

Conservation Principles for Community Wildfire Protection in California's Sierra Nevada

“Fire always has been and always will be an ecological force in the Sierra Nevada. Decades of fire suppression have changed this role, allowing stands to thicken and fuels to accumulate, especially in the foothills and lower montane¹ zone, where developments are increasing. We either manage fire and live with fire on our terms or let fire dictate the terms. The choice is ours.”

— Jan W. van Wagtenonk, *Wildfire* (2006)

Most Sierra Nevada residents choose to live here because of the natural beauty. What many of us don't realize is that living within these forests and *wildlands*² carries a responsibility. We need to be good stewards of the land, learning to live in balance with the natural world, of which fire is a significant part. This document summarizes what residents can do to coexist with fire in the Sierra. It will show you how to provide a positive balance among *fire prevention*,³ conservation, and wildlife protection at your Sierra Nevada home. You've chosen to live here, and with your choice comes a stewardship responsibility.

For more information on fire safety in general, please contact your local Fire Safe Council, or go to
www.fire.ca.gov/education_homeowner.php
www.firesafecouncil.org/homeowner/index.cfm
firewise.org/resources/homeowner.htm

Some Basic Concepts to Remember for Living with Fire in the Sierra Nevada

- ➔ **Fire is a dynamic element of the Sierra.** Your property has likely burned before and will burn again. The landscape where you live today may seem “natural.” In fact it has changed drastically over the last 150 years as we have attempted to manage fire. In preparing your property for fire, you can help restore it to a more ecologically appropriate state. In doing so, you will learn how to be prepared for wildfire—it is not only possible, it's smart. While it is rarely practical to completely “fire proof” your property, there are many steps you can take to survive inevitable wildfire. *For more information see* http://www.fire.ca.gov/education_content/downloads/live_w_fire.pdf.
- ➔ **One size does not fit all in terms of homeowner fire safety.** Every place is unique. Work with your local *Fire Safe Council*,⁴ fire department, *Cooperative Extension Agent*,⁵ *Registered Professional Forester*,⁶ and/or contractors to design the appropriate *fire-safe practices*⁷ and *defensible space*⁸ for your

¹ Montane: A mountainous region of moist cool upland slopes that occurs below the tree line and is predominantly composed of evergreen trees. It is also described as the lower vegetation belt on mountains that is composed of montane plants and animals.

² Wildlands: An area of land that is uncultivated and relatively free of human interference. Plants and animals exist in a natural state, thus wildlands help to maintain biodiversity and to preserve other natural values.

³ Fire Prevention: Actions taken by homeowners and community members to lessen wildfires and damage caused by wildfires. Includes education, enforcement, and land management practices.

⁴ Fire Safe Council: Public and private organizations that comprise a council intended to minimize the potential for wildfire damage to communities and homeowners, while also protecting the health of natural resources. Goals are achieved by distributing fire prevention materials, organizing fire safety programs, implementing fuel reduction projects, and more.

⁵ Extension Agent: An employee from the government or a university who provides information to rural communities about agriculture, land management and/or resource management. In California, the University of California Cooperative Extension (UCCE) provides this service. For more information on UCCE, see: <http://ucanr.org/>.

⁶ Registered Professional Forester (RPF): A person licensed in California to manage state or private forestlands and advise landowners on management of their forests. For more information, see: www.bof.fire.ca.gov/licensing/licensing_current_docs.aspx.

⁷ Fire Safe Practices: Activities such as creating defensible space, firebreaks, access to your home, fire-resistant landscapes, changes to your home in terms of material and design, etc., that make your home/property safer in wildfire situations.

⁸ Defensible Space: An area around a home/structure that has been cleared of flammable materials to act as a barrier between wildfires and property, thereby decreasing the risk of damage or loss. This space is now defined as 100 feet around a structure in California.

property. See www.fire.ca.gov/education_100foot.php and www.firesafecouncil.org/homeowner/index.cfm for more information.

