# Living with Wildfire
## Lake County Community Wildfire Protection Plan
## Overview and Summary


**August 2009**

## Signature Page

The Lake County Community Wildfire Protection Plan:

- Was collaboratively developed. Interested parties and federal land management agencies managing land within Lake County, California have been consulted.
- Identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect Lake County, California.
- Recommends measures to reduce the ignitability of structures throughout the area addressed by the Plan.

The following entities mutually agree with the contents of this Community Wildfire Protection Plan:

Denise Rushing, Chair
*Lake County Board of Supervisors*

Ron Bertsch, Mayor
*City of Lakeport*

Chuck Leonard, Mayor
*City of Clearlake*

Jim Robbins, President
*Lake County Fire Chiefs Association*

Ernie Loveless, Unit Chief
*California Department of Forestry and Fire Protection (CAL FIRE)*

# Living with Wildfire: Lake County CWPP Overview and Summary

Lake County evolved with fire, and fire will continue to shape the landscape. Residents are familiar with the potential repercussions and reality of wildfire; they understand that it is not a question of *if* a wildfire will occur, but rather *when*. The challenge is how to proactively prepare our homes, neighborhoods, communities, and wildlands for coexisting with wildfire instead of reacting to it. A Community Wildfire Protection Plan (CWPP) provides the information and tools residents and agencies need to reduce catastrophic wildfires, protect vital community assets, and live in better balance with the land. This CWPP is a strategic roadmap for Lake County citizens to successfully live with wildfire.

This document summarizes the process, information, and analysis for the Lake County CWPP. The Lake County CWPP identifies wildfire risks and hazards, and actions to reduce them, in Lake County, California. It also provides residents with a step-by-step guide on how to fire-safe their homes, communities, and wildlands, and how to best contend with an impending wildfire.

Detailed information for each of the sections below can be found in the CWPP's relevant chapters and appendices, which are referenced below for more information. A summary of the overall document organization is found below in Section I.D.

Sponsored by the County of Lake and the Lake County Fire Safe Council, the Lake County CWPP represents the collective knowledge, work, and community effort of many individuals and organizations. Registered Professional Forester Tracy Katelman of ForEverGreen Forestry was hired to create this CWPP.

## I. Plan Purpose, Principles, and Background

### I.A. Overall Plan Purpose

The purpose of the Lake County CWPP is:

- To identify priority projects that reduce risks and hazards from wildfire while protecting conservation values in Lake County, California. Goals are to be achieved principally through prioritization and implementation of fuel hazard reduction, fire safety, community education, and fire-protection projects and activities.
- To provide community priorities for conservation-based fuel reduction on public lands, and to provide community direction for federal land management in Lake County.
- To provide conservation-based, fire-safety educational information to residents of Lake County.
- To provide a positive balance among fire prevention, conservation, and wildlife protection.
- To coordinate fire protection strategies across property boundaries, including evacuation planning and preparation.
- To encourage the integration of private land management goals with community needs and expectations for fire safety.
- To create ecologically sustainable biomass utilization and removal projects within Lake County.
- To provide a guiding document for future actions of the Lake County Fire Safe Council, land management agencies, private landowners, and local emergency service providers.
- To provide a guiding document for governmental agencies in developing fire safe practices and policies.
- To meet the requirements under the National Fire Plan and other government funding sources.

## I.B. Conservation Principles for Community Wildfire Protection

This document is based on the following Conservation Principles.

1. **Remember the Vegetation (Native Trees and Other Plants)**
   a. Discover and monitor your forest and vegetation's dynamic changes.
   b. Act conservatively.
   c. Protect native species that share your home.
   d. Keep the oldest and biggest trees.
2. **Remember the Wildlife**
   a. Provide local wildlife a place to live.
   b. Provide access to food and water.
   c. Protect future generations of wildlife.
   d. Value the standing dead trees.
   e. Conserve rare and endangered species.
3. **Remember the Soil**
   a. Maintain the life in your soil.
   b. Ensure that your soil cover is fire safe.
   c. Minimize erosion.
   d. Protect your soil after a fire.
4. **Remember the People**
   a. Plan your actions with your neighbors.
   b. Find experienced workers and treat them well.
   c. Work with your local fire department.

*For a complete description of the Conservation Principles, see Chapter 1, Section 1.8.*

## I.C. Fire Safe Objectives

This Plan was developed as a result of concerns about community and firefighter health and safety, as well as the desire to conserve and protect Lake County's natural resources. The objectives identified in this CWPP are:

- To minimize fire ignitions.
- To decrease the intensity of wildfires.
- To decrease the damage from wildfires.
- To increase the fire permeability of the landscape, to allow wildfire to spread through a community with minimal negative impact.
- To increase wildfire resiliency, for both the community and environment to rebound quickly after a wildfire.

These objectives for fire safety drove the development of the assessment and action plan.

*For more information on these objectives, see Chapter 1, Section 1.7.*

## I.D. CWPP Document Organization

This CWPP is organized into nine chapters, six appendices, and three references. The appendices and references contain several pages that can be copied and/or removed for ongoing local reference. The content and purpose of each document is described below.

**Living with Wildfire: Lake County CWPP Overview and Summary –** is a summary of all the CWPP documents, including the Risk Assessment the Action Plan tables. It functions as an overview of the full CWPP.

**Chapter 1 – Plan Introduction** is an introduction to the document and to Lake County. This chapter is especially written for those unfamiliar with Lake County.

**Chapter 2 – Lake County Fire Safe Planning Process** summarizes this CWPP's public process, outlining the steps taken to meet the collaboration requirements of a CWPP.

**Chapter 3 – Wildfire: Current Environment and Behavior** introduces wildfire concepts and issues in Lake County. This chapter provides a basic introduction to fire science for residents who want to better understand it.

**Chapter 4 – Fire Ecology and Management of Lake County Vegetation Types** summarizes the common vegetation types found in Lake County, their fire ecology, and conservation and fuel management considerations. This chapter provides background information for those in Lake County who would like to manage their lands to reduce wildfire risks and hazards while restoring ecological functions.

**Chapter 5 – Lake County Community Context** describes the social, political, and community-planning context in the county; including a discussion of land ownership and management. The purpose of this chapter is to facilitate better integration of fire planning into the county's existing planning and land management.

**Chapter 6 – Fire Protection Organizations** summarizes current fire protection resources and issues in Lake County, and identifies needs.

**Chapter 7 – Risk Assessment: Identifying and Evaluating Assets at Risk** summarizes assets at risk and the community risk assessment process and results.

**Chapter 8 – Action Plan** identifies actions to reduce risks and hazards from wildfire in Lake County.

**Chapter 9 – Facilitating Lake County Fire Safety in the Long Term** discusses monitoring and long-term steps to maintain and update this CWPP.

**Appendix A – Community Meeting Notes** contains the notes from the community meetings held for this Plan in the fall of 2008.

**Appendices B1 – Community Meeting Data,** and **B2 – Maps,** contain a summary of the data and the maps generated from the community meetings.

**Appendix C– Wildland Fire Safety at Home** explains conservation-based, wildfire-safety principles and practices that can be used around homes and structures to improve residential fire safety.

**Appendix D – Wildland Fuel Hazard Reduction** describes conservation-based fuel-reduction methodologies and prescriptions that can be used on Lake County's wildlands, both public and private.

**Appendix E – GIS Data** contains a description of maps created and sources used.

**Appendix F – Fire-Safety Information** is a set of Internet links and other background documents.

**Appendix G – Fire History Data** contains the data supporting the fire history maps in Chapter 3.

There is a series of reference information in separate documents. These contain general information that can be used by residents to further fire safety in the county. The references include:

**Reference I – Glossary** defines the terms used in this Plan. Upon first appearance within the text, all glossary terms are italicized.

**Reference II – Internet Links for Further Information** provides references for further information on topics discussed throughout this Plan.

**Reference III – Literature Cited** provides references for literature cited in this Plan.

## I.E. Introduction to Lake County, California

Lake County lies in northern California's Coast Range, about 100 miles north of San Francisco, 90 miles northwest of Sacramento, and 35 miles east of the Pacific Ocean. The county was officially formed in 1861, and is part of the US 1st Congressional District and California Senate District 2. In 2007, it was estimated that 64,664 people resided in Lake County.[1]

Lake County has a total land base of 1,327 square miles (849,678 acres), and approximately 51% (435,500 acres) of the county is managed publicly by the US Forest Service, US Bureau of Land Management, Department of Fish and Game, California State Parks, and the County of Lake. The northern portion of Lake County is predominantly the Mendocino National Forest and includes portions of the Snow Mountain, Yuki, and Sanhedrin Wilderness areas. *See Map 1-1 for an overview of Lake County land ownership.*

Clear Lake, the largest natural freshwater lake entirely within California, is the centerpiece of the county. It has a total surface area of 68 square miles, more than 100 hundred miles of shoreline, and sits at an elevation of

[1] U.S. Census Bureau. *State & County Quickfacts.* http://quickfacts.census.gov.

1,326 ft. above sea level. Most Lake County communities—hence the greatest population density in the area—are situated around the lake.

There are four main watersheds in the county: Upper Cache Creek, Upper Putah Creek, Upper Stony Creek, and the Upper Mainstem Eel River. Cache Creek, portions of which are recognized as a State Wild and Scenic River, flows south/southeast in the eastern portion of the county. Putah Creek flows south/southeast in the southern portion of the county, and Stony Creek flows southeast in the very northeastern portion of the county. The Eel River flows south into Scott Dam to form Lake Pillsbury, and then flows west out of Lake Pillsbury in the northern portion of the county. Topography within the county is mainly hilly and mountainous with several large agricultural valleys, and elevations ranging from approximately 640 to 6,873 ft.

The climate in Lake County is characterized by cool wet winters and hot dry summers. The average annual precipitation ranges from 24 inches in the lower areas to 70+ inches in the mountainous regions, mostly in the form of rain (*For more precipitation information, see the Hydrology Map 3-1 in Chapter 3).* Temperatures range from an average low of 32˚ F in the winter months to average highs of 95˚ F in the summer months.

For decades, Lake County has enjoyed some of the cleanest air in the nation.[2] In 2009, the county ranked 3rd cleanest in the US in terms of particulate pollution in the atmosphere.[3] For the past 20 years, strong local support for clean air measures has enabled the county to fully comply with the Federal Clean Air Standards and the more rigorous California standards for ozone and other air pollutants. No other Air District in California matches that record.[4]

Within Lake County there are seven Native American tribes. Robinson Rancheria of the Pomo tribe is the largest landowner of the seven, with 1,200 acres.

Lake County is in the interface between the bedroom communities of the Bay Area to the south and the more natural resource-dependent communities to the north. Its history as an agricultural community full of orchards (it was formerly known as the pear capital of the world) is quickly being transformed into a landscape of wineries. Recreation is now the principal activity on most of the public lands in the county. New residents are mostly retirees and Bay Area commuters.

In 2007 it was estimated that over 16% of Lake County residents lived below the federal poverty level, and another 16% (not necessarily the same) were over the age of 65.[5] These population demographics help guide the need for fire-safety programs within the county, such as low income and elderly/disabled assistance.

Several planning efforts have been undertaken in Lake County that have relevance for wildfire policy and management. These include the 2008 General Plan, the 2007 LAFCO Municipal Service Review, the 2005 Natural Hazard Mitigation Plan (HMP), and the 2009 Draft Emergency Operations Plans, including the 2004 Interface Wildland Fire Contingency Plan. The relevant sections of these documents are summarized in Chapter 5. Action items that pertain to these planning efforts are included in Chapter 8 and Figure 2 below.

*For more background information on Lake County, see Chapters 1 and 5.*

## I.F. Communities at Risk

Most of the population centers in Lake County have been designated either at the federal or state level as "communities within the vicinity of federal lands that are at high risk from wildfire"—more commonly known as "Communities at Risk" or CAR. These CAR designated communities are: Anderson Springs, Blue Lakes, Cobb, Clearlake, Clearlake Oaks, Glenhaven, Hidden Valley Lake, Kelseyville, Loch Lomond, Lakeport, Lower Lake, Lucerne, Middletown, Nice, The Geysers, Upper Lake, and Witter Springs.

This CWPP process has identified and recommended the following 13 communities to be designated as Communities at Risk: Buckingham, Clear Lake Riviera, Coyote Valley, Double Eagle, Harbin Hot Springs, Kono Tayee, Lake Pillsbury, Morgan Valley, Riviera Heights, Riviera West, Soda Bay, Spring Valley, and Twin Lakes.

*For more information on Lake County Communities at Risk, see Chapters 1 and 8.*

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[2] Lake County Air Quality Management District (LCAQMD). www.lcaqmd.net

[3] American Lung Association. *State of the Air Report 2009.* p. 24. www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf

[4] LCAQMD Public Information Release. Douglas Gearhart. Air Pollution Control Officer. May 1, 2009.

[5] U.S. Census Bureau. *State & County Quickfacts.* http://quickfacts.census.gov .

## II. CWPP Planning Process Overview

### II.A. Planning Area Boundaries

This CWPP covers the entirety of Lake County, California. For purposes of this document, the county was divided into ten planning areas to maximize community input. The planning areas are listed here, starting from the northwest area of the county and moving to the southeast:

- Lake Pillsbury, Blue Lakes, Upper Lake
- Scotts Valley, Lakeport
- Nice, Lucerne
- Spring Valley, Double Eagle
- Paradise Valley, Kono Tayee, Glenhaven, Clearlake Oaks
- Soda Bay, Rivieras, Buckingham
- Jago Bay, Lower Lake, Clearlake
- Finley, Kelseyville
- Cobb Mountain
- Hidden Valley, Middletown

### II.B. Planning Process Summary

This CWPP was created to maximize collaboration, one of the requirements of CWPPs. One of its goals was to educate residents regarding fire safety and defensible space. Therefore, the planning process was designed to facilitate public participation and input. A series of ten community meetings was held in October 2008, in each of the planning areas listed above. Community outreach regarding the CWPP and the reconstituted Lake County Fire Safe Council was done jointly. A website was developed for the Plan and the Fire Safe Council on the county's site: www.co.lake.ca.us/FireSafeCouncil.htm.

In addition to the public meetings, a community-based Internal Review Committee reviewed the document between January and April 2009. The Public Draft was released on May 7, 2009, providing residents until July 1st for review and comment. The final Plan was published in August of 2009.

### II.C. Stakeholders

In addition to the approximately 150 individuals who attended community meetings, the following organizations participated in this process:

- Bureau of Land Management (BLM)
- California Department of Forestry and Fire Protection (CAL FIRE)
- Cities of Clearlake and Lakeport
- Clear Lake Riviera Community Association
- County of Lake
- East Lake and West Lake Resource Conservation Districts
- Habematolel Pomo of Upper Lake
- Kelseyville, Lake County, Lake Pillsbury, Lakeport, Northshore, and South Lake County Fire Protection Districts
- Lake County Air Quality Management District
- Lake County Fire Safe Council
- Mendocino National Forest
- South Lake Fire Safe Council
- University of California Cooperative Extension
- USDA Natural Resources Conservation Service

*For more information on the CWPP process and plan development, see Chapter 2.*

## III. Wildfire Environment of Lake County, California

From the grasslands and chaparral to the pine/oak woodlands and conifer forests, it is generally believed today that fires in the rural landscape of Lake County are less frequent and more severe compared to the patterns present before Europeans settled the area. This region evolved with fire, and fire will continue to shape it. Much of the vegetation in the county is adapted to, meaning it has evolved with, fire. For example, ponderosa pine (*Pinus ponderosa*) and incense cedar (*Calocedrus decurrens*) both produce very thick bark with age, helping them to withstand the heat of low and moderate intensity fire. Understanding fire and its role in the ecosystem will help us to better coexist with it, resulting in less catastrophic wildfire.

Lake County is no exception to the increasingly common problem of property loss and habitat destruction from wildfire. Fuel loads have been accumulating to unnaturally high levels throughout the region due to decades of fire suppression and prevalent land-management practices. This has lead to an increase in large, catastrophic wildfires. In 2008, fire protection agencies responded to 687 fires in Lake County. One of the largest fires that year was the *Walker Fire,* burning a total of 14,500 acres in the Walker Ridge area near Colusa County. It started at the same time as the extensive lightning strike fires burned throughout northern California, stressing local fire protection resources. *For more information see Maps 3-3 and 3-4 in Chapter 3.*

One of the tools used to predict fire behavior based on vegetation type is called "fuel models." Fuel models give fire managers a general idea of the type of vegetation that can be found in a given area, and how it is expected to burn. Of the standard 13 fuel models identified in California by CAL FIRE, eight can be found in Lake County. They are: Grass, Pine/Grass, Tall Chaparral, Light Brush, Intermediate Brush, Hardwood/Conifer Light, Medium Conifer, and Heavy Conifer. *For more information see Map 3-2 in Chapter 3.*

Fuel models are combined with topographic slope and fuel density information to provide a fuel hazard assessment of fire behavior under extreme conditions. CAL FIRE's recent Fire Hazard Severity Zones (FHSZ) analysis is based on fuels, terrain, and weather. Most of Lake County's wildland areas are mapped within Very High Fire Hazard Severity Zones, as are the communities of Nice, Lucerne, the Rivieras, Cobb, Lake Pillsbury, and a few others. However, most of the county's residents live in High or Moderate FHSZs around Clear Lake and the valleys. *For more information see Map 3-5 in Chapter 3.*

Another tool used to understand fire is "fire regime." Fire regime is a measurement of fire's historic natural occurrence in the landscape. It includes the season, frequency, intensity, and spatial distribution of fire. In other words, it models how often fire historically would burn through a certain place and at what intensity. A standardized set of five fire regimes is used nationwide. There are two pre-settlement fire regimes found in Lake County: Fire Regime I—a natural fire-return interval between 0–35 years of low-severity fire, and Fire Regime III—a frequency of between 35–100 years of mixed-severity fire.

