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June 21, 2022

Denali Farm LLC
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1632 Broadway # 173
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Re: APN 210-250-008
PLN-10989-CUP

This report is in response to County Planning's deficiency letter dated March 15, 2022, which in part states:

Another factor related to the onsite relocation is that the project parcel is in an area mapped as High or Very High Fire Hazard Severity. The proposal for relocation includes the expansion of existing structures and the addition of new structures in clearings close to the forest edge. The environmental superiority analysis and biological assessment will need to discuss whether increasing the size of existing structures and adding new structures would result in additional timber conversion for any reason such as to create defensible space. It may be appropriate to also consult with a professional forester and assess whether increasing existing structures and adding new structures will increase fire risk and whether the relocation could occur without requiring additional timber conversion.

Fire Risk Background

Wildfires are natural processes that have influenced the California landscape for millennia. Their frequency, intensity, and seasonality determine not only floristic compositions and the rate of forest succession, but are major factors affecting land use as well. Over time, the combination of spatial and temporal patterns of wildfire creates a regionalized fire regime, and this regular rate of disturbance is an integral component of the natural ecology.

Anthropogenic activity for the last several hundred years has affected the natural disturbance regimes. Land use including forest management has altered fuel conditions, and regulated the rate disturbances occur. Timber harvest entries often exceed natural fire return intervals, so the accumulation of fuels on the landscape has been able to exceed its historical capacity. Resulting damages from wildfires led to an aggressive fire suppression campaign that would continue to alter fuel loads for nearly a century.

In addition to changing forest conditions, increasing development in the Wildland-Urban Interface (WUI) continues to put more people, homes, and infrastructure in harm's way from wildland fire. The most recent assessment of California's WUI shows that as of 2010, there were about 3 million housing units in Fire Hazard Severity Zones (FHSZ) that are potentially at risk from wildland fire. A large proportion of the houses within FHSZs are in the southern portion of the state. The top five counties for FHSZ housing units, all in southern California, contain about half of all statewide housing units in FHSZ. However, this is a statewide problem, with 37 counties having at least 10,000 housing units in FHSZ.

A Report from Governor Newsom's Strike Force (April 12, 2019) reveals that climate change has created a new wildfire reality for California. The state's fire season is now almost year-round. It's not a question of "if" wildfire will strike, but "when." More than 25 million acres of California wildlands are classified under very high or extreme fire threat. Wildfires are not only more frequent but far more devastating. Recognizing the need for urgent action, Governor Gavin Newsom issued Executive Order N-05-19 on January 9, 2019. The Executive Order directs the California Department of Forestry and Fire Protection (CAL FIRE), in consultation with other state agencies and departments, to recommend immediate, medium and long-term

actions to help prevent destructive wildfires. The Governor's Strike Force Report and CAL FIRE'S Community Wildfire Prevention & Mitigation Report (February 22, 2019) both recommend improving vegetation management and forest health as a preventative and minimization measure for preventing ignition and spread of wildfire, while simultaneously improving fire resiliency of the landscape.

Humboldt County Wildfire Protection Plan

In 2002, the Humboldt County Board of Supervisors formed the Humboldt County Fire Safe Council (HCFSC) to oversee the preparation of a countywide plan to support the development and implementation of community fire-safe programs and activities. This has become known as the Humboldt County Community Wildfire Protection Plan [CWPP]. This plan was updated most recently in 2019. The stated purpose of the CWPP is to inspire and guide actions that will help mitigate the potential for wildfire loss in all vulnerable communities within the boundaries of Humboldt County.

Thus far it is fortunate that Humboldt County communities and wildlands have avoided the significant losses experienced by neighboring counties during the last few years. However, the CWPP's risk assessment concludes that weather and fire patterns, together with Humboldt County's rugged topography and dense fuel loads, combine to create a generally high fire risk during dry parts of the year. There are indications that the level of risk could continue to grow in the face of climate change. Increasing fuel loads, the spread of forest diseases such as Sudden Oak Death, and continued residential and commercial development in the wildland-urban interface all contribute to the growing risk.

It is also becoming increasingly common that during times of high fire danger in Humboldt County a large portion of local and state firefighting resources are committed to other incidents throughout the state. A wildfire ignition during one of these periods, when resources are stretched thin, could potentially spread quickly, threatening citizens' lives, as well as homes, schools, and businesses. In this scenario, a single fire ignition could have potentially devastating consequences in any Humboldt County community, including coastal areas. Every year, these homes and natural assets are increasingly vulnerable to damage or loss from wildfire.

Cannabis

The legal marijuana industry is a major part of Humboldt County. Since its legalization, hundreds of existing farms have enrolled in the permitting process, however it is uncertain how many still exist illegally (CalCannabis, 2020). Historically, production and extraction both have had a high potential for fire ignitions. The influx of seasonal workers during the peak fire season increases human activity in the WUI, and could contribute to increased wildfire ignition risk. Additionally, the use of spark-generating equipment such as vehicles and generators, infrastructure with faulty wiring, and extraction labs, some using explosive butane, also increases the risks of fire ignitions resulting from cannabis operations. These ignition sources are not only a wildfire risk but can create dangerous conditions for responding firefighters as well. Reducing ignitions in this sector is targeted in the CWPP's County Wide Action Plan, and regulations provide the opportunity to curtail fire risks and hazards associated with the industry. The two key metrics, defensible space and fuel reduction, are the primary actions to reduce potential ignitions and increase community fire safety.

The Commercial Medical Marijuana Land Use Ordinance was adopted by the Board of Supervisors and became effective February 26, 2016. Under the CMMLUO framework, numerous structures are permitted by the County as part of commercial operations. These buildings can include greenhouses, processing facilities, fuel storage and generator housings, and other structures. All of these are required by California law to have defensible space. The treatment of fuels in conjunction with defensible space is consistent with the recommendations not only within the Humboldt County Community Wildfire Protection Plan, but also the Strategic Fire Plan for California, and Executive Order N-05-19.

Ecological Setting and Fire History

The following is taken from the Humboldt County Community Wildfire Protection Plan, 2019 Chapter 4.11: Mad–Van Duzen Planning Unit Action Plan.

The subject property is located in the Mad–Van Duzen Planning Unit, which encompasses 300,661 acres situated in the southeastern region of Humboldt County. Highway 36 is the primary transportation route through the Unit; it is paralleled by the Van Duzen River, which is one of the last remaining free-flowing rivers in California. The river and highway travel across the center of the Unit in a westward direction. Kneeland and Alderpoint Roads provide access to the north and south, respectively. The Unit contains portions of both the Van Duzen River watershed and the Mad River watershed. The topography includes steep canyons formed by the rivers and their tributaries, which include Indian Creek, Larabee Creek, the Little Van Duzen River, Butte Creek, East Creek and Pilot Creek, to name a few.

Private land is the dominant ownership pattern in this unit. The composition of land uses includes farms and rural residences in the lower floodplain and near the river; large- and medium-sized swaths of ranchland; residential parcels concentrated along the main roads; and a few parcels of timberland managed primarily by Humboldt Redwood Company. The majority of residential properties lie along Highway 36, and around and in between Bridgeville and Dinsmore. The majority of assets at risk in this planning unit are residential homes and communities, along with a variety of commercial and service industries, community centers, medical and dental clinics, schools, fire stations, churches, as well as infrastructure components, such as cell phone towers and access roads. The ranching, agricultural, and timber industries within the Unit are also considered assets at risk.

Fire has been a major contributing factor to the ecology in this region. The dominant forest and vegetation types share species compositions characteristic to those developed in fire-prone areas, and the regional climate commonly includes lightning storms that provide sources of ignition during the dry and hot parts of the summer and fall. While lightning strikes certainly provided ignition sources for many fires in this area, there is also a long history of anthropogenic burning from indigenous tribes. Tribes of this region would intentionally utilize fire to maintain grasslands, improve forage and hunting grounds, control forest diseases, and prevent the accumulation of fuels. Early Euro-American settlers used fire in similar ways to manage grazing lands for livestock.

Mean fire return interval (FRI) data for this area shows historically these ecosystems would have been subject to frequent low-severity fires occurring every 15 years with mixed-severity fires occurring every 33 years (Fryer & Luensmann 2012). These fire severities have been recorded as often as every 5 years, and 15 years, respectively. Stand replacing events, or high-severity wildfires, were recorded with a mean FRI of 150 years. In these scenarios, low-severity fires are those that causes less than 25% average top-kill within a typical fire perimeter for a given vegetation type; mixed-severity is defined as between 25 and 75 percent average top-kill; high-severity is defined as greater than 75 percent average top-kill for a given vegetation type (LANDFIRE 2014).

Fire itself is a destructive force. However, fire suppression activities also have environmental impacts that can significantly affect the landscape. The removal, or control, of low- and mixed-severity fire regimes has led to an overcrowding of forests, increased fuel load accumulations, and altered frequency and disturbance types. These changes to the disturbance regime affect vegetation compositions and forests' ecological structure, changing their resiliency to natural disturbances such as wind, fire, pests, and pathogens.

The extent that the landscape has been altered as a result of fire suppression is reflected in the degree of departure from the historical (pre-settlement) fire return interval. The metric used to describe this extent for a unit area is the "condition class." Where the condition class indicates fire has been absent an unnaturally long time, the potential hazard to natural resources and human assets increases. Approximately 52% of the Mad–Van Duzen Planning Unit is condition Class 3, meaning the fire regime is significantly altered from the historical range; and approximately 20% of the area is condition Class 2, or moderately altered from the historical range.

PRC 4290 & 4291 – Defensible Space

State law requires a person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining a mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or land that is covered with flammable material, shall at all times maintain defensible space of 100 feet from each side and from the front and rear of the structure. The legislature did not enact this law intending that landowners apply for a permit from Cal Fire for non-commercial tree harvesting operations, which results in defensible space.

The vegetation surrounding the commercial structures on the subject property are fuel for a fire. Even the structures themselves are considered fuel. Research and experience have shown that fuel reduction around a building or structure increases the probability of it surviving a wildfire. Good defensible space allows firefighters to protect and save buildings or structures safely without facing unacceptable risk to their lives. Fuel reduction through vegetation management is the key to creating good defensible space.

Defensible space requirements (PRC 4290) will apply to the subject property, upon final county approval, given the presence of commercial structures.

State Minimum Fire Safe Regulations, 2021

Pursuant to Public Resources Code 4290, the Board is required to "...adopt regulations implementing minimum fire safety standards related to defensible space" applicable to "the perimeters and access to all residential, commercial, and industrial building construction. In 2018, the Legislature passed and the Governor signed SB 901 (Dodd), which expanded the applicability of the regulations promulgated under PRC 4290 to land in the Local Responsibility Area Very High Fire Hazard Severity Zone (VHFHSZ). SB 901 also revised PRC 4290 to require the Board to more frequently update regulations relating to fuel breaks and greenbelts near communities, and to preserve undeveloped ridgelines to reduce fire risk and improve fire protection.

The Board of Forestry is currently adopting proposed regulations titled "State Minimum Fire Safe Regulations," This rule simply promotes compliance with the revisions to PRC 4290 within SB 901 (Chapter 626, 2018), and to improve the clarity of certain administrative processes within Article 1 of the existing regulations. The narrowed purpose of the proposed action is to:

- Establish standards for fuel breaks and greenbelts near communities;
- Establish measures for the preservation of undeveloped ridgelines;
- Improve clarity regarding the inspection and enforcement agencies;
- Promote local jurisdiction compliance with the Fire Safe Regulations and to clarify the process by which that occurs;
- Increase the flexibility offered to local jurisdictions in implementing the minimum standards provided in these regulations.

