## C. Wildfire Safety at Home[1]

It is possible, and achievable, to create a home that is safe from most wildfire. The general principle behind making an area "fire safe" (making it as safe as possible for when a fire might pass through) is to reduce the amount of fuel and modify the arrangement of fuel that a fire could consume. This will limit the intensity and rate of spread of the fire.


Three factors are required for fire. They are known as the fire triangle: fuel, oxygen, and heat. If any one of these elements is missing, a fire won't start or, should it start, it won't spread. In a wildland situation, the three factors that dictate the extent and severity of fire behavior are fuel, weather, and topography. Fuel is the one element of the three that we can significantly modify. Where there is a lot of fuel, a fire can burn very hot and move very quickly. When little fuel is present, fires tend to slow down and burn cooler. Cooler fires are much easier to control.

For example, in a forest environment, fires that stay on the forest floor—surface fires—tend to be cooler, and hence easier to put out. Ladder fuels (understory trees and brush) connect the surface fuels to the canopy and, once ignited, this combination can support a *crown fire* (where treetops are burning). Crown fires can move very quickly, burn very hot, and are much harder to extinguish. They also generate the most embers, and depending on conditions, can create spot fires from a few feet to miles away. Embers and spot fires are often why homes burn and fires get out of control. One of the main objectives of being fire safe and creating defensible space is to minimize the chance of a fire becoming a crown fire, which will threaten your home, neighborhood, and community.

> "The WUI fire disaster context can be generally described as a set of contingencies. The disaster sequence starts when a wildfire or multiple wildfires burn during extreme fire conditions. The combination of vegetation, weather conditions, and topography produces fast-spreading, intensely burning fire behavior that overwhelms suppression efforts. If the extreme wildfire spreads close enough to residential development with its flames and firebrands (lofted burning embers), hundreds of ignitable homes can be simultaneously exposed. Although protection may be effective for some homes, an extreme wildfire's high intensities and high rate of area growth (rapid spread and spot ignitions) ignites too many houses and threatens firefighters' safety, preventing them from protecting all structures. With homeowners likely evacuated and firefighters unable to protect every house, initially small, easy-to-extinguish ignitions can result in total home destruction."[2]

It is clearly in your best interest to reduce the amount, type, and arrangement of fuel near your home to reduce the risk of a wildfire consuming it.

### C.1. Before the Fire

#### C.1.1. Defensible Space and Home Survivability

Defensible space means creating a space around your structure so it can be defended from a wildfire. The US Forest Service defines defensible space as "an area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss of life, property, or resources. In practice, defensible space is defined (in California) as an area a minimum of 100[3] feet around a structure that is cleared of flammable brush or vegetation."[4]

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[1] Marko Bey of Lomakatsi Ecological Services, Inc. (www.lomakatsi.org) contributed significantly to this document.

[2] Cohen, Jack. "The Wildland-Urban Interface Problem–A Consequence of the Fire Exclusion Paradigm." *Forest History Today.* Fall 2008. p. 22. www.foresthistory.org/Publications/FHT/FHTFall2008/Cohen.pdf.

[3] California now requires 100 ft. defensible space around your home, or to your property line; it used to be 30 ft. It may be necessary (although not legally required) to extend this space up to 200 ft., depending on local conditions.

Firefighters sometimes use the terms "winners" and "losers" (preferable terms are "defendable" and "not defendable") to distinguish between those houses with defensible space versus those that do not have it. In a larger emergency situation (where many homes are threatened), homes without defensible space may get passed over in favor of protecting those with defensible space, which have a greater chance of survival and offer firefighters a safer environment. (The safety of firefighters is critical in structure protection, i.e. homes and buildings. Homeowners should provide an inviting condition; after all, firefighters may be your friends, neighbors, or relatives.) If it is too dangerous for firefighters to get in and out of an area, they are instructed not to risk their lives and equipment to save something that is not defensible.

Many now promote the concept of home "survivability." It's not just about "defending" your space or home, but being fire safe in such a way as to ensure its survivability from fire. This is the ultimate goal for conservation-based fuel reduction and fire-safety efforts: living *with* wildfire.

## The Home Ignition Zone

The *Home Ignition Zone*[5] is a concept introduced by Dr. Jack Cohen of the US Forest Service Rocky Mountain Research Station. Dr. Cohen's research of fires from the 1960s to the present has revealed that more than eighty percent of homes with at least thirty feet of defensible space and a fire-resistant roof have survived wildfires.[6] His research indicates that:

> "The potential for home ignitions during wildfires including those of high intensity principally depends on a home's fuel characteristics and the heat sources within 100 to 200 feet adjacent to a home… This relatively limited area that determines home ignition potential can be called the home ignition zone.
>
> "During a wildland-urban fire a home ignites from two possible sources: directly from flames (radiation and convection heating) and/or from firebrands accumulating directly on the home. Even the large flames of high-intensity crown fires do not directly ignite homes at distances beyond 200 feet. Given that fires adjacent to a home do not ignite it, firebrands can only ignite a home through contact. Thus, the home ignition zone becomes the focus for activities to reduce potential wildland-urban fire destruction. This has implications for reducing home ignition potential before a wildfire as well as implications for emergency wildland-urban fire response strategy and tactics…
>
> "Because of time constraints, most preparation has to come before a wildfire occurs. Major changes to the home ignition zone (the home and its immediate surroundings) such as replacing a flammable roof and removal of vegetation … cannot occur during the approach of a wildfire. Removal of firewood piles, dead leaves, conifer needles, dead grass, etc., from on and next to the home should also occur seasonally before severe fire conditions. The ignition potential of the home ignition zone largely influences the effectiveness of protection during a wildfire. Given low ignition potential and enough time, homeowners and/or wildland-urban suppression resources can make significant reductions in the little things that influence ignition potential before wildfire encroachment. Then, if possible, homeowners and/or wildland-urban firefighting resources can suppress small fires that threaten the structure during and after the wildfire approach."[7]

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[4] Fire Information Toolbox. *Digital Dictionary.* www.fs.fed.us/r2/fio/dict.htm.{ TA \l "www.fs.fed.us/r2/fio/dict.htm" \s "www.fs.fed.us/r2/fio/dict.htm" \c 1 }

[5] Cohen, Jack. *Wildland-Urban Fire, A Different Approach.* 2000. www.nps.gov/fire/download/pub_pub_wildlandurbanfire.pdf.{ TA \l "Jack Cohen, \"Wildland-Urban Fire, A Different Approach,\" http://www.nps.gov/fire/download/pub_pub_wildlandurbanfire.pdf,2000." \s "Jack Cohen, \"Wildland-Urban Fire, A Different Approach,\" http://www.nps.gov/fire/download/pub_pub_wildlandurbanfire.pdf,2000." \c 1 }

[6] Firewise. "Wildfire: Preventing Home Ignitions" video. 19 minutes. 2001. www.firewise.org{ TA \l "Firewise, \"Wildfire: Preventing Home Ignitions\" video, 2001, 19 minutes, http://www.firewise.org" \s "Firewise, \"Wildfire: Preventing Home Ignitions\" video, 2001, 19 minutes, http://www.firewise.org" \c 1 }.

[7] Cohen. 2000.

Consequently, it's the work done in the home ignition zone to reduce flammability that can make the difference between a wildfire disaster, and successfully coexisting with wildfire.

> "If homes are sufficiently resistant to ignition and do not ignite during the extreme wildfire exposure, then the homes survive without firefighter protection: we have an extreme wildfire but not a WUI fire disaster. Thus, WUI fire disasters principally depend on home ignition potential."[8]

The concepts forwarded by Dr. Cohen about the Home Ignition Zone are crucial to designing your defensible space and fuel-reduction prescriptions.

## Defensible Space and Fire-Resistant Landscaping Basics

Homes ignite because of the little things—such as items that are easily ignited by embers—even before the fire has arrived, or after it has passed. There are many simple steps you can take to create your defensible space. The basics of defensible space include:

- Providing a minimum of 30 to 100 ft. clearance of flammable materials around your home. As you'll see later in this document, clearance does not mean dirt or gravel–it's about flammability. If you live on a hill, you should extend this up to 200 ft., depending upon the steepness of the slope and the presence of surrounding fuel. *See Figure C-1: Zones Practices Table below for more information.*
- Landscape your "Defensible Space Zone" with fire-safe plants *(see below for an explanation of zones)*. While no plant is immune to fire, certain plants do exhibit traits that can slow or reduce the spread of fire. Most deciduous trees and shrubs are fire-resistant. Fire-resistant plants generally look green (not brown), healthy, and vibrant. In addition, they have:
    - Leaves that are moist and supple;
    - Little dead wood, and tend not to accumulate dry, dead material within the plant;
    - Sap that is water-like (versus thicker or stickier) and does not have a strong odor.[9]
- Keep your gutters and roofs clean of vegetation and debris, especially pine or fir needles.
- Move all flammable materials (especially firewood or propane tanks) at least 30 ft. from homes or structures.
- Think about your home in terms of flammability. When you start a fire in a woodstove, small pieces of wood and paper are required to ignite the logs. The same is true for your home. Anything around your home that will ignite easily can threaten your home. It can serve as kindling for your house in the event of a fire. Look at your home and surrounding land with this perspective. Shortly after removing dead vegetation and other flammable materials that may be adjacent to your home, you may begin to see the area differently. Objects that you didn't notice before as being a threat to your home may jump out at you. Think about if you would be comfortable if someone walked around your house lighting matches and throwing them around. If you note something that might ignite, remove it or move it out of your Defensible Space Zone.
- Remember the other species who share the land. Leave a vegetation buffer around streams and other wildlife corridors. *See the Conservation Principles in Chapter 1 for more information.*

Spend a few hours reviewing your home and property with the Homeowner's Checklist *(See Appendix F)*. Identify where you are safe and what other steps you need to take to protect your home and family. You can get help with identifying fire safety and defensible-space issues around your home. Contact your local Fire Safe Council, Fire Protection District (FPD), or other fire agencies for more information on defensible space:

- Lake County Fire Safe Council: 707-263-4180, ext. 16.
- South Lake Fire Safe Council: 707-987-2857
- California Dept. of Forestry and Fire Protection (CAL FIRE): 707-987-3689, Kevin Colburn
- US Forest Service: 707-275-1400
- US Bureau of Land Management: 707-468-4000

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[8] Cohen. 2008. Pp. 22–23.

[9] Fitzgerald, Stephen; Waldo, Amy J. *Fire-Resistant Plants for Oregon Home Landscapes.* April 2002. www.fs.fed.us/r6/centraloregon/local-resources/images/fires/pimpact-plant.pdf.