- **Your home exists within a larger watershed.**⁹ It is located in the midst of a much larger landscape. Think about where your property is on the *slope*.¹⁰ Are you on top of a ridge, where fire will easily burn toward your home? Is your slope steep or gentle? Fire moves quickly up steeper slopes, which means that you may need to treat a larger area to create your defensible space. What is below and above you? What direction, or “*aspect*,”¹¹ does your property face? Generally, south-facing properties are hotter and drier; they can therefore be more susceptible to fire. Are there any natural *firebreaks*¹² around you such as streams, rivers, or rocky outcrops where a fire might naturally go out? Do wildlife use or move through your property to get to food, shelter, or water? In what watershed are you located? Do the roads in and out of your property follow ridges or rivers? Look beyond your property lines to understand the ecological perspective of your place. See www.audubon.org/bird/at_home/Explore.html for more information.
- **Fire can behave both predictably and unpredictably.** We can generally predict fire direction and behavior; it will go the way the wind is blowing and burn as much *fuel*¹³ as is available. Predicting the exact time and place where fire will burn is less obvious. As fire moves across the landscape it can climb up into your trees. A key fire safety objective is to prevent that spread. Dead leaves and branches on the ground (*surface fuels*¹⁴) act as a *wick*¹⁵ to move fire horizontally across the land. Shrubs, small trees, and live branches (*ladder fuels*¹⁶) can carry fire vertically into the larger trees. Too much of these surface and ladder fuels can cause the *overstory*¹⁷ trees to burn up in what is called a “crown fire”—when fire spreads from tree to tree in the forest canopy (or tree tops). One of the main principles in creating defensible space and reducing hazardous fuel conditions is to create physical space between vegetation layers (both vertically and horizontally) so a fire cannot climb easily from the ground into the trees or to your home. See www.for.gov.bc.ca/protect/suppression/behaviour.htm#Behaviour for more information.
- **Timing is everything.** There are appropriate times for different actions on your property, much as there are different seasons of work in your garden. Do your defensible space and fuel reduction work well before fire season, to avoid having sparks from equipment start fires in dry vegetation. Avoid *ground-disturbing*¹⁸ activities in your forest or wildland when the ground is too wet or when birds and animals are nesting. Don’t try to do everything at once—think about your fire safety seasonally: plan your activities in

⁹ Watershed: All of the land that drains water runoff into a specific body of water. Watersheds may be referred to as drainage areas or drainage basins. Ridges of higher elevation usually form the boundaries between watersheds by directing the water to one side of the ridge or the other. The water then flows to the low point of the watershed.

¹⁰ Slope: A percentage or degree change in elevation over a defined distance that measures the steepness of a landscape.

¹¹ Aspect: The direction that a slope faces—north, south, east, west, etc.

¹² Firebreak: A strip of land that has been cleared of vegetation to help slow or stop the spread of wildfire. It may be a road, trail, or path cleared of vegetation or other burnable materials. A firebreak could also be a stream.

¹³ Fuel: All burnable materials including but not limited to living or dead vegetation, structures, and chemicals that feed a fire.

¹⁴ Surface Fuels: Materials on the ground like needles or low-growing shrubs that provide the fuel for fires to spread on the ground. Surface fuels are generally considered all fuels within six feet of the ground.

¹⁵ Wick: A combustible material that allows fire to travel along a confined path to larger fuel sources. An example would be a wooden fence connected to your home.

¹⁶ Ladder Fuels: Materials such as shrubs or small trees connecting the ground to the tree canopy or uppermost vegetation layer. In forests, this allows fire to climb upward into trees.

¹⁷ Overstory: The topmost trees in a forest which compose the upper canopy layer; compared to the understory, which is the lower woody or herbaceous layer underneath treetops.

¹⁸ Ground-Disturbing Activities: Actions that interrupt the natural condition of the ground, such as digging and compaction from heavy equipment.

the winter and spring; start clearing when the ground begins to dry (when it's not *saturated*¹⁹) or when there is snow on the ground; finish treatments by early summer before the vegetation is dry; do your defensible space maintenance around and inside your home in the fall; and burn your piles after the rains begin in the winter.

