Fall River Community

Wildland Fire Protection Plan

June 6, 2022

Fall River Community Wildland Fire Protection Plan

In order to protect the lives and land of Fall River Valley Residents, this Community Wildland Fire Protection Plan (CWPP):

① Was collaboratively developed by local residents and CAL FIRE, the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), and Sierra Pacific Industries (SPI). Local fire departments in the project area were also consulted;

② Identifies and prioritizes areas that need to be treated to reduce hazardous fuels, as well as suggesting specific approaches and methods to accomplish this both efficiently and effectively; and

③ Recommends essential measures to reduce structural ignitability.

The following organizations mutually endorse—and agree to—this CWPP:

Name	Title/Organization	Signature	Date
Mary Rickert	District Three Supervisor Shasta County Board of Supervisors		
Greg Mayer	Chief Soldier Mountain Volunteer Fire Company, Shasta County Fire		
Jeff Oldson	Chief Fall River Valley Fire Department		
Craig Drake	Field Manager Applegate Field Office Bureau of Land Management		
Sean O'Hara	Chief CAL FIRE and Shasta County Fire Dept.		
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1 Introduction

1.1 Purpose of the Plan

It Is Not a Matter of **IF** There Will Be a Wildfire, but **When**.

The intent of this Community Wildfire Protection Plan (CWPP) is to more effectively safeguard human life and values within and adjacent to:

- Dana,
- Fall River Mills,
- Glenburn,
- The Alpine and Big Eddy Subdivisions, and
- The Saint John's Ranch Area

(Collectively called "the Communities") through proactive wildland fire mitigation and preparedness. If followed, it will reduce both the threat of, and damage caused by, wildfires *when* they occur.

Protection focuses primarily on life and safety. Preserving other community values is secondary, including: structures, critical infrastructure, businesses, and natural and historic resources. This plan will guide current and future wildfire protection efforts as the community works together to reduce the danger. It was designed for use by homeowners, property owners, business owners, fire protection organizations, and any other interested group/party.

The implementation of the actions presented in this document is subject to available funding, permission/access to work on private lands, the priorities of the community, environmental review under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), and/or any other required permitting processes[1].

1.2 Goals and Objectives

The goals and objectives of the Fall River Community Wildland Fire Protection Plan are presented in Table 1.

[1] Pending site-specific land ownership/administration stipulations.

Table 1 - Goals and objectives of this CWPP.

Goal	Objectives
Reduce the threat to life and property from wildfire.	◦ Identify specific areas with the greatest wildfire threat. ◦ Identify safe evacuation needs. ◦ Identify guidelines and mitigations strategies to reduce threats to life and property. ◦ Partner with BLM/USFS/private landowners on strategic fuel reduction plans.
Promote healthy landscapes in order to improve water and air quality.	◦ Use fire reduction treatment strategies that consider resource and environmental quality. ◦ Use best management practices regarding natural and historic resources. ◦ Ensure the CWPP meets the requirements of the Healthy Forest Restoration Act of 2003. ◦ Seek to coordinate all the efforts being made to mitigate the effects of ongoing tree mortality.
Improve protection of values at risk from wildfire.	◦ Identify measures to reduce the risk of structure loss. ◦ Recommend fuel reduction activities, community education programs, ways to increase firefighting capabilities, and methods to mitigate wildfire hazards. ◦ Develop guidelines and strategies to reduce the threat of wildfire to the area.
Improve egress and ingress.	◦ Create a fire safe corridor along Highway 299, Glenburn Road, McArthur Road, and Six-mile Hill Road to the USFS 18 Road, as well as the secondary roads that feed into them.
Improve both wildfire detection and emergency response.	◦ Engage with CAL FIRE to create a plan to staff the Soldier Mountain Lookout. ◦ Recruit volunteers to join the fire departments in the Fall River Valley.

1.3 Policy and Regulatory Framework

This CWPP is consistent with the established objectives, policies, and regulations of the Federal, California State, Shasta County, and local governments. The most important of these are summarized in this section.

1.3.1 Federal Law and Policy

1.3.1.1 Laws

Disaster Mitigation Act (2000–present): Establishes a national disaster hazard mitigation program to:

① Reduce the loss of life and property, human suffering, economic disruption, and post-disaster assistance costs; and

② Provide pre-disaster funding to assist state, tribal, and local governments with implementing measures to ensure that critical services and facilities keep operating post-disaster.

This act created incentives for state and local entities to coordinate hazard mitigation planning and implementation efforts. Through federal grants, it is an important source of funding for fuels mitigation efforts.

Healthy Forest Initiative (HFI) (2002) and Healthy Forest Restoration Act (HFRA) (2003): Passed in 2002, the Healthy Forest Initiative (HFI) reduces the risk of severe wildfire. Its companion, the Healthy Forests Restoration Act (HFRA), followed in 2003 to provide the administrative tools that were needed to implement it. For hazardous fuels reduction projects, they:

- Require federal agencies to work collaboratively with communities;
- Allow NEPA on adjacent federal lands to be expedited; and
- Direct agencies to prioritize the treatments that have been identified by the communities themselves—in their CWPPs.

National Environmental Policy Act (NEPA) (1969): The first of a handful of major laws in the early 1970s that established the scaffolding of modern federal environmental policy. Designed "to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill [our] social [and] economic [needs]…"[2], it mandates that all agencies in the Executive Branch analyze—and disclose to the public—the environmental effects of their actions. Any potential treatment of federal lands would first require a NEPA document to be prepared and released to the public.

1.3.1.2 National Policy

National Fire Plan (NFP) (2000): The summer of 2000 was a historic milestone for the country. Dry conditions across the West led to there being 92,250 wildfires, which

[2] 42 U.S. Code § 4331 - Congressional Declaration of National Environmental Policy.

collectively burned 7,383,493 acres. This was nearly *double* the 10-year average at the time. The cost of suppressing these infernos was $1,410,802,000—not including damages (NIFC, 2022).

In response, the government appropriated a substantial amount of money to better fund wildland fire management. While public servants created numerous interagency strategies and action plans, one of the most important was the Western Governor's Association's "A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-Year Comprehensive Strategy: Implementation Plan." This document later became known as the *National Fire Plan*. Among other things, it prioritizes collaborative work within communities in order to reduce the risk of largescale wildfires.

National Incident Management System (NIMS): A proactive system to assist groups (government agencies, nongovernmental organizations, and the private sector) in working together in an emergency. It is designed to be adaptable enough to be used in incidents of all types and complexities. Understanding this system can help a community prepare for, and respond to, these events.

2014 Quadrennial Fire Report (QFR): A strategic assessment that is done every four years to evaluate current mission strategies and capabilities against the best estimates of the future wildland fire management environment. The 2014 QFR:

① Sought to identify and explore the key issues associated with wildland fire management;
② Assessed how efficacious current policy, strategy, and programs would be in the expected future environments; and
③ Presented a set of potential actions for wildland fire leaders to consider.

1.3.1.3 Land Management Agency Policy

Bureau of Land Management (BLM): The Bureau of Land Management lands in the CWPP Area are managed by the Applegate Field Office, located in Alturas California. Fire management is guided by the Northern California Fire Management Plan, as well as local direction contained in the Alturas Resource Management Plan (BLM, 2008). All planning for the BLM (and USFS) follows the National Environmental Policy Act.

USFS—Lassen National Forest (LNF): The Forest Service lands in the CWPP Area are managed as part of the Hat Creek Ranger District (HCRD) of the Lassen National Forest. All resource management activities on the forest, including fire suppression and hazardous fuel reduction, are governed by:

- The Lassen National Forest Land and Resource Management Plan (USFS, 1992);
- The Sierra Nevada Forest Plan Amendment (USFS, 2004);

- The Northwest Forest Plan (USFS, 1994);
- The National Fire Plan; and
- Protecting People and Sustaining Resources in Fire-Adapted Ecosystems: a Cohesive Strategy (Laverty and Williams, 2000).

Importantly, this also includes the establishment of natural fuels project priorities and the identification of essential road access needs for protection purposes.

USFS national priorities are:

① Wildland-urban interfaces (WUIs);
② Readily accessible municipal watersheds;
③ Threatened and endangered species habitat; and
④ Existing low-risk Condition Class I Areas[3].

1.3.1.4 National Fire Protection Association Policy:

NFPA 1: Advances fire and life safety for the public and first responders, as well as property protection, by providing a comprehensive, integrated approach to fire code regulation and hazard management.

NFPA 1141: Establishes requirements for the development of fire protection and emergency services infrastructure. Specifically, to ensure that wildland, rural, and suburban areas undergoing land use changes (or land development) have the resources and strategies in place to protect people and property from fire dangers and allow fire fighters to do their jobs safety and effectively.

NFPA 1142: Identifies a method of determining the minimum requirements for alternative water supplies for structural firefighting purposes in areas where the authority having jurisdiction (AHJ) determines that adequate and reliable water supply systems for firefighting purposes do not otherwise exist.

NFPA 1143: Specifies the management practices and policies that are necessary for a fire protection organization to develop a wildland fire management program.

NFPA 1144: Details a methodology for assessing wildland fire ignition hazards around existing structures. In order to reduce the potential of structure ignition from wildland fires, t also describes the requirements for new construction activities.

1.3.2 State Law and Policy

California Building Code (2019): Establishes minimum standards to protect life and property, thereby reducing loses to wildland fire. Within *high hazard severity zones*—in

[3] Condition Class I Areas are those which: (1) are within the appropriate historical range, (2) have a low risk of losing key ecosystem components, and (3) the vegetation attributes (species composition and structure) are both intact and functioning within their historical range of variability (USFS, 2013)

state responsibility areas (SRA[4]) or the wildland urban interface (WUI[5])—its requirements make buildings more resistant to direct flame contact and the burning embers that vegetation fires can produce (see Section 3.3.4 Fire Behavior Characteristics).

California Environmental Quality Act (CEQA) (1970): CEQA requires state and local agencies to follow a protocol of analysis and public disclosure of environmental impacts in proposed projects and to include feasible measures to mitigate those impacts. All of the proposed hazardous fuel treatment projects on private lands recommended in this CWPP must comply with CEQA regulations.

2013 California Fire Code: Contains regulations consistent with nationally recognized and accepted practices for safeguarding life and property from the hazards of fire, explosions and the storage, handling and use of hazardous materials and devices.

California Fire Plan (Strategic Fire Plan) (2018): A strategic, statewide plan managed by CAL FIRE that guides fire policy for much of California. The goals that are critical to achieving the Plan's (2018 Plan) vision revolve around fire prevention, natural resource management, and fire suppression efforts. Its seven strategic goals are to:

① Identify and evaluate wildland fire hazards and recognize life, property, and natural resource assets at risk, including watershed, habitat, social and other values of functioning ecosystems. Facilitate the sharing of all analyses and data collection across all ownerships for consistency in type and kind.

② Articulate and promote the concept of land use planning as it relates to fire risk and individual landowner objectives and responsibilities.

③ Support and participate in the collaborative development and implementation of wildland fire protection plans and other local, county, and regional plans that address fire protection and landowner objectives.

④ Increase awareness, knowledge and actions implemented by individuals and communities to reduce human loss and property damage from wildland fires, such as defensible space and other fuels reduction activities, fire prevention and fire safe building standards.

⑤ Develop a method to integrate fire and fuels management practices with landowner priorities and multiple jurisdictional efforts within local, state, and federal responsibility areas.

⑥ Determine the level of fire suppression resources necessary to protect the values and assets at risk identified during planning processes.

⑦ Address post-fire responsibilities for natural resource recovery, including

[4] See Section 2.3 Fire Protection for definition.

[5] See Section 2.3 Fire Protection for definition.

watershed protection, reforestation, and ecosystem restoration.

California State Multi-Hazard Mitigation Plan (SHMP) (updated 2018): The State's hazard mitigation guidance document. It provides an updated and comprehensive description of California's historical and current hazards, mitigation strategies, goals, and objectives. More importantly, it reflects the State's commitment to reduce or eliminate the potential risks and impacts of natural and human-caused disasters by better preparing California's families, homes, and communities. The SHMP provides guidance for hazard mitigation activities, emphasizing partnerships among local, state, and federal agencies, as well as the private sector.

Government Code 51175-51189:

- Defines: very high fire hazard severity zone (VHFHSZ), defensible space, fuel, fuel management, and wildfire.
- Designates the areas that are in VHFHSZs.
- Details wildland urban interface (WUI) building standards.
- Directs the Office of the State Fire Marshal to create building standards for wildland fire resistance.
- Describes measures that increase the likelihood of a structure withstanding intrusion by fire (e.g., design and construction requirements that use fire-resistant building materials). It also provides protection of structure projections (e.g., porches, decks, balconies, and eaves) and structure openings (e.g., attics, eave vents, and windows).

Public Resources Code 4290: [Verbatim] The board shall adopt regulations implementing minimum fire safety standards related to defensible space that are applicable to state responsibility area lands under the authority of the department, and to lands classified and designated as very high fire hazard severity zones, as defined in subdivision (i) of Section 51177 of the Government Code. These regulations apply to the perimeters and access to all residential, commercial, and industrial building construction within state responsibility areas approved after January 1, 1991, and within lands classified and designated as very high fire hazard severity zones, as defined in subdivision (i) of Section 51177 of the Government Code after July 1, 2021.

Public Resources Code 4291: Establishes defensible space requirements. **[Verbatim]** Maintain defensible space of 100 feet from each side and from the front and rear of the structure, but not beyond the property line, except as provided in subparagraph b. Subparagraph B: A greater distance than that required under subparagraph (A) may be required by state law, local ordinance, rule, or regulation. An insurance company that insures an occupied dwelling or occupied structure may require a greater distance than that required under subparagraph (A).