- Kelseyville FPD: 707-279-4268
- Lake County FPD: 707-994-2170
- Lake Pillsbury FPD: 707-743-1670
- Lakeport FPD: 707-263-4396
- Northshore FPD: 707-274-3100
- South Lake FPD: 707-987-3089

Appendix F contains more detailed information on defensible space and fire safety, including resources for further reading, and Public Resources Codes 4290 and 4291, which are explained below.

## Fuel Reduction Zones for Your Property

We can take Cohen's Home Ignition Zone and break it into four sub-zones. Think of your property in terms of this set of zones. Use it to help you develop the appropriate treatment for each area around your property. *See the table that follows this section for sample treatments for each zone organized by Chapter 1's Conservation Principles.*

The concept of zones around your home is popular. Several organizations have developed there own set of zones. These include: the California Fire Safe Council (firesafecouncil.org/education/attachments/landscapingtimberland.pdf), Firewise (www.firewise.org/resources/files/fw_brochure.pdf), and the California Board of Forestry (www.fire.ca.gov/CDFBOFDB/pdfs/Copyof4291finalguidelines9_29_06.pdf). These all follow the same basic concept of increasing the intensity of your fuel-reduction efforts the closer you get to the home or other buildings. The following zones were developed to implement practices consistent with the Conservation Principles.

The **Fire-Free Zone** is your home and five feet beyond. This is the zone immediately surrounding your home and should be made of concrete, gravel, sand or rock, or some other non-flammable surface. It can include irrigated plants if they are low growing, well watered, and not touching your house. Remove any and all flammable materials in this zone. The most important objectives of this zone are homesite protection and thorough fuel-reduction activities.

The **Structural Protection Zone** extends from the Fire-Free Zone out to thirty feet. This is what CAL FIRE calls the "lean and green" zone. Remove all flammable materials here. Keep all vegetation healthy and green. The objective in this zone is to keep all flammable fuels away from your home to facilitate fire protection. Similar to the Fire-Free zone, the principal objective is to reduce or remove all fuels that could threaten your home.

The **Defensible Space Zone** extends from the Structural Protection Zone out to a distance of 100 feet or more, or to your property line, whichever is greater. The CA Board of Forestry calls this the "Reduced Fuel Zone." In this zone you will encounter more wildland characteristics and will need to begin to balance your fire safety and conservation goals. This area is the secondary fuel reduction zone. Both fuel reduction and ecosystem health are objectives in this zone. Practices for this zone include: mowing grasses to three inches or less, keeping shrubs low and widely spaced (eighteen inches or less in height), and removing lower limbs at least 10 ft. off the ground or 1/3 the height of the tree (use the latter measure if the tree is less than 30-ft. tall).

Finally, the **Wildland Fuel Reduction Zone** is the last zone, extending from the Defensible Space Zone out an additional 100 to 200 feet or much farther. This is the zone where you will carry out wildland fuel-treatment prescriptions. The objective here is to aid in the health and productivity of your wildland while conserving natural values. Within this zone, restoration work can be coupled with fuel-reduction efforts for the long-term health, resiliency, and productivity of the more remote areas of your property.

The Conservation Fire Zones Table on the following pages has a list of practices to apply to each zone, based on the Conservation Principles. *See Appendix D for more details on prescriptions for areas farther from the home.*

**Conservation and Wildfire Fuel Reduction Zones Table**

Once you learn some of the basic fire-safe practices, you are ready to expand them to include the Conservation Principles. The table below will help you apply these principles to each of the four zones on your property as identified above. *See Appendix D and Reference I–Glossary for more information on techniques and terminology.*

***Figure C-1. Conservation and Wildfire Fuel Reduction Zones Practices***

| **Conservation Principle** | **Conservation Practices and Considerations for Each Zone** | | | |
|---|---|---|---|---|
| | **Fire-Free Zone:** ***House + 5 feet*** | **Structural Protection Zone:** ***5–30 feet*** | **Defensible Space Zone:** ***30–100 feet*** | **Wildland Fuel Reduction Zone:** ***100 feet to Property Boundary*** |
| **1. Remember the Native Trees and Other Plants** | | | | |
| 1A. **Discover and monitor your forest & vegetation's dynamic changes.** | | | - Assess native tree & plant species types on site.<br>- Identify plant community types here.<br>- Prior to treatments, document the condition of the plant community.<br>- Identify natural firebreaks in this zone. | - Learn the name and boundaries of your watershed.<br>- Identify natural firebreaks on and near your property. |
| 1B. **Act conservatively.** | - Rake leaves, clear roofs & gutters after windy days.<br>- Remove all flammable objects from this zone, including brooms, baskets, woodpiles, garbage, etc. | - Continually prune dead branches and leaves from all plants.<br>- Clear most understory vegetation nearest to your home (ladder fuels). | - Clear dead branches and leaves on the ground, especially after windy days.<br>- Limb up or prune lower branches 1-2 times/year before fire season.<br>- Perform regular or annual maintenance (removal) on stump-sprouting species, and invasive noxious weeds that may move into the site. | - Return to treated areas every spring and repeat needed treatments.<br>- Monitor and observe previous work; evaluate forest health & conditions.<br>- Use the information learned & apply lessons to other locations on your property.<br>- Calculate the slope of your property to identify recommended treatment area. Moderate slopes of 20–40% treat 100–200 ft., steeper slopes 200 ft. or beyond. |
| 1C. **Protect native species that share your home.** | | - Plant fire-resistant and drought-resistant native plants.<br>- Ensure there is plenty of space between plants so fire cannot move from one plant to another. | - Learn the plants on your property and how they respond to fire. | - Learn the plants in your watershed. |
| | | | - Inventory and identify the different native plants and trees.<br>- Look for and protect areas where native plant diversity is abundant; isolate these areas during thinning, while still reducing hazards.<br>- Retain a diversity and representation of all native species, including herbaceous patches.<br>- When designing fuel-reduction work, consider plant and forest types.<br>- Favor leaving species that are best suited to each location.<br>- Enhance or maintain productivity of understory shrub and herbaceous vegetation.<br>- Promote a high ratio of native grasses to forbs, and a high ratio of native forbs and | |

| Conservation Principle | Conservation Practices and Considerations for Each Zone | | | |
|---|---|---|---|---|
| | **Fire-Free Zone:** ***House + 5 feet*** | **Structural Protection Zone:** ***5–30 feet*** | **Defensible Space Zone:** ***30–100 feet*** | **Wildland Fuel Reduction Zone:** ***100 feet to Property Boundary*** |
| | | | ferns to shrubs.<br>- Retain a variety of lichen and moss species, some mistletoe-infected trees, and some live trees with heart rot (conks).<br>- Retain a significant component of hardwoods.<br>- Generally favor *early-seral* hardwood and softwood species. | |
| 1D. **Keep the oldest and biggest trees.** | | - Retain the healthiest and biggest trees in this zone. Thoroughly thin under these trees to reduce ladder fuels. | - Start by removing the least healthy trees and shrubs. Create space around the healthiest specimens. Don't do too much too quickly.<br>- Create defensible space around any old or large trees.<br>- Initial Entry: Begin by removing smaller trees and shrubs.<br>- Retain a diversity of types of trees and plants.<br>- Treat a small section of your property. Assess your work: evaluate untreated areas and compare that to the work already done.<br>- Following the initial light-touch entry, select plants and trees to come out and mark them for removal. Remove on second entry. | |
| **2. Remember the Wildlife** | | | | |
| 2A. **Provide local wildlife a place to live.** | | - Initiate fuel-reduction treatments with sensitivity to the needs of wildlife.<br>- Remove more fuels closer to the homesite. As you move further away wildlife considerations will be more important.<br>- Isolate patches of live vegetation into clumps while still reducing fuel hazards.<br>- Following fuel treatments in this zone, bird and bat houses can be put on "leave trees" or other locations to increase habitat. | - Balance wildlife and homesite defensible space needs with a site-specific evaluation of both. If certain habitat is abundant, favor defensible space. If habitat is more rare, protect these areas and reduce surrounding fuels.<br>- Identify some wildlife habitat areas and treat as mini islands, maintaining cover and protection.<br>- Create defensible space around any known habitat. | - Identify wildlife habitat areas and treat as mini islands, maintaining for cover and protection.<br>- Leave clumps of vegetation for wildlife, especially in brushy areas.<br>- Retain vegetation with evidence of wildlife use (e.g. bird or woodrat nests, burrows, cavities and hollows).<br>- Leave green islands of tree or shrub thickets (e.g. dog-hair conifer patches) for wildlife habitat throughout the stand.<br>- Create repeating gaps of varying sizes and shapes to retain and create a diversity of habitat types, in line with the Precautionary Principle. |

| Conservation Principle | Conservation Practices and Considerations for Each Zone | | | |
|---|---|---|---|---|
| | **Fire-Free Zone:** ***House + 5 feet*** | **Structural Protection Zone:** ***5–30 feet*** | **Defensible Space Zone:** ***30–100 feet*** | **Wildland Fuel Reduction Zone:** ***100 feet to Property Boundary*** |
| 2B. **Provide access to food and water.** | | - Keep food and other wildlife attractants away from your house. | - Provide pure, clean water in ponds or fountains. Don't add any chemicals that could injure birds or wildlife. | - Leave forest cover around riparian areas for 50-100 ft. from the water.<br>- Retain as much canopy closure and vegetative cover as possible for ephemeral and perennial stream gulches.<br>- Leave healthy hardwood trees and fruit-producing shrubs for food.<br>- Retain sheltered connectivity and game trails between selected vegetation retention areas. |
| 2C. **Protect future generations of wildlife.** | | - Keep pets away from nests and other wildlife habitat. Put bells on cats to protect songbirds. | - Avoid defensible-space treatments during nesting or breeding season of local birds and other wildlife. *See Chapter 3 for threatened/endangered species' nesting needs.*<br>- Avoid herbicide use (especially those that are lethal to wildlife).<br>- Use non-chemical methods for managing plants. If herbicides are a must, hire a certified professional who understands application ratios to minimize impacts on newborn or young wildlife. (May be appropriate for all zones.) | |
| 2D. **Value the standing dead trees.** | | - If you have standing dead trees around your home, reduce their height by removing all dead branches, leave the main trunk intact, and top the tree down to 10 ft. above the ground. | - Look at the size and proximity of snags to your home, or other structures that you want to protect (including large, old trees or wildlife nesting areas). Generally, the bigger the snag, the less likely it will ignite. If the snag were to fall, where would it land? If it would land on your house, you may want to remove it.<br>- For those snags you will leave, create defensible space around them so they have a less likely chance to ignite during a wildfire. | - Identify where snags are in the surrounding landscape to help you decide whether to keep or remove snags closer to your home. If there is an abundance of snags, remove the smallest, most-decayed ones. For those you leave, give them defensible space.<br>- Around certain snags, retain live trees and shrubs in a circle, to provide cover and protection. In these areas, thin away from leave trees by separating the fuel connectivity between patches.<br>- Retain a wide variety of age, size, and decay classes, including dead and dying vegetation; retain some deformed, non-commercial trees (e.g. pistol butts, forked tops, poor live crown %, etc.) for |