Forest Stand Conditions

The property consists of a combination of Douglas-fir encroached oak woodland and second growth timber stands dominated by Douglas-fir. Review of aerial imagery (<https://www.historicaerials.com/>) reveals that the timbered portions of the subject property and surrounding privately-owned parcels were harvested between 1947 and 1968. Review of 1947 imagery shows a dense stand of old growth Douglas-fir surrounded by oak woodland and natural grassland. Review of 1968 imagery reveals signs of a past clearcut, which likely occurred in the late 1960's.

The existing fuel conditions within the property contains both vertical and horizontal continuity of live and dead fuels. Both stand types (Douglas-fir encroached oak woodland and second growth timber) are comprised of densely spaced conifers and hardwoods. Due to the ongoing drought, there are numerous dead, dying, and diseased Douglas-fir located within the oak woodland; particularly along the periphery of the grassland openings. Several of the cannabis cultivation sites are in close proximity to the overstocked timber stands, which includes untreated slash from past timberland conversion and dead, dying, and diseased Douglas-fir trees.

Conclusions

The consolidation of existing cannabis cultivation into fewer sites is not expected to increase forest fire risk relative to the baseline condition. Consolidation can actually result in a reduction of potential ignition sources, such as vehicle traffic, generator use, and chainsaw and power tool use. In addition, consolidation of cannabis cultivation into fewer sites may improve CAL FIRE's ability to respond and suppress a wildfire. CAL FIRE's Fire Protection Objective found in the Fire Operations Handbook, policy 7001.2 states that a system of basic fire protection will be provided so that damages to life, property and natural resources will be held at or below a level acceptable within social, political and economic constraints. Board of Forestry and Fire Protection designates in the 2010 Fire Plan that CAL FIRE will strive to contain 95% of all unwanted fires at 10 acres or less. Obviously, minimizing the spatial arrangement or scattered placement of improvements on the property, which could potentially require protection from CAL FIRE during a large wildfire, improves their ability to respond and minimizes limited resources.

Recommendations

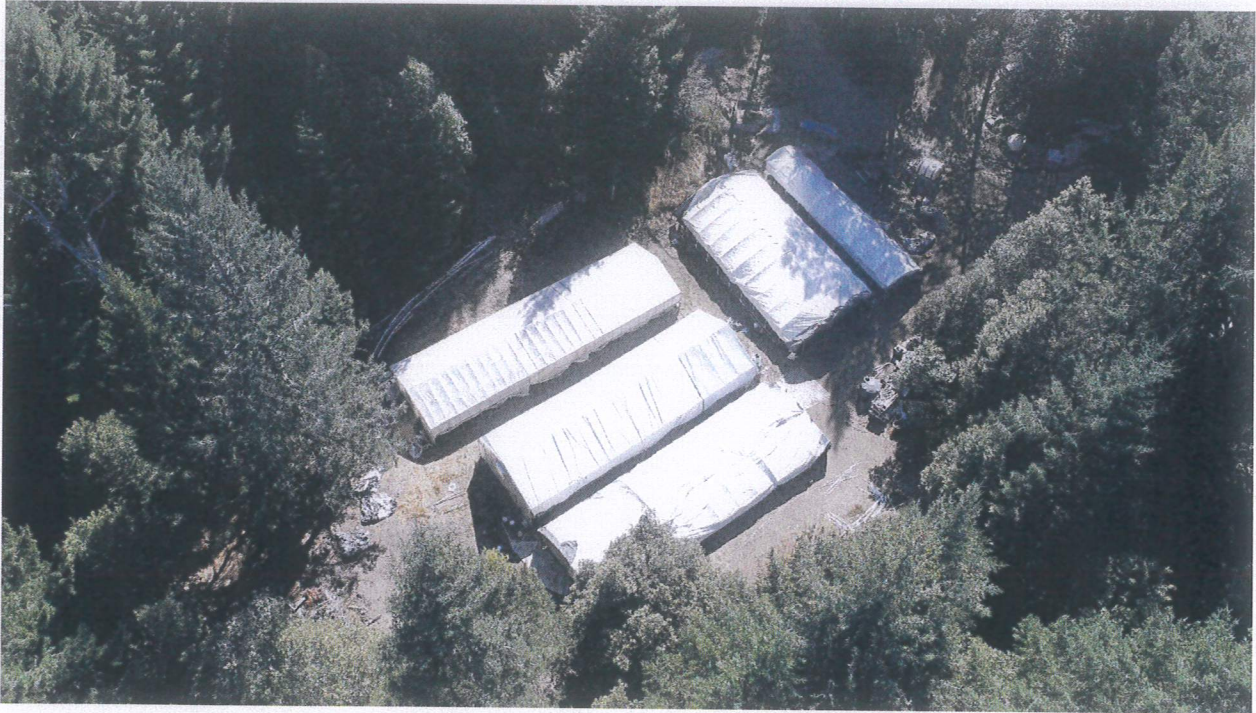
1. The landowner shall maintain defensible space around structures and cannabis cultivation sites as described in CAL FIRE's General Guidelines for Creating Defensible Space (attached).
2. Cannabis cultivation relocation and consolidation shall not result in timberland conversion.
3. The RPF recommends fuel reduction treatment to the forest stands located within the subject property as described in CAL FIRE's Fuel Reduction Guide (attached). Several CAL FIRE exemptions are currently available for the commercial harvesting of timber that would result in fuel reduction and a much healthier timber stand. CAL FIRE Oak Woodland Management Exemptions per 14 CCR § 1038(e) authorize the cutting or removal of trees to restore and conserve California black oak or Oregon white oak woodlands and associated grasslands. The removal of Douglas-fir encroachment and restoration of the oak woodlands could significantly reduce forest fire intensity. CAL FIRE Forest Fire Protection Exemptions per 14 CCR § 1038.3 authorize the cutting and removing of trees to eliminate the vertical continuity of vegetative fuels and the horizontal continuity of tree crowns for the purpose of reducing flammable materials to reduce fire spread, duration, and intensity, fuel ignitability, or ignition of tree crowns.
4. Equipment and Machinery Use: Lawn mowers, weed whackers, chainsaws, portable generators/pumps, and other machinery are useful tools for managing vegetation on the property; particularly surrounding the cultivation sites. However, it is critical to always be mindful of fire hazard conditions when operating equipment and machinery outside. Weather conditions that are hot, dry, and windy cause low moisture levels in vegetation, making them highly receptive to a single spark from your equipment and igniting a fire. Early morning, when the air is cooler and moister and the wind is calmer, is the best time to use equipment during fire season.

Sincerely,



Chris Carroll, RPF #2628
Timberland Resource Consultants

PHOTOGRAPHS



Picture 1: Cultivation site containing Greenhouses 1-6, which will accommodate portions of relocated cannabis cultivation. Note the close proximity of the cultivation site to the surrounding timber stand. Per the attached CAL FIRE Defensible Space Guidelines, maintain a firebreak by removing and clearing away all flammable vegetation and other combustible growth within 30 feet of the commercial structures. In addition, the dense stand of young-growth Douglas-fir forest requires thinning to reduce the vertical and horizontal continuity of fuels in the understory and overstory. Photo date 5-13-2022.



Picture 2: Cultivation site containing Greenhouses 7-10, which will accommodate portions of relocated cannabis cultivation. The vegetation surrounding this site consists primarily of native grassland and oak woodland, with Douglas-fir encroached oak woodland mostly in the background surrounding Greenhouses 11-12. Creation of defensible space requires the removal of the Douglas-fir encroachment and the retention of the fire resistant oak trees. Oregon white oak and California black oak resist fire with thick, furrowed bark and tough, leathery leaves that are slow to burn. The removal of Douglas-fir encroachment will not only restore this valuable forest type, but also significantly lower forest fire intensity. Photo date 5-13-2022.



Picture 3: Cultivation site proposed for Greenhouses 11-12, which presently contains water bladders. The vegetation surrounding this site consists primarily of Douglas-fir encroached oak woodland. Creation of defensible space requires the removal of all dead, dying, and diseased Douglas-fir, and thinning of the Douglas-fir to reduce the vertical and horizontal continuity of fuels in the understory and overstory. The Oregon white oak and California black oak resist fire with thick, furrowed bark and tough, leathery leaves that are slow to burn. The removal of all Douglas-fir encroachment will not only restore this valuable forest type, but also significantly lower forest fire intensity should it occur. Photo date 5-13-2022.



Picture 4: Cultivation site proposed for Greenhouses 11-12, which presently contains water bladders. The dead, dying, and diseased Douglas-fir in the background are succumbing to drought-induced mortality and should be removed to improve defensible space. Photo date 5-13-2022.



Picture 5: Cultivation site containing Greenhouses 13-16. No cannabis cultivation is proposed to be relocated here. However, note the close proximity of the cultivation site to the surrounding timber stand, including dead standing trees, and untreated slash from past timberland conversion. Per the attached CAL FIRE Defensible Space Guidelines, maintain a firebreak by removing and clearing away all flammable vegetation, including slash and woody debris, and other combustible growth within 30 feet of the commercial structures. In addition, the dense stand of young-growth Douglas-fir forest requires thinning to reduce the vertical and horizontal continuity of fuels in the understory and overstory. Photo date 5-13-2022.

Cal Fire Defensible Space Guidelines

General Guidelines for Creating Defensible Space

State Board of Forestry and Fire Protection (BOF)
California Department of Forestry and Fire Protection

Adopted by BOF on February 8, 2006
Pending Filing with Office of Administrative Law



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A. Purpose of Guidelines

Recent changes to Public Resources Code (PRC) 4291 expand the defensible space clearance requirement maintained around buildings and structures from 30 feet to a distance of 100 feet. These guidelines are intended to provide property owners with examples of fuel modification measures that can be used to create an area around buildings or structures to create defensible space. A defensible space perimeter around buildings and structures provide firefighters a working environment that allows them to protect buildings and structures from encroaching wildfires as well as minimizing the chance that a structure fire will escape to the surrounding wildland. These guidelines apply to any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining any mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or any land that is covered with flammable material, and located within a State Responsibility Area.



Effective defensible space

The vegetation surrounding a building or structure is fuel for a fire. Even the building or structure itself is considered fuel. Research and experience have shown that fuel reduction around a building or structure increases the probability of it surviving a wildfire. Good defensible space allows firefighters to protect and save buildings or structures safely without facing unacceptable risk to their lives. Fuel reduction through vegetation management is the key to creating good defensible space.

Terrain, climate conditions and vegetation interact to affect fire behavior and fuel reduction standards. The diversity of California's geography also influences fire behavior and fuel reduction standards as well. While fuel reduction standards will vary throughout the State, there are some common practices that guide fuel modification treatments to ensure creation of adequate defensible space:

- Properties with greater fire hazards will require more clearing. Clearing requirements will be greater for those lands with steeper terrain, larger and denser fuels, fuels that are highly volatile, and in locations subject to frequent fires.
- Creation of defensible space through vegetation management usually means reducing the amount of fuel around the building or structure, providing separation between fuels, and or reshaping retained fuels by trimming. Defensible space can be created removing dead vegetation, separating fuels, and pruning lower limbs.
- In all cases, fuel reduction means arranging the tree, shrubs and other fuels sources in a way that makes it difficult for fire to transfer from one fuel source to another. It does not mean cutting down all trees and shrubs, or creating a bare ring of earth across the property.
- A homeowner's clearing responsibility is limited to 100 feet away from his or her building or structure or to the property line, whichever is less, and limited to their land. While individual property owners are not required to clear beyond 100 feet, groups of property owners are encouraged to extend clearances beyond the 100 foot requirement in order to create community-wide defensible spaces.
- Homeowners who do fuel reduction activities that remove or dispose of vegetation are required to comply with all federal, state or local environmental protection laws and obtain permits when necessary. Environmental protection laws include, but are not limited to, threatened and endangered species, water quality, air quality, and cultural/archeological resources. For example, trees removed for fuel reduction that are used for commercial purposes require permits from the

California Department of Forestry and Fire Protection. Also, many counties and towns require tree removal permits when cutting trees over a specified size. Contact your local resource or planning agency officials to ensure compliance.

