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FOREST STEWARDSHIP SERIES 15

Wildfire and Fuel Management

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Every forest landowner in California should be well aware of the warning "It's not if, it's when" a fire will affect your property. California's forests have evolved with fire, so living in the forest or managing forest lands means anticipating and preparing for fire. This publication gives you background information about fire and fuel management as well as some practices that can help reduce the risk of a catastrophic wildfire occurring on your property.

Objective

Understand the role of fire in forest ecology, what constitutes a fire hazard, and how to modify fuel to reduce fire hazard.

Competencies

- *Understand fire ecology and fire regimes: fire behavior, types of fires, and determinants of fire severity.*
- *Learn the natural resistance of trees to fire.*
- *Understand how fuel management can create defensible space and reduce the chance of wildfire in your forest.*
- *Be aware of local, state, and federal programs that can help develop and fund community and landowner fire hazard reduction projects.*

Related Forest Stewardship Series Publications

- *Forest Ecology, ANR Publication 8233*
- *Forest Vegetation Management, ANR Publication 8236*
- *Forest History, ANR Publication 8234*

FIRE REGIME

"Fire regime" is the characteristic frequency, extent, intensity, severity, and seasonality of fires within an ecosystem. Fire regimes vary regionally in California and have a great impact on vegetation types.

Fire frequency is commonly referred to as the "fire return interval," or the average number of years between fires at a specific location. It varies with climate, forest type, and in response to topography. Most fire scientists agree that before European settlement in California, natural fires occurred more frequently in most forest types than they do today. In some locations, Native Americans intentionally set fires to improve resource conditions for their purposes, for example, to reduce cover to facilitate hunting and to regenerate grasses, herbs, and shrubs for food and basket-making materials. Generally, the fire return interval for most California forest types has been considerably lengthened due to aggressive fire control over the past 100 years. Fires are ignited, but most are extinguished quickly before many acres have burned. A lengthened fire return interval affects forest stand conditions, fuel accumulation, and how intensely and severely future fires will burn.

The size of a fire is called its extent, usually measured in acres. Most fires affecting forests in California are small, on the order of an acre or less, because of our efficient fire suppression. Over the past few decades, there have been at least several fires every year that have affected immense acreages. The dramatic increase in the size of wildfires has been attributed in part to large fuel loads accumulated due to fire suppression activities.

Fires vary in their intensity (how hot they are) and severity (how much damage they do). At one extreme, a fire may be so intense that it completely destroys a forest stand, leaving nothing but bare soil. In actuality, even within a single fire, the intensity and severity of impacts are not uniform and differ from place to place. Many factors influence the intensity and consequent severity of a fire. These include fuel amount, or "loading," and fuel arrangement, topography, wind speed and direction, air temperature, and humidity. However, fuel is the only factor that a forest landowner can manage.

UC PEER REVIEWED

FUEL

Fuels are characterized by their size, moisture content, flammability, and location. The size of the fuel determines how quickly it ignites (its flammability) and how long and how intensely it burns. Larger pieces of wood require greater heat to ignite but, once ignited, can continue to burn for a long time. Smaller pieces ignite more readily but burn quickly. Moisture content of fuel is influenced by whether the fuel is live or dead plants, the season of the year, and recent weather. Dry fuels ignite more easily and burn hotter. As described below (see the section "Fuel Profile," below), the location of fuel and the arrangement of fuel in space determine the type of fire that may be experienced.

There is a clear link between fire intensity and the amount of fuel present. If the time since the most recent fire exceeds the historic fire return interval by many years, excessive fuel may accumulate, and when a fire does occur, it can be quite intense. When there is a combination of exceptionally dry weather, high winds, high air temperatures, and high fuel loading, the most intense fires will occur.

TYPES OF FIRE

There are three main types of fire: surface fires, understory fires, and crown fires. Most forest fires in California are surface fires. They can be low intensity or high intensity depending upon the type and amount of surface fuels, the weather, and topography. Low-intensity surface fires, with flame lengths less than 4 feet, can be controlled with a fuel break line constructed by fire fighters using hand tools. Prescribed fires, or controlled burns, are designed to be low- to moderate-intensity surface fires.