- ↳ **Your house is likely a fuel source.** Many Sierra homes are located in places where a fire can start and spread into surrounding vegetation. The more you prepare your house and other structures, the less you will have to treat the surrounding vegetation. The biggest improvement you can make to reduce your fire risk is to build or remodel your house to resist the millions of tiny *embers*²⁰ created by *ember-attack*²¹ from wildfires. When wildfires burn in extreme conditions they send burning firebrands (embers) ahead of them; these firebrands ignite new fires. Using *fire-resistant building materials*²² and appropriately designed structures will give you the best chance to survive wildfire. Replace wood shake roofs with fire-resistant materials. Don't let your home be part of the problem. An interactive source of information to reduce homeowner risk in the wildland-urban interface is provided by the University of California Center for Fire Research and Outreach; it's called the Fire Information Engine Toolkit. See firecenter.berkeley.edu/toolkit/homeowners.html for details on how this web-based program can help you make better decisions to reduce your fire risk, and the related UC Extension's Homeowner's Wildfire Mitigation Guide groups.ucanr.org/HWMG/index.cfm. Consult your local fire marshal or see firewise.org/resources/files/wildfr2.pdf for more information.

If you are building a new home, consider slope, aspect, surrounding fuels, and your potential environmental impacts before deciding where to site your home. This may be more important than the view in the long term. Talk to your local planning department to learn about local fire-safe building regulations, or see osfm.fire.ca.gov/WUIBS.html, or cdfdata.fire.ca.gov/pub/fireplan/fpupload/fppguidepdf99.pdf for more information about state regulations.

- ↳ **Know your legal obligations.** Learn the legal requirements regarding defensible space and fire-safe building and construction. Discover how to balance these with the ecological needs of your place.
- ↳ **Firefighters need your help to protect your home.** Make it safe for them and their equipment to get to and from your house. Be sure they can find you with visible road and address signs. Remember that fire-safe landscaping and construction greatly improves firefighters' ability to protect your home. See principle 4C below, and www.livingwithfire.info/beforethefire/accesszone/index.php for more information.

¹⁹ Saturated: The broad meaning is "full." Saturated soil refers to the point at which the soil is so full of water that no more water can get into (be absorbed by) the soil, and therefore must run off.

²⁰ Embers: Small glowing or smoldering pieces of wood or other organic debris, often airborne in a fire.

²¹ Ember Attack: Embers blown by the wind during a firestorm that accumulate at intersections between horizontal and vertical members on the outside of your house, igniting debris and combustible materials. Embers can also enter into openings (e.g., attic vents and other wall openings), igniting debris on the inside of your home.

²² Fire-Resistant Building Materials: Materials used in the construction of a house that are resistant to ignition when exposed to radiant heat or flames. Examples include clay tile roofs, metal roofs, and stucco siding.

Conservation Principles

Consider the Conservation Principles below in how you approach your fire safety and defensible space. It's all about balance. It is possible to have an aesthetically pleasing landscape that is fire-safe, supports local plant and animal species, and still provides you with privacy and plantings.

1. Remember the Vegetation (Native Trees and Other Plants)

a. Discover and monitor your forest and vegetation's dynamic changes.

Plan for the future of your forest. Because you are the conservation steward of your land, your work in the forest will be ongoing. Watch the wild areas on your property and learn from them as they grow and change with your stewardship. Think both in the short term (what will happen this year) and the long term (what will happen over time). Document those changes as the years go by; keep notes and records. Learn how to *monitor*²³ the ecological changes on your property and use that information for *adaptive management*²⁴ of your wildlands. To live with wildfire we need to take the responsibility to manage, adapt, and guide the vegetation around our homes. For more information see www.dnr.state.mi.us/publications/pdfs/huntingwildlifehabitat/Landowners_Guide/Habitat_Mgmt/Planning/Evaluating_Land.htm.

b. Act conservatively.

We are manually recreating a more *fire-resilient landscape*.²⁵ In doing this, we need to apply the general concepts of the *precautionary principle*²⁶ while implementing *fuel treatments*²⁷: you can always remove more trees and vegetation at a later time, but you cannot immediately replace what you have cut. The vegetation you leave is ultimately most important. Be sure that what you remove is done with careful planning and consideration to ensure that what you leave standing is healthy and *resilient*.²⁸ See www.mindfully.org/Precaution/Precautionary-Principle-Common-Sense.htm for more information.

c. Protect native species that share your home.