Public Resources Code 4292-4296 and 14 CCR1256: Governs electrical transmission

lines. Among other things, it details clearance requirements for various voltages.

Public Resource Code 4741: **[Verbatim]** In accordance with policies established by the board, the department shall assist local governments in preventing future wildland fire and vegetation management problems by making its wildland fire prevention and vegetation management expertise available to local governments to the extent possible within the department's budgetary limitations. Department recommendations shall be advisory in nature and local governments shall not be required to follow such recommendations.

Section 17053.1. of the Revenue and Taxation Code [Verbatim]

(a) For taxable years beginning on or after January 1, 2016, there shall be allowed a credit against the "net tax," as defined by Section 17039, in an amount equal to the qualified costs paid or incurred by a qualified taxpayer during the taxable year for fuel management activities performed on qualified real property, subject to subdivision (c). See

Appendix E: Excerpt from the Revenue and Taxation Code for definitions.

Title 14, 1270.4 [Verbatim] This subchapter applies to the following: (a) local jurisdictions shall provide the Director with notice of applications for building permits, tentative parcel maps, tentative maps, and use permits for construction or development within SRA, (b) Director shall review and make fire protection recommendations on applicable construction or development permits or maps provided by the local jurisdiction, and (c) the local jurisdiction shall ensure that the applicable sections of this subchapter become a condition of approval of any applicable construction or development permit or map.

1.3.3 Shasta County Policy

The CAL FIRE Shasta-Trinity Unit (SHU) Fire Plan is the framework established to help protect the people and resources of Shasta County. Its goal is to create a state that is more resistant and resilient to the damaging effects of catastrophic wildfires, while also recognizing the beneficial aspects of fire. The unit is dedicated to enhancing the protection of lives, property, and natural resources, as well as improving environmental resistance to these events.

1.4 The CWPP Process

Developing a CWPP is a collaborative process in which community stakeholders:

① Assess the wildfire threat;
② Define their wildland-urban interface (WUI) boundaries;
③ Identify their community's values at risk; and
④ Develop solutions to mitigate that threat.

The 2003 HFRA provides a great deal of flexibility for communities to determine the substance and details of their own plans, as well as how they design them. The relative autonomy granted in the CWPP Planning Process allows residents to influence both the way federal agencies reduce hazardous fuels on public land and how federal funds for treating private lands are distributed.

This process brings together broad and diverse local interests in order to discuss and identify their mutual concerns and establish shared objectives related to public safety, community protection, and natural resource sustainability. It is intended to provide a positive, solution-oriented environment in which they can address the challenges of living in a community at risk from wildfire. In order to craft a successful CWPP, it is critical that fire safe councils (FSCs) solicit input from the community. They should also be sure to provide relevant information about how the document was developed.

As part of the 2003 HFRA, there are three minimum requirements for a CWPP. These include:

① **Collaboration**. A CWPP must be collaboratively developed. Local and state officials must *meaningfully* involve the federal agencies that manage the land in the vicinity of the community, as well as any other interested parties (particularly non-governmental stakeholders).

② **Prioritized Fuel Reduction**. A CWPP must identify and prioritize areas for hazardous fuel reduction treatments on both public and private lands. It also needs to detail the types and methods of treatment that, if completed, would reduce the risk to the community.

③ **Treatment of Structural Ignitability**. A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout its area.

1.4.1 Fall River CWPP Collaboration

In the Intermountain Area, the first two fire safe councils (FSCs) were in Day Bench and Old Station/Hat Creek.

Day Bench: Given that their area is highly exposed (south aspect), has numerous homes, and there is a high density of volatile fuels, the Day Bench FSC was the first one to begin discussing fuels reduction work. This group is covered under the Lassen County FSC's CWPP, which was signed in 2004 and updated in 2006.

Old Station and Hat Creek Valley: This FSC also recognizes the risk and understands the need to develop a fuels reduction plan and designate an evacuation route. The Hat Creek/Old Station Project was completed prior to the Hat Creek Complex (2009).

McArthur: This town is not currently covered under a CWPP.

Burney and Johnson Park: While this FSC had a slow start, they developed energy after the Eiler Fire (2014) and completed their CWPP in February 2018.

However, the local areas within Shasta County (Dana, Fall River Mills, Glenburn, and the associated subdivisions) still were not covered under a plan. Recognizing the need, local fire chiefs, retired wildland fire chiefs, and concerned residents came together to form a FSC and develop one for their communities.

The Fall River Valley Fire Safe Council's first meeting, in October of 2020, established which parties were interested in participating. The fire season was still raging, which prevented many people who were associated with the wildland fire community from attending. Between COVID-19 restrictions and one of the members being in a car accident, the next meeting did not take place until the following April (2021). Against the background of yet another dry winter and the continuing drought, residents engaged with the council and began crafting a plan. The FSC gathered again in May and took a field trip in June to look at various fuel treatments that had been implemented on nearby lands.

The community at large was notified of the meetings by fliers, which were posted at key

points (e.g., local post office, several banks, and Ray's Supermarket) and put in post office boxes. Announcements were also made on Facebook.

To publicize an open house on November 19, in addition to the above:

- Post cards were mailed to all the residents of Fall River Mills;
- The local newspaper (Intermountain News) prominently published details on its front page; and
- Emails were sent out to individuals who had previously expressed interest.

After the event, letters were sent to absentee landowners to notify them about the FSC and the efforts to create a CWPP. Importantly, it asked them if they were interested in reducing hazardous fuels on their properties.

1.4.2 Future Fall River FSC Meetings and Outreach

During the development of this CWPP, the FSC has been meeting on the 4th Thursday of each month at the Soldier Mountain Volunteer Fire Station. Once the document has been completed and signed, the schedule may be reevaluated. However, since projects will need to be coordinated, it is not expected to change in the foreseeable future. Outreach to the local community will continue through flyers, notices on the RCD website, on Facebook, and via newspaper articles and email.

2 Community Overview

2.1 Setting

The CWPP Planning Area lies within a complex geologic transition zone between the southern Cascades, the Modoc Plateau, and the Great Basin. The Fall River Valley is a tectonically dropped valley (known as a graben) and has a smattering of [geologically] young, small volcanoes (e.g., Haney, Saddle, and Soldier Mountains, Timbered Crater, etc.; Clynne and Muffler, 2017). Together with the adjacent Burney-Hat Creek Area, it has an amazingly high number of cold-water springs.

These areas provide important migration routes and habitat for a variety of wildlife species. Recreational opportunities are varied and plentiful. Local livelihoods depend upon the timber and forest products industry, ranching and rangeland use, crop production, hydropower and alternative energy, recreation and tourism, retail trade, business support and visitor services, and government services. It is a prized location for retirement and second homes.

The Valley is part of the Pit River Watershed, which was designated as a priority treatment area under the 2014 Farm Bill and Healthy Forest Restoration Act (2014). This designation was the result of a collaboration between the California Department of Forestry and Fire Protection (CAL FIRE) and the U.S. Forest Service that identified the

areas in California that meet a special set of criteria[6] created from various social, political, practical, and infrastructure considerations. Much of the surrounding area has been designated as being a *high* or *very high f*ire hazard severity zone[7] (CAL FIRE, 2022c)

The planning area covers 73,054 acres and consists of a mix of forests, brush, and agriculture lands. Its boundaries are:

- North: Dana/McArthur Road;
- West: Lone Antelope Road to Red Mountain Road then along the Pit River to Hogback Ridge;
- South: Forest Service Roads—35N13 to 35N22 to 22 Road, then north along the 18 Road; and
- East: Thousand Springs Road to the Shasta County line to Bald Mountain.

For further information, see Appendix C: Maps.

Elevations range from 3,000 feet at the valley floor to 5,543 at the Soldier Mountain Lookout. The Fall and Tule Rivers are the primary means of surface water transport and flow into the Pit River (which passes through the CWPP Area). Downstream from the Fall River Valley, the Pit was impounded to form Lake Britton, which holds water for PG&E's Pit 3 Powerhouse. Precipitation is primarily received as rain, with an annual average of 18–25 inches.

Vegetation is predominately a combination of ponderosa pine (eastside pine) at the lower elevations and transitions into Sierra Mixed Conifer higher up on of Soldier Mountain. North towards Dana, the private land is populated with Sierra Mixed Conifer. The lower areas also have a combination of montane chaparral, montane hardwood, chaparral, and oak-conifer woodlands (depending on soil type). At the south end, around Big Eddy Estates and the St John's Ranch Area, it is mostly juniper and sagebrush, interspersed with grasslands. The eastern portion is almost entirely cropland (alfalfa, wild rice, and grass hay).

2.2 Values at Risk

The communities of Dana, Fall River Mills, Glenburn, and the associated subdivisions have been identified by the State Fire Marshall as being *communities at risk*. Other values include PG&E infrastructure, public and private timber lands, communication infrastructure, historic and prehistoric sites, clear and cold water, and fish and wildlife habitat.

2.2.1 Life Safety

The Fall River Fire Safe Council's highest priority is human life safety. Wildfires can be

[6] Detailed in Section 602 of the 2014 Farm Bill.

[7] See Government Code 51175-51189 in Section 1.3.2 State Law and Policy

extremely complex and move extraordinarily fast. They can change direction unexpectedly, have the wind carry embers that then create new fires (spot fires) ahead of the main fire, and often threaten communities with minimal warning. These fast-moving infernos can leave little time for going to escape routes—leaving residents trapped. The inhabitants of the Intermountain Area have endured several large fires: Popcorn-Peterson (2008), Venture (2008), the Hat Creek Complex (2009), as well as Bald, Day, and Eiler (2014). There have also been several smaller fires in and adjacent to the communities of Glenburn and Fall River: Brown (2005), Gomez (2009), Power (2007), Warner Grade (2013), and Hat (2018).

Figure 1 – Greenville, California after the Dixie Fire. August 2021.

2.2.2 Structures

The majority of the homes in the project area are single-family dwellings that were classified by CAL FIRE as being at *very high wildfire risk* (Shasta County and City of Anderson Multiple Jurisdictional Hazard Mitigation Plan, 2011). Lot sizes vary from less than an acre all the way up to several hundred acres.

Access to, and egress from, homes is a critical factor in parts of the project area. Alpine Estates and Old School Road have access issues. They each are accessed by only one main road. There are other routes out of these two areas, but they are either via roads that are not maintained or are gated.

Some primary factors contributing to potential access and egress issues during a wildfire include narrow and/or winding roads, one-way roads, rough terrain, gates, and thickly encroaching wildland and/or landscaping vegetation. During a wildfire emergency, these

can adversely impact both the response times and safety of emergency personnel due to the lack of the necessary safe access and defensible space.

2.2.3 Critical Infrastructure

Critical infrastructure in the project area includes:

PG&E Natural Gas Pipelines: There is a 36- and a 42-inch pipeline that supply natural gas throughout the western United States. Along each of these, there are also structures and copious equipment. Although the pipeline is buried, during a wildfire, these restriction where a bulldozer can work.

Bonneville and PG&E High Voltage Transmission Lines: To the north of the project area. These supply power to the state grid.

Fiber Optic Cable: Located along Soldier Mountain Road. While it is buried, internet connectivity could be impacted if it were damaged by bulldozers that are constructing fire line.

Haney Mountain Repeater Towers: A major communication hub for the valley and surrounding area. AT&T, BLM, Com-Pair, PG&E, and USFS all maintain communication and internet infrastructure on this site. It has previously been threatened by wildfire.

Powerlines: Stretch across Haney Mountain. These supply electricity to the valley. In 2018, the Hat Fire damaged the poles for this line, which caused the Fall River Valley to lose power for four to five days.

Soldier Mountain Lookout: Managed by CAL FIRE. However, it is not staffed unless it is needed during critical fire weather (e.g., lightning, high winds, etc.). This facility is also used as a repeater site for local and state radio communication networks.

2.2.4 Recreation Facilities

Outdoor recreation opportunities abound in and around the Fall River Valley.

- **Big Lake, Tule River, and the Fall River:** With impressive fishing and views, these attract anglers and hunters to the area during all seasons of the year.
- **McArthur-Burney Falls State Park**: Adjacent to the Fall River Valley CWPP Area, this is an extremely popular destination for locals and tourists alike.
- **Ahjumawi State Park:** Located on the north side of Big Lake, this 5,890-acre area is only accessible by boat. It boasts approximately twenty miles of hiking trails and three campgrounds, as well as a boat launch and picnic areas.
- **BLM Campground**: Near the Pit 1 Powerhouse, this scenic site also includes a day use area and swimming hole.
- **18-hole Golf Course:** In Fall River Mills, this facility attracts visitors from all

over the country.

- **Special Events**: The Fall River Valley hosts various events, such as a well-known century bicycle ride in July.
- **PG&E Recreation Sites** in Fall River Mills.
    - **Fall River Lake**: There are several picnic, boat launching, and swimming areas on the lake.
    - **Two Rivers Park:** This is the new facility, situated were the Fall and Pit Rivers meet. It includes a parking area, bathroom, and trail that leads down to the Pit River.

Deer hunting, fishing, bird hunting, and firewood gathering also take place in lands that are adjacent to the communities. In some areas, people also ride ATV/UTV's and motorcycles on the extensive network of local dirt roads.

2.2.5 Natural and Historic Resources

A wildfire can affect natural and cultural resources in many ways. Results can vary from there being no effect or just temporary alterations all the way up to permanent damage or even complete destruction. A general description of the resources in the CWPP Area is given below.

2.2.5.1 Forestland—Private

There are private timberlands in the project area. These are owned by Sierra Pacific Industries (SPI), Thousand Springs Ranch, Red River Lumber, and Shasta Lands. Red River and Shasta Lands are managed by Beatty and Associates.