| Conservation Principle | Conservation Practices and Considerations for Each Zone | | | |
|---|---|---|---|---|
| | **Fire-Free Zone:** ***House + 5 feet*** | **Structural Protection Zone:** ***5–30 feet*** | **Defensible Space Zone:** ***30–100 feet*** | **Wildland Fuel Reduction Zone:** ***100 feet to Property Boundary*** |
| | | - Snag heights can be reduced to less than 12 ft. by topping them. Short snags can still have a habitat benefit for some species. In this way, the risk of a larger snag falling on your home or throwing sparks can be greatly reduced. | | genetic diversity and wildlife.<br>- Where there are few snags, consider creating them by girdling trees.<br>- Retain a diversity of snag species throughout treatment areas.<br>- Within snag retention areas, leave vegetative cover to shelter habitat zones, in relation to location and site-specific factors, (e.g. 50% of snags are thinned around the snag, 50% are left with vegetative cover).<br>- Retain groupings of snags for wildlife habitat complexity. |
| 2E. **Conserve rare and endangered species.** | | - Find out if there are rare or endangered species on your property, and what precautions you need to take to protect them and their habitat. Consult a natural resource professional for guidance. | | |
| **3. Remember the Soil** | | | | |
| 3A. **Maintain the life in your soil.** | - Keep water drainage away from your house. Don't concentrate water flow in any one place.<br>- Impervious surfaces (e.g. concrete) are great for fire but not for water flow and erosion. | - Don't use pesticides or other poisons that will kill soil life (and possibly poison you or your loved ones). | - When burning slash, leave unburned areas. Protect soil resources by retaining some leaf litter, needles, and organic materials.<br>- Retain scattered areas of ground fuels.<br>- Retain coarse woody debris in selected locations.<br>- Retain the large, downed-wood component.<br>- Follow burning with sowing of native grasses in mineral-rich ashes and disturbed soils to reduce non-native species colonization. | |

| | | | |
|---|---|---|---|
| 3B. **Ensure that your soil cover is fire safe.** | | - Encourage the growth of native perennial grasses over tall annual grasses. | - Retain large, downed woody debris for moisture retention, mycorrhizal inoculation sites, and wildlife habitat. If there is no large downed wood within your treatment location, create it by combining and grouping smaller logs.<br>- Larger downed wood is very important. Buffer and protect by reducing surrounding surface and ground fuels. In wildland fire-fighting, downed wood can be a safety zone because it absorbs water. It is also critical for slope stability and minimizing erosion.<br>- Use the "kick test"—if it falls apart when you kick, spread it out & away from leave trees that could ignite easily. |
| 3C. **Minimize erosion.** | - Construct terraced log-crib planting areas to hold soils.<br>- Plant fire-friendly landscaping, preferably native plants that are low-growing.<br>- Plant shorter-needled native bunch grasses, which are good for holding the soil. | - Design treatments and removal based on aspect, elevation, and steepness. Treatments will vary depending on exposure, moisture, and vegetation.<br>- Keep burning off slopes greater than 55%, especially around draws, headwalls, or loose boulders. Coarse woody debris can be lopped and scattered in these locations to protect soil and enhance slope stability.<br>- On steep slopes:<br>~Thin conservatively to retain root mass for slope and soil stability.<br>~Leave stumps high to use as stakes or anchors for contour-felled logs to assist in stability.<br>~Retain the majority of the live trees along the toe of steep slopes.<br>- On head slumps, contour-fall some dead trees to serve as down wood and soil anchors.<br>- In snag-filled areas where there is severe conifer die-off, reduce snags and contour-fall trees to serve as future *nurse logs*, and as stabilization anchors. | |
| 3D. **Protect your soil after a fire.** | | - Sow native grass seeds into burned soils.<br>- Use bark-chipped, native species as organic mulch to cover disturbed soil.<br>- Avoid using non-native straw. It will introduce invasive annual grasses, which will create a fire hazard.<br>- Place coarse woody debris on the ground to protect soil. Use small logs from 4"-8" diameter.<br>- Use erosion-control fabric (jute cloth) to capture soil movement.<br>- Plant native, low-growing creeping plants to anchor soils. | |

| **4. Remember the People** | | | |
|---|---|---|---|
| 4A. **Plan your actions with your neighbors.** | - Let your neighbors know the locations of water and gas shut-offs, and the location of any domestic animals, for the likely eventuality of a wildfire. | - Cooperate on roadside fuel treatments when multiple neighbors share easements.<br>- Collaborate and plan contiguous strategic fuels treatments with neighbors to benefit multiple residences during a fire.<br>- Collaborate with neighbors on ecological considerations and conservation issues that cross property lines. For example, you may share a stream course, animal trail, or sensitive plant/animal habitat on multiple properties. Communicate about these issues and work together to perform responsible fuel management.<br>- Plan actions with neighbors who may be located above or below you, especially on steep slopes. Consider erosion your treatments may cause, which could affect your neighbors. Work together for solutions. | |
| 4B. **Find experienced workers and treat them well.** | - Research forestry contractors before hiring them. Ask your neighbors whom they have used and like. Talk to local resource professionals for references. Make sure the contractors know site-specific ecological considerations for your vegetation types.<br>- When hiring a forestry contractor, some questions you might ask are: Do the workers have workers' compensation insurance in the event of injury on the job? What are their wages? Do the workers get legal, on-the-clock breaks? Do the workers have safety gear? Has the contractor ever been cited for workforce-abuse violations?<br>- Consider hiring a crew for a one-day trial period to evaluate their work performance. Following the one-day contract, evaluate how they implemented the treatment. Did they leave enough vegetation? Was the thinning too heavy or too light? Were they sensitive to retaining diversity and conservation priorities?<br>- There are many fuel-reduction contractors; few understand both fuel reduction and ecology. Be selective in who you hire. | | |
| 4C. **Work with your local fire department.** | - Make sure local firefighters know where your water and gas shut-offs are located. Take the time to show firefighters around your property before fire season.<br>- Keep important information such as emergency phone numbers and your location (if you do not have a physical address: latitude and longitude or township, range, section) near the phone, in case of wildfire. | - Let firefighters know the locations of any domestic animals and other important information in this zone. | - Inform the fire department of the layout of your property, including potential anchor points, spur roads, skid trails, and snag locations. If you are able, you can use a GPS to ID this, then overlay onto a map of your property. Keep this map near the phone.<br>- Inform the fire department about any completed fuel reduction. |

## Creating Defensible Space

The Fire-Free Zone, Structural Protection Zone, and Defensible Space Zone comprise the immediate 100-ft. buffer around the homesite. While ecological considerations regarding vegetation types are considered, fuel reduction is the most important management objective here. The intention here is to create a defensible perimeter around the home where a fire would decrease in intensity. These zones provide better opportunities for fire-suppression activities. Fuel treatments begin by reducing both live and dead fuels closest to the homesite and gradually *feathering* the treatment, by thinning less vegetation as you move away from the homesite. The reduction in surface and ground fuels is a key objective for this area.

Much of what you need to do comes down to common sense and an awareness of your physical surroundings. An important concept to understand is that of *fuel ladder*s—the continuous line of vegetation from the ground into the canopy (or upper branches) of trees. The concept of *fuel continuity* is similar and includes both vertical and horizontal directions. Vertical continuity is the fuel ladder concept; horizontal fuel continuity thus means a continuous horizontal line of fuel (usually on the ground). In the latter case, the fuel extends from something—like your house—continuously out into the wildland. A good example of this is seen with decks on steep slopes, where the edge of the deck is next to the crowns or tops of the trees (forest canopy). If a fire started either at the house or in the forest, it would have a continuous line of fuel to spread from one to the other via the deck. *(See section C.1.3. below regarding fire-safe construction.)*

An example of a fuel ladder (or vertical continuity) in a forest or woodland setting is grass and/or brush on the ground climbing/leading into smaller trees, especially via dead limbs, reaching up into the canopy of taller or dominant trees. With this continuous fuel ladder into the canopy, it is easier for fire to climb into trees and spread quickly. Hence, it is especially important near buildings and along roads to reduce/remove fuel ladders. The same is true for non-forested landscapes; the main difference is the height of different vegetation layers.

To reduce forest-type ladder fuels, start in the wildlands within 100 ft. of your home, and along your roads. Remove brush on the ground (but don't scrape it clean–this could cause erosion problems when it rains). Removing ground fuels does not mean removing everything growing on the ground. Rather, you can leave clumps of vegetation. The objective is to leave vertical and horizontal space between fuels (in this case, plants). Limb up or prune young trees (remove the lower limbs to create open space between the tree canopy and ground) to a minimum of 15 to 30 ft. aboveground, or at least 6 to 10 ft. above the nearest vegetation.

To reduce the chance of shock, young, short trees should be pruned higher incrementally. A rule of thumb when *limbing* trees is to leave at least one-half to two-thirds of the tree's height in live canopy so you don't harm its ability to grow. You can remove more later—do it in stages so the tree has a chance to adapt. If you leave clumps of shrubs, create at least three times the shrub height in space before the bottom branches of the trees. For example, if you have a 3-ft.-high bush, leave 9 ft. of open, clear space (no vegetation) below the bottom branches of the nearby trees. Figure C-2 below shows how much space you need to have between your trees in your defensible-space area. The clearance suggested in this table is appropriate for the smaller Defensible Space Zone, (i.e. within 100 ft. of structures or roads). It is often too much canopy opening for wildland areas, however. This is because the opening in the vegetation will likely increase the amount of sun on the ground and encourage more shrub and herbaceous understory growth, increasing these fuels. *See Appendix D for more information on appropriate practices in the Wildland Fuel Reduction Zone (beyond 100 ft.).*

***Figure C-2: Plant Spacing Guidelines for Structural Protection and Defensible Space Zones[10]***

| Plant Spacing Guidelines<br>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 | |

In some places it is enough to only *brush* (clearing or "cleaning up") an area. *Brushing* entails removing brush alongside a road or structure to keep the ground relatively open. Removal of all dead materials—shrubs, branches, etc.—is especially important. The idea is to remove anything that is particularly flammable from anywhere near an ignition source, such as you, your kids, your car, or your house. When brushing or removing fuel ladders, focus on the fine or *flashy fuels* such as small sticks that will ignite quickly. If you remove the "kindling" around your larger fuel sources, chances are much greater those fuels will not ignite. In the forest, make sure there are not concentrations of small sticks or brush against treetrunks.