Look at the native vegetation around your property—or ask a local plant or forestry specialist for help—to see what different plants share your home. There may be plants that are rare. If so, protect them by providing defensible space (while keeping in mind their needs, such as shade). Find out if those plants exist in other areas within your watershed and how they are being managed there. Watch for *invasive weeds*.²⁹ Follow vegetation treatments with invasive weed removal. Minimize the

²³ Monitor: To watch, keep track of, or check regularly for changes—in this case, to the environment.

²⁴ Adaptive Management: An approach to managing the environment/property that is based on a “learn by doing” technique that adjusts to changing conditions. Adjustments in management change over time as new information is learned.

²⁵ Fire-Resilient Landscape: A natural landscape featuring plants that have adapted to local wildfire conditions, or a domestic outdoor space where appropriate actions have been taken to make it less vulnerable to wildfire and certainly less prone to causing one.

²⁶ Precautionary Principle: A concept that promotes a cautious approach to development and managing the environment when information is uncertain or unreliable. Erring on the side of caution and conservation is encouraged, along with a “Better safe than sorry” attitude.

²⁷ Fuel Treatment: The act of removing burnable materials to lower the risk of fires igniting and to lessen the likelihood of damage to property and communities. Treatments may include creating a defensible space, developing fuelbreaks, initiating prescribed burns, and thinning vegetation.

²⁸ Resilient, Resiliency: The ability of an ecosystem to return to its balanced state after a disturbance.

²⁹ Invasive Weeds: Undesirable plants that are not native and have been introduced to an area by humans. These plants generally have no natural enemies and are able to spread rapidly throughout the new location. Some examples include Himalayan Blackberries, English Ivy, and Scotch Broom.

introduction of exotic plant species near your home, especially those that can spread into adjacent wildland areas. Invasive species can change your fire hazard very quickly and be difficult to manage.

Avoid unnecessarily introducing water into your landscape, as water will generally help non-native plants out-compete native plants. See www.cnps.org/activities/natives.htm, www.cal-ipc.org, and www.ipm.ucdavis.edu/PMG/weeds_common.html for more information.

d. Keep the oldest and biggest trees.

Generally, most of the oldest trees in the forest are no longer present. If you have old or very large trees, create defensible space around them so they will survive wildfire. This may include raking away thick *duff*³⁰ at the base of the trees. Notice that these trees often have thick bark so they are generally fire-resistant (they have evolved with fire). Think about their protection in terms of building a fire in your woodstove: A big log won't start burning without a lot of smaller kindling (e.g. small trees, shrubs, branches, etc.). In your forest, make sure that the smaller kindling isn't around the bottom of your big trees, and generally the trees will make it through a wildfire on their own. In some cases, you'll need to remove smaller trees that touch the crown of the tallest trees. At the same time, you don't want to remove all of the small trees in your forest. Small trees are the next generation of large trees. Keep enough *regeneration*,³¹ possibly in small patches, to provide for the future forest, while still providing adequate space between all the trees you keep standing. An additional benefit of keeping your biggest trees is that they can break up the wind as it's moving through, which can slow down fire spread. See www.eri.nau.edu/cms/content/view/544/740/ for more information.

2. Remember the Wildlife

a. Provide local wildlife a place to live.

Become familiar with the animals that share your property. Talk to local wildlife experts and/or bird watchers. Learn what wildlife need in terms of shelter, food, water, and reproduction. Remember that your property is their home too. Find ways to balance your land management activities with their needs, and leave some areas *untreated*³² for the birds and wildlife using them. Protect them as you would your home by creating defensible space while still considering their needs for *cover*.³³ If you watch quietly you may see animals using those areas. For more information, see www.fs.fed.us/psw/rsl/projects/wild/verner/psw_37.html, and cetolumne.ucdavis.edu/newsletterfiles/Master_Gardener_Articles_20044858.doc.

b. Provide access to food and water.