These lands are regulated by the California Forest Practice Act (1973). The intent of this law is to "create and maintain an effective and comprehensive system of regulation and use of all timberlands so as to assure that: a) where feasible, the productivity of timberlands is restored, enhanced and maintained; and b) the goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to recreation, watershed, wildlife, cultural resources, range, forage, fisheries, regional economic vitality, employment and aesthetic enjoyment."

2.2.5.2 Forestland—Private, Small Landowner

Within the project area, there are small private landowners with forested land. These parcels can be as small as a single acre or as large as several hundred acres. Other private lands in the CWPP also includes ranches, residences, and recreation facilities.

2.2.5.3 Rangeland

The rangelands in the area are on both public and private lands. On the federal side, there are two USFS grazing allotments on Soldier Mountain (one of which is currently not active) and a BLM allotment by Big Eddy Estates. The rest of the rangeland is privately owned. These cover a variety of habitats: meadows, pine-oak woodland, juniper-sage, and

irrigated pastures. The vegetation is a combination of perennial bunch grasses and annual species.

2.2.5.4 Wildlife

The Intermountain Area is well-known for its abundant wildlife. Largely because of the low human population density, this relatively undeveloped portion of California is occupied by wildlife species that occur in an array of habitat types, ranging from interior forests to sparsely vegetated barrens. In the heavily forested areas, there are: spotted owls, northern goshawks, and fishers, while open habitats support species such as: black tailed deer, mule deer and greater sandhill cranes. Re-introduced elk use areas adjacent to the project area and are seen occasionally within it.

Aquatic species in the Fall and Tule River Area benefit from the clear, cold water (see Section 2.2.5.6 Springs and Groundwater) and are thus renowned for good fishing. Seasonally flooded areas (including agricultural lands) provide important breeding and winter stopover habitat for resident and migratory waterfowl and shorebirds.

Common wildlife species found in these subwatersheds are given in Table 2.

Table 2 – Common Wildlife in the Fall River Valley.

Common Wildlife Species in the Project Area

Forest	Chaparral	Meadow & Agricultural	Aquatic
		BIRDS	
Coopers Hawk	American Crow	Canada/Snow Goose	American Dipper
Goshawk	California Quail	Common Yellow Throat	Bald Eagle
Hermit Thrush	California Towee	Great Blue Heron	Mallard Duck
Mountain Quail	Morning Dove	Northern Harrier	Osprey
Olive-sided Flycatcher	Vesper Sparrow	Sandhill Crane	White Pelican
Turkey	Western Bluebird	Short-eared Owl	Various Shorebirds
		Tundra	Various Other

Common Wildlife Species in the Project Area

		Swan	Species of Duck
		White Fronted Geese	
		Yellow Warbler	
MAMMALS			
Black Bear	Badger	Coyote	Muskrat
Black Tailed Deer	Black Tailed Jackrabbit	Fox	River Otter
Bobcat	Coyote	Mountain Lion	
Grey Squirrel	Deer Mouse	Racoon	
Mountain Lion	Golden Mantel Squirrel	Striped Skunk	
Mule Deer	Mountain Lion	Western Pocket Gopher	
Striped and Spotted Skunk			
OTHER			
Cal. Mountain Kingsnake	Fence Lizard	Common Garter Snake	Big Eyed Sculpin
California Newt	Gopher Snake	Gopher Snake	Rough Sculpin
Gopher Snake	Striped Racer Snake	Northern Alligator Lizard	Shasta Crayfish (Endangered)
Western Rattlesnake	Western Rattlesnake	Pacific Chorus Frog	Western Pond Turtle

2.2.5.5 Aquatic Species

Historically, fish were introduced to various rivers and lakes in the project area, which has resulted in there being a mix of both native and non-native species. The two are separated in some areas were habitat or water conditions favor one over the other. The Shasta crayfish (Pacifastacus fortis; a critically endangered species) inhabits a portion of the CWPP Area (USFWS, 2022). The fisheries in the project area are economically and ecologically important—Big Lake, Hat Creek, and the surrounding areas are known for their blue-ribbon trout fishing. The Fall River Area, in particular, is an important destination for many anglers. Over the past several decades, there has been a strong emphasis on maintaining and restoring its recreational trout fishery and protecting its unique, native aquatic species.

Figure 2 – Approximate outline of the Medicine Lake Highlands/Fall River Springs Aquifer System. From Mancewicz et al. (2021), used with permission from author S.J. Wheelock.

2.2.5.6 Springs and Groundwater

The Fall River Valley is underlain by the Medicine Lake Highlands/Fall River Springs Aquifer System (Figure 2). The lavas the groundwater flows through were erupted approximately 10,000 years ago from the Medicine Lake Volcano, a half-million-year-old shield volcano that—by volume—is the largest in the Cascades (Donnelly-Nolan, 2010).

Precipitation received in the highlands recharges the aquifer, and then mostly emerges through one of the many springs in the valley. This 30-mile (horizontal) journey takes the water 30–40 years (Mancewicz et al., 2021). The lag between changes in precipitation and spring discharge is only 1–2 years (Freeman, 2001).

Taken as a whole, the average flow from the springs in the valley ranges from 850–1350 ft^3/sec (Freeman, 2001), which is about 17% of the inflow into Shasta Lake (Davisson and Rose, 1997). This means that *Fall River Valley Water* produces 5% of the state's hydropower!

2.2.5.7 Hydrology

The Fall River is unique because almost all of its water comes from springs. As such, its waters are both cold and clear. The majority of the flow emerges from Thousand Springs, Rainbows Springs, and through Spring Creek (Figure 3). Other smaller springs and seeps

are distributed throughout the watershed. Its primary surface water tributary is Bear Creek. Dry Creek is an ephemeral stream that is only active during wet periods (Vestra, 2010).

Figure 3 – All of the water in Spring Creek comes from the Medicine Lake Highlands/Fall River Springs Aquifer System (see Figure 2).

2.2.5.8 Historic Resources

The project area has been home to humans for thousands of years. The Fall River Watershed was inhabited by the Achomawi Peoples at the time of historical contact. The Achomawi claimed all the Pit River above what is now Montgomery Creek as their territory (Vestra, 2010). In the 1820's, the first European settlers traveled into the area. Two of the more well-known explorers included John C. Fremont and Peter Lassen. The Nobles Emigrant Trail passed through Fall Fiver Valley and brought many travelers to the area. This led to Fort Crook being built in 1857. Two of the first non-native settlers to the valley were Sam and Jim Lockhart, who started the first ferry crossing on the Fall and Pit Rivers. Captain Winters built a sawmill, flour mill, and planning mill, as well as the first bridge across the Fall River. In the years that followed, the Fall River Mills Feed Mill would become the mainstay of the entire valley.

2.3 Fire Protection

Wildland fire protection in the State of California is either the responsibility of the local, state, or federal government. Incidents in the CWPP Area are dispatched using multi-aid, in which the closest resources respond (e.g., Fall River Valley FPD, Soldier Mountain, CAL FIRE, U.S. Forest Service). The planning area includes the following:

Local Responsibility Areas (LRA): Incorporated cities, urban regions, agriculture lands, and portions of the desert where the local government is responsible for wildfire protection. This is typically provided by city fire departments, fire protection districts, counties, and by CAL FIRE (under contract). In the planning area, the LRA is bordered by a SRA and FRA. The Fall River Valley Fire District has four stations, Fall River Mills, McArthur, Pittville, and Day Road.

State Responsibility Areas (SRA): The State of California is financially responsible for the prevention and suppression of wildfires. SRAs do not include lands within incorporated city boundaries or owned by the federal government. Several fire protection districts in Shasta County are within SRAs: Burney, Happy Valley,

Millville, Mountain Gate, Old Shasta, and portions of Anderson and Cottonwood.

Station #13, Soldier Mountain Fire Company, is part of the Shasta County Fire Department and responds to fires in SRAs, along with CAL FIRE Station #14 in Johnson Park. Station #13 is located between Glenburn and Dana.

Federal Responsibility Areas (FRA): The federal government has primary fiscal responsibility for wildfire prevention and suppression on federal lands. This is done through the United States Forest Service (USFS) or one of the Department of the Interior Agencies (i.e., Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, or National Park Service,). On military lands, the Defense Department has this responsibility. The U.S. Forest Service has an engine station in Fall River Mills.

Additionally, Shasta County OES is committed to serving throughout its jurisdiction.

Office of Emergency Services (OES)**:** The Shasta County OES exists to enhance safety and preparedness throughout the community. We work closely with CAL OES, and other local agencies in a mutual aid setting to provide the highest service to the citizens of our county. Our mission is founded in public service. OES's goal is to protect lives and property by effectively preparing for, preventing, responding to, and recovering from all threats, crimes, hazards, and emergencies.

3 Defining The Wildfire Problem

Wildfire is a natural process that has an important ecological role in maintaining landscapes by reducing surface fuels, thinning small trees, and ensuring that stands and brush alike are composed vegetation of various ages[8], . In California, the combination of:

① Complex terrain;
② Mediterranean climate (hot and dry summers);
③ Productive natural plant communities, which provide ample fuels; and
④ Plentiful natural and anthropogenic ignition sources

Has created a landscape forged in fire. Excluding fires occurring in the desert, estimates of acreage burned prior to the arrival of European settlers range between 4.5 and 12 million acres annually, with frequency, size, and intensity varying based on ecotype and geographic area. This shows the dramatic historical influence of natural wildfire, which supported and maintained ecosystem structure and function throughout California's wildlands (Cal OES, 2018).

The problem is that when wildland fires burn into human developments, they can become disastrous, leading to a loss of structures, improvements, vehicles, and even lives. The probability of a wildland fire impacting an area depends on the ignition source, weather,

[8] This is important for a variety of ecological reasons, including resilience to disturbance.

fire behavior, and the availability of suppression resources to fight it.

IT IS NOT A MATTER OF **IF** THERE WILL BE A WILDFIRE, BUT **WHEN**.

Impressively, local and national firefighters successfully keep the majority of wildfires under an acre when: weather and fuel conditions are favorable, they were reported early, and resources are available. The ignitions that give wildland firefighters issues are the ones that occur:

① Under fire weather conditions (high winds, low humidity);
② In areas with limited access;
③ When there is a lack of resources; and/or
④ When multiple fires are burning (e.g., during lightning storms) at the same time across a large geographical area.

3.1 CLIMATE

The Fall River Valley and project area lie on the eastern flank of the southern Cascade Range. In general, they have a Mediterranean climate, with cool to cold, wet winters and hot, dry summers. However, in these mountains, the degree to which this climate dominates an area is determined by where it is in relation to three climatic gradients:

① A west to east gradient in annual precipitation and winter temperature. Wetter and warmer conditions prevail on the west side of the range, south of Mt. Shasta;
② A north to south gradient where annual precipitation is lower on the west side of the range, north of Mt. Shasta. This is due to a rain shadow[9] effect from the Klamath Mountains; and
③ A decreasing temperature, and increasing annual precipitation, with increasing elevation gradient (Skinner et al., 2006).

The southern Cascades (including the project area) are susceptible to critical fire weather conditions: high winds and low humidity. These are caused by weather patterns that are characteristic of both California and the Pacific Northwest. In this area, three types of fire weather conditions, which occur during the dry period of the year, are important: (1) Pacific High–post-frontal (post-frontal); (2) Pacific High–pre-frontal (pre-frontal); and (3) Subtropical High Aloft (subtropical high) (Skinner et al., 2006).

3.2 FIRE HISTORY

According to Skinner and Collins:

> The gentler topography of the Cascade Range affords conditions where

[9] "The reduction of rainfall to the lee side of a mountain barrier, which results in relatively dry surface conditions, e.g. in the mountains of the south-western USA, where the wetter western slopes of the Coast Range and Sierra Nevada contrast with the desert areas of Nevada and eastern California on the lee side of the mountains. Moist air rising on the windward side…" (Allaby, 2013)

> fires are able to spread rather easily over large areas without significant interruption. Especially on the eastside of the range in the pine and mixed-conifer forests, pre-suppression era fires were not only primarily frequent, low to moderate intensity fires, but were also quite large. Fires of this type[,] covering ten to hundreds of thousands of acres[,]occurred on average once every 20 years. (Skinner and Collins, 2014)

The CWPP Area is within fire regimes 1, 2, and 3. These are descriptions of how often a vegetation type burns, and with what severity (see Table 3). In the project, these are characterized by:

- **Fire Regime One:** The ponderosa pine stands and oak-woodland stands.
- **Fire Regime Two:** The montane chaparral and grass/sage/juniper ecosystems.
- **Fire Regime Three:** The mixed conifer stands on soldier mountain.

Table 4 lists the major incidents that there have been in and around the CWPP Area. Fires generally move with the direction of typical afternoon winds, which in the Fall River Valley, is a southwest flow. Thus, our fires move from the southwest to the northeast.

Table 3 – Overview of fire regimes.

Fire Regime	Description
Fire Regime 1	0–35-year frequency and low (surface fire most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced).
Fire Regime 2	0–35-year frequency and high stand replacement severity (greater than 75 percent of the dominant overstory vegetation replaced).
Fire Regime 3	35–100+ year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced).
Fire Regime 4	35-100+ years frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced).
Fire Regime 5	200+ year frequency and high (stand replacement) severity.

Table 4 – Fires in and around the CWPP Area.

