce fuels on some parcels where practices were funded by the EFRP but were incomplete. Costs for these practices is high, and some landowners could not provide enough of their own funds to provide the required 25 percent cash match to the FSA funds. In these cases, landowners were not able to afford treatment of all their acres in need. EFRT managers were careful not to duplicate treatments on the same acres where EFRP treatments had been done.

Aerial Seeding and Planting of all Parcels: In fall 2023, the EFRT completed aerial seeding of a grass/forb/shrub mix across 2,730 acres where tree removal had occurred under either the EFRP or EFRT. This was undertaken to establish vegetation, stabilize soils and increase soil moisture on the drier sites of the eastern Sierra. The goal of the seeding is to help to develop conditions for tree survival and to reduce the risk of invasive species dominating a burned site. The seed mix included a high proportion of grasses and forbs and a low proportion of shrubs, to minimize shrub competition with conifer seedlings and future woody fuel loading. Also in fall 2023, funding from the EFRT was used to plant conifer seedlings on all parcels where trees had been removed by the EFRT and one large parcel where trees had been removed by EFRP. Some parcels will have additional biomass removed after planting. EFRT managers chose to include parcels treated under both programs in an aerial seeding to reduce the financial burden on landowners who already expended significant resources on treatments via the EFRP.

Project Permitting

Tamarack EFRT tree removal did not include commercial sales, and so was not permitted via the California Forest Practices Act. The potential for ground disturbance by tracked machines used

in tree removal and processing necessitated a Timber Waiver from Lahontan Regional Water Quality Control Board Forestry Dredge and Fill Program. Depending upon project scope, managers filed either a Category 2, Category 4, or Category 6 Timber Waiver with the Water Board, which also satisfied CEQA requirements. Managers also filed a permit with the California Department of Fish and Wildlife (CDFW) for emergency work under CDFW Code Section 1610. Cultural resource surveys were conducted by a contracted professional archaeologist, and identified cultural resource sites were flagged and avoided.

Contracting

Alpine County developed an EFRT team via contracts with multiple partners. With little forestry and post-fire management experience among county staff, Alpine County brought on a project manager to oversee and certify all EFRT activities, and to manage project planning and outreach (Figure 9).

Pathway Five - Integrated Oversight and Implementation: For oversight and completion of EFRT work, the County awarded a three-year project contract to a local environmental consulting company, Nevada Environmental Consulting, LLC. Under this contract, the consultant completed detailed project planning, biological and cultural resource permitting, and operator contracting and oversight, while also acting as the Licensed Timber Operator on all projects. The contract stated that this consultant would hire local operators as subcontractors to complete EFRT work. The consultant wrote work orders for operators and negotiated prices with them, certified the work and paid the subcontractor, and then submitted invoices to the County to recoup funds. The environmental consultant also did some of the restoration work and invoiced the County separately for that work.

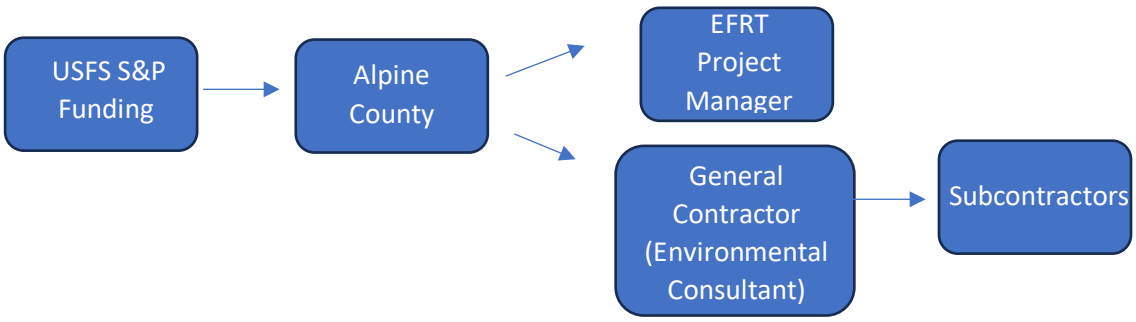


Figure 9. Flow of U.S. Forest Service State and Private Forestry (S&P) funds through Alpine County and contractors.

Progress and Future of the EFRT

Tree removal and processing were completed on the vast majority of EFRT sites in 2023. All acres where tree removal was done were planted and aerially seeded in fall 2023. In total, 121

acres underwent tree removal and processing (mastication, pile construction and/or pile burning, firewood processing) using EFRT funds. Additionally, EFRT funds were used on about 80 acres to process trees cut and left under the EFRP. Across parcels treated under either program, 2,730 acres were seeded with shrub, forb, and grass species, and 195 acres were planted with conifer seedlings.

Future Treatment Goals: Most EFRT treatment goals were met in 2023. Some processing of trees (primarily pile burning) remains to be done and was planned for winter 2023/2024. Managers will assess the effectiveness of aerial seeding and planting treatments and will follow up with additional broadcast seeding and planting as needed. While the EFRT has not undertaken herbicide treatments to date, managers expect to do some brush control in the future, either by herbicide spot treatments or mechanical removal to help planted tree seedlings survive. Also, additional landowners have requested assistance from the EFRT. Managers expect to be able to treat an additional 150 to 200 acres with remaining EFRT funds.

Development of the EFRT led to collaboration between various forest managers and stakeholders and the development of a regional forest health working group that offers a chance for Alpine County, the Forest Service, CAL FIRE, and others to align on regional forest health goals, including a vision for building forest resilience in a matrix of burned and unburned lands in Alpine County.

Role of State and Federal Cost Share Programs

Environmental Quality Incentives Program (EQIP): EQIP received 23 applications from landowners affected by the Tamarack Fire. Three of those applications received funding, encompassing approximately 173 acres with approximately $300,000 dedicated to the work. Many of the other applicants chose to participate in the FSA EFRP.

Emergency Forest Restoration Program (EFRP): The federal Farm Services Agency (FSA) Emergency Forest Restoration Program (EFRP) played a large role in private lands restoration following the Tamarack fire, as described earlier, including about 3,000 acres of tree removal and other site preparation.

California Forest Improvement Program (CFIP): No landowners affected by the Tamarack fire received CFIP funding for forest restoration.

Challenges Encountered by the Tamarack EFRT

Lead Agency Readiness: In the absence of a Resource Conservation District, Alpine County became the lead agency for the EFRT. Without experience in post-fire restoration, it took time for the County to identify appropriate partners and to assemble a team that would be able to address post-fire restoration needs on private lands.