The methods used to manage fuel can be important in the safe creation of defensible space. Care should be taken with the use of equipment when creating your defensible space zone. Internal combustion engines must have an approved spark arresters and metal cutting blades (lawn mowers or weed trimmers) should be used with caution to prevent starting fires during periods of high fire danger. A metal blade striking a rock can create a spark and start a fire, a common cause of fires during summertime.

Vegetation removal can also cause soil disturbance, soil erosion, regrowth of new vegetation, and introduce non-native invasive plants. Always keep soil disturbance to a minimum, especially on steep slopes. Erosion control techniques such as minimizing use of heavy equipment, avoiding stream or gully crossings, using mobile equipment during dry conditions, and covering exposed disturbed soil areas will help reduce soil erosion and plant regrowth.

Areas near water (riparian areas), such as streams or ponds, are a particular concern for protection of water quality. To help protect water quality in riparian areas, avoid removing vegetation associated with water, avoid using heavy equipment, and do not clear vegetation to bare mineral soil.

B. Definitions

Defensible space: The area within the perimeter of a parcel where basic wildfire protection practices are implemented, providing the key point of defense from an approaching wildfire or escaping structure fire. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures.

Aerial fuels: All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush. Examples include trees and large bushes.

Building or structure: Any structure used for support or shelter of any use or occupancy.

Flammable and combustible vegetation: Fuel as defined in these guidelines.

Fuel Vegetative material, live or dead, which is combustible during normal summer weather. For the purposes of these guidelines, it does not include fences, decks, woodpiles, trash, etc.

Homeowner: Any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining any mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or any land that is covered with flammable material, and located within a State Responsibility Area.

Ladder Fuels: Fuels that can carry a fire vertically between or within a fuel type.

Reduced Fuel Zone: The area that extends out from 30 to 100 feet away from the building or structure (or to the property line, whichever is nearer to the building or structure).

Surface fuels: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branches and downed logs.

C. Fuel Treatment Guidelines

The following fuel treatment guidelines comply with the requirements of 14 CCR 1299 and PRC 4291. **All persons using these guidelines to comply with CCR 1299 and PRC 4291 shall implement General Guidelines 1., 2., 3., and either 4a or 4b., as described below.**

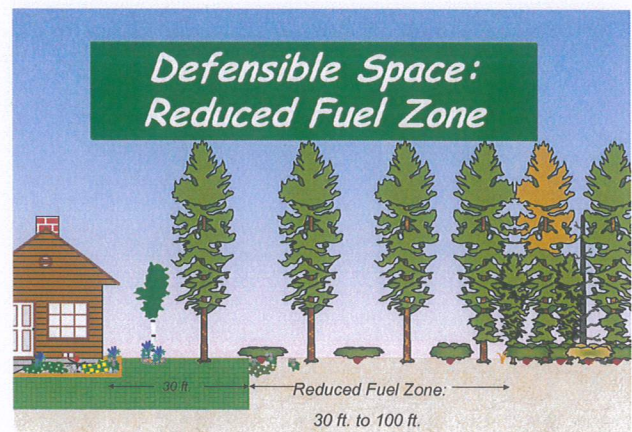
General Guidelines:

1. Maintain a firebreak by removing and clearing away all flammable vegetation and other combustible growth within 30 feet of each building or structure, with certain exceptions pursuant to PRC §4291(a). Single specimens of trees or other vegetation may be retained provided they are well-spaced, well-pruned, and create a condition that avoids spread of fire to other vegetation or to a building or structure.
2. Dead and dying woody surface fuels and aerial fuels within the Reduced Fuel Zone shall be removed. Loose surface litter, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches, shall be permitted to a depth of 3 inches. This guideline is primarily intended to eliminate trees, bushes, shrubs and surface debris that are completely dead or with substantial amounts of dead branches or leaves/needles that would readily burn.
3. Down logs or stumps anywhere within 100 feet from the building or structure, when embedded in the soil, may be retained when isolated from other vegetation. Occasional (approximately one per acre) standing dead trees (snags) that are well-space from other vegetation and which will not fall on buildings or structures or on roadways/driveways may be retained.
4. Within the Reduced Fuel Zone, one of the following fuel treatments (4a. or 4b.) shall be implemented. Properties with greater fire hazards will require greater clearing treatments. Combinations of the methods may be acceptable under §1299(c) as long as the intent of these guidelines is met.

4a. Reduced Fuel Zone: Fuel Separation

In conjunction with General Guidelines 1., 2., and 3., above, minimum clearance between fuels surrounding each building or structure will range from 4 feet to 40 feet in all directions, both horizontally and vertically.

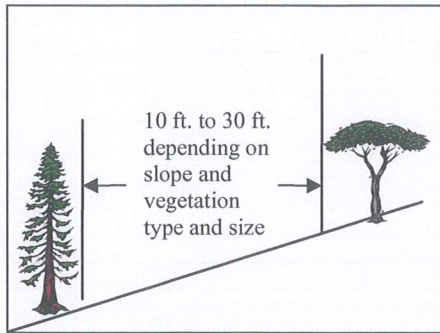
Clearance distances between vegetation will depend on the slope, vegetation size, vegetation type (brush, grass, trees), and other fuel characteristics (fuel compaction, chemical content etc.). Properties with greater fire hazards will require greater separation between fuels. For example, properties on steep slopes having large sized vegetation will require greater spacing between individual trees and bushes (see Plant Spacing Guidelines and Case Examples below). Groups of vegetation (numerous plants growing together less than 10 feet in total foliage width) may be treated as a single plant. For example, three individual manzanita plants growing together with a total foliage width of eight feet can be "grouped" and considered as one plant and spaced according to the Plant Spacing Guidelines in this document.



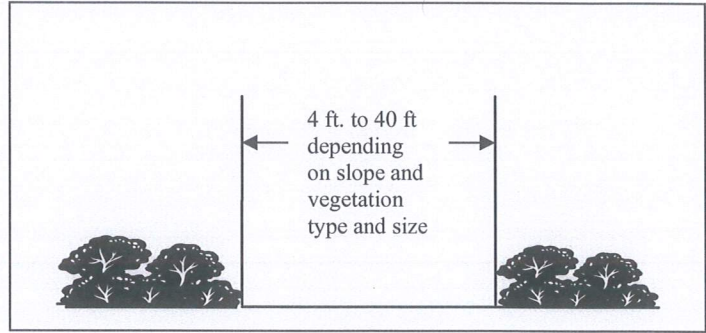
Grass generally should not exceed 4 inches in height. However, homeowners may keep grass and other forbs less than 18 inches in height above the ground when these grasses are isolated from other fuels or where necessary to stabilize the soil and prevent erosion.

Clearance requirements include:

- Horizontal clearance between aerial fuels, such as the outside edge of the tree crowns or high brush. Horizontal clearance helps stop the spread of fire from one fuel to the next.



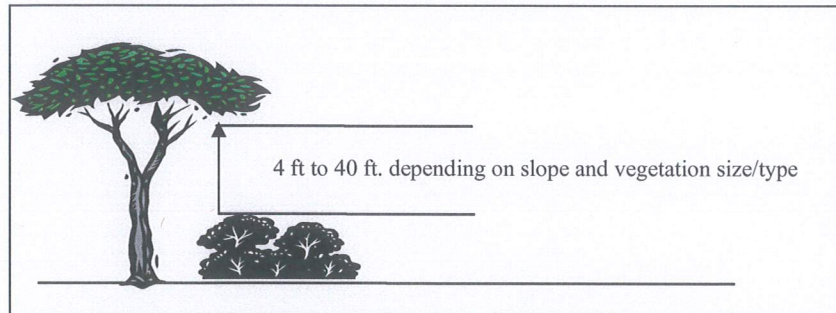
Trees



Shrubs

Horizontal clearance between aerial fuels

- Vertical clearance between lower limbs of aerial fuels and the nearest surface fuels and grass/weeds. Vertical clearance removes *ladder fuels* and helps prevent a fire from moving from the shorter fuels to the taller fuels.



Vertical clearance between aerial fuels



*Effective vertical and horizontal fuel separation
Photo Courtesy
Plumas Fire Safe Council.*

Plant Spacing Guidelines

Guidelines are designed to break the continuity of fuels and be used as a "rule of thumb" for achieving compliance with Regulation 14 CCR 1299.

Trees	Minimum horizontal space from edge of one tree canopy to the edge of the next	
	Slope	Spacing
	0% to 20 %	10 feet
	20% to 40%	20 feet
Greater than 40%	30 feet	
Shrubs	Minimum horizontal space between edges of shrub	
	Slope	Spacing
	0% to 20 %	2 times the height of the shrub
	20% to 40%	4 times the height of the shrub
Greater than 40%	6 times the height of the shrub	
Vertical Space	Minimum vertical space between top of shrub and bottom of lower tree branches: 3 times the height of the shrub	

Adapted from: Gilmer, M. 1994. California Wildfire Landscaping

Case Example of Fuel Separation: Sierra Nevada conifer forests

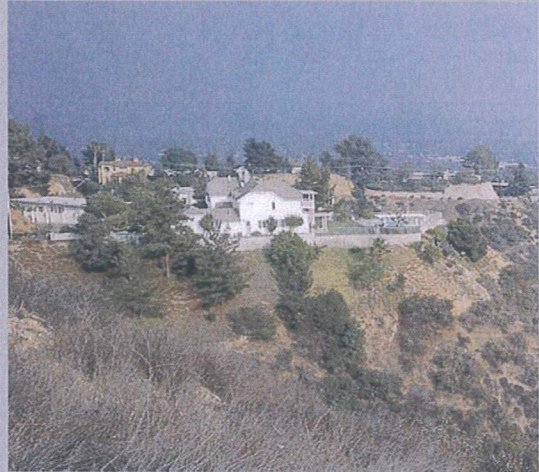
Conifer forests intermixed with rural housing present a hazardous fire situation. Dense vegetation, long fire seasons, and ample ignition sources related to human access and lightning, makes this home vulnerable to wildfires. This home is located on gentle slopes (less than 20%), and is surrounded by large mature tree overstory and intermixed small to medium size brush (three to four feet in height).



Application of the guideline under 4a. would result in horizontal spacing between large tree branches of 10 feet; removal of many of the smaller trees to create vertical space between large trees and smaller trees and horizontal spacing between brush of six to eight feet (calculated by using 2 times the height of brush).

Case Example of Fuel Separation: Southern California chaparral

Mature, dense and continuous chaparral brush fields on steep slopes found in Southern California represents one of the most hazardous fuel situations in the United States. Chaparral grows in an unbroken sea of dense vegetation creating a fuel-rich path which spreads fire rapidly. Chaparral shrubs burn hot and produce tall flames. From the flames come burning embers which can ignite homes and plants. (Gilmer, 1994). All these factors results in a setting where aggressive defensible space clearing requirements are necessary.



Steep slopes (greater than 40%) and tall, old brush (greater than 7 feet tall), need significant modification. These settings require aggressive clearing to create defensible space, and would require maximum spacing. Application of the guidelines would result in 42 feet horizontal spacing (calculated as 6 times the height of the brush) between retained groups of chaparral.

Case Example of Fuel Separation: Oak Woodlands

Oak woodlands, the combination of oak trees and other hardwood tree species with a continuous grass ground cover, are found on more than 10 million acres in California. Wildfire in this setting is very common, with fire behavior dominated by rapid spread through burning grass.