Fire Name	Year	Comments
Glass Fire	1910	

Fire Name	Year	Comments
Soldier Mountain	1950's	
Cassel	1950's	
Horrs Corners	1977	Lightning
Pondosa	1977	Lightning
Chalk	1982	Escaped prescribed fire, burned from Chalk Mtn. to Glenburn Rd.
Brown Fire	2005	Lightning
Power	2007	Burned from highway 299 to Glenburn Road human-caused
Venture	2008	Lightning storm SHU
Gomez	2009	Lightning storm SHU
Cassel	2009	Lightning storm SHU
Warner Grade	2013	Lightning Fire
Eiler	2014	Fire threatened St Johns Ranch Area
Hat	2018	Burned from the Hat Rifle Range to Glenburn Road

3.3 Wildland Fire Environment

The interaction of fuels, topography, and weather affect the likelihood of a fire starting, the direction, speed, and intensity at which it will burn, and the firefighter's ability to control it. Wildfire is defined here as any free-burning vegetative fire that begins from an unplanned ignition, whether natural (e.g., lightning) or human-caused (e.g., powerlines, mechanical equipment, escaped prescribed fires, etc.), in which the management objective is full suppression. This section describes the wildland fire environment within and adjacent to the Fall River Valley CWPP Area.

3.3.1 Fuels

Wildland vegetation is the primary fuel source for wildfires. Characterizing it is one of the most important steps in determining fire hazards. If one of these moves into an urban interface, urban fuels also become a danger. Structures (homes and outbuildings), ornamental vegetation used for landscaping, vehicles, fuel tanks (propane and kerosene), decks, firewood, and fences, can all contribute to the fire environment and drive fire behavior.

Current fire models are not capable of simulating the hazards of urban fuels. Thus, this section will only address the live vegetation that contributes to wildfires. The wildland fire environment is made up of topography, weather, and fuels. Of these, fuels are the *only* aspect that can be altered. In the project area, these vary by elevation and soil type.

North End: Around Dana, there are mixed conifer stands comprised of: incense cedar, Douglas-fir, ponderosa pine, sugar pine, white fir, and oaks (black and white).

Figure 4 – An example of the fuels in the CWPP Area. LNF 40N04 road, near Wiley Ranch.

Glenburn Area: [Including Old School, Gomez Road, and the Alpine subdivision] The vegetation here is conifer-oak woodland, with the main species being ponderosa pine and black oak.

South End: [Encompassing the land around Big Eddy Estates, Six-mile Hill, and down to the St John's Ranch Area] The fuel types here are dominated by grass and brush, with pockets of oak-pine woodland and juniper. In rocky areas with poor soils, there are grasses, juniper, and brush.

3.3.2 Weather

Weather is the most variable aspect of the wildland fire environment. It is also the least predictable. Temperature, relative humidity, wind speed/direction, atmospheric stability, precipitation, and preexisting drought conditions are critical influences on fire behavior, each of which can enhance or reduce it.

In the CWPP Area, records from 1923 thru 2016 show: an average annual precipitation of 18 inches of rain and 19 inches of snow. The average low is 21 °F, while the average summer high is 88 °F. The valley averages 225 sunny days per year. (WRCC, 2022)

As is typical of Mediterranean climates, the months that normally receive the least precipitation are June–September. When there is rain during this time, the moisture comes from summer thunderstorms.

3.3.3 Topography

Topography is defined as: "The configuration of a surface including its relief and the position of its natural and man-made features" (Merriam-Webster, 2022). It is an element of the fire environment that does not change and plays a key role in fire behavior. It can modify general weather by channeling wind (including slope and valley winds), creating thermal belts, and producing orographic thunderstorms, all of which can drastically affect fire behavior. Other elements of topography that can also do this are slope, aspect, terrain (or land features), and elevation.

The planning area has a wide range of slopes and aspects. Slopes range from flat (0%) up to the steep parts of Soldier Mountain, which are over 45%.

3.3.4 Fire Behavior Characteristics

The combination of fuels, topography and weather found within, and adjacent to, the project area produces a fire environment that can support a full range of fire behavior. These include:

Ground Fire: Burns in the organic materials that are under the surface fuels. Examples of these include duff, roots, and buried (or partially buried) dead and decaying woody materials.

Surface Fire: Burns in fuels above the ground. These include low vegetation (e.g., grasses), low shrubs, small trees, and woody debris (e.g., conifer needles, limbs, pinecones, etc.) on the soil surface.

Crown Fire: Burns in the tops of trees, tall shrubs, and tall brush. These are classified in three ways: passive, active, and independent.

Spotting: Occurs when wind, convection, and/or gravity transport firebrands outside the main perimeter of a fire. If one of these lands on receptive fuel, a spot fire can develop. Crucially, this is a main source of wildland fire movement. When spots become established in front of the main fire, they start pre-heating the fuels.

4 Wildfire Assessment

4.1 California Communities at Risk

To help protect people and their property from catastrophic wildfire, the National Fire Plan directs that funding be provided for projects that are designed to reduce the fire risk to communities. A fundamental step in achieving this goal was the identification of communities within the wildland-urban interface (the area where homes and wildlands intermix) that are at a high risk of being damaged. In 2001, a list of these communities was published in the Federal Register. At the request of Congress, this notice only included ones that were neighboring federal lands.

This list represented the collaborative work of all fifty states and five federal agencies. They used a standardized process, in which states were asked to submit the names of all the communities within their borders that met the criteria of structures being at high risk from wildfire. After August 17, 2001, states assumed the responsibility for updating their own lists, so no more notices were published in the Federal Register.

The communities of Dana, Fall River Mills, and Glenburn, as well as their associated subdivisions, were identified by the State Fire Marshall were placed of the State's list.

Figure 5 - The Dixie Fire charging Old Station, California. September 2021. ©Matthew Henderson, Henderson Fire Media. Used with permission from Mr. Henderson.

4.2 Hazard Assessment and Results—Fire Behavior

Behave (6.0) fire modeling (Frames, 2022) was used to evaluate the wildland fire hazard in the CWPP Project Area, which includes a wide range of fuel types. See Appendix D: Fire Modeling for a more in-depth discussion of fire modeling and fuel models.

Fire behavior is measured in rates of spread, flame length, heat per unit area, and spotting. Flame length is a measure that is easily seen on the fire line. The resource type that needs to be hauled to the fireline for various flame lengths has been compiled in a "Hauling Chart" (Rothermel, 1983; Figure 6).

As shown in Figure 6, when a fire has a flame length of four feet or less, firefighters can engage it directly using fire hose and construct additional fireline with hand tools. For flame lengths from four to eight feet, bulldozers and air tankers are needed. Above eight feet, containing the fire with direct fireline is not possible and spotting is occurring. This is a major source of fire movement because, when spot fires become established, they help pre-heat fuels. These can travel anywhere beyond the main fire from just a short distance to well over a mile away.

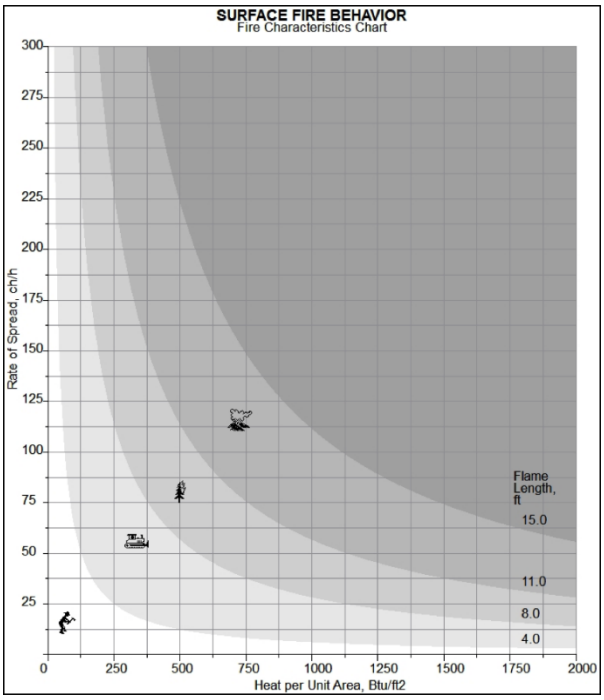

Figure 6 – Hauling Chart. This shows what kind of equipment is needed to engage fires of different flame lengths (Rothermel, 1983).

The tables below show the fuel models that are representative of vegetation in the project area. In these models, fuel loading is measured in tons/acre. Table 5 gives pre-treatment loading for each fuel model, and Table 6 displays the values for post-treatment. See Appendix D: Fire Modeling for a breakdown of these models by size class.

Table 5 – Pre-Treatment Fuel Models

Pre-Treatment Fuel Models

Fuel Model	Type (vegetation)	Tons/Acre
Fuel Model 1	Grass	1.0
Fuel Model 2[10]	Timber w/Grass Understory	4.0
Fuel Model 6	Brush	6.0
Fuel Model 9[11]	Timber/Hardwood Litter	4.8
Fuel Model 10[12]	Timber (Litter Understory)	12.0

[10] Has a live vegetation component.

[11] Tons/acre increased by one third based upon local experience.

Table 6 – Post-Treatment Fuel Models

Post-Treatment Fuel Models

Fuel Model	Type (vegetation)	Tons/Acre
Fuel Model 1	Grass	0.4
Fuel Model 2[12]	Timber w/Grass Understory	2.0
Fuel Model 6	Brush	3.0
Fuel Model 9	Timber/Hardwood Litter	2.4
Fuel Model 10[12]	Timber (Litter Understory)	6.0

The Behave Fire Modeling Suite was used to model pre- and post-treatment fire behavior. While it does take spotting into account, that module is limited to twelve tree species. Importantly, since the estimates of spotting distance are based on wind speed, they do not change with treatment. Specific parameters and assumptions include:

- **Weather:** Ninetieth percentile conditions were used. As with wind speed, these are assumed to not change with treatment.
- **Thinning:** Post-treatment fire behavior was based on surface fuel loadings being reduced by fifty percent.
- **Fuel Model 1 (Grass):** It was assumed that there were not any trees to cause spotting.
- **Fuel Models 2, 6, and 9:** Ponderosa pine was used as the tree species. In order to represent the open spacing of this vegetation type, the threshold for torching was set to groups of three.
- **Fuel Model 10:** Douglas-fir was used, and five trees was picked for torching to represent the lack of spacing in the mixed conifer.

Fire behavior results assume head fire and no suppression action.

Table 7 – Pre-Treatment Fire Behavior

Pre-Treatment Fire Behavior

Fuel Model	Flame Length (feet)	Rates of Spread (chains/hour)	Spotting Distance (miles)
Fuel Model 1	5-6	130	See Footnote[13]
Fuel Model 2	7-8	46	0.3

[12] Has a live vegetation component.

[13] Assumes that there are no trees to create spots.

Pre-Treatment Fire Behavior			
Fuel Model	**Flame Length (feet)**	**Rates of Spread (chains/hour)**	**Spotting Distance (miles)**
Fuel Model 6	8	50	0.3
Fuel Model 9	5	17	0.3
Fuel Model 10	6	11	0.3

Table 8 –Post-Treatment Fire Behavior

Post-Treatment Fire Behavior			
Fuel Model	**Flame Length (feet)**	**Rates of Spread (chains/hour)**	**Spotting Distance (miles)**
Fuel Model 1[14]	3.8	110.2	See Footnote[13]
Fuel Model 2	3.0	13.7	0.3
Fuel Model 6	3-4	16.5	0.3
Fuel Model 9	2.0	5.2	0.3
Fuel Model 10	2.0	3.5	0.3

Thinning reduces small diameter trees that act as ladder fuels, as does treating brush (via mastication, piling, and prescribed burning). In addition to lowering the likelihood that fire will reach the crowns, these also reduce spotting. Surface fuel treatments also remove large dead and down materials, which are what is ignited by burning embers when they create spot fires.

As shown in Table 8, reducing surface fuel loading decreases flame length. As mentioned previously, firefighters can only engage a blaze directly, using engines and hand tools, when flames are under four feet (see Figure 6). Another benefit of shorter flames is that it does not require as many resources to suppress the fire. For these reasons, the goal of all the treatments discussed in this document is to create a landscape that burns in this fashion.

Minimizing flame lengths is especially critical during lightning storms. Strikes from a single swarm in 2009 ignited multiple fires and, despite the best efforts of both the Forest Service and CAL FIRE, four of them became significant: Brown, Gomez, Goose,

[14] Annual grasses grow back every year. Flame lengths will be lower following prescribed burning due to it having reduced the thatch in the grass. This treatment will then invigorate the grass.

Sugarloaf.

4.3 Structure Vulnerability

The National Interagency Fire Center (NIFC) keeps statistics on the number of, and acres and structures consumed by, wildland fires each year. Table 9 presents annual national totals from 2011 thru 2020, along with the state that lost the most. In seven of these years, California had the dubious honor of being on top. Nationally, the annual average over this period was 7,919 buildings.

The Golden State was also the host of the deadliest wildfire in U.S. History, the 2018 Camp Fire, which resulted in 85 deaths and destroyed 18,804 structures.

Given the number of buildings lost to wildfire in the 2020 California Fire Season (Table 9), it is clear that the wildland-urban interface in many areas continues to be at high risk. Furthermore, losses do not only occur within high hazard and high-risk areas, but increasingly, throughout the entire landscape. Complacency can be fatal.

Table 9 – Structural losses per year and the state that had the greatest loss.

Year	Number of Structures[15]	State Highest Structure Loss	
2011	5,246	TX	3,222
2012	4,244	CO	818
2013	2,135	CA	715
2014	1,953	CA	694
2015	4,636	CA	3,075
2016	4,312	TN	2,175
2017	12,306	CA	7,778
2018	25,490	CA[16]	23,647
2019	963	CA	569
2020	17,904	CA	11,473
Average	7,919		

Wildland fire and home ignition research consistently shows that a home's exterior and site characteristics significantly influence how likely it is to catch on fire, and thus its chances for survival (e.g., Cohen, 2000).