Markets: While minimal material was commercialized from the EFRP projects, none was commercialized from EFRT projects due to lack of markets for woody biomass and saw logs, especially eastside pine trees. Inability to market material increased project costs and led to the

piling of a lot of material to be burned, though biomass was chipped or masticated to cover bare soils as funds allowed or donated as firewood for the community.

Timing: EFRT managers went ahead with planting all EFRT and EFRP parcels where trees had been removed, even though some piles remain to be burned and some chip to be broadcast. While final site preparation for planting was not complete on all acres in fall 2023, seedlings were available and so were planted. It was difficult to judge which acres would be ready for planting because of the small number of contractors available to complete the work.

Work Force and Equipment Constraints: Alpine County is the least populated county in California, and the work force is small. Few companies with the experience and equipment needed to complete EFRT projects, including tree falling, mechanical tree removal, and mastication operate in the area. Managers on public and private lands report difficulty in finding the necessary workforce.

Factors Aiding Tamarack EFRT Success

Small Scale: There were relatively fewer landowners that experienced severe fire effects from the Tamarack Fire, compared with other 2021 wildfires in the Sierra Nevada. In addition, the success of the EFRP in treating significant acreage within Alpine County reduced the need for restoration services among fire affected landowners. These factors made addressing remaining landowner needs more feasible, and prioritization less crucial.

EFRT Collaboration: Alpine County has small close-knit communities where most people know one another. Structuring the EFRT with known and trusted individuals as managers improved outreach and communication with landowners.

Collaboration with the EFRP: The EFRT benefitted in multiple ways from collaboration with the EFRP. The EFRT considered what work had been accomplished under the EFRP, and what needs remained, leading to a landscape-scale impact that served much of the need. In addition, the use of EFRT funds to seed and plant parcels that had been cleared under the EFRP was efficient and established vegetation where it would not have been possible under the EFRP due to funding limitations.

Contracting: Given the small size of the EFRT, the area to be served and the limited capacity of Alpine County, awarding a single contract to an environmental consultant to plan, manage, and partially implement EFRT projects was a successful strategy.

Outreach: The Tamarack EFRT benefitted from a collaborative outreach effort between the County and its representatives, the U.S. Forest Service, Bureau of Land Management, and others. Unified messaging about the need for post-fire restoration aided in bringing landowners on board.

Challenges Encountered by the Tamarack EFRP

Landowner Expense: The EFRP provides up to 75 percent of the cost of restoration activities for small private landowners after fire, up to $500,000. Therefore, landowners must have the funds

to cover the remaining portion of restoration costs. Even wealthy property owners may not be able to restore all high-needs areas of their land or be able complete all clean up and planting.

It is possible to solicit a match for EFRP funds from nonprofits, etc. to reduce the cost to landowners, but the EFRT funds could not provide a match because both EFRP and EFRT funds were from federal agencies. The EFRT was able to fund some restoration practices to reduce the financial burden on private landowners, and to provide the whole suite of restoration activities to landowners who could not afford the match required by the EFRP.

Financial Burden Carried by Operators: The EFRP includes a provision by which the operator is paid 75 percent of project costs directly from the Farm Services Agency so that the landowner does not have to pay the operator up front and await reimbursement. Because the federal payment process is lengthy, this imposes a financial burden on the operator who may have to carry the cost of payroll, fuel, transport and repair of equipment, and materials such as seedlings for many months while awaiting reimbursement.

Funding for Technical Assistance: The EFRP is not set up to provide reimbursement for technical assistance (TA) to a private consultant, as the intended TA provider is a state forestry agency (such as CAL FIRE) or a Resource Conservation District (RCD), through an interagency agreement between the U.S. Forest Service and FSA. Another governmental entity can sometimes fill that role if the state forestry agency is not able or willing. Instead, a private consultant provided the TA for the Tamarack EFRP without reimbursement expected, though the consultant has since been successful in obtaining reimbursement through the EFRP technical assistance funds which cover up to eight percent of the total cost of a disaster.

Key Findings

The three pilot Emergency Forest Restoration Team (EFRT) programs, all with different lead agencies and approaches, rapidly accomplished important forest restoration work in their respective fire areas. The characteristics of the wildfire-caused needs they addressed, the makeup of local organizations and the social context affected how they developed and how they carried out their work.

Scale of Restoration Need

The scale of need for forest restoration on private lands varied significantly between the three pilot EFRT programs, as did the method for assessing need (Table 3). The Plumas EFRT had by far the largest number of potential acres to address, resulting from three major fire areas spread across Plumas County in 2020 and 2021. The Tamarack Fire had the smallest number of acres needing complete restoration treatment, as tree removal had occurred on much of the private land with funding from the USDA Farm Services Agency's Emergency Forest Restoration Program (EFRP). The number of acres to be treated influenced the programs' approach to landowner enrollment and contracting, and the need to prioritize project areas.

	Plumas EFRT	Caldor EFRT	Tamarack EFRT
Acres of private land burned at moderate to high severity	19,730*	6,900	4,234**

*Table 3. Acres of restoration potential within the areas addressed by three pilot EFRT programs. Acres within the scope of the Caldor and Tamarack EFRTs is based on Burned Area Emergency Response (BAER) soil burn severity data. Acres within the scope of the Plumas EFRT is based on RAVG vegetation burn severity data. *Plumas EFRT includes acres burned in the 2020 North Complex fires, the 2021 Dixie Fire, and the 2021 Beckwourth Complex fires. ** Dead trees were removed on approximately 3,000 of these acres by the EFRP, reducing the potential scope of the Tamarack EFRT.*

Social Context

The human population varies within the counties covered by each EFRT. Alpine county has by far the smallest population, and has overall the highest level of social vulnerability, in part due to a high proportion of Native American residents. While the populations in El Dorado and Plumas Counties are much larger, the communities affected by the fires were small, rural, and less populated. All three EFRTs addressed the restoration needs of rural communities and individuals who lack the resources to undertake restoration on their own (Table 4).

County	Population	People of Color (%)	Age 65 or older (%)	Persons in Poverty (%)	Social Vulnerability Index (SVI)
Plumas	19,131	10	32	12.6	0.40
El Dorado	192,215	13	24	7.6	0.23
Alpine	1,141	31	26	16.3	0.50

Table 4. Demographic information for the three counties in which the EFRTs operated. All data comes from the United States Census Bureau (2023), except for the SVI, which was assessed by the Agency for Toxic Substances and Disease Registry (2022). The SVI is based on multiple measures of socioeconomic status, household composition and diversity, minority status and language, and housing and transportation. SVI ranges from 0 (low vulnerability) to 1 (high vulnerability).