The difference in fire regime between pre- and post-European settlement is described by the "condition class," or degree of departure from the historical natural fire regime. The greater the departure from the natural fire regime, the greater the variations to ecological components and the higher the risk of losing key ecosystem components. All three condition class levels (of low, moderate, and high departure from historical conditions) are present in Lake County. The largest area in Lake County (at 45%) contains those ecosystems with a low departure from their natural fire regime, and hence low risk of key ecosystem loss. Another 22% are at a moderate departure. Those areas with a significant departure and high risk of ecosystem loss, are 20% of the county lands, and located primarily in the mountainous regions of the north and south. Finally, 13% are not classified because they are not wildlands. *For more information on fire regime and condition class, see Section 3.7, and Maps 3-6 and 3-7 in Chapter 3.*

## IV. Fire Ecology and Management of Lake County Wildlands

Many of the plant communities found in Lake County are considered "fire-adapted"—having evolved with, and responding positively to, wildfire. Chapter 4 describes the vegetative communities of the county and their respective fire ecology. The vegetation types are categorized as follows: grassland, chaparral and chamise/chaparral, foothill woodland, ponderosa pine/mixed conifer, closed-cone pine/cypress, and montane hardwood/conifer. For each vegetation type, the role of fire in shaping the assemblage of plants, the nature of the fire regime, and the common vegetative adaptations to fire are discussed. *See Map 4-1 Lake County Vegetation Types in Chapter 4.*

Each of the county's ecosystem types has a unique fire-behavior pattern and history, which suggests appropriate fuel-modification treatments. For example, grasslands tend to burn more often, with fire passing through fairly quickly. Fire in a grassland system serves to reduce the amount of accumulated dead plant material, and can be beneficial for native grasses over introduced (and often invasive) annual grasses. Fuel-modification treatments for grasslands can employ various methods, including "weed-eating" or grazing. These methods minimize smoke from controlled burning which is another fuel-modification option.

In contrast, montane hardwood/conifer areas are often thickly forested with larger trees. Historically, fires were generally frequent in this area. Periodic fire and other fuel-reduction methods in montane hardwood/conifer forests can reduce the competition for water and nutrients, by reducing the understory tree and shrub component. Fuel buildup here can dangerously affect the health and diversity of these forests, as well as increase the risk of catastrophic fire. Many options exist for fuel-modification treatments in this vegetation type.

This chapter provides fuel-reduction prescriptions for each vegetation type to aid Lake County residents and land managers in effectively reducing fuels in an ecologically appropriate manner. Each type and associated prescribed treatment varies with site-specific factors. Management prescriptions are included that: A) are consistent with the natural disturbance expected for each vegetation type, B) promote the Conservation Principles identified in Chapter 1, and C) improve the fire resiliency of the vegetation type.

*In-depth descriptions of fire ecology and treatments are found by vegetation type, in their respective sections of Chapter 4.*

## V. Lake County Fire Protection Organizations

In Lake County, there are six county Fire Protection Districts (FPDs):

- Kelseyville FPD
- Lake County FPD
- Lake Pillsbury FPD
- Lakeport FPD
- Northshore FPD
- South Lake County FPD

There are also two state and federal fire protection agencies that provide fire protection in the county:

- California Department of Forestry and Fire Protection (CAL FIRE), Sonoma-Lake-Napa Unit. CAL FIRE also provides emergency fire and medical services to all Bureau of Land Management lands in Lake County.
- US Forest Service, Mendocino National Forest

*For more information on fire agency jurisdictions and resources, see Map 6-1 Lake County Fire Protection Resources.*

All of these departments take pride in the work they do for the communities in which they serve. The support given by the approximately 160 volunteers echoes a long tradition of service that makes each department unique and productive.

All of the county's FPDs provide first-response fire and medical service. Generally medical calls make up ½ or more of all first-response calls. Overall fire-protection capacity varies district by district, and is described in detail in each district's respective section in Chapter 6. Fire-agency identified resource needs vary as well; principal needs are summarized here:

**Fire Protection Needs**

- **Kelseyville FPD:** Wildland-urban interface training, Arson Investigator I and II course availability, and a stable funding source.
- **Lake County FPD:** Funding to cover additional personnel and stations.
- **Lake Pillsbury FPD:** Addition of paid firefighters, radio communications, and additional sites for 911-use, as well as more funding for training and equipment replacement.
- **Lakeport FPD:** Replacement of one structural engine and one wildland engine, plus an additional wildland engine.
- **Northshore FPD:** Replacement of a 2,000-gallon water tender, SCBAs (Self Contained Breathing Apparatus), turnouts, radios, and personnel training.
- **South Lake County FPD:** Additional staffing and the addition of two more stations within the district, continued support from the Board of Supervisors in the adoption of Fire Codes, and a fire-sprinkler ordinance.
- **CAL FIRE:** Funding for training, equipment replacement/upgrades, repair/maintenance, and staffing Konocti Lookout. Establishment of stronger mutual-aid agreements and cross-training with Fire Protection Districts.
- **Mendocino National Forest:** Replacement of Engine MNF43, addition of a bulldozer and transportation vehicles to the fleet, and establishment of stronger mutual-aid agreements and cross-training with Fire Protection Districts.

*For more information on fire protection, see Chapter 6.*

## VI. Lake County Risk Assessment

The assets (or values) of the county are the precious and often unquantifiable elements, which make up the quilted fabric of community life. These include homes, community infrastructure, cultural resources, wildlife habitat, natural resources, air quality, recreational facilities and areas, historical structures, and other important attributes upon which individual communities rely.

Assets at risk are those things that are essential or important to the quality of life, that can be at risk of destruction or loss from wildfire. Information on community assets was gathered through community meetings, the public comment process, and researching local property values and existing community infrastructure.

### VI.A. Lake County Assets at Risk

**Homes and Structures**

In addition to protecting human lives, homes are considered one of the highest priorities for protection. All homes are considered to be of equal community value in this analysis. Homes are generally concentrated within town centers (especially around Clear Lake) and along the major roadways. Even though homes not directly adjacent to wildlands often burn during wildfire events, it is the remote homes and those on the edges of communities that are at the greatest risk, as they are generally the first to be reached by a wildfire.

**General Infrastructure Assets**

Infrastructure within Lake County includes all of the roads, utilities, water, and all other services that help Lake County residents live here. Some of these include: the major road systems within the county, Highway 20 and State Routes, 29, 53, and 175; the two county airstrips; The Geysers geothermal power generation facility; communication towers; PGE-maintained transmission lines and substations; approximately 95 water service providers; and other public and private utilities.

**Commercial Assets**

The primary commercial centers within the county are the incorporated and unincorporated metropolitan areas surrounding Clear Lake. Areas not directly adjacent to Clear Lake, such as Middletown, Kelseyville, and Coyote Valley, also have important commercial centers to protect. Lake County is also a year-round tourism and recreational destination. Boating, fishing, camping, wine tasting, sight seeing, and many other recreational activities help bring in monies that aid in the development of community infrastructure and services.

**Schools**

There are seven school districts in Lake County. There are also three parochial schools and two community colleges within the county to make up a total of 53 schools.

**Medical Facilities**

There are two hospitals and three nursing homes within the county as well as six senior centers. These facilities are essential to the health, safety, and lifestyle of Lake County residents.

**Cultural Assets**

People have been living in Lake County for up to 12,000 years; the most-notable human habitation being that of the Pomo Indians, several tribes of whom still remain. Cultural resources accumulated throughout this history include: bedrock mortars, grassland sites for basket making, oak trees for acorn gathering, ceremonial gathering places, and more. Post-settlement assets are abundant within the county as well. Historic downtown areas are found in Kelseyville, Lakeport, Lower Lake, and Upper Lake. Valued historical buildings (such as barns, schools, and churches) exist throughout the county. High-intensity fire poses a threat to all of these cultural assets.

**Natural Assets**

Lake County is ecologically rich; there are many natural assets to protect and responsibly steward. Many of the natural assets are located in remote areas that have associated high fire threat and hazard conditions. The State Parks, State Forest, National Forest, and Wilderness Areas are all important ecological areas within the county. They provide critical habitat for threatened and endangered plants and wildlife. Recreational and research opportunities, scenic vistas, and more are associated with these natural assets. The major natural resource businesses within the county include agriculture, cattle ranches, and wineries.

*For more information on assets at risk, see Chapter 7.*

## VI.B. Conflicts Between Natural Assets and Human Occupation

Human encroachment into highly flammable wildland areas creates a conflict that often threatens life, property, and the natural environment. These areas are often aesthetically pleasing and provide an atmosphere in which many seek to live. This is quite apparent in Lake County, as residents slowly expand into these beautiful, but highly flammable and remote areas farther away from Clear Lake and the agricultural valleys. This type of encroachment into wildland areas will continue to be a significant threat to both the human communities and the ecosystem in which they live.

*The following table summarizes the risk assessment undertaken for this CWPP.*

## VI.C. Assets, Risks, and Priorities Table

***Figure 1. Summary of Assets and Associated Wildfire Risks for Medium and High Risk Communities in Lake County[6,7]***

| Community, Structure, or Area at Risk | Assets at Risk | Fuel Hazard | Risk of Wildfire Occurrence | Structural Ignitability | Fire-Fighting Capability | Overall Risk | Observations |
|---|---|---|---|---|---|---|---|
| **Anderson Springs** | Med | High | High | High | Low | **High** | High fuels, older wooden homes, small and windy roads, remote, significant wildfire threat. Good local FSC. Limited water. |
| **Clear Lake Riviera** | High | High | High | Med | Med | **High** | High-value real estate, with high fuels in a dense development. Wildfire threat from Hwy 29 could threaten rest of Rivieras. Fire station with limited staffing. Water is limited. |
| **Double Eagle** | Low | High | High | High | Low | **High** | Very remote development, surrounded by fuels with high wildfire threat. Very bad roads/access. Minimal fire protection. Limited water. |
| **Greater Cobb Area including Loch Lomond** | High | High | High | High | Med | **High** | High fuels, older wooden homes, fire stations staffed only during fire season. Includes surrounding areas and forested landscape. Significant wildfire threat, access issues. Limited water. Good local FSC. |
| **Harbin Hot Springs and Other Springs** | Med-High | High | High | High | Low | **High** | High fuels, important tourist/recreational destinations, high ignition risk from many visitors, very limited access/evacuation. |
| **Jago Bay, Point Lakeview** | High | High | Med | High | Low | **High** | Tight roads, heavy fuels, older homes. Wildfire threat from Hwy 29 could threaten Rivieras. Difficult access/evacuation. Limited water. |
| **Lake Pillsbury** | Low | High | High | High | Low | **High** | High wildfire threat, surrounding fuels. USFS in-holding community, limited fire protection capacity. Limited water supply outside LP Ranch. |
| **Lakeport** | High | Med | High | Med | High | **High** | High values and historical areas, with significant wildfire threat from BLM to east, some urban areas with high fuels and density. |

[6] This table is adapted from Step 5a of the CFA Simplified CWPP Template. p. 5. http://cafirealliance.org/cwpp/.

[7] Communities that obtained an Overall Risk of "Low" were not included in this list; see text in Chapter 7, section 7.2 for the list of these communities.

| Community, Structure, or Area at Risk | Assets at Risk | Fuel Hazard | Risk of Wildfire Occurrence | Structural Ignitability | Fire-Fighting Capability | Overall Risk | Observations |
|---|---|---|---|---|---|---|---|
| **Spring Valley and Long Valley** | Med | Med-High | High | Med-High | Low | **High** | Good clearance, limited fuels within Spring Valley development. Higher fuels, wildfire threat in surrounding areas. Limited water supply. Remote. |
| **Clearlake Oaks** | Med | High | High | Med | Med | **High-Med** | Wildfire threat during extreme fire weather, with high interface fuels and ignition potential. Good fire protection, limited water supply. |
| **Glenhaven** | Med | High | High | Med | Med | **High-Med** | Narrow strip along Hwy 20, potentially blocked to limit evacuation. High wildfire threat during extreme fire weather, high interface fuels. High ignition potential. Limited water. |
| **Hilderbrand District** | Med | High | High | High | Med | **High-Med** | Residential area along highway, older homes. No hydrants, local fire history. |
| **Hidden Valley and Coyote Valley** | High | Med-High | Med-High | Med | Med-High | **High-Med** | High fuels in the interface. Threat of wildfire from east/northeast. HV Lake HOA great fuel-reduction program. Other areas have access and water issues. |
| **Lucerne** | Med | High | High | High | High | **High-Med** | High wildfire threat from FS during extreme fire weather, with high interface fuels. Some historic sites. Good fire protection and water supply. |
| **Nice** | Med | High | High | High | High | **High-Med** | High threat of wildfire from FS during extreme fire weather event, combined with high fuels in the interface. Good fire protection and water supply. |
| **Riviera Heights*** | High | High | Med | Med | Low | **High-Med** | High-value real estate, with high fuels in a dense development. Not significant wildfire threat, but significant ember threat from local ignitions. Fire station with limited staffing. Good water supply. |
| **Riviera West*** | High | High | Med | Med | Low | **High-Med** | High-value real estate, with high fuels in a dense development. Access issues. Not significant wildfire threat, but significant ember threat from local ignitions. Good water supply, no fire station. |
| **Blue Lakes** | Low | High | High | High | Low | **Med-High** | High fuels and windy roads behind Lakes. Potential evacuation/access issues. No community water system, water source is the lakes. |
| **Clearlake** | High | Med | High | High | High | **Med-High** | Principal urban center. High fuels to east, some subdivisions with high fuels, many older homes. Good local fire protection. |

| Community, Structure, or Area at Risk | Assets at Risk | Fuel Hazard | Risk of Wildfire Occurrence | Structural Ignitability | Fire-Fighting Capability | Overall Risk | Observations |
|---|---|---|---|---|---|---|---|
| **Morgan Valley** | Med | Med-High | High-Med | High | Med | **Med-High** | Rural interface east of Lower Lake, potential wildfire threat from public lands to east. Water and fire protection issues. |
| **Scotts Valley** | Med | Med | High | Med | Med | **Med-High** | Agricultural valley between Lakeport and BLM. Excellent controlled-burn history and interest. Wildfire threat from BLM lands. Water issues. |
| **Buckingham*** | High | Med | Med | Med-Low | Low | **Med** | Very high-value real estate, limited water supply. Limited wildfire threat. Access/evacuation issues. |
| **Jerusalem Valley** | Low | Med | High | High | Low | **Med** | Access/evacuation issues, surrounding fuels. |
| **Kelseyville Interface** | Med | High | Med | Med | Med | **Med** | Fuels and wildfire threat from SW and SE, some remote neighborhoods. Mount Konocti fuel issues. |
| **Kono Tayee** | Med | Med | Med | High | Low-Med | **Med** | Some fuels on steep slopes, wildfire threat during extreme weather events. Adequate water. |
| **Lower Lake** | Med-High | Med | Med-High | Med | High | **Med** | Small community with historical district. Heavier fuels and windy roads at outskirts (see Morgan Valley and Twin Lakes). Local fire protection. |
| **Soda Bay*** | Med | High | Med | Med | Med | **Med** | Some fuels, history of local ignitions. Some wildfire threat from State Park to west. |
| **Twin Lakes** | Med | Med | Med | Med | Med | **Med** | Some fuels. Many homes and roads. |
| **Upper Lake** | Med | Low | High | Med | Med | **Med** | Historic, town center, limited fuels. Higher fuels in interface. National Forest wildfire threat during extreme weather events. Water system issues. |

***The Exception: The Rivieras**

The most obvious distinction in Lake County between "risk of wildfire occurrence" as shown in this table, and the possibility of a large wildland urban interface conflagration is that of the Rivieras communities (Soda Bay, Riviera Heights, Buckingham, and Riviera West). Everyone in the county by and large agrees that the Rivieras would be the worst place for a rural fire to occur. There are large, expensive homes, with a lot of local fuels, and limited access, water supply, and fire-fighting capabilities. However, the chance of a fire coming into the Rivieras from the neighboring wildlands is not high. A fire would need to come down Mount Konocti, or around it from the Highway 29 corridor. The probability of either of these occurring is not high. (However, this could happen in the eastern end of the Rivieras, in Clear Lake Riviera, Point Lakeview, and Jago Bay.) Therefore, the Rivieras area is not ranked as having a high risk of wildfire occurrence, even though a local fire there would quickly simulate extreme wildfire conditions. That said, prioritizing treatment of fuels, implementing defensible space, and reducing structural ignitability are all actions that must happen in the Rivieras, and as soon as is feasible. As stated here and elsewhere in this document, the potential damage from an interface fire in the Rivieras would likely be greater than anywhere else in the county. It is for this reason that the Rivieras area is listed as a top priority area for action within the Action Plan (Chapter 8) even though it did not receive a "high" overall risk ranking in this analysis.

*For more information on the Lake County risk assessment, see Chapter 7.*

## VII. Lake County Community Wildfire Protection Plan, Action Plan Summary

This Plan identifies several actions to reduce hazards and risks from wildfire and decrease structural ignitability in Lake County. The following table summarizes these actions, which were identified through a collaborative public process.

In an ideal world, all of these action items would be implemented expeditiously. However, this Plan is being released in one of the greatest economic downturns in our recent history. Funds for public projects are scarce, especially at the state level. Although it is the intention of CWPP authors and signers that all the action items in this document be implemented as so designated, implementation will need to be done subject to the availability of funds and other resources for this purpose.

Identified action items are followed by an "**S**" (short, 1-2 years), "**M**" (medium, 2-5 years), "**L**" (long, 5-10 years), or "**O**" (ongoing), for implementation priority. In addition, a *"★"* indicates those action items that will be relatively easy to implement or have already been completed.

The following actions are proposed for the Lake County Community Wildfire Protection Plan.