[15] This includes residences, commercial properties, and outbuildings.

[16] This includes both the Carr and Camp Fires.

A wildfire can ignite structures in three ways:

① **Direct Flames**: These can either impact the structure directly or cause the vegetation near it catch on fire and break glass, which then allows flames to enter;

② **Radiant Heat:** This is heat that is generated from burning materials and can be intense enough to cause ignitions without direct flame contact; and

③ **Ember Storm:** As mentioned above, small pieces of burning material can create spot fires when they land on combustible material (spotting).

Spotting, in particular, routinely ignites poorly kept structures and unmaintained flammable landscapes. The risk of a structure burning is directly related to the characteristics of the WUI, which include the:

- Layout of the community—housing density, zoning, distance between structures, and the presence of physical barriers;
- Structural design, construction material, and location (e.g., mid-slope, on top of a ridge, etc.);
- Abundance of flammable materials (e.g., vegetation, wood piles, etc.) around structures that can act as a heat source; and
- Amount of adjacent open space (fuels terrain) (Cohen, 2000).

5 Mitigation Action Plan

5.1 Community Preparedness

A major challenge for the communities of Dana, Glenburn, Fall River, and the associated subdivisions is getting—and keeping— landowners interested. During extreme fire seasons—or when the area is directly threatened—residents are concerned about the risk. However, once winter arrives, engagement quickly wanes. Funding opportunities (such as grants) for project implementation do not always coincide with this cycle. The difficulty is in retaining their attention year-round, regardless of the intensity of the fire season.

5.1.1 Emergency Communications

The Fall River FDP station in Fall River Mills has an air raid siren that currently sounds daily at noon. It is also used to notify volunteers if they need to respond to a fire.

Table 10 lists the TV and radio stations that broadcast to the Fall River Valley and provide emergency notifications for the North State. However, reception quality varies throughout the area.

Table 10 – Media outlets that reach the Fall River Valley.

Call Sign	Channel/Number	Format	Broadcast Area
KRCR - ABC	7	TV	Redding

Call Sign	Channel/Number	Format	Broadcast Area
KHSL – CBS	12	TV	Redding-Chico
KNCA	89.7	Radio	Burney
Q97	97.3	Radio	Redding
K-Shasta	104.3	Radio	Redding
106X	106.1	Radio	Burney

Shasta County has instituted a rapid emergency notification service called CODERED®. Under this program, citizens can sign up to be notified via text, email, and/or voice about emergencies in their area. This service can be used in a variety of emergency situations, such as: fires, chemical spills, evacuations, lock downs, downed power lines, lost individuals, natural disasters, abductions, water system problems, bomb threats, and/or other emergencies.

Signups can be done

① Via the Web: Navigate to https://www.bit.ly/3e2viko; or

② Via text: Text *Shasta911* to 99411.

5.1.2 Evacuation Planning

One of the most effective ways to save lives when there is an emergency is to establish evacuation routes and meeting places *before* they are necessary and then ensure residents are familiar with them.

5.1.2.1 Central Meeting Location

The McArthur Fairgrounds is an excellent meeting place during an evacuation. There is plenty of parking and facilities for livestock (corrals and barns). The fairgrounds also has several large buildings, is centrally located, has several restrooms, and has a kitchen facility in the George Ingham Hall. There is also a children's playground on its west end.

5.1.2.2 Escape Routes

Big Eddy Estates: There is a loop road through the entire subdivision (Shoshoni Loop). In an emergency, residents can use it evacuate to the Fall River-Cassel Road, then go either south through Cassel or north to Fall River Mills. The majority of the roads in the sub-division are good for egress.

Alpine Subdivision: The road system is all dirt. Once they get to the main road, residents can either go west across Solider Mountain Road to Highway 89 or head east to Brown Road.

The other access road, to the south, is not just entirely dirt, but is also not well-maintained. After crossing several Forest Service roads, it eventually ties into Gomez Road, which has several gates. This is *not* a recommended escape route.

St John's Ranch Area: Once on the asphalt road (Fall River–Cassel Road), residents would have the opportunity to head south towards Cassel or north to Fall River Mills. There are several private roads along Fall River-Cassel Road that could have ingress/egress issues and have brush growing along them.

Figure 7 – Obvious.

Old School Road: The main road is currently the primary ingress/egress for the Old School Road Area. This is an issue—especially in an emergency. At the spot where the Odgen Property meets the Forest Service Road, there is a locked gate. The route out through PG&E lands is also gated.

Another challenge in an evacuation is that many residents have livestock and would need time to prepare them as well. Once they reached McArthur Road, they can follow it to the fairgrounds, which has structures (corrals and horse stalls) for housing farm animals.

5.1.3 Emergency Preparedness Programs

Local efforts are almost entirely focused on educating children.

- **In-school:**
  - Before COVID-19 restrictions were enacted, the Forest Service and CAL FIRE both visited local elementary schools. Their most prominent efforts invariably involved Smokey the Bear[17].
  - In local pre-schools, volunteers taught fire safety.
- **Intermountain Fair:**
  - When staffing levels and the severity of the fire season allow, the Burn Trailer is brought to the fair. This interactive experience teaches children how to escape a house during a fire (and curious adults have been known to express jealousy).

[17] https://smokeybear.com/

- Smokey the Bear makes appearances and hands out fire prevention materials.

The programs listed below provide tools and information for wildland fire preparedness that can be used to educate the residents of the CWPP Project Area.

Ready! Set! Go! Preparedness Program[18]: This is a simple, yet effective, three-step approach:

① Ready. Maintain defensible space around your home and harden it for wildfire.
② Set. Get your home, family, and animals ready to evacuate in the event of a wildfire. Have a plan about what to take and were you are going.
③ Go! When wildfire strikes, evacuate early. (CAL FIRE, 2022b)

One Less Spark—One Less Wildfire[19]**:** This is an entire, fleshed-out wildfire prevention campaign. The "One Less Spark—One Less Wildfire" Campaign Toolkit is presented by the Interagency Fire Prevention Action Team and supported by the California Wildfire Coordinating Group (CWCG) Prevention Subcommittee. It is designed to provide consistent reminders during fire season to reduce the numbers of vehicle and equipment fires throughout the state. (CAL FIRE, 2022a)

Fire Adapted Communities[20]**:** The National Wildfire Coordinating Group (NWCG) defines a fire adapted community as: "A human community consisting of informed and prepared citizens collaboratively planning and taking action to safely coexist with wildland fire."

More specifically, these are knowledgeable, engaged communities where the actions of residents and agencies in relation to infrastructure, buildings, landscaping and the surrounding ecosystem lessen the need for extensive protection actions and enable the communities to safely accept fire as part of the surrounding landscape. Because every community is unique, the steps and strategies they take to improve their wildfire resilience will vary from place to place.

As part of the program, there are toolkits to help agencies and individuals prepare for wildfire.

5.2 Protecting Values and Assets

This section describes ways in which the community can better protect the values of the CWPP Project Area.

[18] https://www.readyforwildfire.org/prepare-for-wildfire/ready-set-go

[19] https://www.readyforwildfire.org/prevent-wildfire/one-less-spark-campaign/one-less-spark-campaign-toolkit

[20] https://www.NFPA.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA

5.2.1 Life Safety

The first priority of fire departments is always life safety—property (e.g., homes, businesses, historic sites, infrastructure, etc.) is secondary. As has been proven many times (e.g., Carr, Camp, and Dixie Fires), in a wildland fire situation, there are not enough resources to protect every piece of property that has buildings on it. Additionally, since it is not safe for owners to protect their own property, they are usually under mandatory evacuations before the fire gets there. Their land and structures (business, homes, out buildings, etc.) need to be able to survive on their own.

The ability of firefighters to protect structures and other improvements in the wildland interface depends on a variety of factors. When they arrive, firefighters conduct a rapid evaluation of the situation, which includes:

- Ingress/egress: Can the firefighters safely move into and out of the area?
- What is the structure made of (e.g., wood siding or stucco)?
- Are there hazardous materials in the area?
- Has adequate defensible space been provided for both the structure and the firefighters? Depending on (1) vegetation, (2) where it is on the slope, and (3) the presence of other structures, the minimum 100-foot clearance may not be enough for it to be safely protected.
- Are all structures treated to the required 100-foot clearance or is it only some of them? Buildings that have not been treated can threaten those which have.
- Is there an adequate water source?
- What is the behavior of the wildland fire?

5.2.2 Reducing Structure Ignitability

The following home ignition zone information is from the Firewise Program[21]. The home ignition zone picture shows three zones to treat, the: immediate, intermediate, and extended. For each of these, there is a list of recommended actions that reduce structure ignitability.

[21] https://www.NFPA.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire

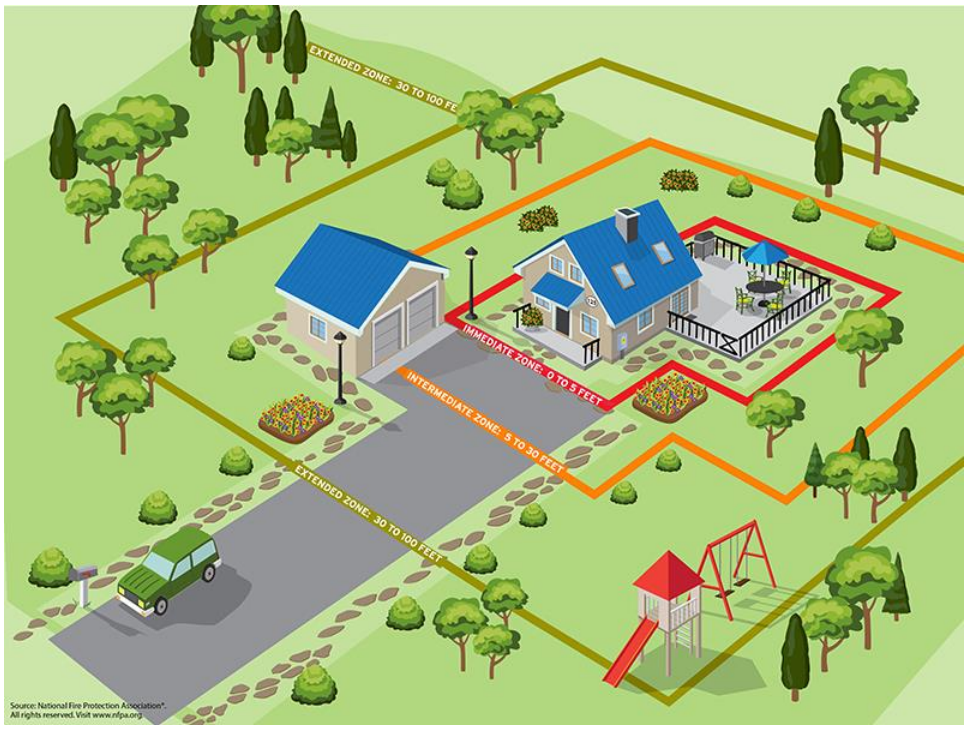

Figure 8 – Home ignition zone illustration from the Firewise Program.

Immediate Zone

The home and the area 0–5' from the furthest attached exterior point of the home; defined as a non-combustible area. Science tells us that this is the most important of the three since it is the most vulnerable to embers, thus work should begin here. START WITH THE HOUSE ITSELF, then move on to landscaping.

- **Roofs and Gutters**: Clean dead leaves, debris, and pine needles that could catch embers.
- **Shingles and Roof Tiles**: Repair/replace any that are loose or missing (to prevent ember penetration).
- **Vents in the Eaves:** Install ⅛-inch metal mesh screening (to reduce the potential for embers to pass through).
- **Exterior Attic Vents:** Clean all debris and install ⅛-inch metal mesh screening (to reduce the potential for embers to pass through).
- **Window Screens:** Repair/replace any that are loose/damaged/broken.
- **Boxed-in Areas** (Below Patios and Decks): Screen with wire mesh (to prevent debris and combustible materials from accumulating).
- **Flammable Material:** Move away from wall exteriors—mulch, flammable plants, leaves and needles, firewood piles—anything that can burn. Remove anything stored underneath decks or porches.

- **Garages:** Make sure doors are properly sealed and that vents for heaters/water heaters have screening (to reduce the potential for embers to pass through).
- **Siding:** Noncombustible materials are the best choice for hardening homes. Examples include: stucco, brick, cement board (T111), and steel.

Intermediate Zone

5–30 feet from the furthest exterior point of the home. Landscaping/hardscaping-employing careful landscaping or creating breaks that can help influence and decrease fire behavior

- **Clear Vegetation:** Under large stationary propane tanks.
- **Create Fuel Breaks:** Driveways, walkways/paths, patios, and decks can be effective.
- **Mowing:** Keep lawns and native grasses to less than four inches.
- **Remove Ladder Fuels** (Vegetation Under Trees): This is done so surface fires cannot reach the crowns. Prune trees up to six–ten feet from the ground; for shorter trees, do not exceed one-third of the overall height.
- **Space Trees:** There should be a minimum of eighteen feet between crowns, with the distance increasing with the steepness of the slope.
- **Plan When Planting Trees:** The mature canopy should be no closer than ten feet to the edge of any structure.
- **Limit Trees and Shrubs:** In this zone, these should be limited to small clusters of a few each in order to break up the continuity of the vegetation across the landscape.

Extended Zone

30–100 feet, out to 200 feet. The goal in this area is *not* to eliminate fire, but rather to interrupt its path and keep flames smaller and on the ground.