Understory fires have longer flame lengths, up to about 10 feet. These fires are fed by surface fuels and the ladder fuels of small trees, brush, and the lower branches (up to 15 feet) of overstory trees. Ladder fuels are so called because they serve as a ladder for surface fires to climb into the crown fuels, creating crown fires. Bulldozers and aerial tankers are generally needed to successfully control understory fires.

Crown fires are the most intense, reaching into the crowns of trees. The fire has flame lengths more than 10 feet, and the behavior of the fire is unpredictable. Sometimes these fires can spread from tree crown to crown without even touching the ground. Direct control of crown fires is very difficult because of their intensity and high rate of spread. They can jump fire lines and quickly increase in size.

Though dramatic, crown fires independent of surface fires are rare in California forests. Most crown fires are supported by surface and understory fuels and fires that ignite the crowns. Fuels treatments should concentrate on surface and ladder fuels first, and crown fuels last if at all.

FIRE SUPPRESSION

Humans have influenced fire regimes for many centuries. Native Americans intentionally set fires to produce desired plants for medicine and food (e.g., acorns, hazelnuts, roots, and even grasshoppers), herd deer, and improve visibility and maneuverability for hunting and travel.

Early European settlers used fire primarily to clear land that had been logged. In some cases, attempts were made to convert forestland to pasture by clearing the trees and burning. Many fires were unintentional or naturally caused by lightning. In the 1900s, fire suppression became institutionalized both nationally and in California on both public and private lands. Fire suppression became much more effective after World War II when California forests became more roaded and accessible for fighting fires. Bulldozers, aerial tankers, chainsaws, smokejumpers, and other practices came into widespread use.

Fire suppression was instituted to protect people, property, and valuable forest resources from destruction due to both natural and human-caused fires. There is general agreement that it has been extremely effective. Recently, it has become clear that fire suppression has also allowed forests to become denser since it prevents the natural thinning that would otherwise have occurred with more frequent fires. Overly dense forests are more vulnerable to drought, fire, disease, insect attack, and other threats. This partly explains the surge in the total area burned and the size of individual fires over the past couple of decades and the perception that many forests are suffering extreme stress. Suppressing fires over time also means that the dead material in the forest is not regularly consumed, which contributes to the severity of a fire when it finally does occur. Accumulated material also ties up nutrients that would otherwise be recycled into the soil from the ashes of a fire.

RESISTANCE TO FIRE DAMAGE

Trees (and other vegetation) differ in their ability to withstand fire. Your management decisions should take into account the natural fire regime for your area and which trees are adapted to it (table 1).

Table 1. Resistance of mature trees to fire damage and mortality, in order of decreasing resistance

Coastal species	Interior species
coast redwood, tanoak	ponderosa and Jeffrey pine, Douglas-fir
Douglas-fir	sugar pine, white fir, grand fir
grand fir, white fir	incense cedar
mountain hemlock	western white pine
noble fir	lodgepole pine, western hemlock
western white pine	canyon live oak
lodgepole pine	black oak
western hemlock	
Sitka spruce, western red cedar	

Source: D. Minore, Comparative autecological characteristics of northwestern tree species: A literature review. USDA Forest Service PNW Research Station Gen. Tech. Rep. PNW-87 (1979), p. 39; Forest Service Web site, http://www.fs.fed.us/pnw/pubs/journals/pnw_1979_minore001.pdf.

A tree's resistance to fire is influenced by several attributes. Thick bark is the most important characteristic. During a fire, thick bark protects the living cambium tissue, just below the bark, from lethal heat. Bark thickness increases with tree age and size, and it varies with tree species. For example, a ponderosa pine has thicker bark than a white fir tree of the same age. Depth of rooting is also important. A tree that has shallow roots is vulnerable to having its roots charred in hot fires when ground temperatures increase significantly. The density of the forest canopy, flammability of the foliage, and the branching habits of individual trees greatly influence how a fire spreads and whether it will reach the crowns. Shade-tolerant trees such as white fir and incense cedar retain limbs and full crowns to the ground even when they are in the understory of other trees. If crowns extend to the ground this can facilitate the spread of fire.