***Figure 2. Lake County Action Plan Summary***

| | |
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| **DESIGNATION OF WILDLAND-URBAN INTERFACE AREAS** | Federal agencies accept CWPP Wildland-Urban Interface (WUI) designations, including those previously identified by CAL FIRE. **S,** ★ *(See Map 8-1.)* |
| | Federal agencies work with Lake County Fire Safe Council, South Lake Fire Safe Council, and other interested community members to agree on projects proposed within Lake County WUI areas. **S,** ★ |
| **DESIGNATION OF COMMUNITIES AT RISK** | Lake County Community Development Department add the following Lake County communities to the Communities at Risk list: **S,** ★<br>Buckingham, Clear Lake Riviera, Coyote Valley, Double Eagle, Harbin Hot Springs, Kono Tayee, Lake Pillsbury, Morgan Valley, Riviera Heights, Riviera West, Soda Bay, Spring Valley, Twin Lakes |
| **ADVANCING DEFENSIBLE SPACE** | **Target Areas in Lake County for Defensible Space, Fire Safe Construction, and Alternate Access Programs:**<br>Rivieras: Soda Bay, Riviera West, Riviera Heights, Buckingham, Clear Lake Riviera, Point Lakeview, Jago Bay; Hidden Valley and Coyote Valley, especially outlying areas beyond Hidden Valley Lakes; Cobb Mountain Area, including Cobb, Loch Lomond, and Anderson Springs; Harbin Hot Springs and neighboring resorts; Double Eagle Ranch; Lake Pillsbury; Northshore communities interface, especially around Nice and Lucerne; Lakeport interface |
| | County, Cities, Federal Agencies, Fire Safe Councils, and other related agencies focus fire safety and prevention efforts in the Target Areas listed above, including defensible space, fire-resistant building, and providing for alternate access routes. **S** |
| | County and City Community Development Departments work with the Lake County Fire Safe Council and other Plan Partners to develop a comprehensive defensible-space ordinance. **S** |
| | Homeowner's Associations in Target Areas work with Lake County Fire Safe Council and Fire Protection Districts to develop fire safe guidelines for all residents. **S** |
| | County apply General Plan (GP) Policy HS-7.6, Development Guidelines to target areas listed above. **M** |
| **RESIDENTIAL FUEL-REDUCTION ORDINANCE** | County work with Fire Protection Districts and other interested parties to develop countywide residential fuel-reduction ordinance based on current state law, with county enforcement, that ensures appropriate defensible-space clearance around all structures. **S** |
| | County Code Enforcement work with Fire Protection Districts and other interested partners to ensure abatement ordinance applies to clearance on abandoned lots and absentee-owned parcels that threaten neighboring parcels. **S** |

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| | County develop provisions in ordinance language to place liens against properties to cover incurred costs. **S** |
| | County provide a funded, countywide enforcement officer to enforce ordinance, in cooperation with Fire Protection Districts. **M** |
| | Lake County Fire Safe Council develop a list of known local fee-for-service contractors to implement residential fuel-reduction ordinance. **S** |
| | Cities work with same partners to implement similar fuel-reduction ordinance programs within their jurisdictions. **M** |
| **DEFENSIBLE SPACE AND NEW DEVELOPMENT** | In addition to the policies set forth in GP Policy HS-7.6, Development Guidelines, and in accordance with GP Policy HS-7.5, Fuel Breaks, the County will require new developments in high risk and hazard areas as defined in this CWPP to create fire-safe landscaping within the 100-foot defensible space zone of all structures. **M** |
| | County Community Development will work with the Lake County Fire Safe Council, Fire Protection Districts, and other Plan Partners to identify the requirements for Wildland Fire Management Plans for new developments as required by GP Policy HS-7.4. In addition to those outlined in the General Plan, these plans will be required for all new developments within the Target Areas as identified in this CWPP. Plans will include the following minimum components. Description of:<br>- Ingress, egress, and primary and alternate evacuation routes, and safety zones/evacuation sites.<br>- Adequate water storage and pressure to meet fire flows during drought conditions.<br>- Fire-safe building to minimize structural ignitability.<br>- Fire-free zone within first 5 feet surrounding structures.<br>- Fire-resistant landscaping, including easily maintainable defensible space in the first 30 feet.<br>- Fire protection coordination, including access through gates, to water, fuels shut-off, landing zones, safe zones, etc.<br>- Strategic landscape fuel treatments to reduce wildfire ingress or egress, based on Conservation Principles. **M** |
| | General Plan Policy LU-3.2 Rural Development, Policy LU-3.3 Clustering of Rural Development, and Policy HS-7.2 Encourage Cluster Development shall focus development in areas of highest potential fire safety within parcels or clusters, while maximizing efficient use of fire protection resources (e.g. access and water). Road standards should include adequate evacuation capability, unhindered access for emergency vehicles, and wherever possible shaded fuelbreaks along roadways, perimeters, and around development clusters, planned with respect to conservation-based principles and local aesthetics. **M** |
| | County ensure Policy OSC-2.1 Design Guidelines for Structures in Rural Areas and Policy OSC-2.7 Landscaping Techniques are done in conjunction with creating adequate defensible space around all new structures in high hazard or risk areas as identified in this plan, and favor fire-resistant landscaping. **M** |
| | Cities of Lakeport and Clearlake model similar defensible space and new development programs for their jurisdictions to those developed countywide. **M** |
| | County Community Development Department will provide applicants for new building permits with copies of the current Fire Hazard Severity Zone maps *(see Chapter 3)* as well as copies of relevant policies from this plan and others regarding construction in high hazard areas. **S** |

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| **COMMUNITY DEFENSIBLE SPACE AND FUEL-REDUCTION PROGRAMS** | Lake County residents implement defensible space around all structures, and on all residential parcels within the county. **S, O** |
| | Lake County residents work with neighbors, and on neighboring properties (with the owner's permission) to create neighborhood-wide defensible space. **S, O** |
| | Lake County Fire Safe Council work with Plan Partners to provide information and resources to help residents create defensible space around their homes and in their neighborhoods. **S,** ★ |
| | Lake County Fire Safe Council work with Plan Partners to explore incentive programs to help residents create defensible space around their homes and in their neighborhoods. **M** |
| | Lake County Fire Safe Council work with Plan Partners, Social Services, Senior Centers, schools, and other community and social service organizations to develop programs to create defensible space for elderly and disabled residents who are not able to do this for themselves. **S, O** |
| | Lake County Community Development Department work with Humboldt County to explore possibility of a similar "Firesafe Homes and Forests Cost Share Program" in Lake County. **M** |
| **COMMUNITY CHIPPING PROGRAM** | Lake County Fire Safe Council work with West Lake RCD to develop a program to provide community chipping days throughout the county, in partnership with the South Lake FSC for its area of influence, and other interested partners throughout the county, including Homeowners Associations. **S, O** |
| | All interested partners support the countywide community chipper program of the Lake County Fire Safe Council, by contributing resources, and helping to secure ongoing funding, as possible. **S, O** |
| **FIREWISE COMMUNITIES PROGRAM** | County work with Fire Safe Councils, MNF, and BLM to assist in the development and implementation of Firewise Communities Programs for all applicable and/or interested areas within Lake County. **S, M** |
| **REDUCING FUELS** | Lake County FSC work with appropriate land management agencies to obtain funding to maintain existing cooperative fuel-reduction projects throughout the county. **O** |
| | Public land-management agencies, tribal experts, and CAL FIRE in cooperation with LCAQMD[8] and Fire Safe Councils educate residents on the positive and negative aspects of controlled burning and prescribed fire and other fuel-reduction options. **S** |
| | Lake County Fire Safe Council work with land-management agencies to develop an "Adopt a Fuelbreak" program for maintenance of fuelbreaks. Work with CAL FIRE, tribal experts, and other fire and resource professionals to employ appropriate maintenance practices. **M** |
| | County support fuel-reduction efforts, consistent with GP Policy HS-7.3 Fuel Modification Programs, by streamlining permitting processes wherever applicable and/or providing in-kind support, such as Public Works resources. **M** |
| | County work with state and federal agencies and Lake County Fire Safe Council to promote creation of shaded fuelbreaks along perimeters and ridges of open space buffers, planned with respect to conservation-based principles and local aesthetics, and consistent with GP Policy OSC-1.9 Open Space Buffers and Policy OSC-2.15 Ridgeline / Hilltop Protections. **L** |
| | County work with state and federal agencies and Lake County Fire Safe Council to explore the creation of a system of ridgeline shaded fuelbreaks or firebreaks planned with respect to conservation-based principles and local aesthetics, and in accordance with GP Policy OSC-6.15 Ridgeline Trails. **L** |

[8] Lake County Air Quality Management District

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| **PRIORITY FUEL-REDUCTION PROJECTS** | Lake County Fire Safe Council work with applicable agency and Plan Partners, (including MNF, BLM, CAL FIRE, RCDs, etc.), to explore funding and to implement the strategic fuelbreaks and fuel-reduction efforts identified in this CWPP throughout Lake County. **S, M, L** *See Figure 3: Lake County Fuel-Reduction Priorities, following this table for a complete listing of priority projects.* |
| **REDUCING STRUCTURAL IGNITABILITY** | |
| **WUI BUILDING STANDARDS** | County implement GP Policies HS-1.3 Building and Fire Codes, and HS-7.7 Fire Resistant Building Materials by continuing to adopt the most current California Wildland-Urban Interface Building Code, especially Chapters 7 and 7A. **S, O, ★** |
| | County and Cities stay current on applicable wildland-urban interface standards and new legislation through the State of California Fire Marshal's Office. **O, ★** |
| | County and Cities Community Development, Fire Protection Districts, and Fire Safe Councils educate decision-makers and residents on the importance of and implementation of WUI Building Codes, including appropriate building materials. **S** |
| | Fire Agencies work with Fire Safe Councils to perform risk assessments within their jurisdictions. **M** |
| **ROOFING** | Fire Agencies, County Community Development, federal partners, and Fire Safe Council continue to educate residents on the importance of replacing untreated wood-shake roofs.**S** |
| | County and Cities develop incentive-based programs for residents to replace untreated wood-shake roofs. **M** |
| **WINDOWS** | Fire Safe Councils, utilities, and interested partners educate residents on need to have double-paned windows throughout their homes with recommendations to upgrade to tempered glass for fire safety where possible. **O** |
| | Fire Safe Councils, utilities, and interested partners explore incentive programs to upgrade windows to double pane or higher standards. **M** |
| **DECKS** | Fire Safe Councils and other Plan Partners educate residents on importance of fire-safe decking. **O** |
| **OUTBUILDINGS** | Fire Safe Councils and others educate residents on need for separation of heat loads from residences. **O** |
| | County Code Enforcement, work with Fire Protection Districts and CAL FIRE to enforce clearing 30-100 feet (or to the property line) around structures, as per State law and the proposed countywide residential fuel-reduction ordinance. **M** |
| **WOODPILES AND OTHER FUEL SOURCES** | Fire Safe Councils and other Plan Partners educate residents on need to have a minimum of thirty feet separation of firewood piles and woodsheds from residences. **O** |
| | Fire Safe Councils and other Plan Partners educate residents on need to have vegetative and flammable material clearance around propane tanks and other fuel storage areas near residences, and keep these at least thirty feet from homes and outbuildings. **O** |
| | Fire Safe Councils and other Plan Partners educate residents on the risks of having wood fences attached to homes. **O** |

| ENHANCING FIRE PROTECTION | |
|---|---|
| **RESOURCES FOR FIRE PROTECTION** | County, Kelseyville FPD, and CAL FIRE explore the possibility of an Amador Plan to provide additional coverage in the Rivieras area. **M** |
| | County, Northshore FPD, and CAL FIRE explore the possibility of an Amador Plan to provide additional coverage in the Glenhaven area. **M** |
| | County work with Kelseyville FPD, Lake County FPD, and local Homeowner's Associations to provide additional fire protection staffing and resources to the Riviera Heights, Point Lakeview, and Clear Lake Riviera fire stations. **M** |
| | Lake Pillsbury FPD, County, Forest Service, Pacific Gas and Electric (PGE), and Fire Chiefs explore options for additional funding and other resources for Lake Pillsbury FPD, including volunteer training opportunities on weekends. **M** |
| | Mendocino National Forest and PGE work with Lake Pillsbury FPD to provide additional equipment and fire protection services in the Lake Pillsbury areas. **M** |
| | Fire Protection Districts work with Lake County Fire Safe Council, and city, county, and federal agencies to develop a countywide volunteer firefighter recruitment program, especially targeting those communities with primarily volunteer staffing. **M** |
| | CAL FIRE evaluate options for repair and staffing of Mt. Konocti Lookout. **M** |
| **WATER** | Lake County Fire Safe Council, RCDs, watershed councils, and other interested partners educate rural residents on the needs and benefits of water storage. **S** |
| | Lake County Fire Safe Council and Plan Partners explore funding for a water storage program (water tanks or water tenders) in rural lands, especially on private lands not adjacent to federal lands, in areas such as Cobb Mountain, Hidden Valley Rancho, Jerusalem Grade, Morgan Valley, and Noble Ranch. **M** |
| | Lake County Fire Safe Council and Plan Partners explore funding for a water storage tank program on private lands not adjacent to federal lands, especially in Cobb Mountain, Hidden Valley Rancho, Jerusalem Grade, Morgan Valley, and Noble Ranch. **M** |
| | Fire Safe Councils, CAL FIRE, local governments, watershed councils, and other interested partners explore incentives for increasing water storage on private properties. **L** |
| | County and city governments, Fire Safe Councils, CAL FIRE, LCAQMD, social service agencies, and other interested partners explore options and incentives for funding low-income, rural water storage. **M** |
| | County, South Lake FPD, CAL FIRE, Calpine, and South Lake Fire Safe Council work with Cobb Area County Water District to develop additional water sources and capacity for fire protection. **M** |
| | County and Kelseyville FPD work with Buckingham Homeowner's Association to develop adequate water for fire protection within the development. **M** |
| | County and Kelseyville FPD work with Homeowner's Associations in the Rivieras to improve their hydrant systems. **M** |
| | Clearlake Oaks County Water District improve the hydrants on Widgeon Way and the Avenues. **L** |
| | Glenhaven Community Water develop a hydrant system for Glenhaven. **L** |
| | County work with Lakeport FPD, CAL FIRE, BLM, and other partners to explore water sources for fire protection in Scotts Valley, including the purchase of additional water tenders. **M** |
| | County work with Northshore FPD, CAL FIRE, USFS, and other partners to explore water sources for fire protection in Upper Lake, including the purchase of additional water tenders. **M** |

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| | Upper Lake Water District support the project to increase water line capacity and storage in the Upper Lake water system, including closing the loop from Old Lucerne to Main Street. **M** |
| | County, South Lake FPD, and CAL FIRE explore options to expand the hydrant system to the east side of Middletown and out Butts Canyon Road. **L** |
| | Callayomi County Water District work with South Lake FPD to explore hydrant system for Hilderbrand District, along Highway 29 south to the Napa County border, if and when service becomes available. **M** |
| | County work with Fire Chiefs to develop a policy whereby the County Assessor will not increase property values and taxes when water storage is added to private properties for the purpose of fire protection. **M** |
| | County Community Development ensure water for fire suppression needs is included in the development of the Integrated Water Management Plan, especially in terms of future development. **M** |
| **ROADS** | County and Cities Public Works Departments work with Fire Chiefs, Law Enforcement, Caltrans, Lake County/City Area Planning Council (APC), and CHP to identify road ingress and egress issues that increase emergency response times. **S** |
| | County and Cities Public Works Departments work with Caltrans, APC, and interested partners to secure funding and other resources to repair priority ingress & egress sites. **O** |
| **SIGNAGE OF ROADS AND STRUCTURES (ADDRESSING)** | Law Enforcement, CAL FIRE, federal agencies, County, and Cities collaborate to enforce existing signage requirements for streets and residences. **O** |
| | Law Enforcement, CAL FIRE, Fire Chiefs, federal, county, and city agencies, and Fire Safe Councils explore incentives for private road and address signage conformance, including public education. **M** |
| | Fire Agencies implement model signage program, similar to that developed by South Lake FPD, to expand it to other areas of the county. **S** |
| | County ensure all signage created in accordance with GP Policy OSC-2.3 Signage Program meets fire protection standards. **O** |
| **EVACUATION PLANNING AND EMERGENCY PREPAREDNESS** | |
| **DEVELOPING EVACUATION ROUTES AND SITES** | County OES, Law Enforcement, CAL FIRE, Lake Transit Authority, Caltrans, CHP, Red Cross, federal agencies, Fire Chiefs, and Fire Safe Councils collaborate to develop a detailed evacuation plan and update it as needed, using the information generated in this plan as a base. **M** |
| | County OES, Law Enforcement, CAL FIRE, federal agencies, Fire Chiefs, Fire Safe Councils, Red Cross, and Senior Centers develop and distribute evacuation-planning materials for all areas of the county based on the South Lake FSC Evacuation Plan model to educate residents on evacuation options in their communities. **O** |
| | County Social Services, OES, Senior Centers, Lake Transit Authority, Lake Family Resource Center, Law Enforcement, Fire Protection Districts, Redwood Coast Regional Center, Red Cross, Lake County Fire Safe Council, and other interested local, state, and federal agencies identify leadership and resources to develop evacuation programs for vulnerable populations. **M** |
| | County OES, Law Enforcement, CAL FIRE, APC, Caltrans, CHP, Red Cross, federal agencies, Fire Chiefs, and Fire Safe Councils explore roles and needs of using the county airport, airstrips, and heliports in evacuation planning. **M** |
| **GATES** | Law Enforcement, CAL FIRE, Fire Chiefs, federal agencies, Fire Safe Councils, and Homeowners Associations initiate informational programs to educate residents about the importance of easily passable gates during emergencies. **S** |