Remember: defensible space and clearing does not mean that you denude or clearcut your property. Rather, your goal is to remove the most flammable materials. Balance your fire-safety actions with general ecosystem health. Don't disturb the ground around streams or you will cause erosion that will harm fish. If you have the good fortune to live along a stream or river with fish in it, make sure you stay at least 25 ft. away from the stream in your clearing activities near your home, farther in the wildland. It's OK to remove some or most dead vegetation there (like pruning in your garden). However, don't take out live vegetation—especially trees—near streams or rivers. Always maintain a dense shade canopy for the fish. Finally, many species of wildlife—such as bear, fox, bobcat, songbirds, and others—use streams as corridors in which to move from one area to another. Leave them some cover to be able to do this without disturbing you, or vice versa.

**Defensible Space Fuel-Modification Treatment Prescription**

- Increase the distance between the ground and the live crown of trees by limbing branches (both dead and live) on all leave trees (i.e. "leave this tree"). Do this within the circumference of the 100- ft. Defensible Space Zone. For larger trees, limb the branches at least 10-15 ft. up the tree. For smaller trees, don't remove more than 1/3 of the live crown.
- When limbing larger branches, cut the limb in half, and then continue by cutting the remaining portion of the limb closer to the tree. Be cautious not to damage the tree trunk by cutting into the cambium layer. In some cases where aesthetics are not an issue, it is OK to leave short portions of the branches sticking out as perches for birds. *See pruning diagram in Appendix D.*
- Reduce fuel connectivity and density in between individual shrubs and smaller trees by a minimum of 10 ft. *Thin from below* within the *drip line* of desired leave trees to reduce ladder fuels.
- Reduce ground and surface fuels.
- Perform treatments in a landscape-sensitive manner.

[10] Gilmer, M. *California Wildfire Landscaping.* 1994. From California Board of Forestry (BOF). *General Guidelines for Creating Defensible Space.* May 8, 2006.

Much has been written on fire safety and defensible space. Several documents and/or references such as the Homeowner's Checklist are contained in Appendix F. Remember: these treatments are for the areas closer to your home. As you move farther away, your management objectives and actions will change. *See Appendix D for more information on appropriate actions in your wildlands.*

## C.1.2. Legal Requirements

### California State Regulations

There are many legal regulations relating to fire safety and defensible space. Following are some of the most relevant state regulations.

**Public Resources Code 4290**

Public Resources Code (PRC) 4290 covers the basics of roads, driveway width, clearance, turnouts, turnarounds, signing, and water regulations related to fire safety. 4290 is usually enacted in legislation at the county level. PRC 4290 has been adopted by the Lake County Building Division of the Community Development Department and is cooperatively enforced by CAL FIRE. Property owners within the South Lake FPD can contact the CAL FIRE District Fire Marshal at 707-987-3069 for additional information. Property owners elsewhere within SRA can call the Kelsey-Cobb station at 707-279-4924, or the Building Division at 707-263-2382.[11,12]

The following summary from the Sierra County Fire Safe Council and Community Fire Plan summarizes important actions for residents to take to meet 4290 requirements:

a) Have proper identification of your home (street names and addresses) readable from a vehicle on the road.

b) Maintain good access to your house for fire apparatus (wide enough for two vehicles to pass, built to carry at least 40,000 lbs., less than 15% grade, room to turn around, etc.).

c) Provide adequate and reliable water storage (at least 2,500 gallons) with access for fire equipment.

d) Use fire-resistant materials (metal, tile, or composition) for roofing.

e) Enclose the underside of decks and balconies with fire resistive materials.[13]

Another good 4290 summary from Mendocino County can be seen online at: www.co.mendocino.ca.us/planning/Permit%20Place%20Training/CalFire%20Permit%20Place%20Version%202.pdf.

**Public Resources Code 4291**

The State enforces basic fire-prevention principles through PRC 4291. "4291," as it's called, regulates the amount of fuel you can have around your property. It is a good summary of the basics of fire-safing. This is the law that requires a minimum of 30 ft. of defensible space. This was updated in 2004 to expand some of the 30-ft. defensible requirements to 100 ft. It was again updated in 2008 (through SB 1595) to expand this to the property line, or further.

> "This bill would change the current brush clearance requirements and would instead require the owner or person in control of a qualified property to significantly reduce the risk of ignition of a habitable structure by maintaining defensible space, as prescribed, within a certain number of feet from the above-described dwellings, buildings, or structures… Because this bill would change the definition of a crime, it would impose a state-mandated local program."[14]

The revised 4291 states:

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[11] Green, Linda. California Department of Forestry and Fire Protection (CAL FIRE). Battalion Chief. Personal Communication. March 24, 2009.

[12] Jezek, Dave. Lake County Community Development Department Building Division. Chief Building Official. Personal Communication. August 7, 2009.

[13] Sierra Economic Development District. 2002. "Fuel Treatment Recommendations." *Sierra County Fire Safe Council and Community Fire Safe Plan.* Pp. 7–1.

[14] Senate Bill 1595. Chapter 366. p. 1.

(1) Maintain defensible space no greater than 100 feet from each side of the structure, but not beyond the property line unless allowed by state law, local ordinance, or regulation and as provided in paragraph (2). The amount of fuel modification necessary shall take into account the flammability of the structure as affected by building material, building standards, location, and type of vegetation. Fuels shall be maintained in a condition so that a wildfire burning under average weather conditions would be unlikely to ignite the structure. This paragraph does not apply to single specimens of trees or other vegetation that are well-pruned and maintained so as to effectively manage fuels and not form a means of rapidly transmitting fire from other nearby vegetation to a structure or from a structure to other nearby vegetation. The intensity of fuels management may vary within the 100-foot perimeter of the structure, the most intense being within the first 30 feet around the structure. Consistent with fuels management objectives, steps should be taken to minimize erosion.

(2) A greater distance than that required under paragraph (1) may be required by state law, local ordinance, rule, or regulation. Clearance beyond the property line may only be required if the state law, local ordinance, rule, or regulation includes findings that such a clearing is necessary to significantly reduce the risk of transmission of flame or heat sufficient to ignite the structure, and there is no other feasible mitigation measure possible to reduce the risk of ignition or spread of wildfire to the structure. Clearance on adjacent property shall only be conducted following written consent by the adjacent landowner.

(3) An insurance company that insures an occupied dwelling or occupied structure may require a greater distance than that required under paragraph (1) if a fire expert, designated by the director, provides findings that such a clearing is necessary to significantly reduce the risk of transmission of flame or heat sufficient to ignite the structure, and there is no other feasible mitigation measure possible to reduce the risk of ignition or spread of wildfire to the structure. The greater distance may not be beyond the property line unless allowed by state law, local ordinance, rule, or regulation."[15]

CAL FIRE is the agency that enforces 4290 and 4291. They have the legal authority to require you to meet these minimum standards. If you refuse to do so, they can do it for you and charge you for it. For many reasons, it is to your advantage to meet these minimum standards set forth in 4290 and 4291.

**Government Code 51175**

This code defines Very High Fire Hazard Severity Zones and discusses its implementation. This was a result of the 1991 Oakland Hills fire and the resultant "Bates Bill" (AB 337).

> The purpose of this chapter is to classify lands in the state in accordance with whether a very high fire hazard is present so that public officials are able to identify measures that will retard the rate of spread, and reduce the potential intensity, of uncontrolled fires that threaten to destroy resources, life, or property, and to require that those measures be taken.[16]

CAL FIRE's Fire and Resource Assessment Program (FRAP) is now using this information to:

> "provide updated map zones, based on new data, science, and technology that will create more accurate zone designations such that mitigation strategies are implemented in areas where hazards warrant these investments. The zones will provide specific designation for application of defensible space and building standards consistent with known mechanisms of fire risk to people, property, and natural resources."[17]

Much of Lake County is classified as Very High Fire Hazard Severity Zone. *See the Fuel Hazard section in Chapter 3 for more detail and a map.*

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[15] Senate Bill 1595. Chapter 366. p. 6.

[16] California Government Code 51176.

[17] CAL FIRE. Fire and Resource Assessment Program (FRAP). *Fire Hazard Severity Zone Re-mapping Project.* http://frap.cdf.ca.gov/projects/hazard/fhz.html.

**Government Code 51189**

This code is a result of AB 1216 (Vargas) and directs the Office of the State Fire Marshal to create building standards for wildland fire resistance. This was also updated in 2008 through SB 1595.

> (a) The Legislature finds and declares that space and structure defensibility is essential to effective fire prevention. This defensibility extends beyond the vegetation management practices required by this chapter, and includes but is not limited to, measures that increase the likelihood of a structure to withstand intrusion by fire, such as building design and construction requirements that use fire-resistant building materials, and provide protection of structure projections, including, but not limited to, porches, decks, balconies and eaves, and structure openings, including, but not limited to, attic and eave vents and windows.[18]

Information about Chapter 7A of the California Building Code (the WUI Building Standards) can be found at: www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php. Lake County has adopted these standards.

**Board of Forestry Regulations**

The California Board of Forestry (BOF) sets forestry and fire policy—overseeing CAL FIRE—for the state. In 2006, they adopted new defensible-space guidelines.[19] These guidelines implement PRC 4291 and are titled "General Guidelines for Creating Defensible Space,"[20] and can be found at: www.fire.ca.gov/CDFBOFDB/pdfs/Copyof4291finalguidelines9_29_06.pdf. These guidelines are being revised.

The Forest Fire Prevention Exemption (from AB 2420) allows exemption from Timber Harvest Plans and other related logging permits for purposes of fire safety, only when several conditions are met.[21] The link to this regulation is www.fire.ca.gov/CDFBOFDB/pdfs/AB2420plead1_8_05.pdf.

> The harvesting of trees in compliance with PRC §4584(k), Forest Fire Prevention Exemption, is limited to those trees that eliminate the vertical continuity of vegetative fuels and the horizontal continuity of tree crowns, for the purpose of reducing the rate of fire spread, duration and intensity, fuel ignitability, or ignition of tree crowns….[22]

The Mattole Restoration Council has a summary and comparison of fire hazard reduction exemptions you can use for your fire-hazard-related forestry operations. See their "Forest Practice Rules for Thinning Exemptions" and "Comparison of Thinning Exemptions" documents available on their website *(and Appendix F).*[23]

## Local and County Regulations

Lake County has what is commonly referred to as a "weed abatement ordinance" within the county Code, Chapter 5 Building Regulations. Specifically, in Sec. 6E. Adoption of Uniform Fire Code, it states:

> "1.(c) Brush and Grass Clearance Around Structures.
>
> (i) Any person that owns, leases, or controls any real property that is within thirty (30) feet of any structure shall maintain on all said real property a firebreak, within thirty (30) feet of said structure which shall be constructed by removing and clearing away all brush and grass. This section does not apply to single specimens of trees, ornamental shrubbery, or similar plants which

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[18] California Government Code 51189, section a.

[19] BOF. *Defensible Space, 2006.* Adopted February 8, 2006. Approved by Office of Administrative Law May 8th, 2006. www.bof.fire.ca.gov/regulations/proposed_rule_packages/defensible_space_2005/defensiblespaceregulationsfinal12992_17_06.pdf.