- **Litter and Debris:** Dispose of heavy accumulations.
- **Dead Plant and Tree Materials:** Remove.
- **Small Conifers** (Growing Between Mature Trees): Remove.
- **Adjacent Vegetation** (To Storage Sheds or Other Outbuildings): Remove.
- **Trees** (30–60′ from Home): Ensure that there is at least 12 feet between canopy tops.[22]

[22] The distances listed for crown spacing are suggested based on NFPA 1144. However, the crown spacing needed to reduce/prevent crown fire potential could be significantly greater due to slope, the species of trees involved and other site-specific conditions. Check with your local forestry professional to get advice on what is appropriate for your property.

- **Trees** (60–100′ from Home): Ensure there is at least 6 feet between canopy tops.[23]

5.2.3 Other Values

Life safety is the first priority for fire protection. The safety of individuals will *always* be the first concern of emergency responders. Once people are out of danger, fire suppression actions are taken to protect structures and infrastructure. The third priority is to safeguard natural and cultural values at risk.

Thus, the best way to protect natural and cultural resources is through reducing fuels. As before, the goal is not to prevent all wildfire, but rather to treat the landscape in such a way that if (when) it burns, it does so at low severity. This is vital because high intensity fire is what causes much of the harm. As demonstrated by the catastrophic wildfire seasons of 2020 and 2021, the ongoing drought and accumulation of fuels is making firefighting more difficult and dangerous. Areas that have not been prepared are increasingly suffering long-term harm, which cannot be repaired.

Fortunately, the vegetation in the project area is well-adapted to fire. This means that thinning and lowering fuel loads—on both private and public land in tandem—can effectively reduce burn severity. Treating landscapes can make wildfire:

- More likely to stay on the ground (instead of burning from crown to crown);
- Spread more slowly; and
- Not burn as hot (thereby reducing the damage it causes).

This is not a theoretical idea, but is seen on the ground again and again. Two well-documented local examples include:

Cone Fire (2002): In the Blacks Mountain Experimental Forest (Eagle Lake Ranger District, LNF), this fire burnt into research units that had undergone different fuels reduction treatments. When it entered stands that had both been thinned and prescribed burned, it dropped from the crowns to the ground and continued at low intensity. Within areas that were only thinned, it still left the crowns, but the burn severities were higher (Skinner et al., 2004).

Butte Fire (2009): In this dramatic example (Hat Creek Ranger District, LNF), the Butte Fire was 1 of 37 that were ignited by a single lightning storm! It could have become an inferno, but only reached 49 acres because the land in the fire's path had been treated. Without abundant fuels, there were no spot fires—and a small group of firefighters were able to prevent disaster (Wintch, 2010).

[23] The distances listed for crown spacing are suggested based on NFPA 1144. However, the crown spacing needed to reduce/prevent crown fire potential could be significantly greater due to slope, the species of trees involved and other site-specific conditions. Check with your local forestry professional to get advice on what is appropriate for your property.

5.3 Fuel Reduction Strategies

To reiterate, wildfires are driven by:

① Weather;
② Topography; and
③ Fuels—The Only Opportunity to Intervene.

Implementing the fuels treatment activities identified in this plan will require some site-specific planning. Considerations include:

- **Land Ownership**: Collaboration with property owners, who may not live locally;
- **Environmental Analysis:** CEQA, NEPA;
- **Resource Protection:** Cultural sites, hydrologic and soil concerns, wildlife, etc.;
- **Funding**; and
- **Product Market Value**: Offsetting costs.

5.3.1 Types of Fuel Treatments

There are a variety of fuels treatment techniques that involve timber, brush, and/or grasses. Each of these address ladder fuels, surface fuels, or both. Common approaches include:

Thinning: Reduces the stocking (number of trees) on the landscape and is done according to "prescriptions." These commonly range between "thinning from below" (removing the small diameter trees and ladder fuels) to "variable density thinning" (removing trees of all sizes). Depending on the location, sensitivity of the site, and acreage, it is either done mechanically or by hand. When trees can be sold, the funds are often used to offset treatment costs.

Mastication: Mowing of brush and small diameter trees. Importantly, it does not remove the material from the site, but rather changes its composition from standing to surface fuels.

Machine Piling: Treating surface fuels by collecting them into large piles. Doing this in a brush field can reduce the density by also removing the root burls.

Hand Piling: Treating surface fuels and any materials (slash) from thinning by manually collecting them into piles. Hand thinning can be used on steep slopes, in sensitive areas, and for small projects that are not suitable for machine work.

Prescribed Fire: Also referred to as "underburning." This important technique treats surface fuels. In areas adjacent to houses and on small properties, this treatment is generally only used for slash piles.

- Pile burning follows the guidelines of the administering agency.
- A smoke management plan is needed for any project greater than ten acres or

when burning more than a ton of material.

- A prescribed fire plan may also be needed depending on the complexity of the project.

Weed-Whacking: Using a weed eater, lawn mower, or hand tool to reduce grasses, forbs, and low-growing shrubs.

Limbing or Pruning: The removal of low limbs using a power or hand saw in order to reduce ladder fuels.

Figure 9 – An example of an ideal underburning operation. Eastside Project, near Coyote Spring. HCRD, LNF.

Biological: Using livestock (e.g., goats, sheep, cattle) to reduce live surface fuel loads. This treatment can be both very efficient and cost effective. However, grazing does involve meeting fencing requirements, maintaining water sources, and transporting the animals, which can be restrictive. Unfortunately, grazing animals are indiscriminate in what they eat, desired plants (e.g., trees) can be eaten along with everything else.

Herbicide: A chemical used to kill live vegetation. These can be applied by hand or over a broad area. Depending on location and type, they can be controversial. They are particularly effective for reducing noxious weeds that contribute to fire hazard (e.g., star thistle, medusa head, etc.).

5.3.2 Fuel Reduction Projects—Completed

Portions of the CWPP Area have already been treated. This includes several recent thinning projects that were done on private lands, which may also be followed up by prescribed burning. In addition to landowner financing, some of these efforts have been funded by grants. Please see Appendix B: Projects Accomplished/Planning Completed for a list of these activities.

5.3.3 Fuel Reduction Projects—Potential

As discussed in Section 1.4.1 Fall River CWPP Collaboration, the Fall River FSC reached out to residents to find out how interested they were in having fuel reduction work done on their properties.

On federal land (USFS, BLM), upcoming activities include:

- **Soldier Mountain Project (LNF):** A 3,000-acre project adjacent to private lands that involves: thinning, prescribed burning, mastication, and machine piling;

- **Thousand Springs Project (LNF):** A 220-acre project that includes both thinning and surface fuel reduction; and
- **Hogback Ridge (BLM):** Prescribed burning.

Potential future projects would take place on a mixture of (1) non-developed private lands, (2) private property with structures, (3) wildland vegetated areas, and (4) maintained landscapes. Please see Appendix A: Project List and Prioritization for details about the community's plans.

5.3.4 Fuels Reduction

Fuel treatments cannot just be done once! Trees continue to drop needles, cones, and branches. Brush grows back. Grasses return and develop a thatch layer. To remain effective, they *must* be maintained. See Section 7.1 Fuels Treatment Maintenance for additional information.

6 Fiscal Resources and Constraints

In the Fall River Valley, parcel sizes vary and there are many different landowners. Depending on the log market and the acreages involved, some residents simply cannot afford to have their properties treated. Thus, no matter how well designed this CWPP might be, the needs of the community cannot be met without additional funding. The Fire Safe Council, with the assistance of the RCD and other groups, will seek external sources to implement the projects listed in Appendix A: Project List and Prioritization

6.1 Potential Grant Funding

The devastation caused by the Camp and Carr Fires alone—even without considering the fire seasons of 2020 and 2021—shows just how important it is to treat landscapes. Fortunately, grants are available from many different sources to help us protect our homes. Eight examples of these include:

AIM Grant: The Action, Implementation, and Mitigation (AIM) Program reimbursement funding is available for a wide variety of capacity building activities, including personnel, planning efforts and wildfire risk reduction work on non-federal lands. Applicants must demonstrate how their proposal fits into the larger community wildfire picture, including by coordinating with federal partners on nearby lands.

CAL FIRE—Fire Prevention Program: Through the California Climate Investments (CCI), this program funds local projects and activities that address the risk, and reduce the potential, of wildfire in forested and forest-adjacent communities. Funded activities include:

- Hazardous fuel reduction;
- Fire prevention planning; and
- Fire prevention education;

All of which should ideally have an emphasis on improving public health and safety; and reducing greenhouse gas emissions.

CAL FIRE—Forest Health Program: Through the California Climate Investments (CCI), this program funds projects that are designed to proactively restore forest health, with an emphasis on those that are locally organized and driven. Its central aims are to:

- Reduce greenhouse gas emissions;
- Promote the long-term storage of carbon in forest trees and soils;
- Safeguard upper watersheds that produce much of the state's water;
- Protect fish and wildlife habitat, and native plant species; and
- Minimize how much stored forest carbon is lost when there are large, intense wildfires.

California Fire Safe Council Grants: The CFSC Grants Clearinghouse supports fuel reduction projects, such as: community chipper programs, fuel breaks, and roadside and defensible space projects, as well as projects to promote community engagement and the use of educational tools to spread the Fire Safe Message.

EQUIP Program: The Environmental Quality Inspection Program assists *non-industrial forest timber owners*. These grants are funded by the Natural Resource Conservation Service (NRCS), which is part of USDA.

National Fish and Wildlife Foundation: This non-profit organization provides funding on a competitive basis to projects that sustain, restore, and enhance our nation's fish, wildlife and plants, and their habitats.

Sierra Nevada Conservancy (SNC): This organization provides grants to: fire safe councils, nonprofit organizations, resource conservation districts, and water agencies to reduce fire risk to communities, infrastructure, and natural resources within the Sierra Nevada. They seek to bring "a fast, thoughtful, and community-based approach to help [these] remarkable mountain communities not just survive fires but thrive."

USDA Joint Chiefs': This joint U.S. Forest Service and Natural Resources Conservation Service program is designed to improve the health of forests in places where public forests and grasslands connect to privately owned lands. Its focus is to restore landscapes, reduce wildfire threats to communities and landowners, protect water quality, and enhance wildlife habitat.

There are a variety of other federal grants available for landowners. The U.S. Forest Service, in particular, funds many fuel-reduction projects. The main web site to apply for federal grants is http://www.grants.gov.

7 Maintenance and Monitoring

7.1 Fuels Treatment Maintenance

As mentioned previously, treatments must be maintained—or they become ineffective. New debris will always accumulate, and vegetation grows back.

The majority of the CWPP Project Area has a fire return interval of 0–35 years. A fire return interval is defined at the time between fire occurrences. The Hat Creek Ranger District has the same types of fuel as the Fall River Valley and uses a 10-year rotation for maintenance. However, due to there being multiple landowners and a variety of parcel sizes, this would not be practical. A 15–20-year rotation is more realistic.

There are a variety of tools that can be used to maintain fuel reduction treatments:

- **Piling and Burning** needles, limbs, and other vegetation debris can be very effective if done yearly and is especially well-suited to small lots.
- **Grazing Animals** (cattle, sheep, goats) can keep grasses down.
- **Mastication** can be used, but its effectiveness can be limited because it only turns standing fuels into surface ones. Since the Intermountain Area is so dry, these do not decompose quickly.
- **Cutting New Seedlings** is a productive way to maintain stands that have been thinned.
- **Herbicides** can be used to reduce the density of vegetation, especially if noxious weeds are present.

For additional information, see Section 5.3 Fuel Reduction Strategies

7.2 CWPP Review Recommendations

The Fall River Community Wildland Fire Protection Plan must continue to evolve. It should be reviewed yearly to—at a minimum—update the project list.

As the Fall River Valley Fire Safe Council, together with local landowners and groups, work to implement this plan, there will be various challenges. Additionally, if there are ever any significant changes in policy, budget, or conditions on the ground (such as from a wildfire), it would have to be revised.

A yearly review of this CWPP will ensure it is current, so it can continue to help us keep our homes and loved ones safe. There is no escaping this reality:

It Is Not a Matter of **IF** There Will Be a Wildfire, but **When**.

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9 Glossary

Aspect: Direction to which a slope faces.

BLM: Bureau of Land Management, Department of the Interior.

CCR: California Code of Regulations.

Century Bicycle: A 100-mile bicycle race.

Chain: A measure of distance—66 feet. This unit is often used in forest management.

Conduction: Heat transfer through a solid material from a region of higher temperature to one that is cooler.

Convection: The transfer of heat by the movement of a gas or liquid.

Community Wildfire Protection Plan (CWPP): A community-based collaborative plan developed by local stakeholders that identifies and prioritizes areas for hazardous fuel reduction treatments to protect communities and infrastructure from wildfire. Stakeholders, applicable local government, local fire departments, state forestry, and federal land management agencies agree to these plans.

Condition Class: Description of the degree of departure from historical fire regimes, based on the current type and structure of vegetation. While these are only general groupings, they are important because they describe the risk of losing key ecosystem components in a wildfire. The range is from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk).

Defensible Space: The area within a parcel, development, neighborhood, or community in which basic wildland fire protection practices can be implemented. This space is key in both defending against wildfires and allowing the occupants to escape from structure fires.

Fuel Model: Mathematical descriptions of fuel properties (e.g., fuel load and fuel depth) that are used as inputs to calculations of fire danger indices and fire behavior potential.

Goal: A broad statement of what one wishes to accomplish, an indication of program intentions.

Infrastructure: Basic physical and organizational structures and facilities (e.g., buildings, roads, and power supplies) needed for the operation of a society or enterprise.

LRA: Local Response Area.

Objectives: These contribute to the fulfillment of specified goals and are measurable, defined, and specific.

Radiation/Radiative Heat: Transfer of heat in straight lines through either a gas or vacuum. If through gas, not dependent on it moving (convection).