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| | County, Law Enforcement, Fire Chiefs, CAL FIRE, Fire Safe Councils, and Homeowners Associations explore incentives and options for fire-safe gates. **M** |
| | Hidden Valley Lakes Homeowners Association work with South Lake FPD to provide access through gates to Hidden Valley Ranchos for evacuation and fire protection. **S** |
| **ALTERNATE EVACUATION ROUTES** | County OES, Fire Chiefs, Law Enforcement, Lake Transit Authority, Caltrans, CHP, CAL FIRE, federal agencies, and Fire Safe Councils collaborate to explore the following evacuation routes: **M** |
| | - Alternate evacuation routes out of Riviera West and Clear Lake Riviera subdivisions to the south. |
| | - Alternate evacuation route out of north side of Clear Lake Riviera subdivision to Soda Bay Road. |
| | - Alternate evacuation route out of Riviera Heights Subdivision off of Westridge Drive or Circle to Soda Bay Road. |
| | - Alternate evacuation route out of Anderson Springs to Socrates Mine Road. |
| | - Alternate evacuation route out of Double Eagle to Benmore Canyon or Walker Ridge Roads. |
| | - Alternate evacuation route between Twin Lakes Subdivision and Perini Road. |
| | - Alternate evacuation route out of Donovan Valley. |
| | - Additional evacuation routes out of Gifford Springs and Jerusalem Grade. |
| | - Improve Point Lakeview Road for evacuation. |
| | - Brush back Seigler Canyon Road to improve it as evacuation route. |
| | - Options for evacuating lakeside communities with boats. |
| | Mendocino National Forest, County, and Northshore FPD explore feasibility of opening Garner Ranch Road to make safe evacuation route out of New Long Valley and Spring Valley. **L** |
| | Mendocino National Forest, BLM, County, and Northshore FPD explore feasibility of opening Wolf Creek Road north to Bartlett Springs to make safe evacuation route out of Spring Valley. **M** |
| | County Public Works, Fire Chiefs, Caltrans, Law Enforcement, and APC explore options to improve roads and signage in Anderson Springs, Widgeon Way, Jerusalem Grade, Double Eagle, Blue Lakes Road, and Laurel Dell Road. **M** |
| **EVACUATION SITES** | County OES, fire chiefs, law enforcement, CAL FIRE, federal agencies, Fire Safe Councils, Red Cross, County Social Services, and Senior Centers develop and/or upgrade appropriate sites identified at community meetings to function as evacuation sites and/or disaster centers during emergency situations. **M** |
| **EMERGENCY NOTIFICATION AND COMMUNICATIONS** | County OES, Fire Chiefs, Law Enforcement, CAL FIRE, and federal agencies explore options for emergency alert sirens and other emergency communication options for remote areas such as Lake Pillsbury and Double Eagle Ranch, and upgrading sirens in Cobb and Loch Lomond. **M** |
| **EMERGENCY PLANNING AND COORDINATION** | County OES organize regular coordination meetings (quarterly at a minimum) between Law Enforcement, Fire Protection Districts, County Community Development, Cities, APC, Fire Safe Councils, other emergency response providers including relevant state and federal agencies, and other interested partners to coordinate joint prevention and emergency response activities. S |
| | County OES organize regular, periodic, documented emergency response trainings and exercises, ranging from local to regionally synchronized, and from tabletop to detailed simulations. Follow sessions with after-learning period to facilitate effective communication and learning among partners, including Law Enforcement, Fire Protection Districts, County Community Development, Cities, APC, Fire Safe Councils, and other emergency response providers. S |

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| | County explore and identify appropriate local structure for seeking state and national emergency response and pre-disaster funding. **S, ★** |
| | County OES, Law Enforcement, Fire Protection Districts, and applicable city, state, and federal agencies maintain and update Lake County emergency response data with the County Information Technology Department (IT) to be shared with all participating agencies in accordance with GP Policy HS-8.8 Coordinate with Cities and Other Local Agencies and Policy HS-8.11 Critical Facilities. **O** |
| | County IT provide current available data and maps to any and all agencies and organizations (including Fire Safe Councils) participating in emergency response in Lake County. **O** |
| | Fire Protection Districts, CAL FIRE, law enforcement, and Fire Safe Councils work with County IT to update and maintain the Fire Run map book. **S, O** |
| | County IT work with OES, Law Enforcement, FPDs, CAL FIRE, APC, FSCs, and other interested partners to develop a GIS-based database of existing and proposed evacuation routes, sites, medical facilities, emergency call boxes, and other relevant evacuation resources. **M** |
| **RESIDENTIAL EMERGENCY PREPAREDNESS** | Lake County residents be prepared for wildfire and other emergencies by creating family disaster and evacuation plans. **S, O** |
| | Residents in remote, rural areas and Target Areas *(see above)* consider storing their most valuable items in a fire-safe urban area during extreme fire weather conditions. **S, O** |
| | County of Lake, Social Services, Red Cross, and other interested partners work with Seniors Centers to upgrade to Disaster Center Readiness level. **M** |
| | County OES and Social Services work with Senior Centers and other interested local, state, and federal partners to develop emergency planning resources and potential evacuation sites for all county residents. **M** |
| | County OES and Social Services work with local Senior Centers, Lake County Family Resource Center, and Red Cross to help residents plan and prepare for emergencies. **O** |
| | County OES, Law Enforcement, CAL FIRE, federal agencies, Fire Chiefs, Fire Safe Councils, Red Cross, Senior Centers, and Lake County Family Resource Center conduct disaster preparedness and emergency response drills for high-risk communities countywide. **S, O** |
| | County OES work with Spring Valley CERT to enhance and improve services. **M** |
| | County OES work with high-risk communities and Target Areas to develop new or enhance existing CERT programs. **M** |
| **SHELTERING IN PLACE** | County OES and Red Cross work with Fire Safe Councils, Fire Protection Districts, Law Enforcement, CAL FIRE, MNF, and BLM to develop local safety information in the event citizens are unable to evacuate. **M** |
| **EVACUATION PLANS FOR PETS AND LIVESTOCK** | Lake County Fire Safe Council work with Plan Partners, Red Cross, Humane Society, and local veterinarians to identify existing options for local pet and livestock emergency evacuation. Work through local feed stores, veterinarians, boarding facilities, and animal associations to educate residents on options. **M** |
| **INTEGRATING POLICY** | County Community Development work with OES, Mendocino National Forest, Bureau of Land Management, CAL FIRE, APC, and other relevant partners to ensure integration between planning efforts in Lake County that could affect the county's long-term fire safety, including at the community and Area Plan planning level. **O** |
| | County develop mandatory, enforceable disclosure regulations for all local real estate transactions regarding the wildfire risks and hazards identified in this CWPP. **M** |
| | County prioritize GP Policy LU-1.6 Paper Lot Consolidation in order to minimize WUI fire threats, especially in the communities of Nice and Lucerne. In those areas where paper lots are turned into open space, management plans shall include creation of shaded fuelbreaks along perimeters or ridges using conservation-based principles. **M** |

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| | Lake County Fire Safe Council work with Community Development and the local insurance industry to educate the industry on appropriate local defensible space practices, and provide materials for them to share with policyholders in accordance with GP Policy HS-8.6 Insurance Provisions. **S** |
| | Community Development work with Lake County Fire Safe Council to develop a fire-safe landscaping document to distribute to Lake County residents, in accordance with GP Policy OSC-1.7 Encourage Planting of Native Vegetation and Policy OSC-1.8 Native Vegetation for Landscaping. **S** |
| | County incorporate the fire planning concepts and actions outlined in this CWPP in its planning for Mount Konocti Public Lands. **M** |
| **PROMOTING FIRE SAFE EDUCATION** | Lake County Fire Safe Council work with CAL FIRE, MNF, BLM, NRCS[9], County, Cities, insurance industry, and others to implement a countywide community fire-safety education program, including Public Service Announcements in all local media. **S** |
| | Lake County Fire Safe Council work with federal agencies, County, Cities, and other interested partners to develop and fund a regular "Living with Wildfire" newspaper or magazine for Lake County residents. **S, O** |
| | Lake County Fire Safe Council work with CAL FIRE, MNF, BLM, and tribal experts to develop and implement a countywide education program on the benefits and risks of using controlled burning/prescribed fire, including the importance of minimizing air pollution during burning. **M** |
| | Lake County Fire Safe Council work with FPDs to explore a "Big Red Truck Program" (similar to that of Trintiy Fire Safe Council) for defensible space education and assessments. Research state and federal funding options for the program. **M** |
| **FIRE-SAFETY EDUCATION IN SCHOOLS** | Lake County Fire Safe Council work with agencies and school districts to implement fire-safety curricula in all grade levels throughout the county, in conjunction with community educational projects. **M** |
| | Lake County Fire Safe Council work with 4-H chapters to develop local fire-safety educational programs for local youth. **S** |
| | Lake County Fire Safe Council work with Chamber of Commerce and local industries to fund and develop a service-learning program in local high schools focused on fire safety and defensible space. **M** |
| **FIRE-SAFETY EDUCATION FOR NEW RESIDENTS AND TOURISTS** | Lake County Fire Safe Council, CAL FIRE, MNF, BLM, Fire Chiefs, and local governments develop fire-safety educational programs for real estate and development industries. **M** |
| | Lake County Fire Safe Council, County Visitor Information Center, CAL FIRE, MNF, BLM, Fire Chiefs, Chamber of Commerce, and local governments develop fire-safety educational programs for local tourism industries. **S** |
| | Lake County Fire Safe Council, CAL FIRE, MNF, BLM, Fire Chiefs, County Community Development, and local governments target fire-safety educational efforts to new residents, especially those coming from urban areas and others with little experience with fire in the wildland-urban interface. **M** |
| | Fire Safe Councils work with Senior Centers to develop a welcome-neighbor program—offering a welcome basket with fire-safety information for new residents. **S** |

[9] USDA Natural Resources Conservation Service

| | |
|---|---|
| **UTILIZING EXCESS FUELS** | Local economic development interests, Resource Conservation Districts, and Lake County Fire Safe Council explore options for utilization of materials generated from hazardous fuel-reduction efforts, including those collected through the County Green Waste program. **L** |
| | Lake County Fire Safe Council and Resource Conservation Districts work with landscaping community to utilize materials generated from the chipping and Green Waste programs, potentially as a funding source for these programs. **M** |
| | County and Cities work with Social Services to develop a voucher program to utilize Green Waste collection for low-income residents who are not already participating in refuse pickup service. **S** |
| | County and Cities Public Services work with Social Services to develop volunteer green waste pickup program for low-income, senior, and disabled residents who are unable to use other programs. **S** |
| | Fire Safe Councils work with local governments and LCAQMD to develop Green Waste collection days. **S** |
| | Lake County Fire Safe Council, MNF, and BLM investigate biomass options in neighboring counties for utilization of fuels from Lake County fuel-reduction efforts. **M** |
| **FACILITATING LAKE COUNTY FIRE SAFETY IN THE LONG TERM** | Public and private sector organizations, agencies, and individuals work with LCFSC and SLFSC to develop ongoing financial and in-kind support for FSC activities and development. **O** |
| | Lake County Board of Supervisors appoint county representatives to actively and regularly participate in the Lake County Fire Safe Council. These appointees could represent Community Development, Emergency Services, the Planning Commission, Social Services, Public Works, and/or the Board of Supervisors. **S,** ✯ |
| | All local, state, and federal public and private land management agencies appoint a representative to actively and regularly participate in the Lake County Fire Safe Council. **S,** ✯ |
| | Public and private sector organizations, agencies, and individuals (including County, RAC[10], MNF, BLM, and CAL FIRE) facilitate long-term funding to maintain a staff coordinator position at LCFSC. **O** |
| | Lake County FSC work with members and local, state, and federal partners to develop a strategic plan for the FSC to identify a successful long-term management structure and funding sources. **S** |
| | Lake County and South Lake FSCs work with MNF, BLM, RCDs, NRCS, and others to develop a long-term ecological monitoring program to track the effects of project activities on ecological processes and functions. **M** |
| | Lake County FSC work with Plan Partners to develop and implement a Strategic Planning Matrix to track project implementation. **S, O,** ✯ |
| | Lake County FSC, County, Cities, Fire Chiefs, and all plan signatories review the Lake County CWPP at least every five years and update it as needed, using a collaborative public process. **M** |

[10] Mendocino National Forest Resource Advisory Council

***Figure 3. Lake County Fuel-Reduction Priorities[11]***

| Community, Structure, or Area at Risk | Project Area/Description | Treatment | Priority 1[12], 2, 3 |
|---|---|---|---|
| All | Ongoing Fuelbreak Maintenance | Maintenance | 1-2-3 |
| All | Ongoing Prescribed Burning in MNF | Control Burn | 1-2-3 |
| Anderson Springs | Anderson Valley Road | Shaded Fuelbreak | 1 |
| Anderson Springs | BLM lands around the Geysers, CAL FIRE VMP | Control Burn | 1 |
| Blue Lakes | Ridgeline Fuelbreak from Blue Lakes to Highway 20 E | Shaded/Fuelbreak | 1 |
| Buckingham | Soda Bay Road (Black Forest) | Shaded Fuelbreak | 1 |
| Clear Lake Riviera | Fuelbreak around development, into and around Community Growth Boundary | Fuel Reduction, Shaded Fuelbreak | 1 |
| Clearlake | Chapman Tract | Fuel Reduction and Defensible Space | 1 |
| Clearlake Oaks | Cerrito and Alta Vista Drives clearance; Opening of Evacuation site at top (at water tank) | Clearance, Shaded Fuelbreak | 1 |
| Clearlake Oaks | Widgeon Way, Lakeview, Konocti Roads | Clearance | 1 |
| Cobb | Whispering Pines Fuel Reduction and Defensible Space | Shaded Fuelbreak with Defensible Space Assistance | 1 |
| Cobb | Bottle Rock Road | Shaded Fuelbreak, VMP | 1 |
| Cobb | Highway 175 Evacuation, Roadside Fuelbreak | Shaded Fuelbreak | 1 |
| Double Eagle | Double Eagle Road and spurs | Roadside Clearance Above and Below | 1 |
| Harbin Hot Springs and Neighboring Springs | Brush Clearing on Harbin Springs Road | Brush Clearing | 1 |
| Harbin Hot Springs and Neighboring Springs | Defensible Space and Fuel Reduction in the Various Hot Springs Resorts in the Area | Defensible Space and Fuel Reduction | 1 |
| Hidden Valley | Hidden Valley Fuel Break, Phase 1 | Fuelbreak /Defensible Space | 1 |
| Hidden Valley and Coyote Valley | West of Yankee Valley Road and Honey Hills Drive | Fuelbreak and/or Control Burn | 1 |
| Kelseyville Interface | Highway 29 to Lower Lake, Where Fuels are Dense | Shaded Fuelbreak | 1 |
| Kelseyville, Soda Bay, Buckingham, Riviera Heights, Riviera West, Clear Lake Riviera, Point Lakeview | Soda Bay Road | Shaded/Fuelbreak | 1 |
| Lake Pillsbury | Lake Pillsbury Ranch Road | Fuel Reduction | 1 |
| Lake Pillsbury, Upper Lake | Elk Mountain Road | Fuelbreak | 1 |
| Loch Lomond | Loch Lomond Road | Shaded Fuelbreak | 1 |

[11] Priorities are approximately considered as 1: 0-5 years, 2: 6-10 years, 3: 11+ years.

[12] Existing projects that are deemed important are also listed as 1st priority if they will be ongoing for several years.

| Community, Structure, or Area at Risk | Project Area/Description | Treatment | Priority 1[12], 2, 3 |
|---|---|---|---|
| Lower Lake, Cobb Mountain, Rivieras, Kelseyville | Highway 175 | Shaded/Fuelbreak | 1 |
| Lucerne | Fuel Reduction on Paper Subdivisions off of Ogden Road South of Town | Fuel Reduction | 1 |
| Lucerne | High Valley Road Shaded Fuelbreak | Shaded Fuelbreak | 1 |
| Morgan Valley | Rocky Creek Road | Fuel Reduction, Shaded Fuelbreak | 1 |
| Nice | Fuel Reduction on Paper Subdivisions Northwest of Town (between/around Sherman to Pyle Road) | Fuel Reduction | 1 |
| Nice, Lucerne, Upper Lake | Hogback Ridge Shaded Fuelbreak | Shaded Fuelbreak | 1 |
| Point Lakeview | Point Lakeview Road | Shaded/Fuelbreak | 1 |
| Point Lakeview | Anderson to Panorama to Sunrise Road | Shaded/Fuelbreak | 1 |
| Riviera Heights | Fuelbreak between development and Soda Bay | Fuel Reduction, Shaded Fuelbreak | 1 |
| Riviera West | Fuelbreak around development | Fuel Reduction, Shaded Fuelbreak | 1 |
| Scotts Valley | Continue control burn program for westside Scotts Valley | Control Burn | 1 |
| Scotts Valley | Hendricks Road | Brushing/Road Clearance | 1 |
| Scotts Valley | Cow Mountain Fuelbreak | Maintenance | 1 |
| Spring Valley | Wolf Ridge and Quartz Canyon | Control Burn | 1 |
| Upper Lake | Fuelbreak east side of Rancheria | | 1 |
| Upper Lake | Pitney Ridge (east of Upper Lake) | Shaded/Fuelbreak | 1 |
| Upper Lake, Nice, Lucerne, Glenhaven, Clearlake Oaks | High Glade Lookout to High Valley | Fuelbreak | 1 |
| Glenhaven | Glenhaven Drive and Leila Drive | Clearance, Shaded Fuelbreak | 2 |
| Blue Lakes | Control Burn North of Blue Lakes | Control Burn | 2 |
| Buckingham | Little Borax Lake Road | Fuel Reduction, Shaded Fuelbreak | 2 |
| Clear Lake Riviera | Wheeler Point | Fuel Reduction | 2 |
| Clearlake | Highway 53, Evacuation Route | Fuel Reduction, Shaded Fuelbreak | 2 |
| Clearlake | Clearlake Park | Fuel Reduction and Defensible Space | 2 |
| Clearlake | Sulfur Bank/Borax Lake | Fuel Reduction | 2 |
| Clearlake Oaks, Glenhaven | Hazardous Fuel Reduction in Hills behind Towns | Fuel Reduction | 2 |
| Cobb | Westside 175 and Bottle Rock Area | Shaded Fuelbreak, Fuel Reduction | 2 |
| Cobb | Gifford Springs Fuel Reduction and Defensible Space | Shaded Fuelbreak with Defensible Space Assistance | 2 |