[20] BOF. *General Guidelines for Creating Defensible Space.* February 8, 2006. www.fire.ca.gov/cdfbofdb/pdfs/Copyof4291finalguidelines9_29_06.pdf.

[21] The projects identified in this CWPP generally meet these conditions.

[22] BOF. *Findings Pursuant to Government Code Section 11346.1(b) in Support of Adoption of Emergency Rules to Implement AB 2420 Forest Fire Prevention Exemption.* December 29, 2004. www.fire.ca.gov/CDFBOFDB/pdfs/OALEmergencyFindiings12_28_04.pdf.

[23] See Mattole Restoration Council's *Hazardous Fuels Reduction:* www.mattole.org/program_services/forestry/fuelsreduction.htm.

are used as ground cover, if they do not form a means of rapidly transmitting fire from the native growth to any building or structure.

(ii) Any person that owns, leases, or controls any real property that is located from thirty (30) feet to one hundred (100) feet of any structure shall maintain on all that real property owned by said person that is located from thirty feet to one hundred (100) feet of said structure a firebreak constructed by removing and clearing away all brush and grass, if the chief determines that extra hazardous conditions requires a firebreak of more than thirty (30) feet from said structure to provide reasonable fire safety. Grass and other vegetation located more than thirty (30) feet from such building or structure and less than eighteen (18) inches in height above the ground may be maintained where necessary to stabilize the soil."[24]

As is described in Chapter 8 of this plan, this ordinance is currently being updated. *See Appendix F for a copy of the 2009 guidelines.*

### C.1.3. Fire-Safe Building and Reducing Structural Ignitability

How your house is constructed is just as important as creating defensible space. The law now requires fire-safe construction for all new construction in communities in the wildland urban interface, especially in Very High Fire Hazard Severity Zones.[25] The roof is the most vulnerable part of your home to wildfire, during which firebrands can land in your roof's nooks and crannies and easily start a fire there. Once your roof covering ignites, chances are very good that the rest of your home will follow.[26] If you have a shake roof, your house is more likely to burn down from embers even if they have fire retardant; thus one of your first actions is to replace your roof. Listed below are key issues regarding fire-safe structures:

- Stucco or fiber cement siding on your house is much less likely to ignite than shake siding.
- Decks sticking out from your house act as kindling to your house for fires. If you have a deck, enclose the underside of it and your house (if it's a post-and-pier foundation, leaving screened ventilation). Do this either with solid building materials or with lattice and tight ¼" screen. You can add green, fleshy, well-maintained plants if desired. This will also give you more storage space, since it is unsafe to store anything (especially firewood or cardboard boxes) under your house if it's open to the outside.
- If you have vents in your attic, make sure they are screened with ¼ non-corrosive metal (not vinyl). Enclose eaves, fascia, and soffits with screens. Embers can get into these places if they are not screened and burn your house down from the inside out. If that happens, there is little firefighters can do to save your house.
- Make sure you have a ¼-inch mesh screen on all chimneys.
- Use double-pane or safety (tempered) glass on all windows.

For more information on making your home safe from wildfire, check out the University of California's Homeowners Wildfire Mitigation Guide,[27] the new WUI regulations,[28] and "Is Your Home Protected From Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit."[29]

The following information is taken directly from "Wildland-Urban Interface Ignition-Resistant Building Construction Recommendations," generated by the 2004 Community Wildfire Protection Plan Workshops, the California Fire Alliance, and the California Fire Safe Council, compiled by Ethan Foote of CAL FIRE.

"One of the major objectives of wildfire control in general, and pre-fire management hazard reduction in particular, is to reduce the loss of life and property. The historical pattern of building loss

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[24] Lake County Code 6E.1.(c). http://municipalcodes.lexisnexis.com/codes/lakeco/.

[25] California Health and Safety Code section 13108.5.

[26] Firewise. *Is Your Home Protected From Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit.* 2001. p. 9. www.firewise.org/resources/files/wildfr2.pdf. { TA \l "Firewise, \"Is Your Home Protected From Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit,\" 2001, page 9, http://www.firewise.org/pubs/is_your_home/WILDFR2.PDF." \s "Firewise, \"Is Your Home Protected From Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit,\" 2001, page 9, http://www.firewise.org/pubs/is_your_home/WILDFR2.PDF." \c 1 }

[27] See http://groups.ucanr.org/HWMG/index.cfm.

[28] See www.fire.ca.gov/fire_prevention/fire_prevention_wildland.php.

[29] Go to: www.firewise.org/resources/files/wildfr2.pdf.

during Interface fires indicates that vegetation fuel management must go hand-in-glove with ignition-resistant building construction to maximize the effectiveness of fire loss mitigation measures.

"Building loss and survival in the 1961 Bel Air fire, which destroyed 505 houses, was well documented. The report 'Decision Analysis of Fire Protection Strategy for the Santa Monica Mountains' found that 71% of the buildings with 26-50 feet of brush clearance survived the fire. However, the survival rate of buildings exposed to the fire increased to 95% for houses that had both brush clearance and ignition-resistant building construction (in this case non-wood roof covering). A similar pattern was seen on the 1990 Santa Barbara Paint fire…. (Source: California's I-Zone: Urban-Wildland Fire Prevention & Mitigation, p. 120).

"On the Paint fire, which destroyed 479 houses and major buildings, the survival rate was 86% for houses with both non-flammable roofing and 30 feet of brush clearance. Only 4% of the 438 houses surveyed in the Paint fire survived where non-flammable roofing and 30 feet of brush clearance were absent. The modeling of structure loss and survival on the Paint fire revealed that brush clearance alone only 'explained' or accounted for 11% of the variation seen in the structure survival patterns. When brush clearance was combined with roof type in the model, and the effect of defensive actions was accounted for, the model explained 59% of the variability in structure loss.

"This is strong evidence that vegetation management alone will not be able to fully explain, nor mitigate, building loss on wildfires. Hence the need for the comprehensive approach in this plan, using a combination of vegetation management and addressing recommendations for ignition-resistant building construction. There is also strong evidence that this comprehensive approach will work to significantly reduce Interface losses. The *Los Angeles Times* (1 April 2004) reporting on the Southern California conflagrations of October 2003 clearly revealed the need for, and effectiveness of, combining vegetation management and ignition-resistant building construction for reducing building loss in wildfires:

> 'Amid the ashes of the most costly wildfires in California's history lies evidence of a crucial lesson: Fire-resistant construction and vigilant removal of flammable vegetation significantly improved the odds of a home's survival, according to a *Times* analysis of fire records from more than 2,300 destroyed structures.
>
> 'The impression left by an out-of-control fire racing through communities can be one of random destruction, with one house, or a whole block, burned to the ground and the next one spared for no apparent reason.
>
> 'In fact, according to the *Times* analysis—which covered homes destroyed by the deadliest of the blazes, San Diego County's Cedar fire—houses built since 1990 were far less likely to burn than those constructed in any previous decade. Houses built during the 1990s were damaged or destroyed at less than half the rate of houses built earlier.'

"The communities and homeowners covered by this plan have, for the past 40 years, had recommendations that can be (and have been) taken to reduce the ignitability of structures. An outcome of the 1961 Bel Air fire was publication of the 'Fire Safety Guides for California Watersheds' by the County Supervisors Association of California in 1965. These recommendations have been updated through the years. The current version of these 'Fire Safe Guides' is 'Structural Fire Prevention Field Guide for Mitigation of Wildfires' and can be found at http://osfm.fire.ca.gov/codedevelopment/pdf/firesafetyplanning/structural/structuralfireprevention guide.pdf.

These recommendations for ignition-resistant building construction include:

- Roofing
- Eaves and Balconies
- Exterior Walls
- Rafters
- Windows
- Doors
- Attic Ventilation Openings
- Underfloor Areas

"In response to the persistent loss of life and property in wildfires, the most important of the recommendations is now a requirement. All new buildings, and significant re-roofing of existing

buildings, in the communities covered by this plan are required to have ignition-resistant roofing (California Building Code §1503). The State of California is also in the process of promulgating changes to the state building code expanding the interface roof requirements and including new requirements addressing exterior wall construction, vents, and ancillary structures."[30]

These recommendations became law in 2003, work on the related Wildland-Urban Interface Building Standards have been completed and adopted by the California Building Standards Commission. *For the latest information on these Standards, see www.fire.ca.gov/fire_prevention/downloads/2007_CBC_Ch7A.pdf. For a copy of the new "Wildland-Urban Interface Products" Handbook, visit: www.osfm.fire.ca.gov/strucfireengineer/pdf/bml/wuiproducts.pdf.*

## C.1.4. Water Storage and Supply

The amount of water you have stored at your homesite could have a significant impact on the ease or difficulty of successfully fighting a fire there. 2,500 gallons of water storage for fire-fighting is the minimum required for new construction. Storing water in the winter for use in the summer and fall, and conserving water, are both critical in this Mediterranean climate. There are many options available in terms of water tanks. Ideally, you should have a dedicated fire-fighting water tank, with a fire-ready standpipe, and a separate tank for domestic use. If you cannot do this, put your domestic waterline out of your water tank in the middle of the tank, so you don't accidentally drain your tank into the garden or elsewhere, keeping the bottom half for emergency use. Combined water storage is allowed as long as the minimum 2,500 gallons for fire department use is always maintained. Typically, this requires plumbing the domestic water flow line above the 2,500-gallon mark of your tank.

Your fire waterline should be a two or four-inch line, buried 12-18 inches underground. An aboveground plastic waterline will likely burn in a fire, but a full plastic water tank probably will not. Put a metal standpipe at the end of the waterline with a 2 ½-inch National male fire hose threaded adapter with cap for pressure and gravity flow systems, and 4 ½-inch National male thread with cap for a draft system. This is so firefighters can quickly attach to your water source. Fire hose thread is known as national thread, national standard, NST, NSFH, NH, or FHT. For an example of a fire-safe water system, see the model at the South Lake Fire Protection District Headquarters in Middletown.

Your water tank can be located anywhere on your property. However, the fire department connection must be located no closer than four feet and no further than twelve feet from the roadway. Make sure that your standpipe is somewhere visible and where a fire truck can access it and turn around to leave. If they don't know where it is or it's not accessible, it's not going to be very useful. The roadway must be wide enough to accommodate the fire apparatus without blocking it. *(See section C.1.5. below).* Make sure your local firefighters know exactly where your tank is located, well before any fires.

In an emergency, swimming pools and ponds provide a great source of water. Firefighters can *draft* directly from these sources if they can get close to them. If you are going to depend on this water as your first response to a fire, you will need a pump and a generator for back up. Remember that when there is a large fire the power will often go out. Therefore, the generator is needed to pump water from your pool or pond.