SRA: State Response Area.

USFS: United States Forest Service, Department of Agriculture.

WUI: Wildland-urban Interface. "The area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels" (McPherson et al., 1990).

10 Appendix A: Project List and Prioritization

Project	1	2	3	4	5	6	7	8	9	10	Total
Christofferson	1	1	0	3	2	0	1	3	0	0	11
Fall River Ranch	1	1	0	2	1	1	1	3	0	0	10
Rickert's	1	1	0	2	2	1	1	2	0	0	10
Switzer	0	1	0	2	2	0	1	3	0	0	9
Bob Hartley	0	1	0	2	2	1	1	4	1	0	12
Big Eddy Estates	0	1	1	2	3	0	1	4	0	1	13
Cassell-Fall River	0	1	1	2	3	0	1	4	0	0	12
Sabel Zell	0	1	1	2	1	0	1	3	1	0	10
Barb Lawson	0	1	0	2	2	1	1	4	1	0	12
Peulso	0	1	0	3	2	0	1	3	0	0	10
Alpine Area	0	1	1	2	3	1	1	4	1	0	14
Richard Nichols	0	1	1	3	2	0	1	4	0	0	12
Bryan Krezanoski	0	1	0	3	2	1	1	4	0	0	12
Old School Road	0	1	0	4	2	1	1	4	1	0	14

① Is the landowner willing to fund part of the work – match potential. Yes – 1 point. No – 0 points.

② Landowner willing to let the work happen. Yes – 1 point. No – 0 points.

③ Adjacent to a completed project. Yes – 1 point. No – 0 points.

④ Treatment costs and treatment methods. Costs are local and can change from year to year.

Hand work will be more expensive than mechanical.

- 1,000 plus dollars per acre – 1 point.
- 750 – 1,000 per acre – 2 points.
- Under 750 per acre – 3 points.
- Bonus point – add a bonus point to any of the above if there are logs to off-set the cost.

⑤ CEQA does it require a forest management plan:

- No CEQA/timber management plan required – 3 points.
- CEQA/timber management plan but follows under an exemption – 2 points.
- CEQA/timber management plan required no exemption – 1 point.

⑥ Collaboration/community involvement. Yes – 1 point. No 0 – points.

⑦ Treatment effectiveness and sustainability can the treatment be maintained and is the landowner willing to assist with the maintenance? Yes – 1 point. No – 0 points.

⑧ Fire environment – past fire history of the area, response time, population density, slope, and vegetation.

- 4 points – Sub-division, been threatened by fire, brush fuel type, slope.
- 3 points – Single structure, brush fuel type.
- 2 points – Single structure, timber or grass fuel types. Private land on a slope, vegetation is brush/timber.
- 1 point – Private land, no structures, on flat land, vegetation is grass.

⑨ Ingress/Egress: Does the project contribute to the ingress and egress of the project area? Yes – 1 point. No – 0 points.

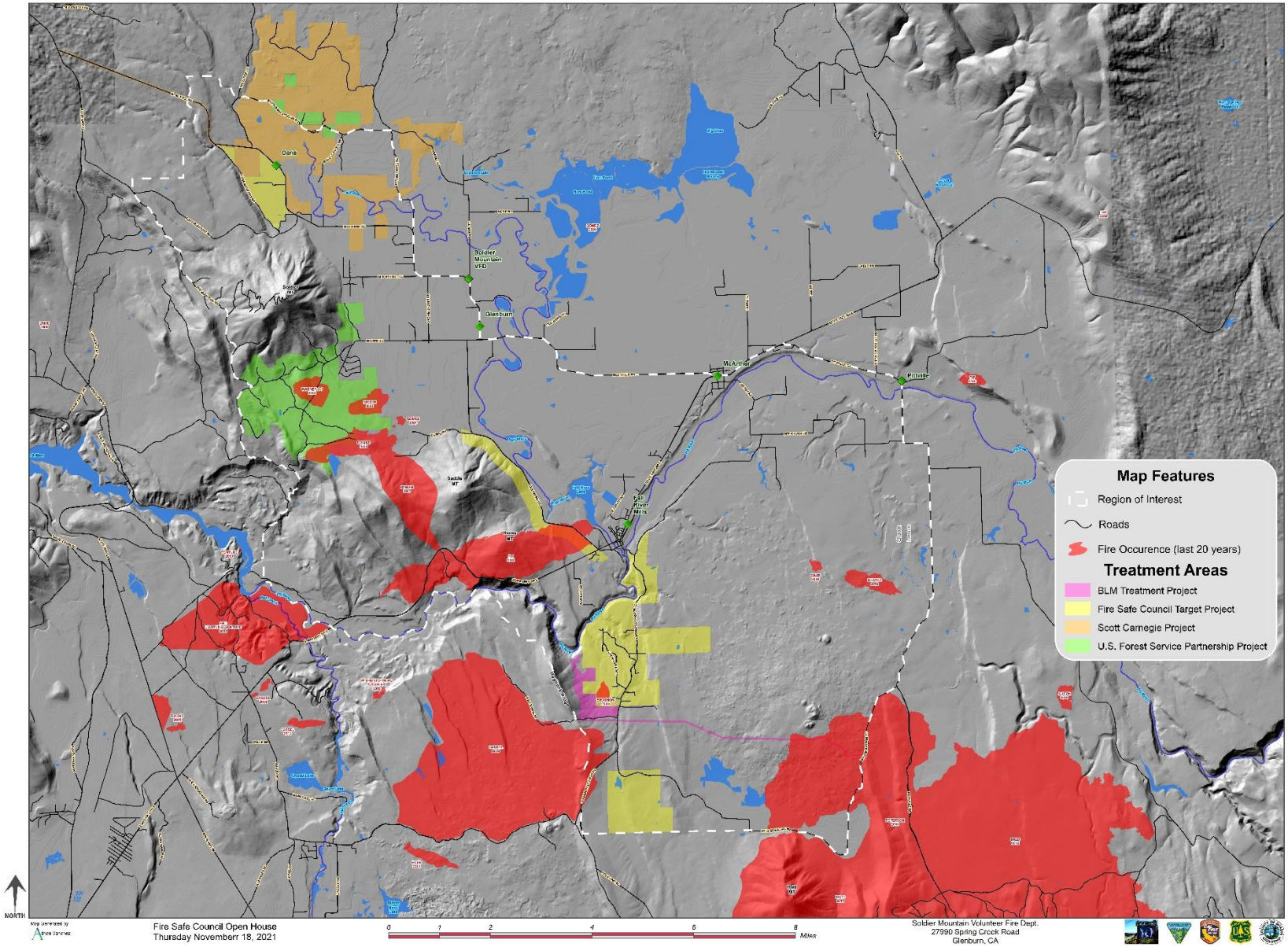
⑩ Is the project shovel ready -can be started without any effort? Yes – 1 point. No – 0 points.

- Big Eddy Estates: Multiple landowners have 5-acre parcels (can be treated as one project).
- Cassell-Fall River Rd: Covers all the 5–10-acre parcels.
- Alpine Area: Multiple small landowners (can be treated as one project).
- Old School Road: Multiple small landowners (can be treated as one project).

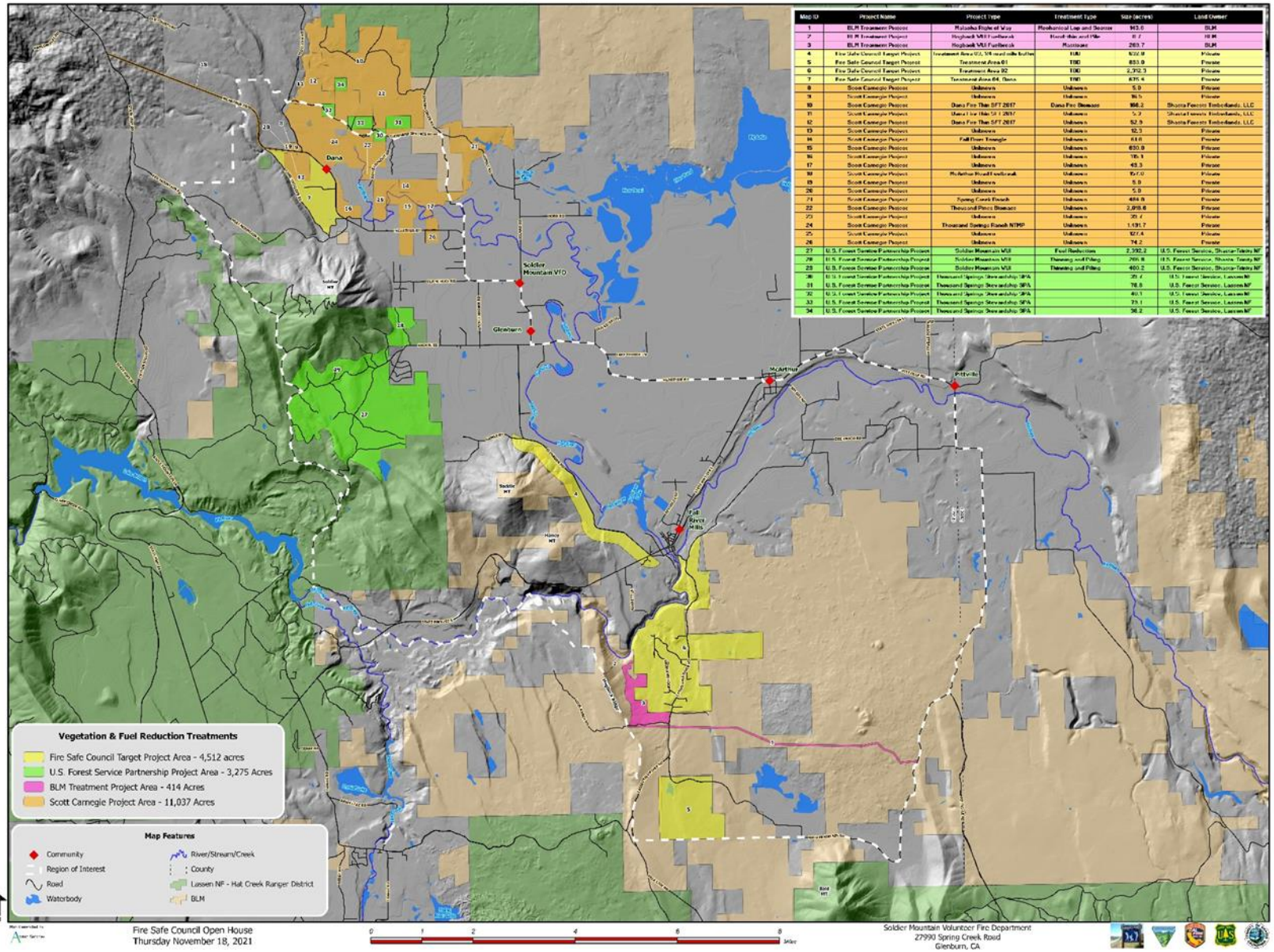
11 Appendix B: Projects Accomplished/Planning Completed

Project Name	Landowner	Acres	Location	Work Accomplished
Thousand Springs Ranch	Private	1491.7	Dana	Thinning
Sandberg's	Private	40.0	Brown Road	Thinning
Hogback	BLM	414.0	Big Eddy Estates	Mastication
Spring Creek Ranch	Private	484.0		Thinning
Fall River Ranch	Private			Thinning
Carnegie/Coe	Private (Neighbors)	10.0	Dana	Thinning/Piling
Upper Fall River Ranch				Thinning
Lower Fall River Ranch				Thinning
McArthur Road Fuel Break	Private—Commercial	157.0	McArthur Road	Thinning
Pierce				
Opalenik				
Shasta Land Trust	Shasta Land Trust/Beatty	226.4	Dana Area	Thinning
Thousand Pines Biomass		2018.0	Dana Area	Thinning
Fall River Triangle	Private	61.0		
WRM				Thinning
Dellaragione				Thinning
USFS Soldier Mountain	USFS	3,000.0	Soldier Mountain	Planned
USFS	USFS	240.0	Thousand Springs	Planned
Hogback	BLM		Fall River	Mastication/Rx Fire

Fall River Valley Fire History



FALL RIVER FIRE SAFE COUNCIL CWPP



Map ID	Project Name	Project Type	Treatment Type	Size (Acres)	Landowner
1	BLM Treatment Project	Malacha Right of Way	Mechanical Lop And Scatter	143.6	BLM
2	BLM Treatment Project	Hogback WUI Fuel Break	Hand Thin and Pile	0.7	BLM
3	BLM Treatment Project	Hogback WUI Fuel Break	Masticate	269.7	BLM
4	Fire Safe Council Target Project	Treatment Area 03—¼ Road Mile Buffer	TBD	632.0	Private
5	Fire Safe Council Target Project	Treatment Area 01	TBD	893.0	Private
6	Fire Safe Council Target Project	Treatment Area 02	TBD	2,312.3	Private
7	Fire Safe Council Target Project	Treatment Area 04—Dana	TBD	675.4	Private
8	Scott Carnegie Project	Unknown	Unknown	5.0	Private
9	Scott Carnegie Project	Unknown	Unknown	16.5	Private
10	Scott Carnegie Project	Dana Fire Thin SFT 2017	Dana Fire Biomass	168.2	Shasta Forests Timberlands, LLC