| Community, Structure, or Area at Risk | Project Area/Description | Treatment | Priority 1[12], 2, 3 |
|---|---|---|---|
| Cobb | Pine Grove, Hobergs, and Other Populated Areas not yet Treated | Fuel Reduction | 2 |
| Double Eagle | Walker Ridge | Fuelbreak | 2 |
| Glenhaven | Harvey Drive | Clearance, Shaded Fuelbreak | 2 |
| Harbin Hot Springs and Neighboring Springs | Fuelbreak and Improved Access along Ridge Road Northwest of Harbin Springs Road | Shaded/Fuelbreak | 2 |
| Hidden Valley | Hidden Valley Fuel Break, Phase 2 | Fuelbreak /Defensible Space | 2 |
| Hidden Valley and Coyote Valley | Spruce Grove Road | Shaded Fuelbreak | 2 |
| Hilderbrand District | 29 Fire Fuels Clearance | Fuel Reduction | 2 |
| Jerusalem Valley | Jerusalem Grade Road | Shaded/Fuelbreak, Clearance | 2 |
| Kelseyville Interface | Upper Kelsey Creek along Roads | Shaded Fuelbreak | 2 |
| Kelseyville Interface | Highland Springs Recreational Area, Highland Springs Road | Shaded Fuelbreak | 2 |
| Kelseyville Interface | Mount Konocti | Fuel Hazard Reduction | 2 |
| Kelseyville Interface | Adobe Creek, Fuel Reduction along Roads and adjacent to Defensible Space Areas | Wildland Fuel Hazard Reduction, Shaded Fuelbreaks | 2 |
| Lake Pillsbury | Rice Fork Fuel Reduction, South of Scott Dam | Fuel Reduction | 2 |
| Lake Pillsbury | Northeast of Lake Pillsbury Ranch | Control Burn | 2 |
| Lakeport | Brewery Hill | Fuel Reduction, Defensible Space | 2 |
| Lakeport | North Lakeport Fuelbreak and Defensible Space | Shaded/Fuelbreak, Defensible Space | 2 |
| Loch Lomond | Cooper and Water Company Lands | Shaded Fuelbreak | 2 |
| Loch Lomond | Parady Property | Control Burn | 2 |
| Loch Lomond | Bonanza Springs | Shaded Fuelbreak | 2 |
| Loch Lomond | Siegler Springs North | Shaded Fuelbreak | 2 |
| Loch Lomond | Siegler Canyon | Shaded Fuelbreak | 2 |
| Loch Lomond | Shenandoah Road | Shaded Fuelbreak | 2 |
| Long Valley, New Long Valley | Garner Ranch Road | Shaded Fuelbreak, Clearance, Road Repair | 2 |
| Lower Lake, Morgan Valley | Ridge southwest of Dry Creek | Shaded Fuelbreak, Control Burn | 2 |
| Lucerne | Fuel Reduction on Hillside behind Town, between Bartlett Springs and High Valley | Fuel Reduction and Eventual Control Burn | 2 |
| Lucerne | Fuel Reduction on Paper Subdivisions off of Bartlett Springs and Foothill Drive, North of Town | Fuel Reduction | 2 |
| Lucerne | Fuel Reduction in North Side Canyon behind Rancho Vista | Fuel Reduction | 2 |
| Middletown | Dry Creek Road | Brush Clearing | 2 |
| Middletown | Middletown Rancheria | Brush Clearing, Control Burn | 2 |
| Riviera Heights | Fuelbreak around Development | Fuel Reduction, Shaded Fuelbreak | 2 |

| Community, Structure, or Area at Risk | Project Area/Description | Treatment | Priority 1[12], 2, 3 |
|---|---|---|---|
| Riviera West | BLM Buckingham Bluff Properties between Riviera West, Buckingham, and Riviera Heights, Fuel Reduction with Control Burn Where Possible | Hazardous Fuel Reduction, Control Burn | 2 |
| Scotts Valley | Cow Mountain Fuelbreak Expansion | Fuelbreak | 2 |
| Scotts Valley | Upper Scotts Creek Watershed | Control Burn Mosaic | 2 |
| Twin Lakes | Twin Lakes Defensible Space and Neighborhood Fuel Reduction | Defensible Space, Fuel Reduction | 2 |
| Twin Lakes | Murphy Springs/Perini Hill – Organize Neighborhood through LCFSC | Fuel Reduction and Defensible Space | 2 |
| Guenoc Ranch | Northwest of Proposed Development, between McCreary Lake and Coast Guard | Shaded/Fuelbreak | 3 |
| Finley | Ecologically Appropriate Tule Fuel Reduction | Fuel Reduction | 3 |
| Harbin Hot Springs and Neighboring Springs | Shaded Fuelbreak North of Harbin | Shaded Fuelbreak | 3 |
| Kono Tayee | Bruner Road | Shaded Fuelbreak | 3 |
| Lower Lake, Morgan Valley | Ridge between Herndon Creek, Ferris Canyon, and Cache Creek | Shaded Fuelbreak | 3 |

*For more information on the Action Plan, see Chapter 8.*

## VIII. Fire Safety and Defensible Space for Lake County Residents and Land Managers

Residents in the "wildland-urban interface," or "WUI" (pronounced "woo-ee"), are usually at the greatest risk from wildfire. When they understand what steps they can take to make their homes and properties more fire safe, they are generally motivated to do so. Appendix C of this CWPP includes general and specific description of how Lake County residents can prepare for and eventually defend themselves when faced with wildfire.

Wildfire behavior depends on fuel, weather, and topography. "Fuel" refers to all burnable materials including (but not limited to) living or dead vegetation, structures (including homes), and chemicals that may feed a fire. Fuel is the one factor that communities have some capacity to control. This Plan focuses on how fuel can be mitigated to enhance community safety while protecting conservation values. It also outlines necessary steps to increase the success of fire protection efforts (e.g. adequate addressing, signage and roads, proper turnarounds, secondary access, water supply, etc.).

One of the most important concepts introduced in this CWPP is that of defensible space. This means creating a space around residences/structures to enhance the chances of structural and human survivability. It also means creating a home that fire fighters can safely defend. A structure has a greater than 80% chance of surviving a wildfire if it has adequate defensible space and is made of ignition-resistant materials.[13] This CWPP documents the various elements that make up defensible space in clear, action-oriented terms. It includes various ways that residents can enhance their chances of surviving a fire, including the use of ignition-resistant building materials and construction methods, water storage, escape plans, landscaping, and fuel hazard reduction.

Additionally, various actions that community members can take when a wildfire threatens are identified. These include actions such as safe and effective evacuation, keeping friends and family members informed of plans and whereabouts, gas/propane shut-off, water preparation and use, preparing homes to survive an oncoming fire, and emergency communication.

Beyond the home, fuel reduction in the wildland-urban interface is critical to help create fire-safe communities, and eventually fire-permeable and fire-resilient landscapes. Wildland fuel hazard reduction methods are described in Appendix D, with practices identified that are consistent with the Conservation Principles. This document includes comprehensive information on all types of fuel-reduction methods so land owners and managers can knowledgably choose the most appropriate practices for their particular site within Lake County. The intent is to inform and empower Lake County landowners (large to small) to work together on fuel management toward a fire-safe community, and a healthier wildland environment. This is where innovative, ecologically savvy fuel-reduction treatments can be accomplished, in an effort to begin the restoration process for previously impacted and degraded landscapes.

*For more information on fire safety and fuel reduction, see Appendices C, D, and F.*

[13] Ethan Foote. "Wildland-Urban Interface Ignition-Resistant Building Construction Recommendations" from the 2004 Community Wildfire Protection Plan Workshops, by the California Fire Alliance and the California Fire Safe Council. August 2004.

# IX. Facilitating Lake County Fire Safety in the Long Term

A community fire plan is only as effective as the community charged with implementing it. Lake County is fortunate to have many people and resources committed to fire safety over the long-term. The will to succeed and the *social capital* exist now within Lake County for the effective implementation of this CWPP.

## IX.A. Monitoring

Monitoring the success of CWPP-identified actions is important to the ongoing success of these fire safety and prevention efforts. This CWPP is based on the collective experience of participants, Lake County knowledge, lessons learned from Fire Safe Councils statewide, and the best available science. However, community fuel reduction and fire safety is an evolving field. Restoring landscapes to be more fire adaptive is a long-term process. Mistakes will be made; they are part of re-learning how to live in balance with wildfire, rather than trying to control and suppress it regardless of the cost. Hence, it is important to monitor the actions identified within this CWPP to understand the actual impact they are having meeting its objectives: to minimize ignitions, decrease intensity, decrease damage, increase permeability, and increase resiliency. In addition to how successful projects are to reduce fuels and the impact of fire, monitoring also refers to tracking how projects affect ecological process and function. From the outset, projects need to be designed to have minimal adverse ecological impact.

Chapter 9 includes suggestions for how to monitor both the projects implemented from this CWPP, and their ecological impact. A Strategic Planning Matrix is shown for ongoing project and CWPP monitoring and implementation. Ongoing project maintenance is also discussed.

*For more information on monitoring and maintenance, see Chapter 9.*

## IX.B. Updating This Plan

No plan is ever permanent. This CWPP was written in 2009 based on current conditions and best available information. The field of fire safety is rapidly changing. It is likely that new developments will occur in the coming years. Therefore, it will be important to review this CWPP at least every five years (depending on available resources). This process can be facilitated by the Lake County Fire Safe Council. Copies of this CWPP will be available for public review at the Lake County Administrative Office (Courthouse), public libraries, and other locations throughout the county

## IX.C. Needed Resources

The Lake County Fire Safe Council will be the principal organization charged with implementing this CWPP. Therefore, it will need to have a structure in place to oversee plan implementation. A coordinator was hired in 2009 with funding from the County of Lake. It will be important to maintain and augment this funding source over time, to ensure CWPP and project continuity.

The success of the Fire Safe Council will also depend on the ability of participating organizations to contribute resources to the Council and its projects. A strategic plan for the Council will need to be developed to identify both a successful long-term management structure that maximizes resident and agency participation, and a long-term funding strategy to ensure its survival.

*For more information on updating this CWPP and needed resources, see Chapter 9.*

# Lake County Community Wildfire Protection Plan

## Table of Contents

**Chapter 9. Facilitating Lake County Fire Safety in the Long Term**

# 1. The Lake County Community Wildfire Protection Plan

## 1.1. Plan Purpose

The Lake County Community Wildfire Protection Plan is a project of the County of Lake and the Lake County Fire Safe Council (LCFSC).

The purpose of this Community Wildfire Protection Plan (CWPP) is:

- To identify priority projects that reduce risks and hazards from wildfire while protecting conservation values in Lake County, California. Goals are to be achieved principally through prioritization and implementation of fuel hazard reduction, fire safety, community education, and fire-protection projects and activities.
- To provide community priorities for conservation-based fuel reduction on public lands, and to provide community direction for federal land management within the county.
- To provide conservation-based fire safety educational information to residents of Lake County.
- To provide a positive balance among fire prevention, conservation, and wildlife protection.
- To coordinate fire protection strategies across property boundaries, including evacuation planning and preparation.
- To encourage the integration of private land management goals with community needs and expectations for fire safety.
- To create ecologically sustainable biomass utilization and removal projects within Lake County.
- To provide a guiding document for future actions of the Lake County Fire Safe Council, land management agencies, private landowners, and local emergency service providers.
- To provide a guiding document for government agencies in developing fire safe practices and policies.
- To meet the requirements under the National Fire Plan and other government funding sources.

## 1.2. Organization of This Document

This CWPP is organized into nine chapters, six appendices, and three references. The content and purpose of each document is described below.

**Living with Wildfire: Lake County CWPP Overview and Summary** is an abridged version of the entire CWPP, including the complete results of the risk assessment and action plan.

**Chapter 1 – Plan Introduction** is an introduction to the document and to Lake County. This chapter is especially written for those unfamiliar with Lake County.

**Chapter 2 – Lake County Fire Safe Planning Process** summarizes this CWPP's public process, outlining the steps taken to meet the collaboration requirements of a CWPP.

**Chapter 3 – Wildfire: Current Environment and Behavior** introduces wildfire concepts and issues in Lake County. This chapter provides a basic introduction to fire science for residents who want to better understand it.

**Chapter 4 – Fire Ecology and Management of Lake County Vegetation Types** summarizes the common vegetation types found in Lake County, their fire ecology, and conservation and fuel management considerations. This chapter provides background information for those in Lake County who would like to manage their lands to reduce wildfire risks and hazards while restoring ecological functions.

**Chapter 5 – Lake County Community Context** describes the social, political, and community-planning context in the county; including a discussion of land ownership and management. This chapter was written to facilitate better integration of wildfire issues into the county's existing planning and land management.

**Chapter 6 – Fire Protection Organizations** summarizes current fire protection resources and issues, and identifies needs of existing fire protection agencies.

**Chapter 7 – Risk Assessment: Identifying and Evaluating Assets at Risk** summarizes assets at risk and the community risk assessment process and results.

**Chapter 8 – Action Plan** identifies actions to reduce risks and hazards from wildfire in Lake County.

**Chapter 9 – Facilitating Lake County Fire Safety in the Long Term** discusses monitoring and long-term steps to maintain and update this CWPP.

The appendices and references contain pages that can be copied and/or removed for ongoing reference.

**Appendix A – Community Meeting Notes** contains the notes from the community meetings held in the fall of 2008 as part of this planning process.

**Appendices B1 – Community Meeting Data,** and **B2 – Maps,** contain a summary of the data and the maps generated from the 2008 community meetings.

**Appendix C– Wildland Fire Safety at Home** explains conservation-based wildfire safety principles and practices that can be used around homes and structures to improve residential fire safety.

**Appendix D – Wildland Fuel Hazard Reduction** describes conservation-based fuel-reduction methodologies and prescriptions that can be used on Lake County's *wildlands,* both public and private.

**Appendix E – GIS Data** contains a description of maps created and sources used.

**Appendix F – Fire Safety Information** is a set of Internet links and other background documents.

**Appendix G – Fire History Data** contains the data on which the fire history maps in Chapter 3 are based.

There is a series of reference information in separate documents. These contain general information that can be used by residents to further fire safety in the county. The references include:

**Reference I – Glossary** defines the terms used in this Plan. Upon first appearance within the text, glossary terms are italicized (as with the word "*wildlands*" above).

**Reference II – Internet Links for Further Information** provides references for further information on topics discussed throughout this Plan.

**Reference III – Literature Cited** provides references for literature cited in this Plan.

## 1.3. Lake County Community Description

Lake County lies in Northern California's Coast Range. It is approximately 100 miles north of San Francisco, 90 miles northwest of Sacramento, and 35 miles east of the Pacific Ocean. *(See Map 1-1 at the end of this chapter.)*

Originally and to this day the home of the Pomo Indians, Lake County was officially formed on May 2, 1861, from land separated mainly from the former Napa County, with small portions coming from Mendocino County and Colusa County. This was 10 years following the 1850 admission of California Statehood into the Union and the establishment of the 27 original California Counties. Lake County is now bordered by Mendocino County to the north and west, Yolo, Colusa, and Glenn Counties to the east, and Sonoma and Napa counties to the south.

Clear Lake, the largest natural freshwater lake entirely within California, is the centerpiece of the county. It has a total surface area of 68 square miles (43,000 acres), more than 100 miles of shoreline, and sits at an elevation of 1,326 ft. above sea level. Most Lake County communities, and hence the greatest population density in the area, are situated around the lake.

There are four main watersheds in the county: Upper Cache Creek, Upper Putah Creek, Upper Stony Creek, and the Upper Mainstem Eel River. Cache Creek, portions of which are recognized as a State Wild and Scenic River, flows south/southeast in the eastern portion of the county. Putah Creek flows south/southeast in the southern portion of the county. Stony Creek flows south/southeast in the northeastern portion of the county. The Eel River flows south into Scott Dam to form Lake Pillsbury, and then flows west out of Lake Pillsbury in the northern portion of the county. Topography within the county is mainly hilly and mountainous with several large agricultural valleys, and elevations ranging from approximately 640 ft. to 6,873 ft.

The climate in Lake County is characterized by cool wet winters and hot dry summers. The average annual precipitation ranges from 24 inches in the lower areas to 70+ inches in the mountainous regions, mostly in the form of rain. (*For more precipitation information, see the Hydrology Map 3-1 in Chapter 3.)* Temperatures range from an average low of 32˚ F in the winter months to average highs of 95˚ F in the summer months.

Lake County is known nationally for its excellent air quality. In 2009 it was reported 3rd best in the nation and scored an overall "A" rating from the American Lung Association.[1] It is currently the only Air District in the State of California to meet all ambient air quality standards, both State and Federal.[2]

The total county land base is 1,327 square miles (849,678 acres). Approximately 51% (435,500 acres) of the county is managed publicly by the US Forest Service, US Bureau of Land Management, California Department of Fish and Game, California State Parks, and the County of Lake. The northern portion of the county is mostly the Mendocino National Forest, and includes portions of the Snow Mountain, Yuki, and Sanhedrin Wilderness areas. The Cache Creek Wilderness is also located in the county. *See Figure 1-1 for a list of public land managers.*

***Figure 1-1. Public Land Managers in Lake County***

| Agency | Name | Number of Acres |
|---|---|---|
| **USDA[3] Forest Service** | Mendocino National Forest (This includes the 347-acre Yuki Wilderness, the 281-acre Sanhedrin Wilderness, and a portion of the 37,000-acre Snow Mountain Wilderness.) | 256,725 |
| **US DOI[4] Bureau of Land Management** | Cow Mountain Recreation Area | ~52,000 |
| | Indian Valley Recreation Area | ~ 31,000 |
| | Cache Creek Natural Area (includes Cache Creek Wilderness) | 27,245 |
| | Knoxville Recreation Area | ~ 4,000 |
| | Portion of The Geysers | ~ 2,000 |
| | Black Forest/Mt. Konocti | 912 |
| **California State Lands** | Boggs Mountain Demonstration Forest | 3,493 |
| | Anderson Marsh State Historic Park | 870 |
| | Clear Lake State Park | 300 |
| **CA Dept. of Fish & Game** | Indian Valley Wildlife Area | 4,988 |
| | Cache Creek Wildlife Area | 2,330 |
| | Boggs Lake Ecological Reserve (owned and co-managed by The Nature Conservancy) | 153 |
| | Rodman Slough | 108 |
| | Clear Lake Wildlife Area | 97 |
| | Loch Lomond Vernal Pool Ecological Reserve | 8 |
| **Native American** | Robinson Rancheria of the Pomo Indians | 1,200 |
| | Big Valley Rancheria | ~ 350 |
| | Middletown Rancheria | 110 |
| | Elem Indian Colony | 52 |
| | Scotts Valley Band of the Pomo Indians | 35 |
| | Lower Lake Rancheria of the Koi Nation | 0 |
| | Habematolel Pomo of Upper Lake Rancheria | 0 |
| **Lake County** | Helen Mitcham Park | 203 |
| | Trailside Nature Preserve | 107 |
| | Spring Valley Lake Greenbelt | 55 |

[1] American Lung Association. *State of the Air Report 2009.* p. 24 and p. 54. www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf.