While ponds are ideal for storing large amounts of water for fire fighting, they must be properly sited to avoid erosion. Ponds built on unstable ground can give way, leading to large washouts and gullying, choking streams with sedimentation, in turn harming fish habitat. Ponds should be built on stable ground, have adequate overflow protection, and should not be built across seasonal or perennial creeks. Remember that ponds can breed nuisance species such as bullfrogs, mosquitoes, and non-native fish that can harm native salmon and steelhead.

There are more and more options for inexpensively storing water. Cisterns (catchment to collect rainwater) are becoming increasingly popular. Several websites describe how to make one yourself. Low-cost water tanks

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[30] Foote, Ethan. "Wildland-Urban Interface Ignition-Resistant Building Construction Recommendations." August 2004. Community Wildfire Protection Plan Workshops. California Fire Alliance and the California Fire Safe Council.{ TA \l "Ethan Foote, \"*Wildland-Urban Interface Ignition Resistant Building Construction Recommendations from the 2004 Community Wildfire Protection Plan Workshops, the California Fire Alliance and the California Fire Safe Council\"* , August 2004." \s "Ethan Foote, \"Wildland-Urban Interface Ignition Resistant Building Construction Recommendations from the 2004 Community Wildfire Protection Plan Workshops, the California Fire Alliance and the California Fire Safe Council\" , August 2004." \c 1 }

are also available. The easily transported Pioneer Tanks from Australia are now seen throughout the US (www.pioneertanks.com.au).

The use of gray-water systems is an alternative method for watering yards and vegetation to conserve your water. A gray-water system is where water is collected after a non-contaminating use such as the kitchen sink or washing machine, and stored and used for irrigation. For more information on safe and sanitary gray-water systems, see www.oasisdesign.net/greywater or www.greywater.com, and check with your local health department.

### C.1.5. Roads and Access

Roads are critical components in the fire equation. They are a great place for a fuelbreak. They are also vital for evacuation and for firefighters to access your home. Fire engines generally need a minimum of 20-ft. wide by 15-ft. high clearance, and a 60-ft. "Hammerhead T" or 45-ft. circle to turn around for safe retreat. This is in addition to fuel-reduction treatments of at least 15 ft. on both sides of the road. You also need plenty of places on the road where vehicles can pass each other, i.e., adequate turnouts properly designed and spaced along your access road or driveway. If a wildfire is threatening and a fire engine is trying to get to your home or business while you're trying to evacuate, there need to be areas in the road wide enough to accommodate traffic safely from both directions. Remember, when a wildfire is near, chances are it will be very dark and smoky, thus very disorienting. Take the time now to make it easier on yourself, so yu are prepared if and when a wildfire comes.

A fire engine needs to be able to turn around to leave. If they cannot safely get the engine in and out, that makes your home less defensible. Most firefighters will not and should not unnecessarily risk their equipment or lives to protect your property. Firefighters will almost always turn around immediately when they arrive to a fire, for safer and quicker escape. This is good advice for you too. Get in the habit of parking your vehicle(s) facing out at home so you can leave quickly if necessary.

If you have locked gates, they will likely be cut by firefighters. If you don't want that to happen, make sure you leave them unlocked. If you have electric gates, make sure they have a back-up power source or other way to open when the power is out, which is likely during a large wildfire. Bridges also need to be evaluated for safe fire truck passage as per PRC 4290. Generally, if a propane (or other fuel) truck or water truck can make it across the bridge, then a fire truck can. If you have a bridge that will not safely carry a fire engine, you must contact your local fire department and let them know. Don't make their job any more dangerous than it already is. Instead, help them to help you.

Finally, many private dirt roads can become nearly impassable after a rough winter. Maintaining your dirt and gravel roads is important for many reasons, including not only keeping dirt out of streams, but ensuring a safe evacuation in an emergency. If several households share the same road, consider rotating the responsibility for coordinating road maintenance every few years. The identified coordinator can collect an agreed-upon annual assessment from all those who regularly use the road, and organize the maintenance. *For more information on private road maintenance in Lake County, see: www.co.lake.ca.us/Government/Directory/Public_Works/Roads/Private_Road_Maintenance.htm.*

## Fuel Treatments along Roads and Driveways

Fuel treatments along driveways and road systems should be considered a high priority. While ecological concerns regarding vegetation types are considered, fuel reduction will be the primary management objective. The main objective for *ingress-egress* corridors is to create a defensible perimeter along and adjacent to all roads and driveways. These access routes are also where a fire would decrease in intensity and provide safer access for firefighters.

Roads can be a potential ignition source for wildfires (from vehicles and people). When treated, they serve important functions as natural fuelbreaks, and also anchor points for tactical fire-suppression activities. Thus, treatment of these areas is a top priority in any fuel-management strategy. Treatments along driveways and road corridors will also benefit multiple landowners in the event of a wildfire; thus providing an opportunity for community planning and collaboration.

**Roads and Driveways Fuel-Modification Treatment Prescription**

- Retain larger trees while aggressively thinning understory vegetation in 100-ft. area from roads or driveways.
- *High-prune* all branches that are hanging over the road up to 15 ft. above the ground.

- Reduce standing dead trees (snags) directly along roadways. Retain some, reducing snag height to 12 ft. by climbing, topping, and chunking-down sections.

### C.1.6. Signage and Addressing

Chances are firefighters are not going to know where you live, especially in the case of a large fire where out-of-town firefighters are present. Make sure you have a visible road and address sign. This is legally required of you. If you have a visible address sign on your house and/or driveway and a road sign at the street, emergency service personnel (fire, ambulance, police) will likely find it. If not, they may not. Work with your local fire department if you have specific questions regarding how to do this most effectively.

Your sign should be of reflective material so that it is visible at night, and non-flammable (metal on metal post). The letters must be at least 4" high and 3/8 stroke, reflective, and of a contrasting color to the sign background. Additionally, they need to be visible from both directions for at least 100 ft.[31] (If you want emergency personnel to be able to find you, do your part. In a medical emergency a few minutes may be the difference between life and death.)

South Lake County FPD has a signage program to provide inexpensive signs to residents in their district. Orders are placed though the district and the staff will deliver, properly locate, and install the signs for a non-profit total of $20.00. For more information, contact them at 707-987-3089.

## C.2. During the Fire

Fire can be extremely frightening. However, taking steps now to prepare you, your family, and your home will make it easier to survive a fire. It will also likely reduce panic and help you to effectively deal with the situation. Even the most organized of us will forget something when a crisis moment arrives. Create easy-to-follow checklists for your family to use to safely survive a wildfire.

Figure C-3 on the following page, from Pacific Northwest Wildfire Consulting Group's "Living with Wildfire," can be copied and posted somewhere prominent in your home or with your emergency preparedness kit. It is a great summary of what to do when wildfire arrives.

***Figure C-3. When Wildfire Approaches Checklist***[32] *(next page)*

[31] University of California and the Interagency Engineering Working Group. *Structural Fire Prevention Field Guide for Mitigation of Wildland Fires.* April 2000. p. 40. www.osfm.fire.ca.gov/codedevelopment/pdf/firesafetyplanning/structural/structuralfirepreventionguide.pdf.

[32] Pacific Northwest Wildfire Consulting Group. *Living with Fire—A Guide for the Homeowner.* http://pnwfireprevention.com/LWF/Livingwithfire.pdf.

## WHEN WILDFIRE APPROACHES

Should homes be threatened by wildfire, occupants may be advised to evacuate to protect them from life-threatening situations. Homeowners, however, do have the right to stay on their properties if they so desire and so long as their activities do not hinder fire-fighting efforts. If occupants are not contacted in time to evacuate or if owners decide to stay with their homes, these suggestions will help them protect their properties and families.

- ☐ Evacuate, if possible, all family members not essential to protecting the house. Evacuate pets.
- ☐ Contact a friend or relative and relay your plans.
- ☐ Make sure family members are aware of a prearranged meeting place.
- ☐ Tune into a local radio station and listen for instructions.
- ☐ Place vehicles in the garage, have them pointing out, and roll up windows.
- ☐ Place valuable papers and mementos in the car.
- ☐ Close the garage door but leave it unlocked. If applicable, disconnect the electric garage door opener so that the door can be opened manually.
- ☐ Place combustible patio furniture in the house or garage.
- ☐ Shut off propane at the tank or natural gas at the meter.
- ☐ Wear only cotton or wool clothes. Proper attire includes long pants, long-sleeved shirt or jacket, and boots. Carry gloves, a handkerchief to cover face, water to drink, and goggles.
- ☐ Close all exterior vents.
- ☐ Place a ladder[33] near the house so firefighters have easy access to the roof.
- ☐ Make sure that all garden hoses are connected to faucets and attach a nozzle set on "spray."
- ☐ Soak rags, towels, or small rugs with water to use in beating out embers or small fires.
- ☐ Inside, fill bathtubs, sinks, and other containers with water. Outside, do the same with garbage cans and buckets. Remember that the water heater and toilet tank are available sources of water.
- ☐ Close all exterior doors and windows.
- ☐ Close all interior doors.
- ☐ Open the fireplace damper, but place the screen over the hearth to prevent sparks and embers from entering the house.
- ☐ Leave a light on in each room.
- ☐ Remove lightweight and/or non-fire-resistant curtains and other combustible materials from around windows.
- ☐ If available, close fire-resistant drapes, shutters, or Venetian blinds. Attach pre-cut plywood panels to the exterior of windows and glass doors.
- ☐ Turn off all pilot lights.
- ☐ Move overstuffed furniture (e.g. couches, easy chairs, etc.) to the center of the room.
- ☐ Keep wood shake or shingle roofs moist by spraying water. Do not waste water. Consider placing a lawn sprinkler on the roof if water pressure is adequate. Do not turn on until burning embers begin to fall on the roof.
- ☐ Continually check the roof and attic for embers, smoke, or fire.

If a fire should occur within the house, contact the fire department immediately. Continue to inspect your house and property for embers and smoke.

**Most importantly, STAY CALM!**

[33] Not a wooden ladder! Put it on the ground near the house so it does not act as a fuel ladder for fire to climb up your house.

Conserve your water. Save it for when the fire is at your house, or the fire has passed. This is when you may need it to put out any embers or sparks. Remember that if the power goes out and you use a well system with a pump, you won't have water unless you have a backup generator. Fill bathtubs and any available containers to store water as soon as possible before power may be lost.

If you are relying on a cordless telephone, make sure you have a backup non-electric phone. If you have a cellular phone, be sure you have your car charger available so you can charge it from your car battery. Make sure that all backup generators have an approved crossover switch, installed by a Licensed Electrician so that when the power company is fixing downed lines, you don't harm or kill a lineman with your generator.