Funding

Rapid funding of the three pilot EFRTs was possible through special disaster relief funds available following the 2021 fires, administered by the U.S. Forest Service State and Private Forestry, and by CAL FIRE in the form of Wildfire Resilience Block Grants. This funding was non-competitive and did not come with a requirement that grantees define lands to be treated before receiving funds, making it possible to start work quickly. The amount of funding received by the three pilot EFRTs correlated with the scope of restoration need in their areas. Each EFRT received an initial pulse of funding, and two required additional funds to address the scale of need in their target area. One received additional funding through a competitive grant while another received additional direct, non-competitive funds (see Table 5).

	Initial Funding (2022) ($million)		Additional Funding (2023) ($million)		Total ($million)
	CAL FIRE	USFS	CAL FIRE	USFS	
Plumas EFRT	8.3	2.5	2.5	8.5	21.8
Caldor EFRT	2.5	2.5	*	6.5	11.5
Tamarack EFRT		1.8			1.8

*Table 5. Funding received by the three pilot EFRT programs to date. All CAL FIRE funds were non-competitive Wildfire Resilience Block Grants. U.S. Forest Service (USFS) funding awarded to all pilots in 2022 and to the Caldor EFRT in 2023 were non-competitive disaster relief funds from USFS State and Private Forestry, Region 5. USFS funding awarded to the Plumas EFRT in 2023 was a competitive Community Wildfire Defense Grant (*El Dorado RCD applied for a $7 million grant from CAL FIRE in summer 2023 but was not awarded the funds.)*

Program Accomplishments to Date

All programs made significant progress toward their restoration goals by the end of 2023, completing post-fire reforestation treatments where they likely would not otherwise have happened (Figure 10). All programs have funds remaining and treatments will continue in 2024.

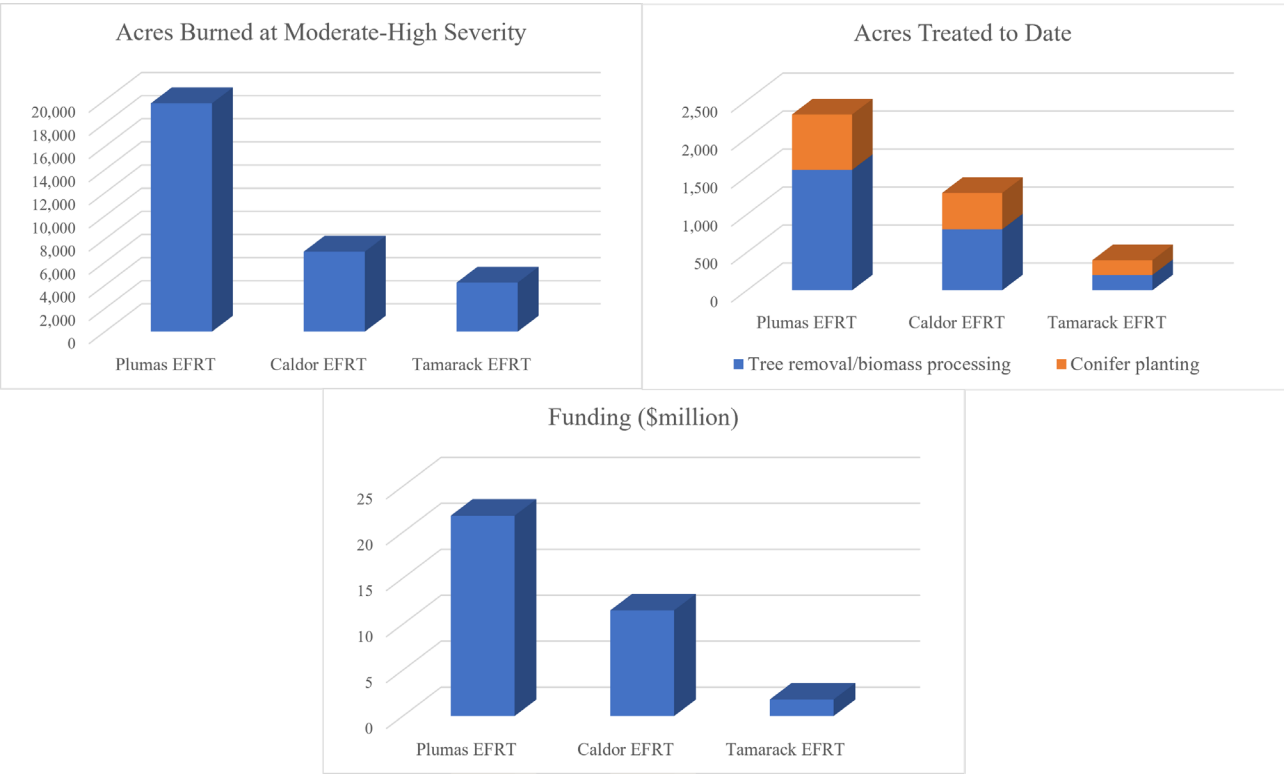


Figure 10. Estimated scale of restoration need (moderate-severely burned acres), acres treated to date, and funding for the three pilot EFRT programs. The Plumas EFRT completed 1,586 acres of tree removal and site preparation and 730 acres were planted (roughly half were sprayed with herbicide). The Caldor EFRT completed 803 acres of tree removal and site preparation, and 479 acres of planting, with herbicide required. The Tamarack EFRT completed full tree removal and site preparation on 121 acres, additional biomass processing on about 80 acres where tree removal and staging had occurred under the EFRP. The Tamarack EFRT also completed 2,730 acres of aerial seeding of forbs, grasses, and shrubs, and conifer planting on 195 acres.

EFRT Leadership and Structure

The leadership and structure of the EFRTs varied depending upon the presence or absence of an RCD and the expertise and capacity of local organizations and professionals. The Feather River Resource Conservation District (RCD) and the El Dorado RCD served as the lead agencies for the Plumas EFRT and Caldor EFRT, respectively. Both programs were managed by two RCD staff members, and each contracted with three professional foresters to plan, permit, and oversee EFRT projects. The Plumas EFRT was unique in its inclusion of multiple local natural resources organizations as subgrantees and partners in early planning and outreach.

Alpine County led the Tamarack EFRT in the absence of a local RCD. With no staff capacity to manage the EFRT program, the County contracted with a project manager to oversee all EFRT projects. An environmental consultant was also contracted to participate in planning and to permit and oversee treatment implementation.

All EFRTs were successful in developing and executing a program to rapidly address the post-fire restoration needs in their communities.

> *"I think every single [project] we did would have been in that position [of not happening without EFRT funds]…It's really gone a long way on the ground in getting work done."* – Private Forester, Plumas County.

RCDs are well-positioned to lead EFRTs because their local focus facilitates connections within the community, and their status as a state special district held to the standards of a governing board helps to protect the integrity of EFRT projects. However, they vary in their level of experience with post-fire restoration work, and, as much of their work is funded through project specific grant funding, their capacity to provide time and expertise to address local post-fire needs is often limited.