[2] Douglas Gearhart. Lake County Air Quality Management District. Air Pollution Control Officer. Personal Communication. May 1, 2009.

[3] USDA: United States Department of Agriculture.

[4] US DOI: United States Department of Interior, or "DOI".

| Agency | Name | Number of Acres |
|---|---|---|
| | Lakeside Park | 53 |
| | Rodman Slough | 40 |
| | Upper Lake Park | 8 |
| | Library Park | 3 |
| | Kelseyville Park | 3 |
| | Alpine Park | 1.5 |
| | Keeling Park | 1.5 |
| | Hinman Park | 1 |
| | Lower Lake Park | 1 |
| | Lucerne Clubhouse | 1 |
| | Lucerne Harbor | 1 |
| | Middletown Park | 1 |
| | Nice Beach | 1 |
| | Pioneer Park | .25 |
| **Lake County Water Resources** | Highland Springs Recreation Area | 3,200 |
| **Lake County Land Trust** | Rodman Slough Preserve | 132 |
| | Rabbit Hill | 7 |
| | Chaparral Preserve | 2.5 |
| **University of California Natural Reserve System** | McLaughlin Natural Reserve | 2,459 |
| **Clearlake** | Austin Park | 20 |
| | Redbud Park | 15 |
| | Highland Park | 1 |
| **Clearlake Oaks** | Nylander Park | 1 |
| **Lakeport** | Westside Community Park | 55 |
| | Westshore Pool | .5 |

According to the 2000 US Census there were 58,309 residents in Lake County. In 2007 it was estimated that 64,664 people called Lake County home. In 2006 it was estimated that there were 34,516 housing units within the county and that the median income was $38,113.[5] *See Map 1-2 at the end of this chapter for the geographical distribution of Lake County residents in relation to existing communities and the county General Plan projected growth boundaries.*

According to the 2008 Lake County General Plan, Lake County includes two incorporated cities, eleven major unincorporated communities, and six areas of "special interest." The two incorporated cities are Lakeport (the county seat), and Clearlake (the largest population center).

The eleven major unincorporated communities are:

- Clearlake Oaks
- Clear Lake Riviera
- Coyote Valley
- Kelseyville
- Lower Lake
- Lucerne
- Middletown
- Nice
- North Lakeport
- Soda Bay

[5] U.S. Census Bureau. *State & County Quickfacts.* http://quickfacts.census.gov.

- Upper Lake

The six areas of "special interest" are:

- Blue Lakes
- Cobb/Loch Lomond Mountain areas
- Glenhaven
- Guenoc Ranch
- Lake Pillsbury area
- Spring Valley Lake

The major roadways that traverse the county include State Routes 20, 29, 53, and 175. Highway 20, which runs east-west through the county and joins up with Highway 101 (on the west) and Interstate 5 (on the east), is a major transportation corridor through the county. This route gives access to many communities on the northern edge of Clear Lake. Route 29 runs through Napa County to the south and meanders north and west, around the southern end of Clear Lake, then through Lakeport until it reaches Highway 20 in Upper Lake. This route gives access to communities in the southern portion of the county as well as the southern and western shore of Clear Lake. Route 53 runs north-south along the eastern portion of Clear Lake and adjoins Highway 20 in the north and 29 in the south. This route gives access to communities on the eastern end of Clear Lake, mainly Clearlake and Lower Lake. Route 175 gives access to communities in the southwestern portion of the county, especially the areas around Cobb Mountain.

## 1.4. Lake County Communities at Risk

On January 4, 2001, for the purposes of the National Fire Plan, the Department of Interior (DOI) published in the *Federal Register* a "Notice of Urban-Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk from Wildfire." In Lake County, Cobb, Clearlake, Hidden Valley Lake, Kelseyville, Lakeport, Lower Lake, Lucerne, and Nice were part of this original list of communities to be designated as "communities within the vicinity of federal lands that are at high risk from wildfire," more commonly known as "Communities at Risk" or CAR. On August 17, 2001, the DOI added Anderson Springs, Blue Lakes, Middletown, The Geysers, Upper Lake, and Witter Springs to the CAR list.

After the 2000 fire season, the California Department of Forestry and Fire Protection (CAL FIRE) worked with the California Fire Alliance[6] and developed a list and associated map of communities at risk from wildfire. In addition to the above-mentioned communities, they added Clearlake Oaks, Glenhaven, and Loch Lomond.[7]

Thus, many of the populated areas within the county have already been given the CAR designation either at the federal or state level. The existing Communities at Risk are shown in the following table. Map 1-3 at the end of this chapter also shows these existing CARs, as well as those proposed to be added by this CWPP. *See Chapter 8 for more information on proposed CARs.*

***Figure 1-2. Lake County Designated Communities at Risk***

| Community at Risk | Threat Level[8] | Federal Adjacency?[9] | Source of Designation |
|---|---|---|---|
| Anderson Springs | 3 | F | DOI, *Federal Register*, 8/17/01 and CDF/CA Fire Alliance, 2001 |
| Blue Lakes | 3 | F | DOI, *Federal Register*, 8/17/01 and CDF/CA Fire Alliance, 2001 |
| Clearlake | 3 | F | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| Clearlake Oaks | 3 | | CDF/CA Fire Alliance, 2001 |

[6] The California Fire Alliance is an interagency forum made up of the leadership of federal, state, and local agencies who address wildfire issues in California. www.cafirealliance.org.

[7] California Fire Alliance. *Communities At Risk History.* http://cafirealliance.org/communities_at_risk/communities_at_risk_history.

[8] The Threat Level Code designates a community's fire threat level, with 1 indicating the least threat, 3 indicating the highest threat.

[9] Lands adjacent to federal lands are indicated as such with a mark in this column.

| Community at Risk | Threat Level[8] | Federal Adjacency?[9] | Source of Designation |
|---|---|---|---|
| Cobb | 3 | F | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| Glenhaven | 3 | | CDF/CA Fire Alliance, 2001 |
| Hidden Valley Lake | 3 | F | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| Kelseyville | 3 | F | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| Lakeport | 2 | | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| Loch Lomond | 3 | | CDF/CA Fire Alliance, 2001 |
| Lower Lake | 3 | F | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| Lucerne | 3 | F | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| Middletown | 3 | F | DOI, *Federal Register*, 8/17/01 and CDF/CA Fire Alliance, 2001 |
| Nice | 3 | F | DOI, *Federal Register*, 1/4/01 and CDF/CA Fire Alliance, 2001 |
| The Geysers | 3 | F | DOI, *Federal Register*, 8/17/01 and CDF/CA Fire Alliance, 2001 |
| Upper Lake | 2 | F | DOI, *Federal Register*, 8/17/01 and CDF/CA Fire Alliance, 2001 |
| Witter Springs | 2 | F | DOI, *Federal Register*, 8/17/01 and CDF/CA Fire Alliance, 2001 |

## 1.5. Lake County Fire Protection Areas and Agencies

There are six county Fire Protection Districts, as well as CAL FIRE and the USFS that provide fire-fighting services to Lake County. All of these fire-fighting agencies have the responsibility to provide emergency services within their jurisdictional boundaries. These jurisdictions include Federal Responsibility Areas (FRA), State Responsibility Areas (SRA) and Local Responsibility Areas (LRA). Jurisdictions are based on a variety of factors such as federal ownership, urban areas, and wildland areas. Different fire-fighting agencies will be dispatched to certain areas based on these different jurisdictional boundaries. However, jurisdictional boundaries are often crossed in order to provide the best emergency services to all areas within the county.

On FRA lands, federal agencies have primary responsibility for fire protection. Federal agencies (in Lake County the US Forest Service Mendocino National Forest) have responsibility to provide wildland resource fire protection on FRA lands in Lake County. This includes the financial responsibility of preventing and suppressing fires. Federal lands managed by the Bureau of Land Management (BLM) within the county have the same legal obligations, but they are contracted to CAL FIRE to provide fire protection. BLM does not have fire-fighting resources in Lake County, which makes contracting with CAL FIRE beneficial. However, in the event of a fire on or threatening BLM property, CAL FIRE will consult with BLM managers on suppression tactics.

State Responsibility Area (SRA) lands are defined based on land ownership, population density, and land use. CAL FIRE determines SRA lands per the guidelines established by the State Board of Forestry and Fire Protection. CAL FIRE has a legal responsibility to provide wildland resource fire protection on all SRA lands, including the financial responsibility of preventing and suppressing fires.

Lands in incorporated cities or surrounded by federal land are excluded from SRA lands. For example, CAL FIRE does not have responsibility for densely populated areas or agricultural lands. To more efficiently provide protection over a more contiguous land base, CAL FIRE swaps protection areas with other agencies, with the resulting lands being called CALFIRE Direct Protection Areas.

Local fire districts and urban fire departments are responsible for providing structure protection on SRA lands. They are also responsible for providing all fire protection on Local Responsibility Area (LRA) lands. Therefore, LRA lands are not the responsibility of federal or state agencies. All LRA lands within the county are within the existing boundaries of the local Fire Protection Districts.

As stated above, CAL FIRE provides emergency medical and fire services on SRA lands throughout the state. However, during the non-fire season, seasonally staffed stations reduce or eliminate personnel because of the overall lack of fire risk during the winter months. During this time, local fire departments must continue to provide service. Many rural fire departments throughout the state find it financially beneficial to contract with CAL FIRE in order to continue providing service even during the non-fire season. These "Amador Plans, " such as the one between CAL FIRE and the South Lake County Fire Protection District, help to maintain sufficient

emergency fire and medical services during the non-fire season at a cost that is lower than if the city/county had to provide fire personnel.

*For a map of current FRA, SRA, and LRA designations as identified by cooperating state and federal agencies, see the Fire Protection Resources Map 6-1 in Chapter 6.*

The following fire protection agencies provide fire protection services to residents in the planning area. *For more information on these agencies and their services and needs, see Chapter 6.*

- Kelseyville Fire Protection District
- Lake County Fire Protection District
- Lake Pillsbury Fire Protection District
- Lakeport Fire Protection District
- Northshore Fire Protection District
- South Lake County Fire Protection District
- CAL FIRE – Sonoma-Lake-Napa Unit
- US Forest Service – Mendocino National Forest

## 1.6. Introduction to Lake County Fire Safe Councils

The Lake County Fire Safe Council (LCFSC) was started as an advisory committee to the Lake County Board of Supervisors in 2000. Assisted by a grant obtained by the West Lake Resource Conservation District (WLRCD), LCFSC developed an initial countywide Fire Safe Plan, held workshops to provide fire safety education to citizens, provided community chipping days, and partnered in the creation of a fuel break which addressed private property issues in the wildland-urban interface.

A Fire Protection Workshop in March 2009 covered the history of local fires, current hazardous fuel reduction ordinances, community fire-safe preparations, and introductions to local fuel reduction specialists. The intent was to activate citizens to do the necessary fuel reduction work before fire season starts. The Council participated in the development of this Community Wildfire Protection Plan (CWPP), in partnership with the County of Lake and ForEverGreen Forestry. The FSC helped organize the ten community meetings throughout the county to gather citizen input for the document *(see Chapter 2)*. The development of Lake County's CWPP has LCFSC members enthusiastic and proactive about fire prevention, with a new respect for the safety of the men and women who strive to help us protect our homes. The County of Lake recently set aside funds to provide a coordinator for the Council to assist with education, organization, planning, project development, grant writing, and project implementation.

The South Lake Fire Safe Council (SLFSC) started in 2001, and is a non-profit organization with an active community volunteer program. SLFSC serves residents and property owners in the 286-square-mile South Lake County Fire Protection District. The group organizes a free-chipping program, is actively working on shaded-fuel breaks in strategic areas of their district, and has an in-school education program. They donate fire safety calendars to the local schools, and a new fire safe tip is discussed each month as part of the students' lesson plan. SLFSC is also contributing to the development of this CWPP.

For more information on the Lake County Fire Safe Council, please contact them at 707-263-4180, ext 16. To contact the South Lake Fire Safe Council, please call 707-987-2857.

## 1.7. Fire Safety Objectives

This Plan was developed as a result of concerns about community and firefighter health and safety, as well as the desire to conserve and protect Lake County's natural resources. The following objectives are addressed:

### Minimize Ignitions

Unplanned ignitions should be minimized. Numerous ignitions place a strain on fire-fighting resources, which can lead to high levels of damage because of greater fire area burned.

### Decrease Intensity

One factor that disposes structures to fire damage is fire intensity, or the amount of heat transferred to the structure. High-intensity fires also are most likely to produce *crown fires* and *torching.* Embers created from these crown fires are lofted well ahead of the fire front, creating numerous *spot fires,* and they are often the cause of structures burning. The level of fire intensity greatly influences the damage to natural resources. Every ecosystem is adapted to a range of fire intensities; most of Lake County was historically characterized by low- or medium-intensity fire.[10] Higher-intensity fire causes a greater level of damage, such as erosion, degraded water quality, air pollution, tree mortality, visual blights, and a decline in certain wildlife habitats.

### Decrease Damage

Fire is part of the natural ecology of Lake County. In contrast, wildfire damage to structures and human improvements needs to be minimized. Increasing fire safety will help limit smoke pollution from conflagrations, helping to minimize damage to local air quality.

### Increase Permeability

A principle goal is to allow fire to return to the landscape to play its natural role, without the associated losses and other negative effects such as excess smoke. This describes the concept of permeability, whereby fire can spread through a community with minimal negative impact. The perfect situation will be one in which vulnerable resources are protected while "cool" fire burns under its normal regime.

### Increase Resiliency

An important objective is to rebound quickly after a wildfire burns through a community. Fires of small size or limited damage support a more rapid recovery. Communities with greater preparation for wildfires (rehearsed evacuations, established communication protocols, effective collaboration among agencies, etc.) also have greater resiliency against fire and other disasters.

[10] See Chapter 3 and Map 3-6 Fire Regime, for more information.

## 1.8. Conservation Principles for Community Wildfire Protection[11]

*This document is based on the following conservation principles. These principles were developed in 2007 by a Steering Committee of California agency, conservation, and scientific fire experts. They were modified here to apply to Lake County. The principles were written to be used as a guide for residents in rural areas.*

Most residents choose to live here because of the scenic beauty, clean air, and closeness to nature. What many of us don't realize is that living within these forests and wildlands 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 Lake County. It will show you how to achieve a positive balance among *fire prevention*, conservation, and wildlife protection. You've chosen to live here, and with your choice comes a stewardship responsibility.

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

**Some Basic Concepts to Remember for Living with Wildfire**

- **Fire is a dynamic element of California.** If you live in or near a wildland area, 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 "fireproof" your property, there are many steps you can take to survive inevitable wildfire. *For more information see: www.fire.ca.gov/communications/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, fire department, Cooperative *Extension Agent*, *Registered Professional Forester,* and/or contractors to design the appropriate *fire-safe practices* and *defensible space* for your 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.*** It is located in the midst of a much larger landscape. Think about where your property is on the *slope.* 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,"* 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* 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.*

- **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* 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)* act as a *wick* to move fire horizontally across the land. Shrubs, small trees, and live branches *(ladder fuels)* can carry fire vertically into the larger trees. Too much of these surface and ladder fuels can cause the *overstory* 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

[11] For more information, see ForEverGreen Forestry's *Conservation Principles for Community Wildfire Protection in California's Sierra Nevada* at www.forevergreenforestry.com/SierraConservationCWPP.html.

and horizontally) so a fire cannot climb easily from the ground into the trees or to your home. *See www.bcwildfire.ca/FightingWildfire/behaviour.htm.*

- **Timing is everything.** There are appropriate times for different activities on your property, much as there are different seasons of work in your garden. Perform 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 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 the winter and spring; start clearing when the ground begins to dry (when it's not *saturated*) 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. If you need advice about defensible space and fuel reduction planning for your property, contact the Lake County Fire Safe Council. *See http://celosangeles.ucdavis.edu/Natural_Resources/Wildland_Fire.htm for more information.*

- **Your house is likely a fuel source.** Many rural 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* created by *ember-attack* 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* 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 http://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 http://groups.ucanr.org/HWMG/index.cfm. Consult your local fire marshal or see www.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 www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php 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. *For more information see principle 4c below, and www.livingwithfire.info/beforethefire/accesszone/index.php.*

**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 a pleasing landscape.

**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 or wildland area. Because you are the conservation steward of your land, your work 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* the ecological changes on your property and use that information for *adaptive management* of your forest or wildland. To live with wildfire we need to take

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.**

To reduce the risk of fire over the long term, we can proactively recreate our surroundings into a more *fire-resilient landscape.* In doing this, we need to apply the general concepts of the *precautionary principle* while implementing *fuel treatments:* 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. 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,* which can be some of the worst offenders in spreading wildfire. Follow vegetation treatments with invasive weed removal. Minimize the 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/cnps/nativeplants/, 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* 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,* 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/joomla/content/view/220/200/lang,en/ 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* 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.* 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 *http://cetuolumne.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* used by wildlife. Act especially carefully and leave cover around streams, *seeps,* 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 poisons and *sediment* away from any water that could drain into them. Consider using organic or non-toxic materials for fertilizer and weed/pest control. *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*—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 a rural area 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. In Lake County, these agencies can be contacted by calling 707-263-6838 (Cooperative Extension) or 530-934-3316 (USFS). 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/wildlife/nongame/t_e_spp/ and www.fs.fed.us/r5/projects/ecoregions/m261b.htm.*

**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, Natural Resource Conservation Services representative, or local gardeners to find out what *soil types* are on your property. Some soil types can tolerate much more *disturbance* than others. Minimize activities that could *compact,* 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 http://managingwholes.com/new-topsoil.htm for more information.*

**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* (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 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,* 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* areas and *riparian* 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 www.uri.edu/ce/healthylandscapes/tips/6.html and https://fp.auburn.edu/fire/topos_effect.htm for more information, or Lake County Community Development Erosion Control Guidelines at www.co.lake.ca.us/Assets/WaterResources/docs/Erosion+control.pdf.*

**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. Get involved in your local Fire Safe Council. 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/communications/downloads/fact_sheets/Evacuation.pdf, and www.firewise.org.*

**b. Find experienced workers and treat them well.**

Fuel reduction workers with equipment 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; this will achieve better ecological outcomes on the ground. Happy, respected people do the best work. *See http://ewp.uoregon.edu for more information.*

**c. Work with your local fire department.**

Talk to your local firefighters.[12] Find out what they need to safely get to your house and back out. Make sure that your *access roads* 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.*

This CWPP follows these Conservation Principles in an attempt to balance fire safety with other considerations in Lake County. Lake County residents are encouraged to follow these principles in all fuel reduction and fuel safety activities they undertake.