Be prepared. Create a map of your property that shows where the most valuable structures and other resources are. Mark on your map the location of your water sources, where your gas/propane/diesel tanks and shut-offs are located, and any other highly flammable or explosive materials. Include locations of any locked gates and the combinations to those gates. Also include locations of any pets or livestock. Put your name, phone number (and/or cellular number), street address, and parcel number or GPS coordinates on this map. Put a copy on the wall by a phone, with the number of your local fire department so you can use it in case of an emergency. If you are comfortable, put it up somewhere near the entrance to your property where firefighters can see it, perhaps with your visible fire-fighting tools. Check with your local fire department to see if they want a copy. Or better yet, invite them out to your property (long before fire season) to review this and show them where everything is. This will help them effectively protect your property in case of fire. If you are concerned about security issues, you can talk to them to work out a compromise that will meet your confidentiality needs while making their job easier to defend your property if and when the day comes.

If you have any experience or training in fighting fire, create a fire-fighting tool area that is easily accessible. Keep this in a non-flammable structure, such as a metal shed or your garage. Your collection should include tools like shovels, hoes, Pulaskis, McLeods, etc. Keep a set of fire-fighting clothes there as well, including heavy cotton or wool clothing and leather boots and gloves. Put a fire hose at your water source and mark it well so you, your neighbors, and/or firefighters can easily find and use it.

Remember to call 911. In the midst of the excitement and panic of a fire, and attempts to extinguish it, it is possible to forget to call 911 to alert firefighters. Do not call the office/station phone numbers of the fire-fighting services–911 is the number to report a fire, and every second counts in fighting a fire! Should the time come that you do have to call 911, give your address (which must be visibly marked on the road so firefighters can find your home) or GPS coordinates if you have them.

After you call 911, go to the beginning of your road, and either have someone stand there or put up a non-flammable flag or some sign to let firefighters know where the emergency is and the way to your house. The easier you can make it for the firefighters, the greater your chance of surviving a fire.

### C.2.1. Evacuation

Be ready if you need to evacuate. Have everything you need packed beforehand (including your cellular phone car charger). Some residents in high fire-risk areas move their valuables to a safer location during extreme fire weather. Identify all of your alternate evacuation routes and drive them now so you know them well. Do this in the dark too so you will be comfortable during a large fire, where visibility can be very low. Know at least two ways out. Make sure you are comfortable with both routes. Have keys or combinations to locked gates in your vehicle. Turn on your headlights, and drive SLOWLY and carefully. There could be many people trying to leave and/or firefighters and other emergency service personnel trying to enter to protect you and your house. Sometimes your safest or quickest evacuation may be on foot. Know those routes too; make sure your friends, family, and local firefighters know that you may be on foot during a wildfire. *See CAL FIRE's evacuation information in Appendix F, and the evacuation information in Appendix B, for more detailed information.*

### C.2.2. Shelter in Place

When it is not physically possible to evacuate, you may be forced to shelter in place. This means you wait out the fire wherever you are, and for as long as it takes. Your chances of surviving a wildfire when you shelter in place will be greatly enhanced if you have excellent defensible space. As described in the following section, a better option is to get to a community-identified safety zone if you are unable to evacuate.

Don't be surprised if firefighters and law enforcement are hesitant to let you shelter in place, especially given the recent tragedy in Australia. Residents often do not have the proper equipment or training to stay behind and not evacuate; there are also numerous liability issues. CAL FIRE recommends the following.[34]

- *Preparing your property* to enhance its ability to survive a wildland fire is the idea behind defensible space. Preparation actions can also be applied to pre-planning evacuation needs for citizens at risk, such as home-bound seniors, domestic animals, and pets.
- *Leave early* cannot be emphasized enough. If you think a wildland fire may be a threat to you or your property, don't wait for an evacuation order to leave.
- If an *evacuation order* is issued, it is imperative that you comply with the order. As mentioned above, firefighters are placed at a higher risk when performing structure protection, and protecting civilians during evacuations under extreme circumstances just compounds the issue.

It can be very difficult to know what the right thing to do is as the fire approaches. Be prepared. Talk to your local firefighters now to develop a plan.

### C.2.3. Safety Zones (Local Evacuation Sites)

If you are unable to evacuate by road, know where your nearest "safe" or "safety zones" are located *(safe zones are identified on each community map in Appendix B)*. A safe zone is where you can go (other than your house) to shelter in place. These are locations where you and your family can survive a fire without any special equipment or clothing if your home is not safe (although your home is often your safest place). Safe zones are also used as staging areas but usually do not provide any services. Steep creek channels are not a good place to seek refuge, as fire travels faster in steep canyons. The fire will consume the oxygen there ahead of the flames and you could suffocate before the fire arrives. Instead look for big open fields with very short grass, or lush, green vegetation; large river bars; wide-open graveled or paved roads; or an open area that has already burned. This area should be four times wider than the fire's flame lengths *(see the fuel models for various vegetation types in Chapter 3 for typical flame lengths)*. Talk to your local fire department about potential safe zones, *and see the map for each community in Appendix B*, so that you are familiar with the area now.

Safe zones for residents are different than those for firefighters. Do not attempt to shelter in a firefighter safety zone if you are not actively fighting the fire.

If an evacuation is ordered or you are sent to a safe zone, you will be notified of where to go by local law enforcement. Some safe zones may be used as the Emergency Operations Center and hence should be avoided so as not to interfere with the success of fire-suppression efforts.

### C.2.4. Preparing Pets and Livestock

If you have pets and/or livestock, take the time now to plan for how best to ensure their survival. The following text is from "Disaster Preparedness for Dog and Cat Owners," by the California Department of Food and Agriculture. Similar brochures are available regarding birds, horses, and livestock. These can all be found at: www.cdfa.ca.gov/Ahfss/Emergency_Preparedness/Public.html#Disaster_Brochures.

> **"With a little advance planning, you can save your pet's life in a disaster.**
>
> **Before:** PLAN AHEAD. In the event of an evacuation, pets may not be allowed inside human emergency shelters. Determine the best place to leave your pet in case of a disaster. Identify an off-site location as well as a place in your home.
>
> IDENTIFICATION AND PHOTOGRAPHS. Dogs and cats should always wear properly fitting collars, personal identification, rabies, and license tags. Make sure all the information on the tags is current. Keep a current photo of each pet. Make sure any distinguishing markings are visible. You will need proof of ownership to retrieve your pet from a shelter.
>
> DISASTER KIT. Maintain a disaster preparedness supply kit for each of your pets.
>
> PAPERWORK AND RECORDS. Store important animal documents in a zip-lock or waterproof plastic bag. These should include vaccination and medical records.

[34] Green, Linda. CAL FIRE. Battalion Chief. Personal Communication. August 4, 2009.

VACCINATIONS. Your pets need to be current on vaccinations. You will be required to show proof of vaccination if you need to board your pet.

TRANSPORTATION. Each animal should have his or her own pet carrier. Familiarize your pet with the carrier or cage before an emergency.

LEASHES AND COLLARS. Keep a leash handy for each dog and cat in your home. Consider using a harness.

BUDDY SYSTEM. In case you are not home when disaster strikes, ask a trusted neighbor to check on your animals. Exchange veterinary information and file a permission slip with your veterinarian authorizing them to get emergency treatment for your pet if you can't be located.

**During: IF YOU TAKE YOUR PET:**

Evacuate your pet early, if possible.

Take your disaster preparedness kit, including the pet's vaccination and medical records, as well as identification photographs.

**IF YOU CAN'T TAKE YOUR PET WITH YOU:**

Bring your pet indoors. Do not leave pets chained outdoors.

Prepare a pre-selected site indoors for your pet. Use a room with no windows but adequate ventilation, such as a utility room, garage, bathroom, or other area that can be easily cleaned. Do not tie them up.

Leave only dry foods and fresh water in non-spill containers. If possible, open a faucet to let water drip into a large container or partially fill a bathtub with water.

Do not leave vitamin treats, which could be fatal if over-eaten.

House cats and dogs separately, even if they normally get along.

What about pets other than dogs and cats?

Plans for birds and reptiles can be found in the brochure: Disaster Preparedness for Bird and Reptile Owners

Small mammals, or pocket pets, should be transported in carriers suitable for maintaining the animals while sheltered. Remember to take bedding materials. Keep animals in a quiet, safe place.

**After:** Pet behavior may change after an emergency. Monitor your pets closely and keep them leashed. Familiar scents and landmarks may be altered, causing confusion and abnormal behavior.

Be aware of downed power lines, fallen trees, debris, and local wildlife.

If you find a pet, call animal control or any emergency phone numbers set up after the disaster. Isolate it from your animals until it is returned to its owner, or can be examined by a veterinarian.

**IF YOU'VE LOST YOUR PET:**

Visit each shelter in your area at least once every other day. You must check the shelter in person; you are the only person who can truly identify your animal. Keep a current photo of your pet showing or describing any distinctive markings.

Create a flyer with your pet's photo and description, pet's name, your name and phone numbers where you can be reached.

When you do find your pet, immediately examine it for illness or injuries. Obtain medical attention from your veterinarian if needed. Use caution when handling animals. Panicky or injured animals may bite.

**Practice Your Plan!**

**[Pet] Disaster Preparedness Kit**

- Pet carrier or cage for each pet
- Two-week supply of food and water
- Non-spill food and water bowls
- Medications and dosing instructions
- Pet first-aid kit
- Vaccination and medical records
- Your veterinarian's information
- Cat litter box and litter
- Newspaper
- Plastic bags for waste disposal
- Paper towels
- Disinfectants
- Leash and collar/harness
- Blankets
- Toys and treats

Be sure to provide your pets with as many amenities as possible.

Remember, they are counting on you for their survival and support!

**Emergency Contact Information**

You will need to have your emergency contact information in one easily accessible place. This information is different in every county.

By filling in the information below, you will be prepared to reach the key animal disaster resources in your county. "[35]

The local contact is the Lake County Animal Care and Control: 707-263-5067, and after-hours emergency: 707-263-2690.

## C.3. After the Fire

As a resident living in Lake County—where the ecosystems are naturally prone and dependant on frequent wildfires—there is a possibility that a fire may eventually occur on your property. If fuel reduction has taken place prior to the fire, the intensity of the fire will likely be less severe. Regardless of whether you have fuel-hazard treatments or not, varying degrees of land restoration and post-fire impact mitigation measures may be needed. After the fires are finally put out or have burned out, the important step of healing the land will begin.

If a fire does occur on your land, the first post-fire step is to assess how severely the fire burned. Did the fire burn at a low, moderate, mixed, or high severity? In certain situations, such as with low-intensity fire, it may have achieved positive results, like reducing fuel loads and benefiting natural processes. This includes burning through the understory and occasionally scorching individual trees, but not becoming a crown fire. In addition to reduced fuel loads, the wildfire may have performed a service by increasing the structural diversity on your land and benefiting the local ecology and wildlife habitat through snag creation.