Given a setting of moderate slopes (between 20% and 40%), wide spacing between trees, and continuous dense grass, treatment of the grass is the primary fuel reduction concern. Property owners using these guidelines would cut grass to a maximum 4 inches in height, remove the clippings, and consider creating 20 feet spacing between trees.

4b. Reduced Fuel Zone: Defensible Space with Continuous Tree Canopy

To achieve defensible space while retaining a stand of larger trees with a continuous tree canopy apply the following treatments:

- Generally, remove all surface fuels greater than 4 inches in height. Single specimens of trees or other vegetation may be retained provided they are well-spaced, well-pruned, and create a condition that avoids spread of fire to other vegetation or to a building or structure.
- Remove lower limbs of trees (“prune”) to at least 6 feet up to 15 feet (or the lower 1/3 branches for small trees). Properties with greater fire hazards, such as steeper slopes or more severe fire danger, will require pruning heights in the upper end of this range.



Defensible Space retaining continuous trees



Photo Courtesy Plumas Fire Safe Council.



Defensible space with continuous tree canopy by clearing understory and pruning

Authority cited: Section 4102, 4291, 4125-4128.5, Public Resource Code. Reference: 4291, Public Resource Code; 14 CCR 1299 (d).

CAL FIRE's Fuel Reduction Guide



FUELS REDUCTION GUIDE

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CAL FIRE: Dedicated to California's Forests & Wildlands



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Mission

The women and men of the California Department of Forestry and Fire Protection (CAL FIRE) are dedicated to the fire protection and stewardship of over 31 million acres of California's privately-owned wildlands. CAL FIRE's mission emphasizes the management and protection of California's natural resources; a goal that is accomplished through ongoing assessment and research. Department personnel including foresters, environmental scientists, archaeologists, biologists, and fire personnel work closely to implement fuels management projects to reduce the threat of uncontrolled wildfires and improve forest health.

History

Forest and land management has been at the core of the Department since its inception in 1885. Then known as the State Board of Forestry, the Department was primarily tasked with enforcing the few laws the state had concerning wildfire and forest lands. At the turn of the 20th century, the first state forester was assigned (E.T. Allen) and the earliest stages of a state fire patrol began to form. As the century progressed, so too did the responsibilities of the Department. Today, CAL FIRE is a full-service resource protection and emergency management department responding to wildfires and all risk emergencies.

Fire Prevention

Preventing wildfires in the State Responsibility Area (SRA) is a vital part of CAL FIRE's mission. While these efforts have occurred since the early days of the Department, CAL FIRE has adapted to the evolving threat from wildfires and has succeeded in significantly increasing its efforts in fire prevention. Common fire prevention projects include fuels reduction, prescribed fire, Defensible Space inspections, emergency evacuation planning, fire prevention education, fire hazard severity mapping, home hardening and fire-related law enforcement activities. Wildland fire prevention engineering processes reduce or eliminate fire hazards and risks by reducing fuel loads and creating a break in horizontal and vertical fuel continuity.

Environmental Protection

CAL FIRE uses the totality of its resource professionals to ensure that California environmental laws are obeyed for any project undertaken by the Department. Registered Professional Foresters, Environmental Scientists, Archeologists, Hydrologists, Soil Scientists, Fire Scientists, and various other experts in natural resource protection contribute to this work every day. On December 30, 2019, the Board of Forestry and Fire Protection approved a Statewide Programmatic Environmental Impact Report titled "California Statewide Vegetation Treatment Program," known as the CalVTP. The program provides California Environmental Quality Act (CEQA) compliance for CAL FIRE and other public entities' vegetation management projects.

Learn More

For additional information, click the "Learn More" links throughout the document.

Learn More

What We Are Doing



A healthy forest is more resilient to potentially devastating disturbances, such as fire, pests, disease and drought, and plays an important role in California's water supply and air quality.

Fire is an essential ecological process in fire-dependent ecosystems, such as California wildlands. However, over a century of fire suppression has led to wildlands, woodlands and rangelands that are unable to withstand normal droughts, insect outbreaks or wildfires. The purpose of any fuels reduction project is to change the size and composition

of the fuels in the forest, creating a break in fuel continuity. Doing so removes ladder fuels which can carry fire from the forest floor to the tree crowns where it can become a devastating fire that quickly spreads. The goal of fuels reduction is to create conditions that mimic the role of low intensity fire or other disturbances that once naturally thinned the forest.

Learn More

In response to Governor Newsom's Executive Order N-05-19, CAL FIRE systematically identified 35 high priority fuels reduction projects and other measures to protect over 200 of California's most wildfire-vulnerable communities. For further information and detailed project reports, click here.

Learn More

California's Forest and Wildfire Resilience Action Plan outlines actions to reduce wildfire risk and improve the health of forests and wildlands. Learn what CAL FIRE will do by clicking here.

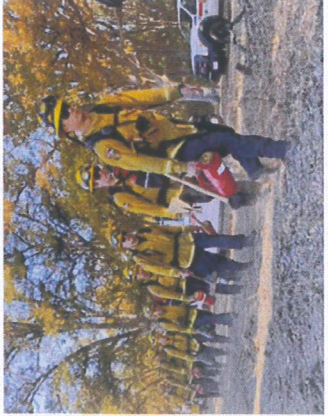
Personnel



People working together through public and private partnerships are CAL FIRE's biggest asset on fuels reduction projects.

CAL FIRE engages in fuels reduction work and fire prevention activities year-round. Fuels reduction work is done by dedicated CAL FIRE Fuels Reduction Crews, California National Guard, California Conservation Corps, California Department of Corrections and Rehabilitation, and CAL FIRE fire suppression resources including

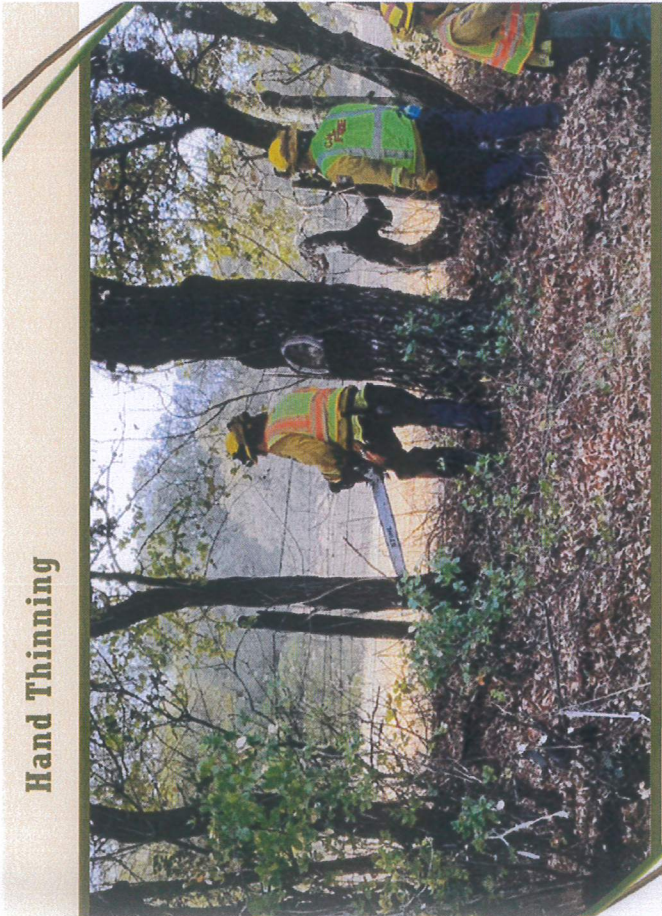
firefighter hand crews and engine crews when they are not responding to other emergencies. Defensible Space inspectors ensure homeowners do their part to be ready for wildfire, and fire prevention specialists engage daily with their communities to promote fire prevention education.



Learn More

CAL FIRE provides employees with a variety of career choices and diverse opportunities.

Hand Thinning



Hand crews conduct work in areas where prescribed fire and mechanical thinning aren't practical, like neighborhoods, or where the terrain is too steep for heavy equipment.

Fuels reduction projects are either done using hand tools, known as hand thinning or by using heavy equipment, known as mechanical thinning or a combination of both. In the case of hand thinning, crews use cutting, grubbing and scraping tools like chainsaws, Pulaskis and Mcleods, to cut through vegetation, trees and understory brush. Mechanical thinning



Chainsaw— Used for felling, limbing and cutting trees and brush.



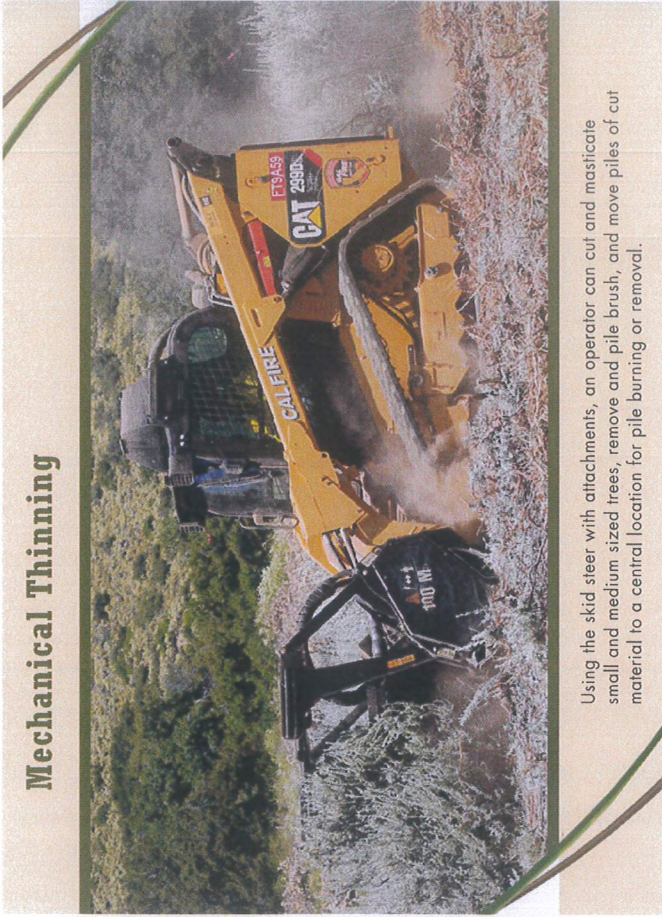
Pulaski— features an axe on one side for chopping saplings and brush, and a grubbing blade to remove roots and small stumps.



Mcleod— used for fireline construction to scrape and rake away vegetation, leaving only bare mineral soil.

is accomplished using equipment that can remove fuel from the project site. Once cut, crews or equipment drag the vegetation to the roadside or to a central location to be chipped or burned. The chips will either be left on site, removed to a biomass facility or burned in an Air Curtain Burner (see page 19).

Mechanical Thinning



Using the skid steer with attachments, an operator can cut and masticate small and medium sized trees, remove and pile brush, and move piles of cut material to a central location for pile burning or removal.

Personnel are essential for hand thinning work in rough terrain, but heavy equipment allows personnel to treat large acre projects efficiently. The tracked compact skid steer loader is a common and essential piece of equipment used by CAL FIRE personnel.

Compact skid steer loaders are fitted with one of three attachments: the masticating head, a grapple head or a brush rake, depending on the project. These tools serve to decrease hand labor and increase the efficiency of fuels reduction projects.



The **brush rake** has a scoop and forks that can be used to clear brush and form piles. It can also clear the ground to bare mineral soil around brush piles, preparing them for burning.