FUEL MANAGEMENT

The first step in a fuel management project is to understand your fire hazard. Key considerations include defensible space around structures and the fuel profile, including surface, ladder, and crown or aerial fuel. Once you know the fuels, you can decide what kind of fuel management project, if any, is appropriate.

Making Your House More Fire Resistant

Few existing homes in the forest are designed and maintained to resist ignition and destruction in a wildfire. Most homes are ignited by embers and ash that fall on combustible roofs and combustible materials near homes (firewood stacked against the house, wood decks and fences attached to the house, landscape plants under eaves), and that enter vents under the house and eaves. These embers can fall up to a mile ahead of a wildfire, depending upon wind and topography, before you can see the flaming front.

When first ignited, fires are small and readily extinguished by firefighters. For this reason, firefighters must know where your house is, be able to get to your home quickly, and have defensible space around the home so they can safely defend it, and the wildfire must be moving slowly enough that it is not challenging many homes at the same time, overwhelming the firefighting forces available.

Wildfire rate of spread is an important fire behavior characteristic that can be modified with fuel reduction. The 2005 Manton Fire in Shasta County spread at a rate of 150 acres per hour, while the 2003 Cedar Fire in San Diego County spread at a rate of 5,000 acres per hour. Fire suppression forces were sufficient to cover homes in the Manton Fire, but they were not sufficient to cover the homes in the Cedar Fire because too many homes were challenged at the same time by the fast-moving fire. Fuel treatments in the forest and wild lands are designed to reduce fire intensity and rate of spread, giving limited fire suppression forces the time to get to homes challenged by the fire.

In terms of your home itself, the roof is the first thing to be made fire resistant. A Class A roof offers the best protection. Tile, slate, asphalt composition, and metal are fire resistant. Next, treat the vents in the eaves and under the house. These vents are designed to remove excess moisture from the house and prevent mold and decay, but they are also access points for embers and ash, which can ignite attics. Research is underway as to how to maintain proper venting for moisture control while excluding embers; in general:

- Inspect and maintain vegetation in the vicinity of soffit vents. Remove highly combustible plants.
- Clean vents on a regular basis to minimize buildup of debris in the screen mesh.
- Remove debris that accumulates on roofs and other areas that may expose vents if ignited. This includes the ground near crawlspace vents.
- Prepare vent covers that can be temporarily installed when a wildfire approaches your home. Vent covers can be built from plywood or some other solid substance that would provide short-term protection from embers and flame.

Finally, make attached decks and fences less ignitable by keeping them free of combustible materials during the fire season. If firewood is stacked against the house in the winter, move it away from the house during the fire season. Maintain the landscaping around the house to minimize ignition by embers by keeping it well watered and free of dead leaves and branches. If ignited, small, well-pruned plants generate less heat and are less able to ignite the siding or create embers. No plant species is fire resistant. All plants, even green plants, will burn under severe fire weather conditions if they have not been well watered and maintained.

For more on making your home fire resistant, see the Homeowner's Wildfire Mitigation Guide Web site, *http://groups.ucanr.org/HWMG/index.cfm*.

Defensible Space

Defensible space is an area created around a structure to reduce the transmission of fire to the home and improve the ability of firefighters to effectively fight the blaze. It provides a safe place from which to defend against an approaching wildfire and extinguish spot fires caused by embers on and around the home. Defensible space applies at the community scale as well. For a community, a defensible area has emergency vehicle access, emergency water reserves, street names and building identification, and fuel management measures. Fire suppression agencies also suggest the concept of survivable space. Developing survivable space prepares your home and property for wildfire under the assumption that fire fighters will not be present to defend it and suppress the fire.

Fuel Profile

The fuel profile is comprised of the surface, ladder, and crown fuels. All elements of the fuel profile should be considered when managing fire hazard, but the surface and ladder fuel have highest priority in terms of reducing fire intensity, rate of spread, and the potential for crown fire.

Surface fuel includes grasses, leaves and needles, small branches, logs, and stumps on the ground. Ladder fuel includes combustible materials (both live and dead) 6 to 15 feet above the ground, small trees and shrubs, and the lower limbs of overstory trees that could provide a path for a surface fire to climb up into the crowns; this includes living foliage and branches as well as any dead material, such as needles, caught up in the branches of other plants. Standing dead trees with many limbs near the ground are another example of ladder fuel. Dead limbs with no remaining foliage have less potential to carry the fire up into the live crown and are of less concern than are dead limbs with foliage.