In addition, all managers expressed that they would have benefited from more preparation prior to the wildfires. All EFRT lead agencies had to rapidly change priorities to create a new program for which there was no precedent.

> "*Get[ting] some funding together so other RCDs can be set up before the fire, [would] make a world of difference….I wish I had had an additional 6 months before the fire to put all my protocols, policies and contract language in place, because we were getting calls within weeks of being approached by* CAL FIRE*, saying, 'I hear you have an assistance program'."* – Plumas EFRT Manager

Landowner Communication and Enrollment

All EFRT managers noted that establishing consistent and quality landowner communication was essential to program success, and all devoted significant staff time to this task. Managers reported difficulty in contacting landowners in areas where many had lost homes and been displaced by wildfire, and that many landowners were confused and wary when approached by multiple agencies doing post-fire tree removal (including Cal OES and utility companies). Landowner confusion and the frequent lack of familiarity with forest restoration practices meant that early and clear communication about EFRT program goals, intention and capacity was essential.

> *"[A strength of our program has been] providing assistance without being overbearing, and it's been quick. I think that us being present, and being able to visit each property, face to face with landowners, shows them that someone's here to help."* – Plumas EFRT Manager

> *"When I talked with these landowners, they were so thankful because they were like, 'We come up here for 4 weeks a year or one month a year or whatever, and we don't know anything about managing forests or how to abate these hazards.'"* – Plumas EFRT Forester

The three pilot programs took somewhat different approaches to landowner communication.

The Plumas EFRT's outreach was minimal early in the program, as word of mouth produced a high level of interest, facilitated by relationships between landowners and local forestry operators. The RCD later conducted targeted outreach to better manage landowner expectations for treatments timelines, and to reach landowners in priority areas.

The El Dorado RCD held public meetings early in the Caldor EFRT planning process to gauge landowner needs and to inform them of program scope and intent. Following the landowner enrollment process, the RCD hired a dedicated communications staff person as the main point of contact for landowners, smoothing the communication process.

Since the scope of the Tamarack EFRT included a smaller group of landowners, Alpine County was able to contact and offer assistance to all landowners in western Alpine County who had been affected by the Tamarack Fire. EFRT managers coordinated early outreach with other public and private land managers to inform landowners of available assistance programs and to spark a community conversation about forest management.

Prioritization of EFRT Work

While prioritizing work areas was important in all pilot programs, it was even more critical where the scale of restoration need was large, especially when that need was spread across a broad geographical area. The programs all prioritized projects close to the severely affected small towns as opposed to larger, dispersed, and more rural properties. This strategy likely led to fewer acres treated but served more residents and reduced fuels around rebuilding communities, while reestablishing forested acres.

The Plumas EFRT did not initially prioritize areas of work, hoping to address the needs of all who were interested within the first couple of years of the program. A great level of interest in the program across the burned portions of Plumas County forced managers to later prioritize and, in some cases, to readjust their anticipated timeline for serving landowners. The RCD chose to prioritize clustered properties within a few specific areas in Plumas County, including around the burned town of Greenville.

Much of the impact of the Caldor Fire to non-industrial private lands was concentrated around the burned town of Grizzly Flats, and so this area was a clear priority for the Caldor EFRT from the outset. The RCD prioritized first the area immediately surrounding the town, and then the town itself, once debris clearing and hazard trees threatening public property were removed by the California Office of Emergency Services (Cal OES).

Private land impacts of the Tamarack Fire were concentrated in the area around the town of Markleeville, which largely survived the fire. Prioritization was less needed because the Emergency Forest Restoration Program (EFRP) had already addressed many of the larger landholdings in need of restoration. The EFRT focused on smaller landowners, including those

who could not afford the out-of-pocket costs associated with the EFRP, as well as additional treatments on some EFRP treated parcels.

Treatments

All pilot EFRTs undertook tree removal, site preparation and conifer planting, though practices varied somewhat due to vegetation type and the degree of tree removal already completed by salvage logging projects or other post-fire assistance programs. The EFRTs varied in how they handled commercialization of trees and other wood products, and in their use of herbicide to control competing vegetation (see Table 6).

	Site Preparation					Reforestation		Aerial Seeding (forbs, grasses, shrubs)
EFRT	Tree Removal	Commercialization of Trees and /or Woodchips	Pile and Burn	Mastication	Soil Ripping	Conifer Planting	Herbicide	
Plumas	Yes	Yes	Yes*	Yes	No	Yes	Optional	No
Caldor	Yes	No	Yes	Yes**	Yes	Yes	Required	No
Tamarack	Yes	No	Yes	Yes	No	Yes	No	Yes

*Table 6. Treatments undertaken by the pilot EFRTs. *Use of pile burning was minimal and woody material was processed almost entirely by mastication and chipping. ** Use of mastication in the Caldor EFRT was minimal and pile burning was the method most used to process woody material on site.*

The Tamarack EFRT's treatment approach was unique given its eastern Sierra and Great Basin ecotone location and drier, slower growing plant communities. In addition to dead tree removal and conifer planting, treatments included aerial seeding of forbs, grasses, and shrubs to stabilize soils, retain moisture, and establish native vegetation to outcompete invasive species. The EFRT provided aerial seeding to all acres where trees were removed by the EFRP and the EFRT to reduce the cost burden on landowners enrolled in the EFRP. No herbicide has been used to date by the Tamarack EFRT given its focus on establishing a variety of vegetation in an ecosystem where shrub competition is less of a challenge in early reforestation. In the next year, managers will assess whether some herbicide use is necessary to control shrubs competing with tree seedlings.

The Caldor EFRT was unique in two practices: 1) soil ripping to increase root and water penetration and reduce erosion – a practice common to this area, and 2) requiring landowners to accept herbicide use as a condition of tree removal and planting to ensure conifer seedling success. The Plumas EFRT offered herbicide release treatments but did not require that landowners accept them. About half opted to have herbicide sprayed after planting.

Project Permitting

Permitting strategies varied between the pilot EFRTs, demonstrating the lack of a clear pathway for permitting post-fire tree removal and reforestation work on private lands. All EFRTs were

required to complete an environmental review process because they received public funding (Valachovic et al. 2022).

The environmental review and permitting process followed by EFRTs varied depending upon whether the program included commercial sale of wood products. The Caldor and Tamarack EFRTs did not integrate commercial wood products into their projects and so used the California Environmental Quality Act (CEQA). The Plumas EFRT integrated commercialized wood products into funded projects and so used the California Forest Practices Act (FPA) permitting pathway. As planting and herbicide application are not covered by a CAL FIRE Emergency Notice, Plumas EFRT managers had to then conduct a CEQA analysis for these activities (See Table 7).