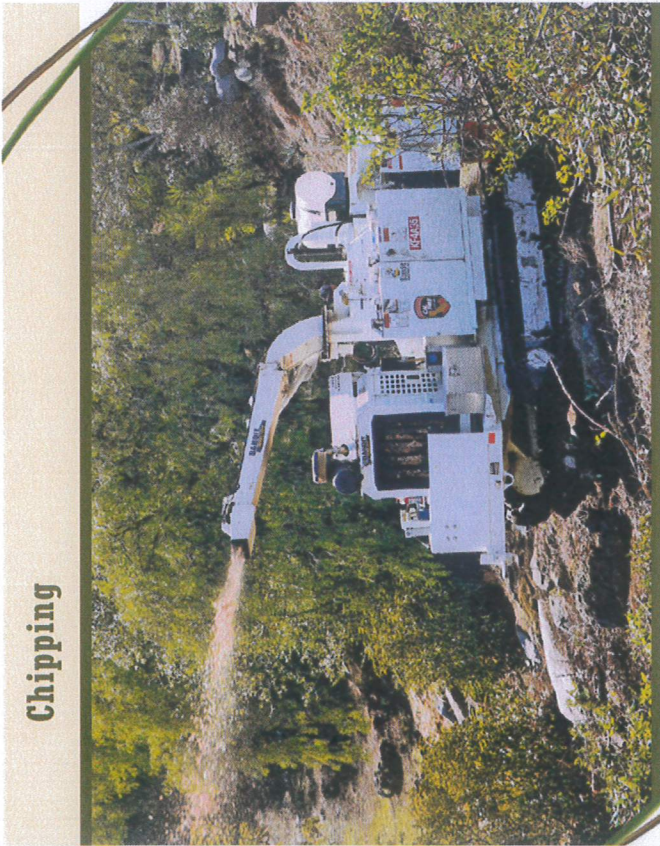
The **grapple attachment** can pick up cut tree stems larger than what can be done by hand and move them for pile burning or chipping.



The **masticating attachment** produces a similar result to chipping, except the masticating head does all the work—it can both cut and chip trees up to about four inches in diameter.



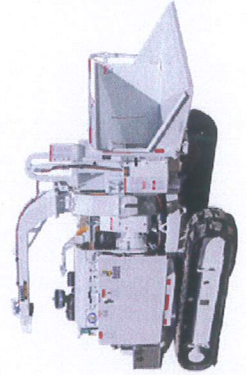
Chipping



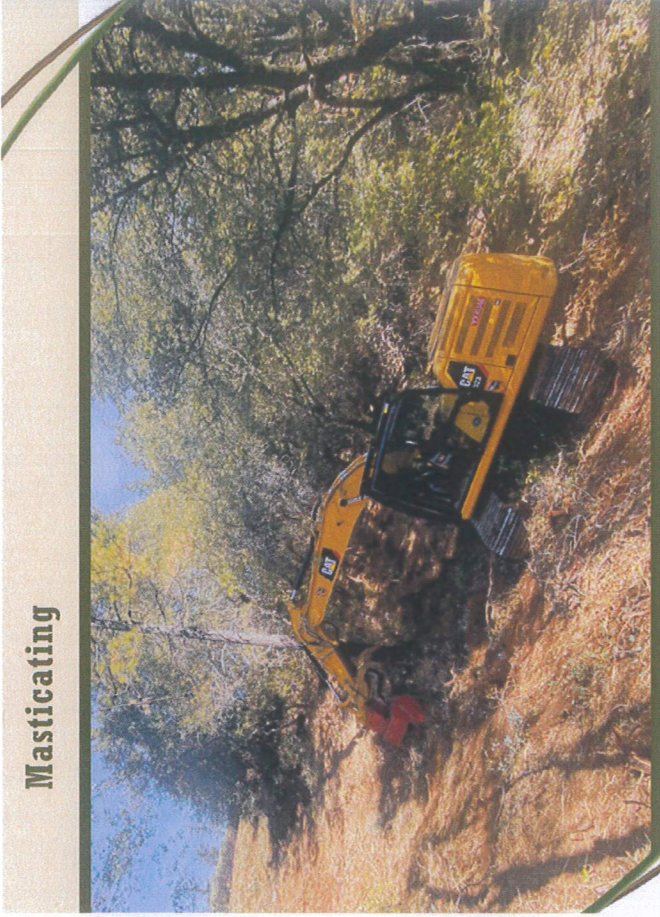
Chippers are an important part of CAL FIRE's fuels reduction work. Both tracked and tow chippers are used where hand thinning projects are being completed.

Chippers are used to change the size, shape and distribution of fuels in the forest, thereby reducing the risk of catastrophic wildfire. CAL FIRE uses both tracked chippers and tow chippers for fuels reduction projects. Tow chippers are typically used for roadside clearing and in neighborhoods. The cleared material is staged at the edge of the road where the chipping crew feed branches into the hopper. The chips are blown back into the area where the fuels came from. Tracked chippers are used for projects beyond the roadway and in steep difficult terrain. Working off-road, tracked chippers are moved by remote control, often across rough terrain, close to the project location, helping to limit the time crews spend dragging materials to the chipper.

As with the tow chipper, the chips are blown and dispersed back onto the forest floor.



Masticating

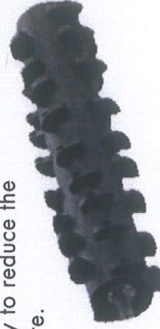


An excavator with a masticator/mulcher attachment can chop or grind vegetation into 1 - 2 inch pieces creating a break in horizontal and vertical fuel continuity. Excavators are an effective tool when creating a shaded fuel break.

Excavators are versatile machines that can maneuver in steep terrain and heavier fuels where skid steer masticators are unable to accomplish the project objectives. Fitted with a masticator/mulcher attachment, large brush and trees of up to 25 feet in height and large diameters can be turned into small chunks and left on site. Just like chipping, this creates a break in horizontal and vertical fuel continuity to reduce the risk of catastrophic wildfire.



Excavators run multiple heads such as flat disk and drum.



Crushing & Chaining



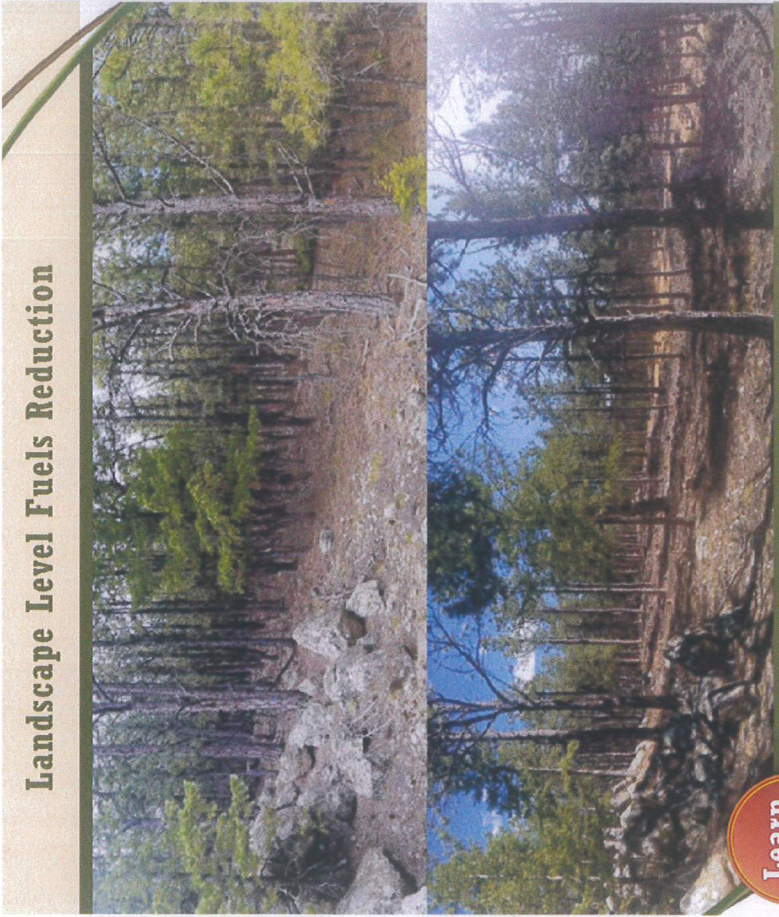
Dozers are used to crush brush by pulling a chain or a ball and chain over the brush. When fitted with a brush rake, dozers are quick and effective at removing and piling brush, preparing it for burning.

A dozer is a versatile piece of equipment that is used to clear fuels for fire breaks, move large logs and brush, improve access and repair existing roads that are often used for emergency access for the public and first responders. When used for fuels reduction, the dozer blade is lifted and a chain is pulled behind the machine to crush brush and help prepare an area for a future controlled burn.



A ball and chain pulled behind a dozer crushes brush, changing fuel composition.

Landscape Level Fuels Reduction



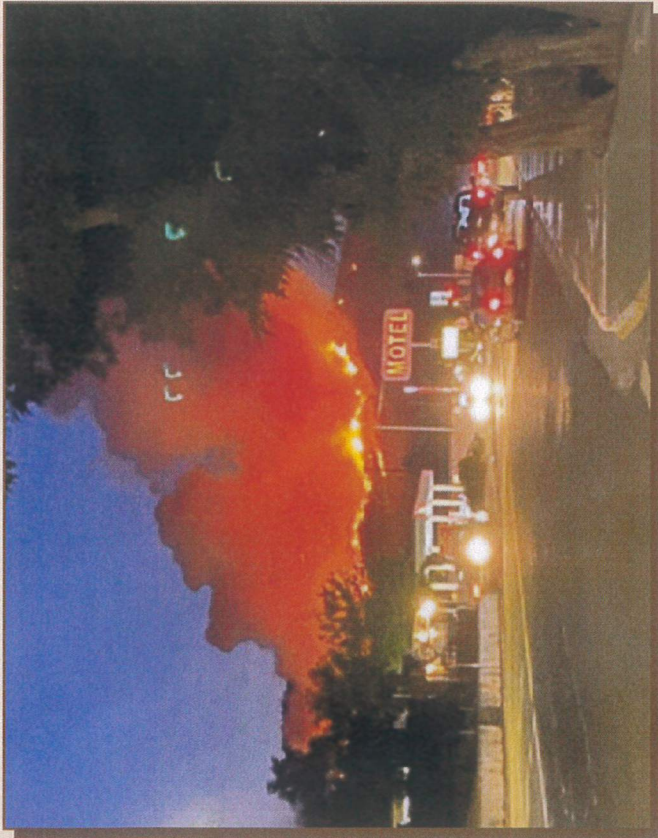
Learn More

CAL FIRE partners and cooperators, including land managers like United States Forest Service and community-based organizations like Resource Conservation Districts and Fire Safe Councils are essential to completing fuels reduction work at a landscape scale.

The Federal Government owns and manages 57% of the State's forested lands. In addition to grant agreements, California uses Good Neighbor Authority agreements to implement fuels reduction on federal lands. A Good Neighbor Authority agreement was signed between the California Natural Resources Agency and the United States Forest Service, allowing the Forest Service to enter project agreements using state funds and resources to perform forest, rangeland and watershed restoration services on Forest Service lands.

The Craggy Vegetation Management Project ("Craggy Project") is a Good Neighbor Authority project developed by the Klamath National Forest, CAL FIRE Siskiyou Unit and the Yreka Fire Safe Council to better protect local communities from wildfire and improve forest health, wildlife and plant habitats, and watershed conditions within the project area.

The Craggy Project



The Craggy Project played a key role in slowing fire spread and keeping fire out of the community of Hawkinsville and the greater Yreka area. It was beneficial to firefighters suppressing the Badger Fire and contributed to the successful protection of communities and infrastructure in this area of high fire risk.

Account provided by National Fish and Wildlife Foundation.