When assessing your fire hazard, it is important to acknowledge that while some large decomposing logs and snags (dead trees) are needed to maintain good wildlife habitat, it is important not to have too many. Also, different fuel burns at different

rates. Pine needles are "flashy" fuel that ignite easily and burn quickly. Other fuel, such as logs, are very difficult to ignite but once ignited can burn and smolder for weeks or even months.

Fuel Management

Fuel management projects are designed to reduce fire hazard by removing or rearranging fuel. Fuel management projects can be applied to strips of land or to broad areas. When a fuel management project is applied to strips of land it is known as a fire break or fuel break. When creating a fire break, all of the vegetation is removed down to bare soil, leaving nothing to burn. Fire breaks are a minimum of 3 feet wide and are used to control low-intensity fires (hand lines). They are often used in grassland ecosystems, especially in Southern California. Generally, a fire break is three times wider than the fuel height, so a fire break may be quite wide, depending on the vegetation type and anticipated burning conditions. Fire breaks are often strategically placed along ridges and roads. Roads themselves can function as effective fire breaks.

Fuel breaks are strips of land in which vegetation, both dead and live, has been modified, but some trees and shrubs are retained. The purpose is to reduce the amount of combustible material so that when a fire burns into the fuel break, it will decrease in intensity, drop from the canopy to the ground, and slow its rate of spread. Areas treated in this manner are often referred to as shaded fuel breaks. Another term that is used to describe fuel breaks in forests is defensible fuel profile zone, or DFPZ. In a shaded fuel break (fig. 1) the trees are generally thinned so that their crowns no longer touch each other and are horizontally separated. Lower branches of overstory trees are pruned, reducing the ladder fuels. Shrubs and dead and down material is removed to reduce surface fuels. Not all small trees and shrubs need to be removed in a shaded fuel break, but the fuel reduction project should create horizontal space between small trees and nearby larger trees to minimize the transmission of fire. Shaded fuel breaks are most often placed strategically along roads and around structures.

Figure 1. A: Aerial view of a shaded fuel break in a mixed conifer forest. *Photo:* © Stephen M. Jolley. B: Ground view of a shaded fuel break in a mixed conifer forest. *Photo:* Gary Nakamura.

Fire breaks and fuel breaks can help fire suppression forces control a fire , but they may not be effective when conditions are extreme, such as on a hot, dry and windy autumn day. A forest landowner may want to consider managing the fuel over the entire forest to reduce wildfire intensity and rate of spread so that it is less severe and more easily suppressed.

Forest fuel management often includes forest thinning. Forest thinning is conducted in stands

Figure 2. A: Surface, ladder, and crown fuels create a condition that will carry fire from the surface up the ladder fuels and into the crowns of the larger trees. B: In this forest fuels treatment has removed the ladder fuels and pruned the lower limbs of the overstory trees. A crown fire entering this stand will drop to the surface, be reduced in intensity, and be more readily suppressed. *Photos:* Gary Nakamura.

with small-diameter trees (precommercial thinning, or PCT), or in stands with larger, commercially valuable trees (commercial thinning). Whether a tree has commercial value often depends on the milling capacity in the area. In either case, the purpose of forest thinning that emphasizes fuel management is to reduce surface, ladder, and crown fuels. An important additional benefit of thinning is that by reducing tree density a healthier, more vigorous reserve stand is created in which trees experience less competition for sunlight, water, and nutrients and become more resilient to drought and insect attack (fig. 2).

It is critical that surface fuel that results from the thinning activity, known as slash, as well as surface fuel that existed prior to the thinning be removed as part of the fuel management project. If you leave the slash behind, a fire may burn hot and fast through the fuel bed, killing trees that you chose to leave during the thinning. Take care to retain some of the organic matter on the ground so that erosion hazard is not increased. Treating the slash can significantly increase the cost of a fuel management project (see "Managing Debris and Slash," below). When conducting a fuel management project you may harvest some trees with commercial value to offset the costs of surface, ground and ladder fuel treatments.