> "Fire-killed snags and logs serve vital roles in the structure and function of healthy forest ecosystems in general, and are especially important for natural recovery processes following fire events. They provide food and shelter to wildlife, fish, and numerous insects, microbes, and fungi that are vital to post-fire recovery and long-term site productivity, they help retard surface water runoff and help retain and build soil, they help cycle nutrients and water to plants and soil, and snags that fall across streams provide links between terrestrial and aquatic ecosystems."[36]

High-intensity Wildfires can negatively affect soils and kill all overstory trees. This is known as a "stand-replacement fire." Moderate and mixed severity fires will burn hot in certain locations; these locations may need some restoration. Often, post-fire restoration efforts will focus on mitigating the impacts of fire suppression activities such as back burns and the firebreaks created by heavy equipment during emergency operations. If a wildfire has burned through your property without fire suppression activities having taking place, the end result of that fire may be a positive one; nature may accomplish its own healing process with only a little bit of assistance from you.

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[35] California Animal Health and Food Safety Services (Animal Health Branch). *Disaster Preparedness for Dog and Cat Owners.* October 1998. www.cdfa.ca.gov/ahfss/Animal_Health/pdfs/dompets.pdf.

[36] Ingalsbee, Timothy. *Salvaging Timber; Scuttling Forests, The Ecological Effects of Post-Fire Salvage Logging.* 2003. Western Fire Ecology Center and American Lands Alliance. www.fire-ecology.org/research/salvage_impacts.html.

Wildfires that have burned at high severity may have dangerous adverse effects to watershed health and pose extreme safety issues to local communities. Water erosion is one of the main concerns. Mountainsides that are completely burned, with all of the trees and vegetation gone, will not have the ability to hold back or absorb water (e.g. rain). Burned up hillsides may turn *hydrophobic,* where the ground is sealed and repels water instead of absorbing it. In these situations the potential for catastrophic events like landslides—where entire hillsides can turn to liquid and move downslope—are possible.

In addition to slope instability, invasive species can take hold after fire, changing the ecological balance for decades. Species like star thistle, an annual weed, will take over and out-compete native plants. Once established, star thistle increases future fire risk as it is highly flammable in late summer when it carries fire very well. This increases the likelihood of more fires and, in turn, more weeds to perpetuate this cycle long into the future.

One technique for rehabilitating soils after a fire is to break up hydrophobic soils by raking or mulching charcoal into the ground to help soak up water. Other activities include native grass seeding to mitigate invasive weed invasion, planting trees and shrubs, and other short and long-term erosion control efforts.

Following a fire, it is highly recommended to consult trained resource professionals. Sometimes a team of specialists (including hydrologists, geologists, soils scientists, botanists, foresters, and engineers) may need to be consulted to asses the impacts the fire may have caused. They can give you direction regarding how to develop a restoration plan to start the healing process. In addition to their advice, it is also good to consult with an ecologist to review your restoration plan. Often, activities (such as *salvage logging*) that some professionals consider to be restoration can set back the cycle of ecological recovery, inflicting more damage on the already disturbed land.

Directly following a fire the land is at its most sensitive. It is in an unstable state. Therefore, very careful consideration will need to be taken to ensure your actions will benefit its recovery.

*For more information, see After the Burn: www.cnr.uidaho.edu/extforest/AftertheBurnFINAL.pdf.*

## C.3.1. Assess Your Situation

In the 2004 summer fires in Shasta County, some homes were threatened that had burned only a few years before. Just because you live through a fire does not mean it couldn't happen again. Learn from experience to be better prepared next time. *Forestland Steward* published this article after Southern California's 2003 firestorms:

**"Post-Fire Response: Assess Your Situation**

"Although we all know that the California landscape is adapted to burn, we are seldom prepared for the reality of a large wildfire. The effects of a fire will have consequences for years. Approach the post-fire period thoughtfully. After a fire, there are important decisions to be made. What should you be concerned about and what needs to be done? The wrong choices could lead to problems down the road, so take some time to assess your situation before taking any action.

**Areas of concern:**

**The homesite**

- Damage to the home or other structures
- Loss of landscaping
- Hazardous trees or vegetation
- Danger of flooding, on-site sedimentation
- Drinking water quality and other environmental impacts

**The landscape**

- Safety hazards—trees, power lines, etc.
- Regeneration and recovery
- Wildlife habitat
- Watershed functions
- Erosion concerns
- Condition of remaining vegetation

**Streams**

- Proximity to home, roads, other facilities
- Hydrologic connectivity of existing drainage facilities
- Potential of increased woody debris load, streamflow, flooding, debris flow

- Need for treatments to upper watershed to minimize downstream impacts, impacts to property

**Roads**

- Existing problems that may be exacerbated by wildfire effects
- Damage to stream crossings, culverts
- Gullies, potholes, fill slope failure, cut slope failure, sediment deposits, wet spots
- Potential for culvert obstruction and diversion."[37]

If you are in the unfortunate situation of losing your home to fire, learn from the experience in terms of what areas burned around your property versus those that didn't. Design your new fire-safe landscaping with this in mind. Perhaps most importantly, build/rebuild your home with fire-resistant materials, as in section C.1.3 above, and in a "micro-site" that is less susceptible to wildfire.

## C.3.2. Developing and Implementing a Restoration Plan

After a wildfire has burned through your property you will need to assess the impacts and decide what measures you will need to take to restore and mitigate the damage. Similar to developing a fuel-treatment prescription you will need to develop a Post Wildfire Recovery Plan which will outline the priority areas on your property to begin work, and the sequence, schedule and timing that work will follow. Post-fire restoration activities are aimed to focus on mitigating increased ecological damage, and safety issues for your homesite and road infrastructure.

### Where to Begin?

**Immediate and Long Term Needs**

In developing your restoration plan, prioritize both immediate needs and longer term actions. Immediate needs relate to seasonal time lines and activities that need to occur right away, for both human safety and the mitigation of ecological impacts. Following a wildfire, you need to be thinking about autumn rains or snows. To mitigate slides and erosion issues, your first step will be to stabilize these areas. Roadway infrastructure, homesite, and riparian areas are other immediate areas for restoration projects.

Long-term actions are the recovery work you will do over time. Restoration is a process and not a one-time occurrence. Planting trees, shrubs, and native grasses can happen immediately, but are part of long-term restoration activities. Maintaining fuels by limiting resprouting is another long-term effort.

**Restoration Plan Mapping and Layout**

Following fire, consult with natural resource professionals to help you assess the damage. Get an aerial photograph of your property and designate zones for restoration priorities. Free aerial pictures can be obtained from Google Earth (http://earth.google.com); however be sure to check the photo date, as it may not be as current as the fire. With this photo and subsequent map you can define those areas that burned the hottest, need immediate restoration, need long-term restoration, and project locations of greatest concern. This map will correspond to a written plan that describes the proposed restoration activities. Using *GIS* and *GPS* tools and technology can be extremely helpful in creating your maps and plan.

### Developing a Restoration Priority List

**Priority #1: Roads, Driveways, Homesite, and Steep Areas**

In order to undertake restoration work, you will need access to your property. Following a wildfire, weakened trees can fall across roads or threaten driveways and roads. Ensure ingress and egress safety by removing them.

Slope movement from a high-intensity fire followed by rains can cause slides above and below roads. Stabilize these areas with erosion-control methods. Trees that burned or were scorched can pose safety issues along roads. These trees can be used to stabilize road banks by contour-falling them *(see Appendix D for descriptions)*. You can achieve several goals with one activity. In restoration we call this *stacking functions.* In this situation you can increase safety of travel along your driveway, in turn using the trees to hold slopes in place.

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[37] California Forest Stewardship Program. *Forestland Steward*. Spring 2004. p. 1.{ TA \l "Forestland Steward, Spring 2004, page 1." \s "Forestland Steward, Spring 2004, page 1." \c 1 }

If the fire burned hot within 100 feet of your home, you will need to take measures here to increase safety. If you have steep slopes below or above your house, perform safety-mitigation work and erosion control. If your homesite is on a steep slope directly above your neighbors, prioritize developing a mitigation plan.

**Priority #2: Streams, Riparian Areas, and Sensitive Habitat Areas**

After safety and access is assured, perform restoration activities, focus on mitigating stream impacts. To prevent sedimentation from erosion into streams, focus your attention on these locations. In addition to riparian areas and streams, think about upland slopes above stream corridors.

If you have identified important wildlife corridors, sensitive habitat zones, and ecologically significant locations, you will also want to focus your attention on these places.

**Priority #3: Remaining Wildlands**

Following restoration treatments of the priority areas described above, focus the rest of your restoration activities on the long-term recovery of the wildlands you are fortunate enough to steward.

It is important when planning your post-fire restoration efforts that you focus your attention on areas that are most in need. Following fire, some areas on your property may be fine left alone for natural recovery. Ultimately the natural world will heal itself–the land has been here longer than any one of us—what we are attempting to do is assist that recovery, and mitigate further damage without causing additional problems. When developing your restoration plan, take into account each location and what its specific needs are. Directly after a fire things look charred and heavily impacted; however new life is there, and will literally rise from the ashes.

## C.3.3. Make a Plan to Be Better Prepared Next Time

Living through a wildfire can be a life-altering experience. There is no other 'wake-up call' quite like a wildfire. You will likely learn many new things about where you live and probably about who you are.

When replacing structures and/or landscaping after wildfire, use defensible-space concepts like those outlined in this document to help you design a more fire-safe home. If you have to start from scratch, think about where to site it. Where are those places on your property that burned less or not at all? What about putting your house there now? Look at the places on your property or in your neighborhood that survived and try to understand why. Talk to your neighbors about how their places survived and what they learned. Mimic those features that lead to survivability in the other places on your property that did not fare so well. If you improve your understanding of your local landscape and how it reacts to fire, you can improve the survivability of your home and your ability to plan for future fires.

Homes don't have to burn in a wildfire. We know what causes a fire to spread and homes to ignite. We have the knowledge to make them survivable, even in the absence of structure protection (fire-fighting) resources.

Finally, a few closing words from Dr. David Horne. David has been active with the Greater Laguna Fire Safe Council since he lost his home to wildfire:

> "Though it may be difficult, try to avoid spending energy on blaming someone or group or agency or fate that 'caused' the wildfire to happen. Distance yourself from the doom-and-gloom personalities that will emerge to spread their message of sorrow. You only have so much personal strength and you will need it for the recovery phase in a post-incident situation. Think positively, talk positively, and act positively about the future. Concentrate on regeneration prospects and rebuilding your homes, neighborhoods and community to be even better than before. Be a positive example of the incredible resiliency of the human spirit that will inspire your loved ones and others to pitch in to move forward with confidence and assurance. You can do it!"[38]

[38] Horne, Dr. David. Director, California Fire Safe Council. Personal Communication. March 15, 2007.