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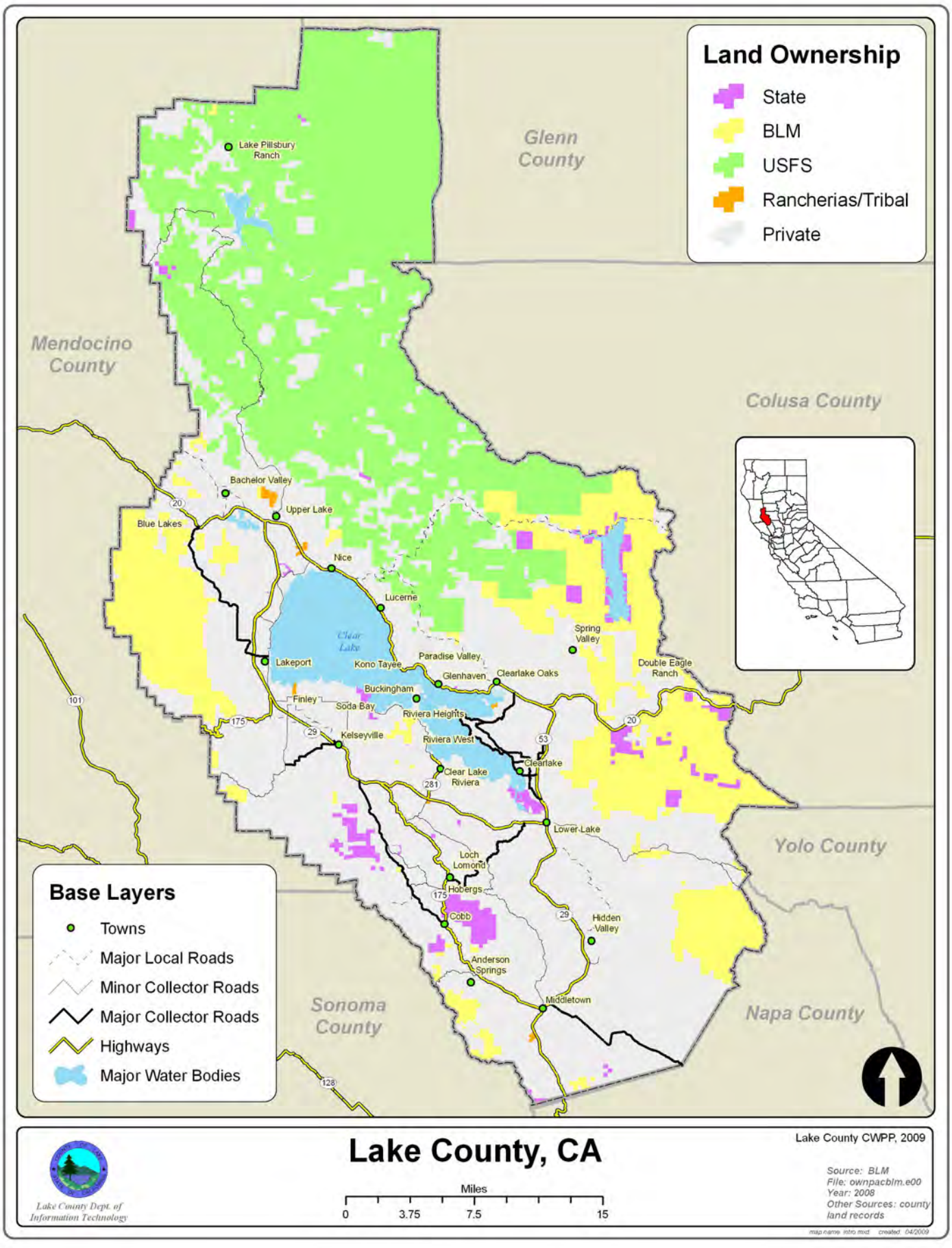
[12] See Chapter 6 for contact info for all Fire Protection Districts in Lake County.

***Map 1-1. Lake County, California***




# Lake County, CA

Lake County Dept. of Information Technology

Miles

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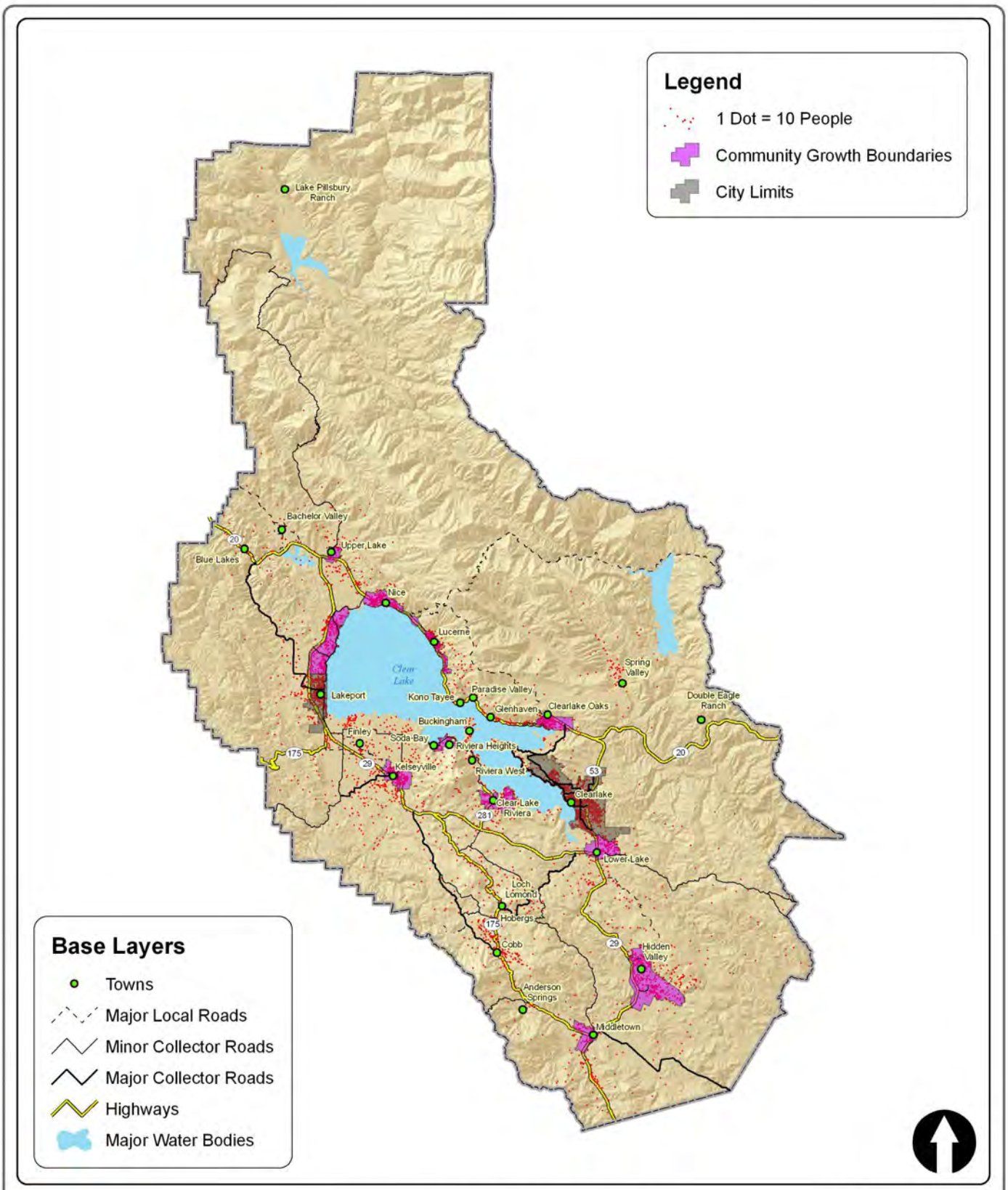
Lake County CWPP, 2009

Source: BLM
File: ownpacblm.e00
Year: 2008
Other Sources: county land records

map name intro.mxd created 04/2009

***Map 1-2. Lake County Population Distribution***




# Population Distribution

Lake County CWPP, 2009

Lake County Dept. of Information Technology

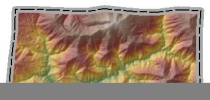
Miles

0 4.5 9 18

Source: 2000 Census, Lake County General Plan

map name: census.mxd created: 04/2009

***Map 1-3. Lake County Communities at Risk from Wildfire***



**Legend**

- Existing Communities at Risk
- Proposed Communities at Risk

# 2. Lake County Fire Safe Planning Process

## 2.1. Planning Area Boundaries

This Fire Plan covers the entirety of Lake County, California. The county was divided into ten planning areas to maximize community input. Planning areas were created around existing population centers. From northwest to southeast, they are listed here and shown in Map 2-1 at the end of this chapter.

- Lake Pillsbury, Blue Lakes, Upper Lake
- Scotts Valley, Lakeport
- Nice, Lucerne
- Spring Valley, Double Eagle
- Glenhaven, Clearlake Oaks, Paradise Valley, Kono Tayee
- Soda Bay, Rivieras, Buckingham
- Jago Bay, Lower Lake, Clearlake
- Finley, Kelseyville
- Cobb Mountain
- Hidden Valley, Middletown

## 2.2. Planning Area Descriptions

### 2.2.1. Lake Pillsbury, Blue Lakes, and Upper Lake

The Lake Pillsbury, Blue Lakes, and Upper Lake planning area is the northernmost area in Lake County. This planning area borders Mendocino County to the west, Glenn County to the north and east, and Colusa County to the east (and is the largest of all of the Lake County planning areas). Much of this planning area is managed by the Mendocino National Forest (MNF), including the Snow Mountain Wilderness. The Lake Pillsbury Fire Protection District (FPD), Northshore FPD, Mendocino National Forest, and CAL FIRE are all designated to provide fire protection in this planning area.

Most of the area is very rural, consisting of resorts, agricultural lands and vast expanses of open space. Several natural and human-made lakes—including Lake Pillsbury, Blue Lakes, and Tule Lake—are found here. The approximately 1,040-acre Robinson Rancheria, including a casino, is also here. Upper Lake, a once thriving port town, memorializes its roots with a historical downtown area. There are also major agricultural lands around Upper Lake that support crops such as strawberries, walnuts, and wine grapes.

This planning area includes the communities of Blue Lakes, Bachelor Valley, Witter Springs, Upper Lake, and Lake Pillsbury. The combined population is approximately 3,100.[1]

### 2.2.2. Scotts Valley and Lakeport

The Scotts Valley and Lakeport planning area is in the westernmost area in Lake County. This planning area borders Mendocino County to the west and Clear Lake to the east. Much of this planning area is within the US Bureau of Land Management's (BLM) Cow Mountain Recreation Area. The Lakeport FPD, Northshore FPD, and CAL FIRE provide fire and emergency fire and medical services here. Several lakes, including Clear Lake, Burger Lake, and Hidden Lake are found within this planning area. These lakes provide recreational opportunities for residents and visitors.

The communities of Scotts Valley and Lakeport are located here. Lakeport, the county seat, lies on the western shore of Clear Lake and was traditionally a port town. Today Lakeport houses most county government, including the county courthouse and the Lake County Historic Courthouse Museum. Lakeport is also home to the county fairgrounds and one of the two hospitals within the county. Areas west of Lakeport within Scotts Valley consist mainly of rural housing and agricultural lands. Cattle ranches, orchards, and other croplands are found here. The combined population of this area is approximately 11,680.

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[1] Population data for this section was taken from the General Plan, Fire Protection District surveys *(see Chapter 6),* and personal communication with Pat Brown, Northshore FPD.

### 2.2.3. Nice and Lucerne

The Nice and Lucerne planning area is centrally located in the county, lying between the northern edge of Clear Lake on Highway 20 and Hogback Ridge. Most of the area is privately owned, some of which backs up to the Mendocino National Forest. The Northshore FPD provides emergency fire and medical services to the areas, as well as the MNF.

This area is primarily residential, with a few large landowners, and many lakeside resorts. The Highway 20 corridor provides access to Clear Lake, several parks, and other recreational opportunities in the area. It has a large retirement community, but is primarily a tourism destination. This area includes the communities of Nice and Lucerne, with most of the population occurring along the Highway 20 corridor. The combined population is approximately 6,200.

### 2.2.4. Spring Valley and Double Eagle

The Spring Valley and Double Eagle planning area is the second largest of the ten planning areas used for this process and lies entirely within the North Fork Cache Creek watershed. This planning area borders Colusa County to the east, and includes portions of the Cache Creek Wildlife Area, which is managed by the BLM and the California Department of Fish and Game. Much of the planning area is publicly owned, with most of the population occurring in the developments of Spring Valley and Double Eagle Ranch. Portions of the Mendocino National Forest are found here, and the area contains several small lakes, including Spring Valley Lake reservoir. Indian Valley Reservoir is the dominant water body, however. The Northshore FPD, CAL FIRE, and the Mendocino National Forest provide emergency fire and medical services to the area.

Beyond the areas of Spring Valley and Double Eagle Ranch, there are sparsely populated rural areas in this planning area. Double Eagle is the most remote development in the county, with very limited access. Outdoor recreation, such as hiking, camping, and fishing, attracts local residents and visitors to the area. The combined population is approximately 1,000 or more residents.

### 2.2.5. Glenhaven, Clearlake Oaks, Paradise Valley, and Kono Tayee

The Glehnaven, Clearlake Oaks, Paradise Valley, and Kono Tayee planning area is also centrally located within the county and is within the Upper Cache Creek Watershed. This planning area borders Highway 20 and Clear Lake to the south, and the Spring Valley/Double Eagle planning area to the north and east. The Nice/Lucerne planning area is bordered to the west. The area is comprised of mostly private property, with a very small portion of the Mendocino National Forest on the northwestern edge of the planning unit. The primary emergency fire and medical services provider for the urban areas here is the Northshore FPD.

This planning area includes the small residential communities of Glenhaven, Clearlake Oaks, Paradise Valley, and Kono Tayee. Clearlake Oaks is the county's easternmost community along Highway 20. There are many upscale waterfront and ridgetop houses that overlook Clear Lake. There is a variety of lodgings, shops, and restaurants within the area that attract residents and visitors. The area is sparsely populated outside of its urban areas. The combined population is approximately 5,000 or more residents.

### 2.2.6. Soda Bay, Rivieras, and Buckingham

The Soda Bay, Rivieras, and Buckinham planning area is centrally located within the county. This is the smallest of the planning areas geographically. It borders Clear Lake to the north, and the Kelseyville and Finley planning area to the south. Mt. Konocti is the dominant feature, along with Clear Lake, in this area comprised of mostly private property. However, there is also BLM and state-owned property here. This area falls within the Upper Cache Creek Watershed. Emergency fire and medical services are provided by the Kelsyville FPD.

This planning area includes the densely populated communities of Soda Bay, Buckingham, and the Rivieras: Riviera Heights, Riviera West, and Clear Lake Riviera. There are many upscale hillside and lakefront properties throughout the area. The county's largest employer and largest resort, the Konocti Harbor Resort and Spa, is here. With several lake access points, residents and visitors can find a variety of recreation opportunities. The population in this area is estimated to be around 5,000.

### 2.2.7. Jago Bay, Lower Lake, and Clearlake

The Jago Bay, Lower Lake, and Clearlake planning area is located on the southeastern edge of Clear Lake. The area borders Clear Lake to the north and west, Colusa County to the east, the Hidden Valley/Middletown planning area to the south, and two planning areas to the north: Spring Valley/Double Eagle; and the Glenhaven planning area.

The eastern portion of this planning area is dominated by the Cache Creek Wilderness Area. It falls within the Cache Creek and Upper Putah Creek Watersheds; Cache Creek flowing east and Putah Creek flowing south out of the county. The state-managed Anderson Marsh State Historic Park is located along the shore of Clear Lake. The Lake County FPD and CAL FIRE provide the primary emergency fire and medical services to the area.

This planning area includes the city of Clearlake, and the communities of Lower Lake, Jago Bay, and Point Lakeview. Jago Bay is along the southern edge of Clear Lake and has very limited access. Clearlake, is the larger of the two cities in Lake County, with a population of approximately 15,096. Clearlake is a commercial center and contains the St. Helena Clearlake Hospital, as well as the Clear Lake campus of Yuba Community College.

Lower Lake retains its past with a small historical downtown, as well as some of the county's oldest, preserved houses. There are many recreation and tourism opportunities throughout this planning area, including parks, lake access, and retail shops. Most of the population within this planning area is adjacent to Clear Lake. The combined population is approximately 17,112.

### 2.2.8. Finley and Kelseyville

The Finley and Kelseyville planning area is largely an agricultural valley that is located partially along the shores of Clear Lake and the western slope of Mt. Konocti, down to Sonoma and Mendocino counties on the southwestern border. It falls within the Cache Creek watershed. The Soda Bay/Rivieras/Buckingham planning area is bordered to the northeast, while the Lower Lake/Clearlake planning area is bordered to the west. Cobb Mountain planning area is to the south, and the Scotts Valley and Lakeport planning area makes up the western boundary. Most of the planning area consists of private property, including Boggs Lake, which is owned by The Nature Conservancy and cooperatively managed with the California Department of Fish and Game.

This planning area includes the communities of Kelseyville and Finley. Most of the population is clustered in these two communities, with population density decreasing outside of these areas. The Kelseyville FPD provides emergency fire and medical services. Aside from the rural residential areas, this is one of the county's thriving agricultural areas. For example, Kelseyville is known as the pear capital of the world. Pears, walnuts, and wine grapes are all cultivated here. The estimated population is 6,000.