In some cases the treatment of surface and ladder fuel can be accomplished by mastication, which is the mechanical chipping of trees and shrubs by mobile equipment and spreading it on the ground (fig. 3). The fuel is not removed, but its size is reduced, it is rearranged to be less flammable, and it is put in contact with the ground, where it can decompose more readily. A prescribed fire may be an effective treatment following mastication because the ladder fuel has been reduced and there is often a continuous layer of surface fuel to carry a fire.

A fuel management treatment may also include pruning, or removing the lower (live and dead) limbs of trees to reduce ladder fuel. Lower limbs should be pruned to a height of 8 to 12 feet. Care should be taken to not remove more than 50 percent of the live crown length of a tree. Conifer limbs should be cut flush against the stem (leaving no stub) so that the cut will heal over more quickly. Pruning small-diameter trees, 6 to 8

Figure 3. A: Manzanita brush and ponderosa pine before fuels treatment, Whitmore, Shasta County, California. B: The same forest following mastication of the brush, creating a less flammable fuel condition. *Photos:* Gary Nakamura.

inches in diameter, has the added benefit of producing higher-value logs with clear lumber. All the wood produced after the pruning will be clear, free of knots, and useful for high-value molding, doors and window frames.

Managing Thinning Debris and Slash

Vegetation management, whether it includes pruning, precommercial thinning, or commercial harvests can generate large amounts of waste material (slash) that is potential fuel for a fire. It is very important that this waste material is managed in such a way that it does not contribute to the fire hazard. The waste material can be modified in size and arrangement, burned, or removed from the site completely (table 2).

Mastication, described above, is one method for managing slash. Broadcast burning is a prescribed burn following a timber harvest. "Pile and burn" refers to gathering slash

Table 2. Fuels and slash management alternatives to reduce fire hazard

Treatment	Cost	Positive aspects	Negative aspects
mastication	high	very effective for nonsprouting brush no smoke long operating season alternative to herbicides can be used for large brush can combine with PCT	slope limitations high cost encourages sprouts increases flashy fuels
broadcast burning	low	very effective can use on steep slopes inexpensive imited operating seasonl	creates smoke potential for erosion often need to create fuel breaks
pile and burn	low	very effective low escape potential longer window of operation than broadcast burning can use equipment brought on-site for piling for other purposes	creates smoke potential for erosion limited by terrain (equipment limitations) potential for soil compaction
prescribed fire and underburning	low	very effective low cost large areas can be safely treated may decrease herbicide use by controlling timing of sprouting	potential for erosion smoke limited season risk of escape not a stand-alone tool
lop and scatter	high	less effective than the above no slope limitations allows for underburning	expensive increases flashy fuels

into piles with fire breaks around them, for a safer more controlled fire than a broadcast burn (fig. 4A) Prescribed fire and underburning are designed and conducted to treat fuels in stands of live trees without damaging them (fig. 4B). Lop and scatter cuts up the fuels and scatters it on the ground, lowering the fire hazard but not eliminating it

If you choose to pile and burn, follow these tips on how to burn safely. Call your local fire department first to find out if there are any special restrictions or requirements in your area.

- Burn on a "burn day" (call the local air quality management district to find out if it is a burn day). On a "no burn day," authorization for burning may be granted on a case-by-case basis by contacting the district directly.
- Keep dirt out of the burn pile as much as possible. This will help it burn completely and cleanly, with less smoke.
- Make sure your smoke does not become a nuisance to neighbors.
- Keep your burn pile under 4 feet in diameter; larger piles are subject to special rules. To keep piles this small, use multiple piles or feed material into burning piles by hand.
- Don't burn material over 12 inches in diameter.
- If you need to cover your pile to keep it dry, use black polyethylene plastic. All covering should be weighted down so that the covering will maintain its position in high winds or heavy rain.
- Locate piles in areas that will not result in damage to desired trees that were left following the thinning. If possible, locate piles outside the edge of the crown of remaining trees.