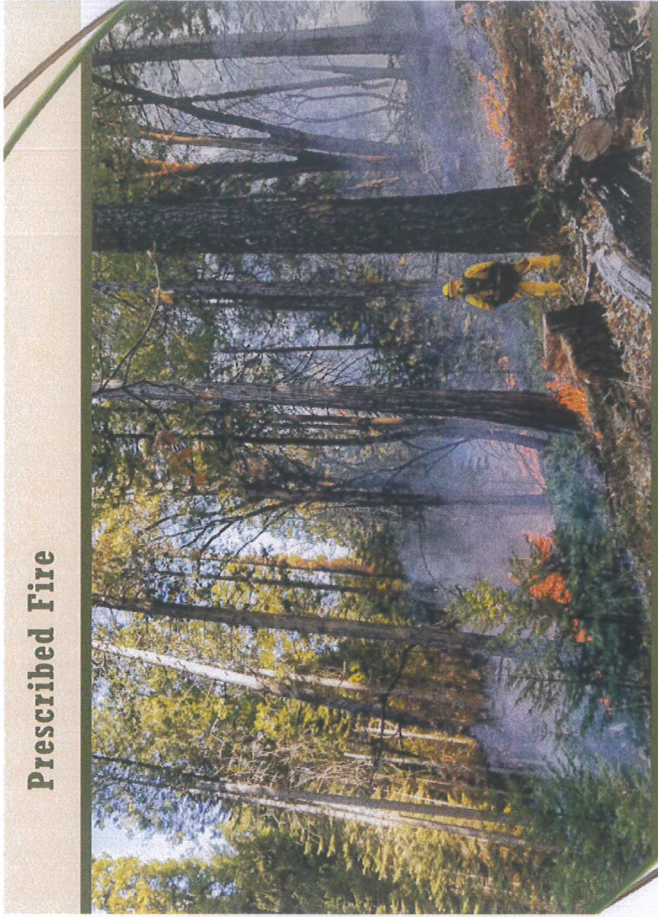
On July 18, 2020 two fires, the Humbug and Badger, were burning in State Responsibility Area just north of Yreka. Eventually merging into one, the Badger fire was contained at approximately 600 acres 10 days later. At the time of the fire, approximately 600 acres of mastication and 1,400 acres of hand thinning and piling had been completed on the Craggy Project.

The western part of the Badger Fire reached areas within the Craggy Project footprint that had been treated using mastication. Fire spread dramatically slowed

in those masticated areas as the fire transitioned from crown fire to surface fire. This reduction in the speed of spread allowed bulldozers time to safely build indirect fireline across the bottom of the fire during the evening and tie it in by daybreak. The lack of brush also eliminated the need for crews to be on hand conducting fireline improvements, freeing them up to work on other areas of the fire.

Continued implementation of this project will enhance these benefits during future fire events.

Prescribed Fire



Preparing for a prescribed fire is like other fuels reduction projects, with one key difference—prescribed burning requires a burn plan and a smoke management plan.

Prescribed fire is the planned and controlled application of fire to the land, under specified, low-risk weather conditions. As a land management tool, prescribed fire is an efficient and cost effective way to reduce fuels where physical and social conditions are conducive to its use. Before implementing a prescribed burn, the

site is prepared by reducing and removing the amount of vegetation to a safe burning density. Methods include using bulldozers, hand tools, herbicide treatment, pile and burn or a combination of these methods. A key element in site preparation is the construction of a well-established fireline to limit fire spread.



A **drip torch** ignites vegetation by dripping flaming fuel onto the ground.



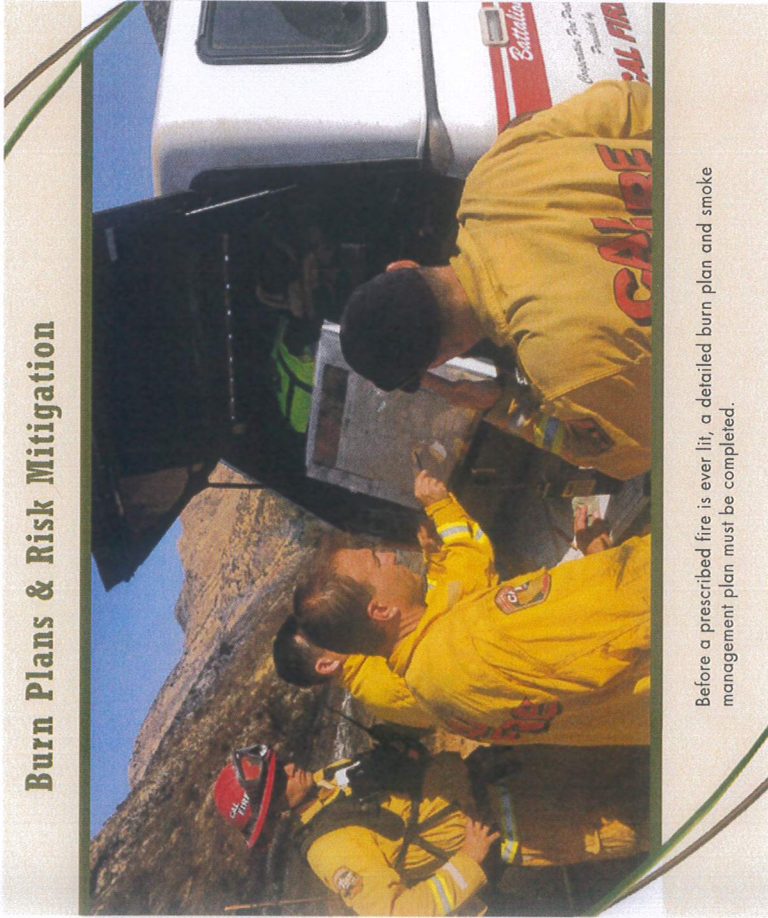
A **helitorch** is a firing device effective for igniting prescribed fire over a large area.



A **terra torch** throws a stream of flaming liquid that rapidly ignites surrounding fuels.

Photo credit: Al Galub

Burn Plans & Risk Mitigation



Before a prescribed fire is ever lit, a detailed burn plan and smoke management plan must be completed.

A burn plan, or prescription, includes comprehensive information about weather, terrain, fuel moisture and values at risk. Values are natural resources, humans and their developments, and public and political features, including cultural, that have inherent significance.

For a burn to be 'in prescription', conditions on the ground must meet the

specifications contained in the burn plan. Burning when conditions are 'out of prescription' will not meet desired objectives and can produce undesirable conditions that may threaten the identified values and create undue risk.

Prescribed burning is done for different purposes, and will vary depending on the project location and landowner goals. Common objectives are:

Ecological Restoration—

California's wildlands are adapted to fire, with the exception of some chaparral ecosystems that currently experience more frequent fire than historically. Putting fire back on the land helps protect and improve habitat for wildlife and optimizes soil and water productivity, and can also help control or eliminate noxious, invasive plants.

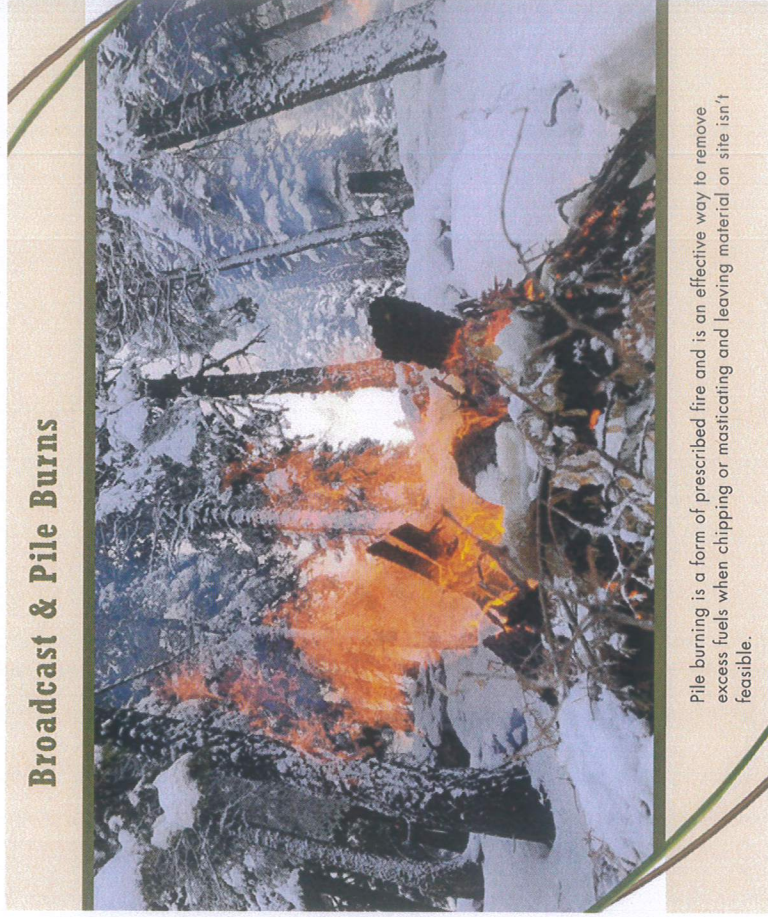
Fuels Reduction—

burning is an efficient solution for removing excess fuels across large landscapes.

Community Protection—

fire strategically used around communities to reduce fuels.

Broadcast & Pile Burns



Pile burning is a form of prescribed fire and is an effective way to remove excess fuels when chipping or masticating and leaving material on site isn't feasible.

A broadcast burn is when fire is put to the ground with low intensity to consume understory brush and dead, fallen vegetation. Broadcast burns require significant site preparation before burning; thinning vegetation,

piling and burning excess fuels prior to a broadcast burn being lit. These actions mitigate the risk of an unintended high intensity fire, while removing fuels and providing ecological benefit.



A broadcast burn is the controlled application of fire to wildland fuels in their natural or modified state over a predefined area, often conducted to reduce wildland fire fuel loads, restore ecological health of an area, or to clear vegetation.

Fuel Breaks



Fuel breaks are strategically placed along ridgetops.

A fuel break is strip of land on which the vegetation and fuels have been reduced or modified to decrease the risk of a fire crossing the strip of land. Fuel breaks are not designed to stop fire spread, especially during periods of strong winds when fire can be blown across these linear features. However, fuel breaks do provide opportunities for firefighting success by creating areas of lower fire intensity, improved access for ground based firefighters, and increased fireline construction rates. The lighter fuels, often associated with fuel breaks, also provide opportunities for indirect fireline construction through backfire or burn-out operations to consume fuel ahead of the spread of the main fire.

Shaded Fuel Breaks



In a shaded fuel break, trees are typically spaced so their crowns no longer touch, lower branches are pruned, and brush and dead and down material are removed or replaced with masticated material. Shaded fuel breaks are most often placed strategically on ridgetops, roads, and around structures.

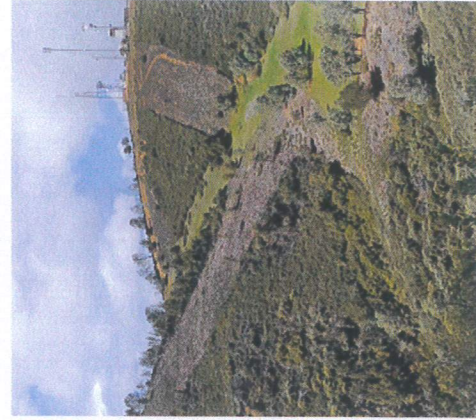
Shaded fuel breaks are strips of land in which vegetation has been modified to act as strategic "defensible landscape." The purpose is to reduce the amount of combustible material so that when a fire hits the shaded fuel break it will

decrease in intensity, cool down, and drop from the canopy to the ground. Along roadways, shaded fuel breaks create safer ingress and egress routes for fire personnel and citizens.