Both the FPA and CEQA required that an archaeological review of the treatment area be completed. FPA permitting allowed an RPF to complete the assessment if they had the required CAL FIRE certified archaeology surveyor training, whereas the CEQA process required a professional archaeologist. Managers reported that the need to contract a professional archeologist increased program costs, and that these professionals are few. To minimize this burden, managers using the CEQA pathway were able to use cultural resource reports already completed by an RPF under a CAL FIRE permit, or those completed by Cal OES, where they were available (See Table 7).

<table>
<tr><th></th><th></th><th>Plumas EFRT</th><th>Caldor EFRT</th><th>Tamarack EFRT</th></tr>
<tr><td rowspan="3">Permit Pathway</td><td>Merchantable tree removal</td><td rowspan="2">CAL FIRE Emergency Notice (RPF completed cultural resource reporting)</td><td>N/A
(CAL FIRE Emergency Notice by some landowners prior to EFRT)</td><td>N/A
(CAL FIRE Emergency Notice by two landowners prior to EFRT)</td></tr>
<tr><td>Sub-merchantable tree removal</td><td rowspan="2">CEQA Categorical Exemption (cultural resource reports from Emergency Notices and Cal OES activities utilized where available)</td><td rowspan="2">Water Board Timber Waiver (cultural resource reports completed by a certified archaeologist)</td></tr>
<tr><td>Planting and herbicide</td><td>CEQA Statutory Exemption (cultural resource reports from CAL FIRE Emergency Notices utilized)</td></tr>
</table>

Table 7. Permitting pathways for EFRT projects. The Plumas EFRT went through two permitting processes due to their integration of commercial wood product sales in EFRT contracts. The Caldor and Tamarack EFRTs completed a single permitting process following CEQA guidelines because wood products sales were not integrated into their treatment contracts.

Whether permitted through the California Forest Practices Act or CEQA, all EFRT projects avoided treatments around known and observed cultural resource sites. Treatment in these areas would require contracting with a professional archaeologist to further evaluate the site or supervise treatment activities, increasing costs and time. As a result, significant portions of project areas were excluded from treatment, particularly for the Caldor EFRT, as the Grizzly Flats area has an extensive history of hydraulic mining. Managers had some success in treating near prehistoric sites through tribal consultation.

Tree removal activities conducted by Cal OES, Caltrans, and electric utilities in all fire areas prior to EFRT treatment required permitting in addition to the permitting pathways later followed by EFRTs. As a result, some properties had as many as three discrete permitting efforts to achieve all the practices needed for post-fire restoration. This highlights the opportunity for collaboration in permitting.

The Caldor EFRT had some success in collaborating on permitting with Cal OES, who helped the EFRT by sharing permitting information and resources. Tree removal activities undertaken by the Cal OES hazard tree program were covered by an Environmental Protection Plan (EPP). While EFRT treatments could not be covered by this EPP, the RCD was able to adopt environmental measures laid out in the EPP to help establish grounds for a CEQA Categorical Exemption for EFRT treatments. The RCD also received biological and cultural resource reports generated by the Cal OES where they had completed hazardous tree removal. Neither the Tamarack nor Plumas EFRT had such collaboration with Cal OES.

> *"[OES was] very, very supportive, and we would not have been able to get through the environmental [review] or even our initial work plan without their help."* – Caldor EFRT Manager

> *"We were attempting to share a lot of the actual outcomes from our environmental assessments and monitoring. And we had a biologist and qualified archaeologist on pretty much every single parcel in Grizzly Flats… I early on said, 'well gosh, there's got to be a way you can benefit from the fact that we've already paid for all this work and you're planning to work a stone's throw from our project.'"*– Cal OES Debris Operations Chief

Commercialization of Woody Material

Commercialization of forest products in the form of salvaged sawlogs, firewood, or woodchips varied on the parcels treated by the ERFT programs and had an influence on the amount of material left onsite. While retention of some woody material was desirable for erosion control and moisture retention on bare mineral soils, the lack of markets led to a large volume of woody material processed or left onsite by all programs.

> "*We've been to some properties with just beautiful trees that are… completely burned [with trees that] could definitely still have some value. And they're just getting chipped…If there were a market it would be great."* – Plumas EFRT Manager

> *"To the extent that there can be pre-existing, functional pathways or processes [for handling woody biomass] pre-fire…it's critical, because there is going to be another fire...It feels like we are trying to stand up this new way of doing things in an emergency setting…which is a terrible time to try to start a new thing."* – Forestry Program Manager, Sierra Institute for Community and Environment

The Plumas EFRT allowed for commercialization of wood products by operators under contract for EFRT projects when markets were available. This region has historically maintained a strong

forest products economy. However, markets were limited because the extreme size of the fire and the area burned at high severity meant that the supply of salvaged timber far exceeded manufacturing plant capacity. Additional constraints to commercialization included limited operators, transportation costs relative to product value, and small project scale. Approximately 1,015 acres treated by the EFRT had some sawlog and chip removal, while the remaining 571 acres had wood chip and firewood removal only. While some material was sold as part of each Plumas EFRT project, many parcels still had a large volume of woody material that had to be processed onsite via mastication and chipping and broadcasting, including many sizeable trees.

> *"Trucking is [very expensive] and there are not a lot of trucks. And so that is another reason why mastication and just rearranging [fuels] and leaving it all on site is one of the go-to [treatments]."* –Plumas EFRT Forester

> *"[The lack of markets for logs and wood chips] is a gigantic limitation. So much more could be accomplished if there was more of a market... even just for chips. If chips were paying enough to offset some of this cost, that would change things a lot."* – Plumas EFRT Forester

The Caldor EFRT did not include commercial tree removal under its contracts and instead encouraged landowners to work with an RPF to sell marketable trees prior to EFRT work and facilitated sales by conducting a market study to help inform professionals and by connecting landowners to forestry professionals. While markets for fire-killed trees were limited in the area, some landowners chose to sell logs and were successful. Of the 803 acres prepared for planting by the Caldor EFRT, 554 acres were salvage logged prior to EFRT treatments. In these cases, the number of trees needing removal using EFRT funds was reduced, though sub-merchantable trees and other woody material remained on these parcels after logging. Where landowners did not sell trees prior to the EFRT work, a larger volume of trees remained for processing onsite through pile burning and mastication.

Markets for fire killed trees from the Tamarack Fire were extremely limited, though salvage logging occurred on about 470 acres where some additional treatment was later funded by the EFRT. While some trees cut by the EFRT were donated as firewood to the community, much of the biomass was burned or chipped and or masticated and remained onsite.