Protect and retain trees with nests and cavities, or where obvious wildlife feeding or nesting activities are occurring. Leave some plants that have berries or other fruit or *mast*³⁴ used by wildlife. Act especially carefully and leave cover around streams, *seeps*,³⁵ or other wet areas to keep those areas cool and wet; this will provide wildlife the protective cover they need when they are using those places or moving to and from them. Make sure all natural water supplies are clean by keeping any

³⁰Duff: A layer on the forest floor that is made up of decomposing organic matter such as leaves, needles, and small branches.

³¹ Regeneration: The renewal of trees or forests by planting seedlings, or the direct seeding by humans, wind, birds, or animals after large disturbances like fire. "Regeneration" also refers to the young trees that were naturally seeded or planted.

³² Untreated: Not altered from a natural or original state; e.g. no fuel reduction or defensible space activities.

³³ Cover: Any plants or organic matter that holds soil in place or grows over and creates shade that provides wildlife with an area to reproduce and find protection from predators and weather.

³⁴ Mast: Nuts or fruits of trees and shrubs such as acorns, walnuts, or berries that collect on the forest floor and are a food source for animals.

³⁵ Seep: An area where water rises from an underground source to the surface and creates a wet area.

poisons and *sediment*³⁶ away from any water that could drain into them. For more information, see www.dnr.state.mi.us/publications/pdfs/huntingwildlifehabitat/Landowners_Guide/Habitat_Mgmt/Backyard/Backyard_Intro.htm.

c. Protect future generations of wildlife.

Find out when local species are nesting and/or breeding and avoid working in and around your wildlands during those times. Learn what kind of habitat local species might use for nesting and breeding, and be sure to protect those areas during your management activities. See www.paws.org/about/emailnetwork/archive/wildagain/wild_2004_06_02.html and www.audubon.org/bird/at_home/SafeMisc.html for more information.

d. Value the standing dead trees.

Standing dead trees—or *snags*³⁷—are especially important for wildlife. They provide both shelter and food to many birds and other animals. However, they can also be a wildfire hazard if they are near enough to fall on your home or fall and block an evacuation road during a fire. Balance the needs of wildlife with your need for fire safety. Think about your home within the landscape; if you've got snags in the area, you don't need them next to the house. Take the time to find the most appropriate actions for your unique place. See www.nwf.org/backyard/snags.cfm for more information.

e. Conserve rare and endangered species.

One of the bonuses—and responsibilities—of living in the Sierra is living with the many rare and endangered species with which you share habitat. Find out if there are rare or endangered species in your area by talking to your local Cooperative Extension Agent or Forest Service wildlife biologist. Plan your fuel reduction actions around the needs of these species. Often by a fairly minor refinement of your activities, such as timing, technique, or extent, you can protect species while realizing your fuel reduction goals. For more information, see www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtm, www.dfg.ca.gov/habitats/wdp/region-sierra_nevada-cascades/overview.html.

3. Remember the Soil

a. Maintain the life in your soil.

There is as much or more activity below the ground on your property as there is above the ground. Keep this in mind in terms of what you do above ground. Talk to your Cooperative Extension Agent or local gardeners to find out what *soil types*³⁸ are on your property. Some soil types can tolerate much more *disturbance*³⁹ than others. Minimize activities that could *compact*,⁴⁰ flood, or poison your soil. The health of your land is directly dependent on the health of your soil. As such, the soil is one of the most valuable assets of your property. See managingwholes.com/new-topsoil.htm for more information.

³⁶ Sediment: Particles of topsoil, sand, and minerals that come from soil erosion or decomposing plants and animals. Wind, water, and ice carry these particles; when the sediment collects in waterways it can destroy fish and wildlife habitat.

³⁷ Snag: A standing dead tree that has usually lost most of its branches. Snags offer essential food and cover for a host of wildlife species.

³⁸ Soil Type: Refers to the different combinations of soil particles and soil composition. Soil can vary greatly within short distances.

³⁹ Disturbance: Various activities that disrupt the normal state of the soil such as digging, erosion, compaction by heavy equipment, etc.

⁴⁰ Compact: To pack closely or tightly together, as in the fragments of soil being compacted from heavy equipment, thereby limiting the ability of oxygen or water to pass freely.

b. Ensure that your soil cover is fire safe.