Creek Fire

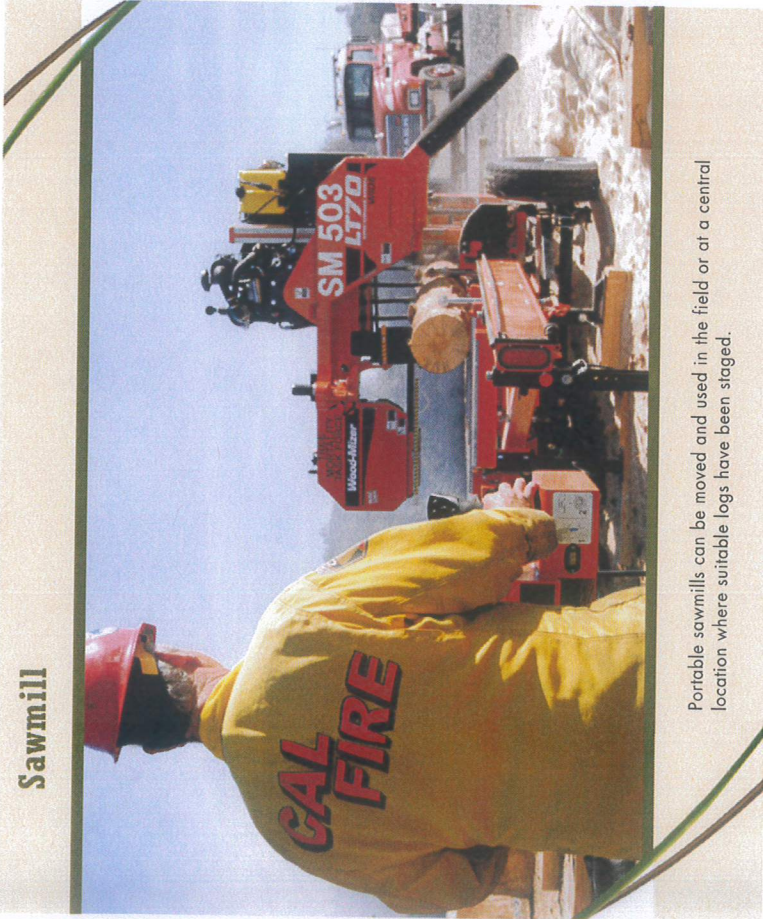
During the 2020 Creek Fire, thousands of residents and visitors were safely evacuated along the Highway 168 corridor, where Highway 168 Fire Safe Council had received grant funding to construct a roadside fuel break and clear dead trees from the massive beetle kill caused by drought. The role these fuel breaks and tree removal played in keeping this fire

from being much more destructive cannot be understated. They played a key role in buying time, allowing for preparation around communities and managing fire activity. Dozers were able to quickly open up and expand fuel breaks, turning them into constructed line that aided fire fighters in saving homes and resources.



Fuel breaks create Defensible Space around critical communication, water and power infrastructure.

Sawmill



Portable sawmills can be moved and used in the field or at a central location where suitable logs have been staged.

On some fuels reduction projects, there will be a few trees of good quality timber, but not enough to be economically feasible to transport to a sawmill. Portable sawmills can be used to process saw logs on-site where they can be set up next to the trees being cut. The sawn logs are used to make



Specialty timber products not readily available through lumber yards can be milled on a portable sawmill. They are useful in urban settings too, where moving logs would be impractical.

Air Curtain Burner



An Air Curtain Burner works by pushing high velocity air over the top of the burn chamber, creating a curtain of air which the rising smoke cannot penetrate. The unburned particulates are pushed back down into the chamber where they reburn until they are light enough to rise through the air curtain.

Air Curtain Burners or Air Curtain Incinerators are used to dispose of forest waste generated from fuels reduction projects in areas where the debris cannot be left on-site, and broadcast or pile burning is not an option. Air Curtain Burners produce a much cleaner, nearly smokeless burn with emissions consisting mostly of water vapor and biogenic carbon dioxide.

The air curtain reduces particulate matter (PM), or smoke, which results from burning clean wood waste, to an acceptable limit per United States Environmental Protection Agency

guidelines. Because Air Curtain Burners consume fuel so efficiently, they can be operated on days when weather conditions aren't suitable for broadcast or pile burning. Air Curtain Burners are capable of burning five to seven tons of material per hour.



Landowner Assistance



Individuals and communities play a role in fuels reduction and community fire safety. There are several programs and organizations to support these efforts.

Unit fire plans and Community Wildfire Protection Plans outline fire and fuel hazard situations at the local level for each of CAL FIRE's 21 Units statewide. Each identifies prevention measures to reduce risks, to educate and engage the local communities, and provide a framework to diminish the potential loss due to wildfire. Planning includes other state, federal and local government agencies, as well as Fire Safe Councils and community

based organizations. Building strong partnerships and community trust are core values for CAL FIRE; these are essential for planning and implementing fuels reduction projects in and around communities and the wildland.

Learn More

CAL FIRE Unit Fire Plans.

CAL FIRE Cost Share Incentive Programs

Learn More

The Vegetation Management Program (VMP) is a cost-sharing program that focuses on the use of prescribed fire, and mechanical means for addressing wildland fuel hazards and other resource management issues on State Responsibility Area (SRA) lands.

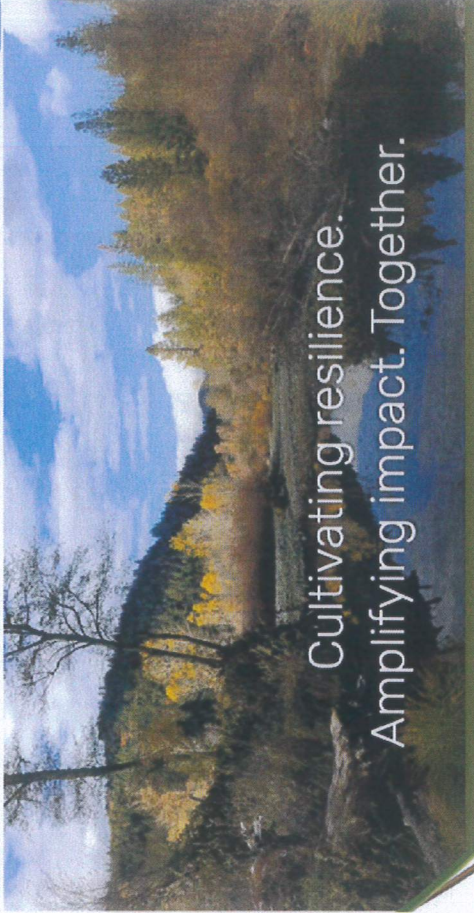
Learn More

The California Forest Improvement Program (CFIP) provides technical assistance and funding to improve the management of private forest lands.

Resource Conservation Districts



RCDD - About Us - Our Work - Events - Partners - Updates - Support



Cultivating resilience. Amplifying impact. Together.

Resource Conservation Districts combine the accountability and transparency of a public agency with the flexibility and non-regulatory approach of a non-profit organization. This nimbleness allows them to adapt to the ever-changing needs of communities, build trusted relationships, and act as the crucial bridge that connects individuals with state and federal partners and programs. [Excerpted from <https://carcd.org/>]

Resource Conservation Districts (RCD's) were first founded after the Dust Bowl in the 1930s to bring federal and state funding and technical assistance to farmers and ranchers so that they could voluntarily conserve water, soil, and wildlife habitat on their land with

the help of a local and neutral partner. RCD's are an important partner for forest health and fire prevention project planning and implementation with landowners in communities across the state.

Grant Programs

Learn More

Fire Prevention
The Fire Prevention Grant Program, aims to reduce the risk of wildland fires to habitable structures and communities, while maximizing carbon sequestration in healthy wildland habitat and minimizing the uncontrolled release of emissions emitted by wildfires.

Learn More

Forest Health
The Forest Health Program funds active restoration and reforestation activities aimed at providing for more resilient and sustained wildlands while also mitigating climate change, protecting communities from fire risk, strengthening rural economies and improving California's water & air.

What Can I Do?



FIND OR CREATE A LOCAL FIRE SAFE COUNCIL OR FIREWISE COMMUNITY

Fire Safe Councils are grassroots, community-led organizations that mobilize residents to protect their homes, communities, and environments from catastrophic wildfire. Fire Safe Councils throughout California educate homeowners about community wildfire preparedness activities while working with local fire officials to design and implement projects that increase the wildfire survivability of their communities. Many Fire Safe Councils have successfully implemented such projects as hazardous-fuel-reduction, Community Wildfire Protection Planning, and homeowner training.

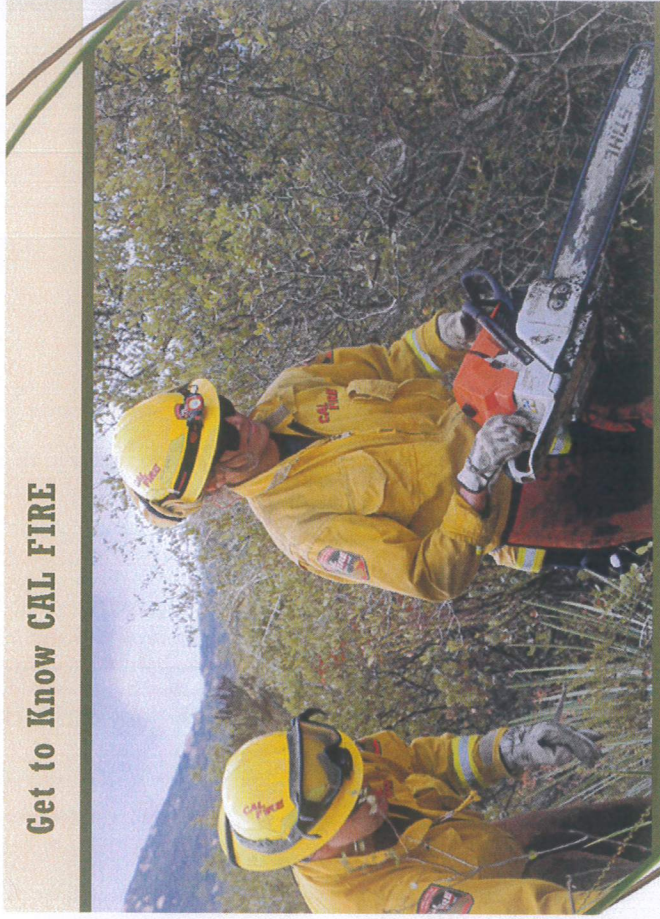


Many communities have a Fire Safe Council. Click here to see the one closest to you, or learn how to start one.

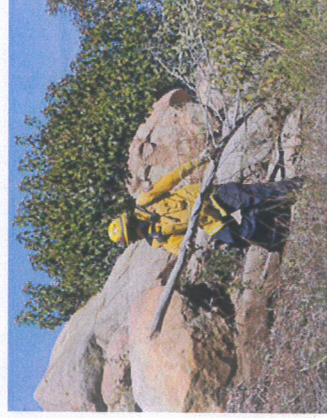


Find out how to be recognized as a Firewise community by clicking here.

Get to Know CAL FIRE



Get to know CAL FIRE by following us on Social Media. Information about fuels reduction work, emergency incidents, fire prevention and fire safety education is posted regularly to keep the public up to date on CAL FIRE's work.



Do you want to learn more about CAL FIRE? Visit our website where you will find resources and information about our programs, the equipment we use, how to protect your home and family, careers and more.