Map ID	Project Name	Project Type	Treatment Type	Size (Acres)	Landowner
11	Scott Carnegie Project	Dana Fire Thin SFT 2017	Unknown	5.3	Shasta Forests Timberlands, LLC
12	Scott Carnegie Project	Dana Fire Thin SFT 2017	Unknown	52.9	Shasta Forests Timberlands, LLC
13	Scott Carnegie Project	Unknown	Unknown	12.3	Private
14	Scott Carnegie Project	Fall River Triangle	Unknown	61.0	Private
15	Scott Carnegie Project	Unknown	Unknown	630.0	Private
16	Scott Carnegie Project	Unknown	Unknown	115.1	Private
17	Scott Carnegie Project	Unknown	Unknown	49.3	Private
18	Scott Carnegie Project	McArthur Road Fuel Break	Unknown	157.0	Private
19	Scott Carnegie Project	Unknown	Unknown	5.0	Private
20	Scott Carnegie Project	Unknown	Unknown	5.0	Private

Map ID	Project Name	Project Type	Treatment Type	Size (Acres)	Landowner
21	Scott Carnegie Project	Spring Creek Ranch	Unknown	484.0	Private
22	Scott Carnegie Project	Thousand Pines Biomass	Unknown	2,018.6	Private
23	Scott Carnegie Project	Unknown	Unknown	39.7	Private
24	Scott Carnegie Project	Thousand Springs Ranch NTMP	Unknown	1,491.7	Private
25	Scott Carnegie Project	Unknown	Unknown	127.4	Private
26	Scott Carnegie Project	Unknown	Unknown	74.2	Private
27	U.S. Forest Service Partnership Project	Soldier Mountain WUI	Fuel Reduction	2,392.2	U.S. Forest Service, Shasta-Trinity NF
28	U.S. Forest Service Partnership Project	Soldier Mountain WUI	Thinning And Piling	206.8	U.S. Forest Service, Shasta-Trinity NF
29	U.S. Forest Service Partnership Project	Soldier Mountain WUI	Thinning And Piling	400.2	U.S. Forest Service, Shasta-Trinity NF
30	U.S. Forest Service Partnership Project	Thousand Springs Stewardship SPA	See NEPA Document	39.7	U.S. Forest Service, Lassen NF

Map ID	Project Name	Project Type	Treatment Type	Size (Acres)	Landowner
31	U.S. Forest Service Partnership Project	Thousand Springs Stewardship SPA	See NEPA Document	78.8	U.S. Forest Service, Lassen NF
32	U.S. Forest Service Partnership Project	Thousand Springs Stewardship SPA	See NEPA Document	40.1	U.S. Forest Service, Lassen NF
33	U.S. Forest Service Partnership Project	Thousand Springs Stewardship SPA	See NEPA Document	79.1	U.S. Forest Service, Lassen NF
34	U.S. Forest Service Partnership Project	Thousand Springs Stewardship SPA	See NEPA Document	38.2	U.S. Forest Service, Lassen NF

13 Appendix D: Fire Modeling

This section will discuss the methods and terms used for fire modeling.

Surface fuels are measured in total tons per acre. Surface fuels are then broken into three size classes and measured in tons/acre for the three size classes. The three size classes in the fire behavior models are based on how long it takes them to reach saturation or the opposite to dry. The three sizes are one hour (fine fuels less than 0.25 inches in diameter), 10-hour fuels (0.25 to 1 inch in diameter) and 100 hour (1 to 3 inches in diameter). There are also 1,000-hour fuels (greater than 3 inches) which are used to track drying trends.

Surface fuels drive fire behavior. Reducing the surface fuels reduces flame lengths. As shown in the Grass Valley fire: Fire behavior in fuel treatment areas was less rapid and less intense than in adjacent untreated wildland fuel and urban structural fuel. The reduced spread rate and intensity allowed suppression forces to concentrate on protecting structures and on preventing additional fire spread to the south. Thinning alone will not reduce fire behavior. Thinning and removing ladder fuels will reduce the ability of fire to torch trees or to become a crown fire.

The weather is from Ladder Butte RAWS station. This station has been in service since 1988 and the data has been archived thru WIMS. This station is used as the severity station for the Lassen National Forest. The weather data is for 90th percentile fire weather data. This is the weather that occurs during ten percent of the fire season. See table A1 below for the weather used.

Fire modeling was done using the Behave fire modeling. The following assumptions are part of Behave fire modeling program: 1. surface and vertical fuels are homogenous across the landscape, 2. topography is homogenous across the landscape, 3. weather is homogenous across the landscape, 4. the fire is a single point source (it does not take into account spotting), and 5. Fire spreads in an elliptical shape. The Behave Program does not take into account suppression action when predicting fire spread. It does have a section that deals with containment.

Table 11 – Behave input parameters.

Weather Parameter (Ladder Butte)	90th percentile
1 hour	2.5
10 hour	3.0
100 hour	5.0
Live Fuel Moisture	100.0
Woody Fuel Moisture	100.0

Temperature	87.0
Relative Humidity	14.0
20-foot Wind Speed	12.0
Wind Speed Reduction for Grass/brush	0.4
Wind Speed Reduction for Timber	0.3

Table 12 - Pre-Treatment (tons/acre)

Fuel Model	1-hour	10-hour	100-hour	Depth (feet)	Live
1	0.74	0	0	1.00	0
2	2.00	1.00	0.50	1.00	0.50
6	1.50	2.50	2.00	2.50	0
9	3.80	0.53	0.20	0.26	0
10	3.01	2.00	5.01	1.00	2.00

Table 13 - Post Treatment (tons/acre)

Fuel Model	1-hour	10-hour	100-hour	Depth (feet)	Live
1	0.38	0	0	0.50	0
2	1.00	0.50	0.25	0.50	0.25
6	0.75	1.25	1.00	1.25	0
9	1.90	0.25	0.10	0.13	0
10	1.50	1.00	2.50	1.00	0.50

All fuels in the 1 hour, 10-hour, 100-hour and live fuel are measured in tons per acre. Depth of the fuel in measured in feet. The pre-treatment tons per acre (Table A2) is from the Aids for Determining Fuel Models. The vale from Fuel Model Nine has been increased by thirty percent based on local knowledge of this fuel model. The post treatment tons/acre (Table A3) has been reduced by fifty percent to reflect the treatment of the surface fuels.

14 Appendix E: Excerpt from the Revenue and Taxation Code

Section 17053.1. of the Revenue and Taxation Code

(a) For taxable years beginning on or after January 1, 2016, there shall be allowed a credit against the "net tax," as defined by Section 17039, in an amount equal to the qualified costs paid or incurred by a qualified taxpayer during the taxable year for fuel management activities performed on qualified real property, subject to subdivision (c).

(b) For the purposes of this section, the following definitions shall apply:

(1) "Defensible space" means the area adjacent to a structure or dwelling where wildfire prevention or protection practices are implemented to provide defense from an approaching wildfire or to minimize the spread of a structure fire to wildlands or surrounding areas.

(2) "Fuel management activities" means the creation of a defensible space around structures, the establishment of fuel breaks, the thinning of woody vegetation for the primary purpose of reducing risk to structures from wildfire, or the secondary treatment of woody fuel by looping, scattering, piling, chipping, removing from the site, or prescribed burning, provided these activities meet or exceed the requirements of the 2015 California Forest Practice Rules.

(3) "Hazardous fire area" has the same meaning as that term is defined in Section 4251 of the Public Resources Code.

(4) "Licensed contractor" means a contractor licensed under the Contractors' State License Law (Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code) with a license that relates to the duties necessary to provide fuel management activities.

(5) "Professional forester" means a person licensed under the Professional Foresters Law (Article 3 (commencing with Section 750) of Chapter 2.5 of Division 1 of the Public Resources Code).

(6) "Qualified costs" means 25 percent of the costs paid or incurred by a qualified taxpayer for labor or services performed for fuel management activities by a licensed contractor or professional forester, which costs are evidenced by records and documents, including, but not limited to, a written certification.

(7) "Qualified real property" means real property that is located within a hazardous fire area or a very high fire hazard severity zone in this state.

(8) "Qualified taxpayer" means a taxpayer who owns qualified real property. A taxpayer who owns a share of qualified real property may be allowed a share of the credit based on the taxpayer's share of the qualified costs.

(9) "Wildfire" means an unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other

wildland fires where the objective is to extinguish the fire.

(10) "Very high fire hazard severity zone" has the same meaning as that term is defined in subdivision (i) of Section 51177 of the Government Code.

(11) "Written certification" means a written evaluation by the State Board of Forestry and Fire Protection or local fire department that certifies the establishment of defensible space, provided that the certification shall be obtained within 30 days after completion of the work establishing the defensible space. The qualified taxpayer shall retain a copy of the certification and provide it to the Franchise Tax Board upon request.

(c) The amount of the credit allowed by this section shall not exceed the lesser of two thousand five hundred dollars ($2,500) per qualified taxpayer per taxable year or 50 percent of a qualified taxpayer's total tax liability for the previous taxable year.

(d) A deduction shall not be allowed under this part for any amount paid or incurred for which a credit is allowed by this section.

(e) The Franchise Tax Board shall establish a procedure to verify that the amount was paid or incurred by the qualified taxpayer for fuel management activities on qualified property.

(f) It is the intent of the Legislature to enact legislation to comply with the requirements of Section 41.

(g) If the credit allowed by this section exceeds the "net tax," the excess may be carried over to reduce the "net tax" in the following year, and the succeeding six years, if necessary, until the credit is exhausted.

15 Appendix F: California Environmental Quality Act (CEQA)

This information is included in order to assist members of the public in preparing proposals.

CEQA and/or a timber management harvest plan is required for land management activities. Certain activities have exemptions from the requirements. As an example, any fuels reduction work done to maintain defensible space is exempt from CEQA. The following does not show all the rules of CEQA and/or timber harvest plans, just a place to start down the requirements for CEQA/timber harvest plan.

If grant money is being used for the project – CEQA is required.

If trees are being sold as logs, traded or bartered – CEQA is required.

Biomass being sold to a mill – CEQA is required.

Exemptions: Each exemption has a set of rules and regulations with it, the list below is just the title with a note about registered foresters.

10% DEAD, DYING OR DISEASED TREES FUELWOOD OR SPLIT PRODUCTS OR REMOVAL OF SLASH & WOODY DEBRIS NOT LOCATED WITHIN A WLPZ (watercourse or lake protection zone) EXEMPTION: This exemption still requires a write up by a registered professional forester.

STRUCTURE PROTECTION EXEMPTION: Removal of fire hazard trees from 0 to 150 feet of an Approved and Legally Permitted Structure. This also requires a registered professional forester to be involved in the marking of the timber or a designee.

STRUCTURE PROTECTION EXEMPTION: Removal of fire hazard trees from 150 to 300 feet of an Approved and Legally Permitted or (Habitable) Structure. Trees marked for harvest must be marked by a registered professional forester or a designee.

FOREST FIRE PREVENTION: This requires participation of a registered professional forester.

Notice of Exemption SHALL only be used on Timberlands that are within the most recent version of the Departments Fire Hazard Severity Zone Map, located at the Departments website at: https://osfm.fire.ca.gov/divisions/wildfire-prevention-planningengineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/ that shows the exemption will occur in areas determined to be moderate, high, or very high fire threat. 14 CCR § 1038.3

(b) Harvest Area shall not exceed three hundred (300) acres. 14 CCR § 1038.3

(c) Only trees less than 30 inches outside bark stump diameter 8 inches above ground level may be harvested. 14 CCR § 1038.3

(h) Road Construction and Reconstruction: ¬ No tree larger than 36 inches in diameter at stump height, measured 8 inches above ground level, may be removed for the purpose of road construction or reconstruction. 14 CCR § 1038.3(e)(5)

(F) Trees between 30 and 36 inches in stump diameter at stump height, measured 8 inches above the ground may be removed for the purpose of road construction and reconstruction, WHEN NO OTHER FEASIBLE OPTION EXISTS FOR ROAD ACTIVITIES. 14 CCR § 1038.3(e)(5)(F)

THE SMALL TIMBERLAND OWNER EXEMPTION: This requires the participation of a registered professional forester.

NORTHERN / SOUTHERN FOREST DISTRICTS –

- 100 ACRES or less of timberland within a single Planning Watershed (CALWATER 2.2). 14 CCR § 1038(f)(1)(A)
- Only trees less than 32 inches outside bark stump diameter 8 inches above ground level. 14 CCR § 1038(f)(4)
- No trees of the Quercus Species greater than 26 inches outside bark stump diameter 8

inches above ground level. 14 CCR § 1038(f)(4)(A)

- Timber Operations SHALL only occur once over a 10-year period on any given acre. 14 CCR § 1038(f)(10) During the 10-years following the submittal of this Notice of Exemption the Director SHALL not approve a plan allowing for even aged silvicultural prescriptions. 14 CCR § 1038(f)(10)
- During the 10-years following the submittal of this Notice of Exemption the Timberland Owner shall not submit an exemption per 14 CCR § 1038.3 - Forest Fire Prevention Exemption. 14 CCR § 1038(f)(10)
- Timberland Owner may only submit 3 notices of exemptions pursuant to this section. 14 CCR § 1038(f)(11)

OAK WOODLAND MANAGEMENT RESTORE AND CONSERVE CALIFORNIA BLACK OAK, OREGON WHITE OAK WOODLANDS AND ASSOCIATED GRASSLANDS: Requires a registered professional forester.

NO trees larger than twenty-six (26) inches outside bark stump diameter, measured eight (8) inches above ground level may be removed for commercial purposes. 14 CCR § 1038(e)(3).

REGISTERED PROFESSIONAL FORESTER (RPF) CERTIFICATION: Per 14 CCR §1038(e)(2)(C)(1)-(2) – As the RPF preparing this Exemption notice I CERTIFY that the harvest area prior to timber operations has a minimum of thirty-five (35) square feet of basal area per acre of California black oak or Oregon white oak, or both. The purpose of Timber Operations per this notice of exemption is to restore and conserve California black oak and Oregon white oak and associated grasslands.