Though they took different approaches, about two thirds of the lands treated by the Caldor and Plumas EFRTs were salvage logged. There are advantages and disadvantages to including commercial products within EFRT projects. One advantage is the potential to lower overall project costs by increasing efficiency. Working with a single operator to complete both sawlog removal and treatments of sub-merchantable material in the same project reduces costs associated with moving equipment to a project site under two separate contracts. Including commercial sales also leads to permitting of tree removal under the Forest Practices Act, allowing the permitting forester to complete archaeology reports, which is often more cost-effective. However, inclusion of commercial sales within Plumas EFRT projects led to multiple permitting pathways – the Forest Practices Act for tree removal and site preparation, and CEQA for planting and herbicide. Additionally, including commercial sales within EFRT contracts led

to complex accounting. It is notable that commercial tree removal is not allowed in state and federal landowner assistance programs (e.g. CAL FIRE CFIP; NRCS EQIP).

Contracting

The structure of contracts to complete EFRT treatments varied by program. All programs contracted with multiple operators, allowing work to be completed simultaneously and increasing efficiency. Across the EFRTs, five different contracting methods were utilized, and all were effective, though some were more complex.

The Plumas EFRT followed multiple contracting pathways. While the EFRT was still in development, Feather River RCD was able to amend an existing contract with a local operator in the Greenville area to fund the tree removal and site preparation work they were already doing for landowners (Pathway One). This made it possible to leverage EFRT funds to support landowners quickly and allowed them to work with an operator well-known in the community. Work under this pathway continued into 2023. Plumas EFRT leaders then awarded an indefinite delivery/indefinite quantity (IDIQ) contract to a single operator (with the option to subcontract) for the bulk of tree removal and site preparation work (Pathway Two). Additionally, Feather River RCD funneled EFRT funds through the Maidu Summit Consortium who contracted directly with operators for tree removal and site preparation on their Tasmam Koyom land (Pathway Three). Single contracts were awarded for planting and herbicide application.

The Caldor EFRT awarded three contracts to operators in three distinct geographical zones (Pathway Four). These contracts included all aspects of treatment (tree removal, soil ripping, tree planting, herbicide) which could be subcontracted at the primary operator's discretion.

For the Tamarack EFRT, Alpine County contracted with an environmental consultant to plan and permit all projects (Pathway Five). The consultant completed a portion of the work as an operator and subcontracted several operators to complete additional work.

Dividing contracts into distinct geographical areas, as in the Caldor EFRT, made it easier to define the work to be done, and so to set a per-acre rate for work. The greater geographic range of work to be accomplished under the Plumas EFRT contract added complexity to contracting due to the unknown quantity, timelines, and scope of work. This made contract bidding, implementation, and administration more complex. On the other hand, this broad contract allowed for work to begin before all projects to be completed were prepared, and provided the flexibility to add parcels once more landowners became interested in treatment.

Role of State and Federal Landowner Cost Share Programs

The role of cost-sharing individual landowner assistance programs, including EQIP, CFIP, and EFRP, varied significantly across the three EFRTs (See Table 8). In the Plumas and Caldor EFRTs, these programs were not widely used, and many landowners were referred by EQIP managers to the EFRTs for more timely or flexible technical assistance and funding. However, the Tamarack Fire provided an example of the important role cost share programs can play and

demonstrated that EFRTs can coordinate and leverage the work of these programs to have a greater landscape scale effect.

Prior to the formation of the Tamarack EFRT, the USDA Farm Services Agency (FSA) Emergency Forest Restoration Program (EFRP) funded restoration work for several larger private landowners affected by the Tamarack Fire. This reduced the scale of need for the EFRT program and allowed for prioritization of the smaller landholdings closer to the community of Markleeville. The EFRT then completed work on larger parcels where work was partially funded by the EFRP but where landowner capacity to match EFRP funds was limited, or the maximum EFRP funding allotment had been met.

> *"We will have some money available to do some more work [after currently enrolled landowners are served]. I think that's a testament to the fact that [the technical assistance provider] got a lot of money to the landowners through the EFRP process…The massive influx of EFRP funding was huge. So, the total restoration dollar figure is way larger than EFRT.* –Tamarack EFRT manager

	NRCS EQIP		CAL FIRE CFIP		FSA EFRP	
Fire	Landowners	Acres	Landowners	Acres	Landowners	Acres
Plumas*	2	285	4	400	0	0
Caldor	8**	255	0	0	0	0
Tamarack	3	173	0	0	18	2,978

*Table 8. Landowner cost share assistance programs that contributed to post-fire restoration on private lands in fires covered by EFRTs. Additionally, My Sierra Woods funding already granted for forest thinning work on private lands was repurposed to provide post-fire restoration assistance for some landowners in the Dixie Fire. *The scope of the Plumas EFRT included private lands burned in the 2020 North Complex, 2021 Beckwourth Complex, and 2021 Dixie Fires. The six projects funded between CFIP and EQIP in this area were in the North Complex Fire. **The 8 projects funded by EQIP were outside of the Grizzly Flats area.*

It is notable that these state and federal cost share programs require that the landowner pay a portion of restoration costs, and often that the landowner be able to pay those costs up front prior to reimbursement. All EFRT programs provided restoration funding and technical assistance at no cost to the landowner.

> *"That's where the EFRT comes in and is very helpful. If you're just one landowner at the end of the road, the likelihood of finding somebody to come and take your logs...where are they going to take them? The cost to get them off [the land]... our [NRCS Cat Fire] funds are so minimal because we're looking at funding anywhere between 50 to 75 percent [of the project cost]...it just ends up being too costly."* – NCRS EQIP Program Manager

In addition to assistance programs for individual landowners, there are grant programs with the potential to provide funding for EFRT lead agencies to do landowner assistance work. The Plumas EFRT explored applying for funding through the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program but decided not to pursue the funds because FEMA timelines and permitting processes were too complex and lengthy and required a 25 percent match with non-federal funds. The Caldor EFRT applied for CAL FIRE California Climate Investments (CCI) grant in 2023 but was unsuccessful.

Conclusions and Recommendations

1. Success in Delivering Post-Fire Treatments

- **Conclusion 1a: The EFRT program model works.** The EFRT pilot programs effectively delivered rapid post-fire technical assistance and forest restoration services to small private forest landowners. The flexibility of the model allows for rapid development of assistance programs in areas with variable fire impacts, vegetation types, community capacity, and forest management industry and workforce.
- **Recommendation 1a: Development of EFRTs to address post-fire forest restoration should be continued.** Emergency Forest Restoration Teams led by local organizations such as Resource Conservation Districts should be formed to address urgent post-fire restoration needs on non-industrial private forest lands.