Regulations Affecting Fuel Management Projects

California Forest Practice Rules may apply to fuel management projects that include the removal of commercially valuable trees. If you sell, barter, or trade the logs or wood produced by a fuel management project, the project is subject to the Forest Practice Rules and a timber harvest plan (THP) will be required. The Rules are extremely detailed and complex, and you will need to hire a registered professional forester (RPF) to prepare the THP. The Forest Practice Rules do include exemptions from preparing a THP for landowners doing fuel management around their home. Consult the local CAL FIRE offices to determine whether your project qualifies for an exemption from THP.

Figure 4. A: Material thinned from the forest is piled for late-fall or winter burning, when the fire season is over, in Lassen Volcanic National Park. B: A prescribed burn is conducted when weather and fuel conditions will allow a safe, controlled fire. This fire is of low intensity, low flame lengths, and will not damage the trees but will consume the surface fuels and reduce fire hazard. *Photos:* Gary Nakamura.

Case Study: Oakhurst, Madera County

The mountains and landscapes of Oakhurst, California, have caused many to call this Eastern Madera County town the "Gateway to Yosemite." However, Oakhurst's forests and rugged terrain present special needs for catastrophic wildfire prevention. The local economy is shifting from logging and grazing to tourism-centered services. This shift has stimulated rapid population growth and an increase in the number of homes and businesses located in the wildland-urban interface.

Oakhurst faces a challenge that many California communities face: developing ways for citizens to protect their communities from wildfire while maintaining the beauty of their surroundings.

In a cooperative effort among several state and local government agencies, private professionals, and the public, Oakhurst was able to coordinate a fire prevention, fire suppression, and resource management program.

A permanent fuel break was the top priority. First, the steep and treacherous Deadwood Peak needed to be cleared of the dense and highly flammable manzanita that grew there. The peak was so steep that using tractors to clear it was impossible, and hundreds of hours were devoted to removing the brush by hand. Next, a controlled burn was conducted to eliminate the dense brush, leaving only the manzanita root system to prevent soil erosion. As the final step, 35,000 ponderosa pine tree seedlings were planted.

Another project, called "Trees for Oakhurst," was sponsored by the Madera County Chamber of Commerce. It included replacing trees that were cut down during construction along Highway 41. The 1,400 oak, sycamore, and evergreen trees that were planted by the community helped reduce noise and the effects of vehicular emissions, improved air quality, enhanced wildlife habitat, and restored the natural beauty of the area.

In a similar endeavor, government agencies, citizens, and local businesses contributed time and money to the Oakhurst River Parkway Project. This project worked to restore Oak Creek and the Fresno River to a level of stability that existed before intense development nearly destroyed them.

Local citizens and community organizations such as the Rotary Club, Chamber of Commerce, and Oakhurst Community Center played an active leadership role in these efforts. Other participating groups included the Coarsegold Resource Conservation District, California Department of Forestry and Fire Protection (CAL FIRE), USDA Agricultural Stabilization and Conservation Service, USDA Forest Service, California Department of Transportation, and Madera County Road Department.

Funding for many of the projects was secured through federal and state programs such as the Stewardship Incentive Program and Agricultural Conservation Program. For more information, see the Madera Fire Safe Council Web site, *http://www.maderafsc.org/*.

AFTER A FIRE

If a wildfire does burn through your property, begin recovery immediately. Immediate concerns include:

- control of soil erosion
- protecting your roads, particularly water crossings and road drainage structures
- assessing whether you can conduct a salvage timber harvest
- regenerating the forest and replanting if necessary
- understanding your economic losses and the applicable tax laws

For further information, see *Recovering from Wildfire: A Guide for California's Forest Landowners*, (UC Agriculture and Natural Resources Publication 21603), available from the ANR Communication Services Web site, http://anrcatalog.ucdavis.edu/InOrder/Shop/ItemDetails.asp?ItemNo=21603.

RESOURCES

Funding Your Project: State and Federal Programs

A number of state and federal programs can assist landowners with land management activities, including fuel reduction projects. Funding for these programs varies considerably from year to year. Two excellent guides are available from the Forest Stewardship Helpline, at 1-800-738-8733, or by e-mail at ncsaf@mcn.org:

- Cost Share and Assistance Program Directory for Individual California Landowners and Indian Tribes (2003), http://ceres.ca.gov/foreststeward/html/financial.html.
- The California Fire Alliance Community Resources Guide. This resource guide provides a brief summary of assistance available from various state and federal agencies to help tribes, communities, and other groups plan and implement community fire protection.