Replace cover that burns easily (such as dry or dead vegetation) with cover that is less *flammable*⁴¹ (e.g. gravel, fleshy green plants, etc.). The objective is to ensure that if and when a fire comes through, it is not so hot that it kills the life in your soil. Rather, it should move through without a lot of fuel to consume in its path. For example, a very light layer of pine needles can help with soil erosion (*see below*), but too much can be a fuel problem. *See http://www.laspilitas.com/classes/fire_burn_times.html for more information.*

c. Minimize erosion.

Protect your soil by keeping it covered. Cover helps to prevent *erosion*,⁴² especially on ground that is not flat; it keeps the soil in place. Don't let soil move across your property, most importantly not into streams or other natural water sources. Keep ground-disturbing activities away from *unstable*⁴³ areas and *riparian*⁴⁴ areas. Pay special attention on steep slopes. The steeper the slope, the faster the soil can move downhill if it's disturbed, and the faster a fire can climb uphill under the right (or wrong!) conditions. *See <http://www.uri.edu/ce/healthylandscapes/tips/6.html> and http://www.pfint.org/fire/topos_effect.htm for more information.*

d. Protect your soil after a fire.

Soil can be most fragile after a wildfire. This is often exacerbated when winter rains come soon after a fire. The potential for erosion and loss of soil is huge with this combination of conditions. If you have experienced fire on your property, get cover onto your soil as soon as you can to prevent erosion. Remember, your soil is alive, so help it grow. *See www.ext.colostate.edu/PUBS/NATRES/06308.html and www.cnr.uidaho.edu/extforest/AftertheBurnFINAL.pdf for more information.*

4. Remember the People

a. Plan your actions with your neighbors.

Talk to your neighbors. Find out what they are doing on their land. Find ways to cooperate in your land management actions. Your defensible space will likely impact your neighbor's chances of surviving a wildfire and vice-versa. Talk about what to do in an emergency and how to most safely evacuate. Find out if there is a Fire Safe Council (FSC) in your community, and if so, get involved. Help make your community a Firewise community. Coordinated work amongst neighbors will have a greater impact on your individual fire safety. *For more information, see www.firesafecouncil.org, www.fire.ca.gov/about_content/downloads/Evacuation2006.pdf, and www.firewise.org.*

b. Find experienced workers and treat them well.

Forestry workers with chainsaws in hand are the actual decision-makers as to what stays or goes—what lives or dies—in your forest. If your objective is to reduce fuels while still maintaining ecological integrity and diversity on a site, your workers must have the knowledge and experience to help you achieve this. Involve the workforce in the design, planning, and monitoring of projects. Talk to your local FSC or neighbors and check references to find reputable contractors. Pay workers well and maybe even bring them chocolate chip cookies; this will achieve better ecological outcomes on the ground. Happy, respected people do the best work. *See ewp.uoregon.edu/programs.html for more information.*

⁴¹ Flammable: A quality of a substance that makes it likely to catch fire, be easily ignited, burn quickly and/or have a fast rate of spreading flames.

⁴² Erosion: The removal of soil over time by weather, wind and/or water such as rain or water runoff from roads.

⁴³ Unstable: Land that is lacking stability, or liable to change with activity, such as in the case of steep slopes or crumbly soils.

⁴⁴ Riparian: A strip of land along the bank of a natural freshwater stream, river, creek, or lake that provides vast diversity and productivity of plants and animals.

c. Work with your local fire department.

Talk to your local firefighters. Find out what they need to safely get to your house and back out. Make sure that your *access roads*⁴⁵ are safe; maintain your fuel treatments along all roads, both for firefighter safety in protecting your home and your safety in case of evacuation. Let firefighters know where you live and what's on your property; invite them out to see it. Have street and address signs visible so out-of-town firefighters can find you if there is a big fire. Make sure you have a water supply they can find and use. Know where and how to turn off any fuel sources such as natural gas or propane. See www.projecttahs.org/pdf/firedepartment.doc for more information.

These Principles were developed by the following Steering Committee members between September 2006 and June 2007 for the Sierra Nevada Community Conservation and Wildfire Protection Plan Guidebook:

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For more information, see forevergreenforestry.com/SierraConservationCWPP.html.

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⁴⁵ Access Roads: Roads that allow entrance into and out of a property.