- **Conclusion 1b**: **Where present, Resource Conservation Districts (RCDs) were effective EFRT lead agencies**, demonstrating their ability to manage complex forest restoration work. If the capacity built up with EFRT funds were sustained, RCDs could continue essential pre- and post-fire forest restoration work.
- **Recommendation 1b**: **RCDs should be supported to manage forest restoration work after conclusion of the EFRT through sustained funding**. Planted forests need ongoing maintenance for reforestation to be successful, including control of competing vegetation and thinning. RCDs are well positioned to continue this work.

2. Funding and Support for EFRTs

- **Conclusion 2a: Rapid implementation of the three pilot EFRTs was made possible by special, discretionary disaster relief funds** available through the U.S. Forest Service and CAL FIRE. This pulse of funds allowed for work to begin much more quickly than would have been possible if EFRT managers had to wait for competitive grant funding processes.
- **Recommendation 2a: Future sources of rapid funding for EFRTs should be explored.** Such funding sources should be available to fund work quickly after a fire and be flexible in providing funds before identification of lands to be treated.

- **Conclusion 2b**: **EFRTs may not be able to address the total landscape in need of treatment due to limited funding.** The scale of immediate restoration need after wildfires is large and tree removal, processing of woody debris, and site preparation is costly, particularly in the absence of a viable market for forest products.

- **Recommendation 2b: EFRTs should be allocated sufficient funds to implement costly and complex projects**. To achieve the intended social and landscape-scale ecological impact, sufficient rapid response funding is needed to treat high priority areas.

- **Conclusion 2c**: **Local lead agencies implementing EFRTs would benefit from support before a wildfire.** Regardless of an organization's experience and capacity, rapid development of an EFRT can put strain on implementors as they must redefine priorities, bring on any necessary new staff, and quickly develop and execute a new work plan.
- **Recommendation 2c**: **Support should be provided to local organizations to plan post-fire assistance programs before a wildfire occurs.** Advanced funding and technical assistance could support local organizations like RCDs to develop programs to respond quickly should a wildfire occur. RCDs would also benefit from having access to templates to assist in the development of program documents such as contracts and right of entry agreements. Templates could be developed by the California Association of Resource Conservation Districts (CARCD).

- **Conclusion 2d: RCDs and other organizations that have led EFRTs are an important resource for those who will develop EFRTs in the future**. Access to their experience and knowledge would allow new EFRTs to develop with greater efficiency.
- **Recommendation 2d: A team of experienced EFRT leaders could be funded to provide support to new EFRTs as they develop.** Such a team would provide advice to local organizations during the critical formation period, and provide information and resources for contracting, permitting, etc.

3. Prioritization of Treatment Areas

- **Conclusion 3: Prioritization of treatment areas is important for EFRT success,** especially when the potential scope of work for an EFRT program is large**.** With funding for EFRTs limited and community expectations high, lack of prioritization leads to difficulties in logistics and landowner communication.
- **Recommendation 3: EFRT managers should prioritize the landscape to be treated early** by defining the program's goals and scope and setting criteria for landowner enrollment**.** Managers should consider first prioritizing geographical areas based on greatest need and the potential impact of treatments. They may need to further prioritize parcels based on factors such as parcel size, fire severity, restoration objectives, and treatment type.

4. Landowner Outreach and Communication

- **Conclusion 4: Communication with landowners about forest restoration projects is critical to EFRT success.** Establishing and maintaining quality communication helps to manage landowner expectations, promote trust, and minimize confusion. Landowners who have been affected by wildfire, especially if they have lost a home, are often vulnerable and may be overwhelmed by the complicated process of wildfire recovery.
- **Recommendation 4: EFRT managers should prioritize communication with landowners.** Managers should clearly communicate program intent, scope, and capacity from the beginning. It may be beneficial to hire or assign a communications manager as the primary point of contact with landowners.

5. Wood Products Markets and Commercialization

- **Conclusion 5a**: **Commercializing dead trees reduces the amount of wood that must be processed on site.** There are pros and cons to including commercial sales within EFRT contracts. The use of a single contractor for commercial and non-commercial work may increase efficiency. A downside to including log sales in contracts is that it may lead to difficult accounting.
- **Recommendation 5a: EFRT funding should allow flexibility to sell woody material whenever possible.** Commercialization of wood products should be encouraged by EFRTs, whether sales occur as part of the work completed under EFRT contracts or prior to EFRT treatments. When managers choose to structure EFRT programs to begin work after commercial harvesting is complete, they should facilitate commercial operations where possible by connecting landowners to local forestry professionals and operators.

- **Conclusion 5b**: **The lack of markets for fire-killed woody material, including sawlogs, firewood, and woodchips, makes implementation of post-fire projects more difficult.** While markets vary by location and year, mills and processing sites for woody biomass are limited and transporting material is very expensive. This increases the amount of woody biomass left on site and so increases treatment costs.
- **Recommendation 5b**: **Development of a wood products industry should be prioritized to support both green thinning and effective post-fire restoration.** Having a viable local timber industry in place would substantially reduce the cost and complexity of post-fire fire treatments supported by public funds.

6. Project Permitting

- **Conclusion 6a**: **Post-fire permitting is complicated and confusing.** In California's complex regulatory landscape, there is no clear pathway for permitting publicly funded post-fire forest restoration projects on private land, and all pathways come with limitations in scope and timeliness. Consequently, treatment options and flexibility may

be constrained, and redundant permitting may be required for different treatment types and different agencies.

- **Recommendation 6a**: **Permitting should be simplified and clarified.** The permitting process for publicly funded post-fire restoration should facilitate and expedite restoration work. The California Natural Resources Agency and the California Board of Forestry should identify a clear and streamlined permitting process for post-fire restoration projects that simplifies environmental compliance. Possible pathways include:
    - For projects permitted through the California Forest Practices Act, permitting could also include common post-fire activities such as non-commercial tree removal, site preparation, planting, and competing vegetation control.
    - For projects using CEQA, a broader base of forest management professionals could be allowed to meet archeological survey needs as is permitted under the California Forest Practices Act.
    - Post-fire forest restoration work undertaken by EFRTs could be allowed coverage under an Environmental Protection Plan (EPP) when such a plan is drafted for emergency response agencies working in the same area. Such a process could be facilitated through interagency emergency response collaboration as described in recommendations 8c and 8d, below.
    - Sharing permitting information (e.g. archaeological reports) could be allowed across agencies and programs to expedite restoration activities.