Fire Safe Councils

Fire Safe Councils are groups of people who come together to make their homes, neighborhoods, and communities fire safe; to discuss fire safety issues; and to determine actions to improve fire safety. They may also be involved in acquiring, funding, and administering grants to assist landowners and communities with fuel treatment projects. Membership may include representatives from public agencies, private organizations, companies, landowners, or interested citizens. Fire Safe Councils exist on the state and local levels.

The statewide Fire Safe Council is a partnership of dozens of public and private agencies and organizations. For more information on the statewide Council's publications and videos, visit their Web site at http://www.firesafecouncil.org.

Local fire safe councils are grassroots organizations that can be started by anyone. Participants might include interested citizens (landowners, neighbors), civic service organizations (Red Cross, Rotary Club), local business interests (Chamber of Commerce, forestry companies), insurance companies, environmental organizations (The Nature Conservancy, The Audubon Society), and county, state, and federal government fire districts and agencies. Examples of projects include

- planning cleanup days
- sponsoring a chipper to come through neighborhoods to treat fuels
- producing educational material
- sponsoring a seminar on designing and maintaining fire safe landscapes
- setting up demonstration gardens
- forming a speakers' bureau to give fire safe presentations
- organizing safety fairs or mock fire exercises
- sharing information and solving problems on public safety issues other than fire safety, including earthquake preparedness, emergency medical response, and so on.

The first steps in forming a council include the following:

- Identify potential members.
- Invite them to a meeting.
- Hold a meeting.
- Appoint a facilitator.
- Define area of concern and values at risk.
- List objectives and action items.
- Develop a plan and mission statement.
- Review the plan regularly.

Many local fire safe councils have established nonprofit tax status, enabling them to accept grants and financial donations. As a member of the California Community Forests Foundation, the California Fire Safe Council can accept monetary donations deposited to a California Community Forests Foundation fund. The California Community Forest Foundation charges a 10 percent administrative transaction fee. Local councils may make a similar arrangement with organizations such as local firefighter associations or local environmental groups who have already established nonprofit status.

Agencies

The following agencies can provide more information about fire safe actions to interested communities:

California Department of Fish and Game (DFG). A state agency that manages California's wetlands, wildlife habitats, and ecosystems. See the "State Government" section in a telephone directory or visit their Web site at http://www.dfg.ca.gov.

California Department of Forestry and Fire Protection (CAL FIRE). A state agency that provides fire protection and a multitude of fire-related and natural resource management services to state and private lands. Web site, http://www.fire.ca.gov.

Center for Fire Research and Outreach UC Cooperative Extension, Berkeley, Web site, http://firecenter.berkeley.edu/about.htm.

City or county public works or planning departments. These city and county agencies can provide information about building codes and other fire safe requirements.

Forest Stewardship Helpline. This service of the Forest Stewardship Program provides information and referral to landowners, resource professionals, and others. The Helpline is an excellent information clearinghouse, answering your questions about forest management—what to do, whom to call, where to go for more information, etc. Call 1-800-738-8733 or e-mail ncsaf@mcn.org.

Local fire stations. Local fire departments may have professionals to help communities identify fire hazards and implement loss reduction programs.

Natural Resource Conservation Service (NRCS). A federal agency with expertise in agronomy, natural resources, and civil engineering that helps communities identify problems before construction begins and can help burned areas begin the recovery process. See the "U.S. Government" section of a telephone directory or visit their Web site at http://www.nrcs.usda.gov/.

University of California Cooperative Extension (UCCE). The University of California has an extensive network of agricultural and natural resource education services. Look in your local "County Government" or "Farm Advisor" listings in a telephone directory or visit the UCCE Web site at http://www.ucanr.org.

US Fish and Wildlife Service (FWS). This federal agency can help with information about wildlife, endangered species, and other habitat questions. Web site, http://www.fws.us.gov.

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foot (ft)	0.3048	3.28	meter (m)
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