Terminology

Broadcast burn: A broadcast burn is the controlled application of fire to wildland fuels in their natural or modified state over a predefined area, often conducted to reduce wildland fire fuel loads, restore ecological health of an area, or to clear vegetation. Broadcast burns accomplish planned resource management objectives under specified conditions of fuels, weather, and other variables.

Burn Plan: The burn plan will provide a description of the burn area, target weather conditions, hazards that may be encountered, personnel needs, safety, and contacts to make prior to burning. Prescribed fire projects must have an approved, written burn plan before a prescribed fire can be implemented.

Chipping: Chippers are used to change the size, shape and distribution of fuels, thereby reducing the risk of catastrophic wildfire. Brush chipping is an excellent option for fuels reduction, as it can be more economical than hauling and safer than burning. The chips are blown and dispersed back onto the land returning nutrients and providing erosion control.

Community Wildfire Protection Plan (CWPP): A collaborative effort involving government entities and affected non-governmental interests, especially local community residents. A CWPP identifies and prioritizes areas for hazardous fuel reduction and recommends measures to reduce the ignitability of structures.

Crown fuels: The tops of trees and shrubs usually ignited by a surface fire.

Defensible Space: Defensible Space is an area around a house or other structure that has been modified to reduce wildfire threat. This is usually done by clearing and separating highly flammable material so there are no paths for fire to travel to the home. California law requires 100' of Defensible Space around homes and structures. When residents have done their Defensible Space, firefighters can defend property with confidence and safety, knowing fire behavior will be disrupted when it meets the area with broken up fuels.

Fuel Break: A natural or manmade change in fuel characteristics that changes fuel arrangement and continuity to reduce fire spread to structures and/or natural resources, and to provide a safer location to fight fire. Fuel breaks are strategically placed along a ridge, valley bottom, access road, or around a subdivision.

Fuel continuity: A qualitative description of the distribution of horizontal and vertical fuels. Discontinuous fuels disrupt fire behavior and slow fire spread. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread.

Fuel Type: An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.

Ground fuels: Fuels that lie beneath surface fuels, such as organic soils, duff, ground fuels, decomposing litter, buried logs, roots, and the below-surface portion of stumps.

Hand tools: Grubbing, scraping and cutting tools used for removing fuels without heavy equipment.

Ladder fuels: Fuels which provide vertical continuity, thereby allowing a fire to spread from the ground to the canopy. Branches, shrubs or an understory layer of trees are considered ladder fuels.

Mastication: A mechanical process that changes the shape, size and distribution of fuels. Whole trees and large brush are broken down into small chunks and left on the forest floor or removed for burning or biomass. Mastication is effective for clearing trees along roadsides, ravines and places that could be difficult to reach with other equipment or on foot.

Pile burn: Piling materials resulting from management activities and subsequently burning the individual piles.

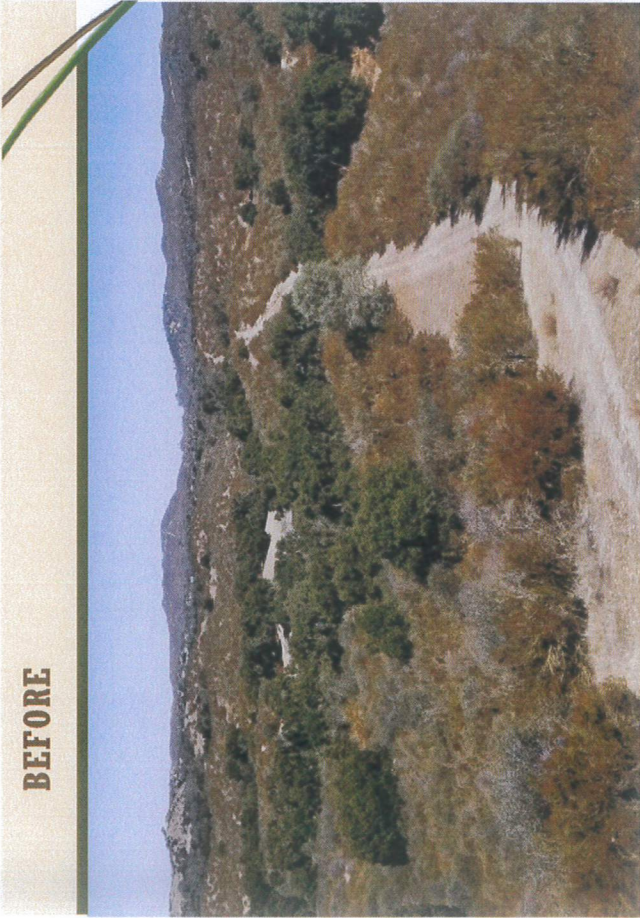
Shaded Fuel Break: Fuel breaks built in areas where the trees on the break are thinned and pruned to reduce the fire potential yet retain enough crown canopy to make a less favorable microclimate for surface fires.

Smoke Management Plan: A smoke management plan identifies smoke sensitive receptors, including population centers, recreation areas, hospitals, airports, transportation corridors, schools, and other values that may be impacted. Smoke mitigation strategies and techniques to reduce the impacts of smoke production must be included, and must comply with local air district requirements.

Surface fuels: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants.

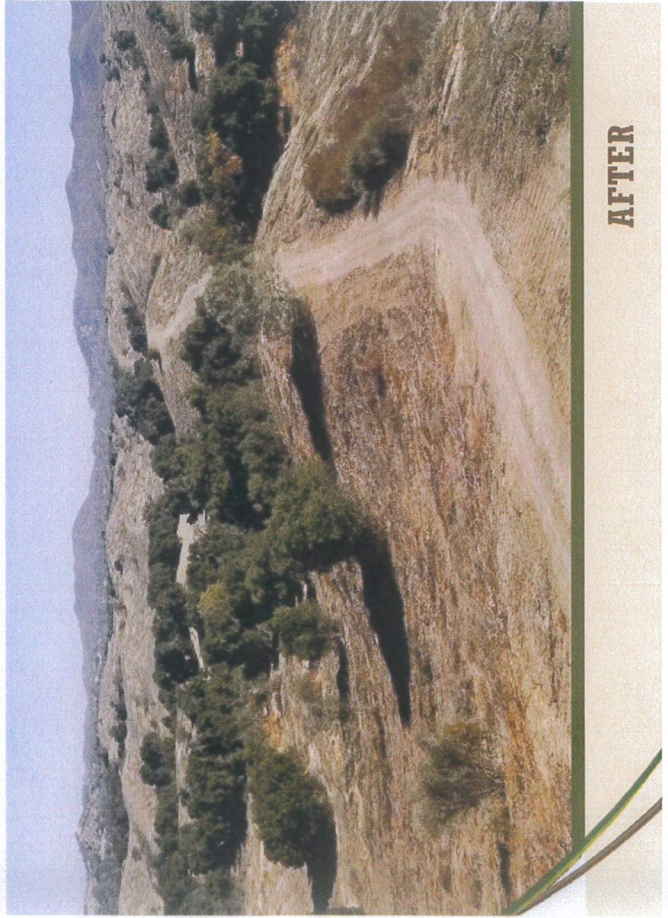
Thinning: Cutting of trees to reduce the density of the remaining trees.

BEFORE

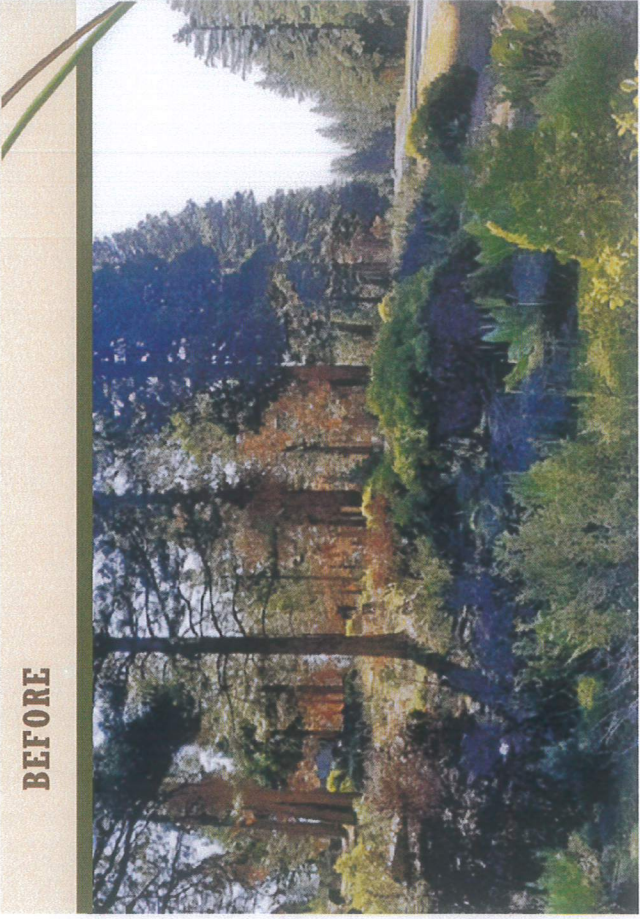


Removing brush strategically across the landscape interrupts fuel continuity which helps slow an advancing wildfire, allowing firefighters a safe place to defend nearby communities and protect natural resources.

AFTER

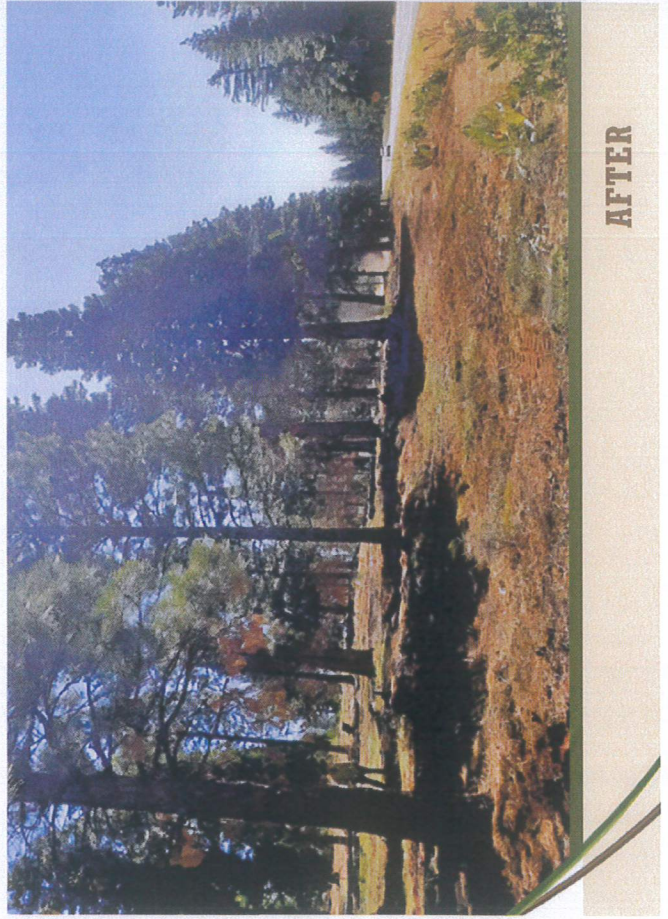


BEFORE



Shaded fuel breaks along roadways remove heavy fuels and are designed to prevent roadside sparks from becoming a devastating wildfire. They also create safer ingress and egress routes for emergency personnel and residents.

AFTER





FUELS REDUCTION GUIDE

WWW.READYFORWILDFIRE.ORG
WWW.FIRE.CA.GOV



When a high-intensity wildfire burns into an area that has been treated with thinning, mastication, or prescribed fire, fire behavior moderates, often shifting from a crown fire to a surface fire with low intensity fire behavior. Low intensity fires have ecological benefits, remove brush and ladder fuels and help protect nearby communities.