- **Conclusion 6b**: **EFRTs are leaving cultural resource sites untreated due to cost and complexity of compliance.** This may leave large portions of the landscape left untreated, especially in the Sierra Nevada where there is an extensive mining history. Where post-fire fuels are heavy, this puts communities and cultural resource sites at risk of damage from future fire and tree fall.
- **Recommendation 6b**: **The cultural resource review process for post-fire restoration projects should be reviewed and improved.** EFRT managers should consult with tribal members to review prehistoric sites and discuss possibilities for carefully treating the sites.

7. Contracting Pathways

- **Conclusion 7**: **There are challenges and benefits associated with different contracting approaches.** The three pilot projects used five different contracting pathways to complete forest restoration work, varying in the number of contracts awarded, the size and scope of contracts, the complexity of work to be done, and whether contracts designate specific parcels to be treated.
- **Recommendation 7**: **EFRT managers should carefully weigh the advantages and disadvantages of contracting mechanisms**. Because of the complexity and scope of EFRT programs, there are many factors at play in contract design.

- Though each contract requires administrative time and effort, managers should consider awarding multiple contracts to increase the pace of work.
- Contracts should designate work in a particular geographical area to minimize the potential for complexity in treatments and to increase work efficiency.
- Contracts should establish a clear scope of work and simple pay rates to reduce negotiation once contract work has begun.
- Managers should consider allowing flexibility in defining parcels to be treated, as possible, so that parcels can be added to contracts as needed.
- Managers must understand whether direct reimbursements to landowners for restoration work are allowed under their funding source. If such payments are made, landowners should be informed of the tax liability they may incur.

8. EFRT Partners and Interagency Collaboration

- **Conclusion 8a**: **EFRTs require expertise in multiple fields to be successful.** Critical skills include environmental compliance, communications and outreach, contract administration, and forest restoration practices. Multiple organizations may be needed to fulfill all necessary skill sets. The direct involvement of multiple agencies in an EFRT may spread the workload, leverage expertise, and reduce redundant environmental compliance. However, close coordination and collaboration is essential to allow for smooth team functioning.
- **Recommendation 8a**: **EFRTs should include partners with the experience and expertise needed for program success**. Roles and responsibilities of each partner should be clearly defined and documented to improve efficiency and avoid duplication and delays.

- **Conclusion 8b**: **Local forest professionals play a key role in the success of EFRTs.** Where they are active within a community, they can facilitate EFRT work through their relationships with landowners and other professionals. Their connections to processing facilities can increase wood commercialization and so decrease program costs and enhance program effectiveness.
- **Recommendation 8b**: **EFRTs should integrate private forest professionals into planning and implementation of projects.** RPFs, LTOs, and other local forestry professionals have knowledge and connections that can lead to program success. In communities with well-established forestry professionals, program managers should seek their involvement in the EFRT and when possible, consider designing the program such that a landowner can work with an RPF and/or LTO they already have a relationship with.

- **Conclusion 8c**: **Collaboration with other state and local agencies working on private land after wildfire reduces the workload for EFRTs**. Collaboration and information sharing with other organizations removing trees on private land after wildfire, including Cal OES and electric utilities, facilitated EFRT planning and implementation.
- **Recommendation 8c: EFRTs should seek collaboration with other agencies engaged in post-fire forest restoration on private lands**. Beneficial outcomes might include:
    - Improved access to landowner contact information.
    - Coordinated, multi-agency landowner outreach regarding different emergency response programs, minimizing landowner confusion.
    - Facilitated information sharing between agencies as they plan landowner assistance projects (for example development of a regional GIS database capturing post-fire response activities).
    - Coordination in permitting similar work in a common area.

- **Conclusion 8d**: **Pre-fire relationships aid collaboration**. Collaboration on post-fire assistance to private landowners is facilitated by pre-existing relationships between agencies.
- **Recommendation 8d: Landowner assistance agencies and organizations should collaborate before disasters**. Local agencies should meet regularly to coordinate their assistance programs. One meeting goal would be to analyze how best to integrate their landowner assistance programs and share information after wildfires. Additionally, RCDs could coordinate across the state on best practices for post-fire response in preparation for possible wildfire, while CARCD could seek coordination of post-fire responses with Cal OES at the state level.

- **Conclusion 8e**: **All EFRTs developed important collaborations with public land managers**. EFRTs conducted restoration projects on public land with special use permits as well as coordinating on public education and outreach.
- **Recommendation 8e**: **EFRTs should seek collaboration with state and federal land managers** such as the US Forest Service, US Bureau of Land Management, and State Parks, when possible, to explore shared treatment opportunities and united public education efforts. Public agencies should look to engage with EFRTs to assist in treating public lands in private use.

9. Integration with State and Federal Cost Share Programs

- **Conclusion 9a**: **Emergency Forest Restoration Teams can work productively in partnership with existing landowner assistance programs.** To address the large scale of landowner needs after wildfire, cost share programs such as EQIP, CFIP, and EFRP are necessary even where an EFRT has been established. EFRT programs are effective at

delivering timely technical assistance and services (with no cost share requirements) targeted to specific areas such as around communities. Traditional cost share programs may be more effectively used to address individual landowner needs on larger, more scattered rural parcels that do not pose an immediate threat to rebuilding communities. Working together allowed EFRTs and cost share programs to increase the landscape and community restoration scale.

- **Recommendation 9a**: **Individual landowner cost share programs should participate in EFRTs to help with prioritization, landowner communication, and implementation**, while EFRTs should facilitate landowner participation in cost share programs when possible. This will increase the scale and impact of restoration work, and lead to greater efficiency in the work of each program.

- **Conclusion 9b: The practices implemented by EFRTs directly after a fire are not sufficient to develop resilient forests for the long term.** Maximizing reforestation success and developing a resilient forest for the long term requires multiple treatment entries over several years to manage vegetation and thin young stands.
- **Recommendation 9b: To achieve reforestation success in the long term, landowners should be supported to continue forestry management beyond the time frame of an EFRT.** Cost share programs such as CFIP and EQIP should play an important role in funding future forest management on these parcels. When capacity allows, EFRTs could promote future management by developing forest management plans for landowners who receive immediate post-fire treatments from the EFRT.

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Dedication

This report is dedicated to the memory of our co-author Ryan Tompkins, the UCCE Forestry and Natural Resources Advisor for Plumas, Lassen and Sierra Counties, who tragically passed away before its publication. He made invaluable contributions to California's forests and their inhabitants through his dedication to reforestation and resilient forest management. His depth of experience and knowledge of forest restoration treatment implementation and monitoring greatly shaped the contents of this report. His talent for sharing information with wisdom, humility, and humor will be greatly missed by us, his many professional colleagues in the University of California, the US Forest Service, and Plumas County, and the many forest landowners he advised.

Ryan Tompkins leading a field trip to the Dixie Fire, September 2022. He helped many people understand the necessity and challenges of post-fire reforestation in the Sierra Nevada.

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