### 2.2.9. Cobb Mountain

The Cobb Mountain planning area is located in southwestern Lake County, along the Sonoma County line. The area falls within the Cache Creek and Upper Putah Creek watersheds. The Kelseyville/Finley and the Soda Bay/Rivieras/Buckingham planning areas are bordered to the north, with the Lower Lake/Clearlake planning area to the east, and the Hidden Valley/Middletown area to the southeast. The Cobb Mountain area includes the state-managed 3,493-acre Boggs Mt. State Demonstration Forest, as well as The Geysers geothermal plants. The South Lake County and the Kelseyville FPD provide emergency fire and medical services to the area.

Cobb Mountain planning area is sparsely populated, and includes the communities of Cobb, Loch Lomond, The Geysers, and Hobergs. It contains some of the most forested landscape in the county, as well as higher elevations. County and out-of-county residents own second homes and cabins here. It contains some of the county's oldest resorts and inns, providing tourism opportunities. The combined population is approximately 2,000 or more residents.

### 2.2.10. Hidden Valley and Middletown

The Hidden Valley/Middletown planning area is the southernmost of the ten planning areas, and falls within the Upper Putah Creek watershed. The area around Hidden Valley is known as Coyote Valley. The Lower Lake/Clearlake planning area makes up the northern boundary, while the Cobb Mt. area is bordered on the west. Sonoma and Napa Counties are bordered to the south and east.

Most of the area is within private ownership, including the approximately 16,000-acres of Langtry Farms and Guenoc Winery that reside within Lake County. The BLM also manages some land here. Emergency fire and

medical services are provided by the South Lake County FPD, and CAL FIRE maintains its largest presence within Lake County in this planning area.

The communities of Hidden Valley, Middletown and Anderson Springs are located here, all of which have their own unique flavor. Hidden Valley/Coyote Valley consists mostly of suburban development, and is more densely populated. The Middletown area is the southernmost community in the county, and resides along the junction of Highway 175 and 29. Several wineries, as well as the Twin Pines Casino, are found within Middletown. The Anderson Springs area is remote and contains many older wooden cabins, hot springs, and resorts. Most of the population is found clustered within these three communities. This planning area contains the popular resorts of Harbin Hot Springs and Ettawa Springs. The population becomes sparse further away from the town centers. The combined population is approximately 8,820 or more residents.

## 2.3. Process and Plan Development

A community-intensive process was used in the development of this Community Wildfire Protection Plan (CWPP), to ensure maximum resident and stakeholder input.

### 2.3.1. Community Meetings

An initial community meeting was held in Lakeport on August 21, 2008 at Lake County Courthouse to introduce interested community and agency members to the Lake County CWPP project and the reconstituted Lake County Fire Safe Council. Speakers at that meeting included:

- *Denise Rushing*, Lake County Board of Supervisors
- *Pat Frost*, California Fire Safe Council
- *David Henderson,* South Lake Fire Safe Council
- *Jeff Tunnell,* Bureau of Land Management
- *David Jaramillo*, ForEverGreen Forestry

**Community/Neighborhood Meetings**

One of the goals in developing the Lake County CWPP was to educate residents regarding fire safety and defensible space. Therefore, the planning process was designed to maximize public education and participation. A series of ten community meetings were held in various locations throughout the county. An additional meeting for Lake Pillsbury residents was organized out of the first meeting and held on November 3rd. The community meetings were held in the following locations in October 2008. Approximately 140 people attended the meetings.

***Figure 2-1. CWPP Community Meeting Schedule***

| Date & Time | Communities | Location |
|---|---|---|
| Monday, October 20, 6:30 pm | Lake Pillsbury, Blue Lakes, Upper Lake | Odd Fellow's Hall<br>9480 Main St., Upper Lake |
| Tuesday, October 21, 6:30 pm | Hidden Valley, Middletown | Calpine Visitors Center<br>15500 Central Park Rd., Middletown |
| Thursday, October 23, 6:30 pm | Lakeport, Scotts Valley | Scotts Valley Women's Clubhouse<br>2298 Hendricks Rd., Lakeport |
| Friday, October 24, 6:30 pm | Nice, Lucerne | Lucerne Alpine Senior Center<br>10th & Country Club Dr., Lucerne |
| Saturday, October 25, 2:00 pm | Cobb Mountain | Cobb Mt. Lions Club Community Center<br>15790 Bottle Rock Rd., Cobb |
| Sunday, October 26, 2:00 pm | Spring Valley, Double Eagle | Spring Valley Home Owners' Association<br>3000 Wolf Creek Rd., Clearlake Oaks |
| Monday, October 27, 6:30 pm | Jago Bay, Lower Lake, Clearlake | Brick Hall, 16374 Main St., Lower Lake |
| Tuesday, October 28, 6:30 pm | Glenhaven, Clearlake Oaks, Paradise Valley, Kono Tayee | Live Oak Senior Center<br>12502 Foothill Blvd., Clearlake Oaks |
| Wednesday, October 29, 6:30pm | Soda Bay, Rivieras, Buckingham | Riviera Elementary School Cafeteria<br>10505 Fairway Dr., Kelseyville |
| Thursday, October 30, 6:30 pm | Finley, Kelseyville | American Legion Hall<br>Gaddy Lane & 2nd St., Kelseyville |

The following agenda was used at all of the community meetings.

**Community Fire Safe Planning Meeting, Sample Agenda**

1. Introductions (15 minutes)
2. Fire safety, defensible space, and local fire protection (Jeff Tunnell, Tracy Katelman, Local Fire Chief – 50 minutes)
3. Neighborhood fire history (10 minutes)
4. Mapping Exercise (55 minutes)
    a. Identify values and assets at risk
    b. Identify high-risk and high-hazard areas
    c. Local Fire-Fighting Resources
    d. Developing projects to reduce identified risks; Prioritize projects
5. Lake County Fire Safe Council (5 minutes)
6. Close (5 minutes)

### 2.3.2. Community Outreach

Outreach regarding the CWPP and the new Fire Safe Council was done jointly. A series of articles and ads were run in local media from August through October 2008. A website was developed for the Plan and the Fire Safe Council on the county's website: www.co.lake.ca.us/FireSafeCouncil.htm.

### 2.3.3. Public Review and Input

In addition to the meetings that generated local data, there were several opportunities for public input to this document. An Internal Review Committee *(see Figure 2-2 below)* made up of a variety of Lake County residents participated in the first review of the document between January and March 2009. This was primarily a virtual, web-based process.

An Internal Review Draft was prepared for the Internal Review Committee, Lake County Fire Safe Council, the County of Lake, the six Fire Protection Districts, and the cities of Clearlake and Lakeport on March 1, 2009. Comments were incorporated from that review and a Public Draft was published on May 13th. Copies of the Public Draft were distributed on CD and via the Internet, with hard copies available for review throughout the county. A public meeting was held in Lakeport on June 8, 2009 with 36 participants. Public comments were received on July 1st, and the final CWPP was published in August 2009.

In addition to the many community members who participated in the process of this Plan, several individuals and organizations contributed to its creation. The Working Group, who actively oversaw the creation of the CWPP, is listed below.

### 2.3.4. CWPP Working Group

A Working Group was established to oversee development of this Plan and to ensure its compliance as a Community Wildfire Protection Plan. The purpose of the committee was:

- to provide oversight to the Lake County CWPP process,
- to meet the requirements of Community Wildfire Protection Plans (CWPP) of the National Fire Plan,
- to ensure that the Plan meets the needs of all sectors of Lake County in terms of fire safety and prevention.

**Lake County CWPP Working Group Members:**

- Denise Rushing, County of Lake, Supervisor
- Linda Juntunen, Lake County Fire Safe Council, Coordinator
- Jeff Tunnell, Bureau of Land Management, Fire Mitigation and Education Specialist
- Linda Green, CAL FIRE, Battalion Chief
- Tracy Katelman, ForEverGreen Forestry, Project Coordinator
- David Jaramillo, Project Assistant
- Mireya Turner, County of Lake

### 2.3.5. CWPP Community Internal Review Committee

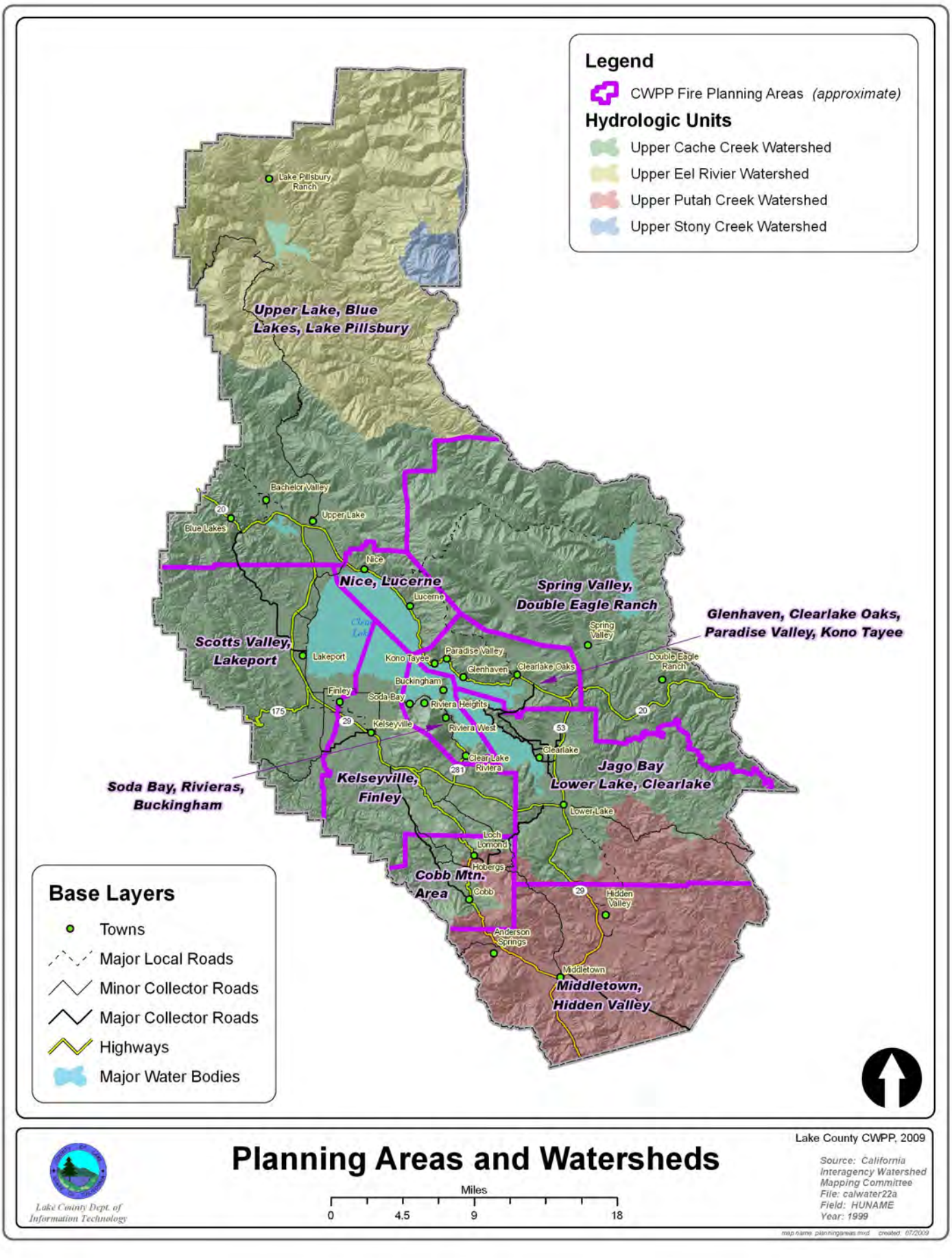
As mentioned above, a committee of community members from various disciplines was invited to participate in the CWPP review. The committee provided comments from January 2009 until the final approval of the Plan.

Review committee members were chosen to represent all stakeholder groups in the planning area, including local government, CAL FIRE, local fire agencies, Fire Safe Councils, state and federal land management agencies, tribal organizations, industry, and non-profit organizations. Oversight of the planning process by this committee helped ensure that the Plan meet the collaboration requirements of a CWPP.

***Figure 2-2. Community Internal Review Committee***

| Name | Affiliation |
|---|---|
| Clelia Baur | Lake County Planning Commissioner |
| Julie Berry | Clear Lake Riviera Homeowner's Association |
| Paula Britton | Habematolel Pomo of Upper Lake |
| Greg Dills | Resource Conservation Districts |
| Doug Gearhart | Air Quality Management District |
| Greg Giusti | University of California, Cooperative Extension |
| Linda Green | CAL FIRE |
| David Henderson and Bruce Anderson | South Lake Fire Safe Council |
| Jared Hendricks | Hendricks Ranch |
| David Jezek | Lake County Community Development |
| Linda Juntunen | Lake County Fire Safe Council |
| Joe Koschik | USDA Mendocino National Forest |
| Erica Lundquist | Agriculture |
| Madelyn Martinelli | South Lake Fire Protection District |
| Jeff Rein | Lake County Administrative Office |
| Jim Robbins | Lake County Fire Chiefs Association |
| Denise Rushing | Lake County Board of Supervisors |
| Korinn Smith | USDA Natural Resources Conservation Service |
| Jeff Tunnell | USDOI Bureau of Land Management |
| Jerry Wilson | Lake County Office of Emergency Services |

***Map 2-1. Planning Areas***




Lake County CWPP, 2009

# Planning Areas and Watersheds

Lake County Dept. of Information Technology

Miles

0 4.5 9 18

Source: California Interagency Watershed Mapping Committee
File: calwater22a
Field: HUNAME
Year: 1999

map name: planningareas.mxd created: 07/2009

# 3. Wildfire: Current Environment and Behavior[1]

Wildfire is considered to be one of Lake County's most dangerous natural disaster threats. The potential for a large, destructive wildland-urban interface fire is considered to be extremely high within the county.[2] The lands of Lake County have evolved with fire, and fire will continue to shape the landscape. Many Lake County residents understand that it is not a question of if a wildfire will occur here, but rather when. Much of the vegetation in the county is adapted to—meaning it has evolved with—fire. For example, ponderosa pine (*Pinus ponderosa*) and incense cedar (*Calocedrus decurrens*) both produce very thick bark with age, helping them to withstand the heat of low and moderate intensity fire. Understanding fire and its role in the ecosystem will help us to better coexist with it, resulting in less catastrophic wildfire.

## 3.1. Introduction: Defining the Wildfire Problem

It is generally accepted today that fires in post-European California are less frequent and more severe compared to patterns present before European settlement. Lake County is no exception to this pattern. How wildfire will affect Lake County depends on several factors, including topography, weather, and the condition and type of vegetation and other fuels. Understanding environmental conditions in Lake County helps us to formulate practices or actions that can best modify the local environment to improve its *fire resiliency,* or ability to rebound after a wildfire. This chapter explains those factors, and the fuels, fire history, and fire science that better our understanding of the wildfire problem in Lake County today.

## 3.2. Fire Behavior Characteristics

Knowing the attributes of *fire behavior* is important in order to communicate the various threats from any fire and the benefits of mitigation. Flame lengths*, fire intensity, heat output,* rate of spread, residence time, and whether the fire burns on the surface or crown are all ways to describe fire behavior and to relate its resistance to *control* and potential damage or positive impacts from fire. The following paragraphs provide an introductory definition to these terms.

### Surface Fires

On flat or moderate terrain (<30% slopes) in light fuels, fires usually burn as a surface fire. Surface fires may advance quickly with short or long *residence time* and a range of heat output, and as such, they respond well to suppression. A manageable fire is one of the desired results of *fuel modifications.*

### Crown Fire Potential

Crowning activity indicates locations where fire is expected to travel into and possibly consume the crowns (or tops) of trees. Crown fires typify a fire of high intensity and exhibit high heat output and rates of spread. These attributes challenge suppression efforts. When a fire burns through tree crowns, countless embers are produced and distributed, sometimes over long distances. These embers can start new fires (or spot fires), which can each grow and confound the finest fire-suppression forces.

Crown fire initiation (or torching) occurs when ladder fuels are present, providing a connection between the surface fuels and the crown fuels. The higher the base of the tree canopy away from surface fuels, the more difficult it is for crown fires to ignite. Once in the tree canopy, crown fire spread is more likely in dense canopies and with high wind speeds.

### Fire Intensity

Fire intensity describes the amount of heat that is released by flaming combustion in a specific unit of time (BTU/ft./sec[3]). This measurement captures the energy of a fire in any location; it is often confused with fire severity, which is a term describing fire effects *(see below)*.

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[1] Elements of this chapter were written by Carol Rice, Wildland Resource Management.

[2] Smith, G. 2005 Lake County Natural Hazard Mitigation Plan (HMP). p. 79.

[3] BTU: British Thermal Units (heat)/feet/second.

### Fire Severity

Fire severity describes the resulting effects of a fire, based on the amount of soil damage and tree mortality. It is determined by observing vegetation and soil conditions after a fire. The relationship between predicted fire behavior characteristics (flame length, heat per unit area, fireline intensity, etc.) and fire severity are being explored, but are not yet well established. Long flame lengths, large amounts of torching, crown fire presence, high fireline intensity, and high heat per unit area are all indicators of potentially severe fires.

### Flame Length

Flame length is the span of the flame from the tip to the base, irrespective of its tilt. This factor most influences the probability of structure damage and ease of fire suppression. Flame length is highly correlated with fire intensity, which can help predict fire severity. Flame lengths less than four feet are associated with fires that are more easily controlled—generally with hand crews—and are also associated with the widespread low-intensity fires prevalent prior to European settlement. In contrast, flame lengths longer than twelve feet often thwart suppression efforts, and are associated with crown fires seen on the front pages of newspapers. Typically fuel-management goals aim for production of flame lengths less than four feet.

### Rate of Spread

The rate of spread measures how fast the *leading edge* of a fire advances. A rate of spread faster than fire-line-building capacity will challenge fire-suppression efforts. High spread rates also indicate the potential for quick changes in fire spread direction, which could endanger firefighters and increase the potential damages. High rates of spread in grass can exceed three hundred feet per minute. In rare crown fires, rates of spread can exceed one hundred feet per minute. A more acceptable rate of spread would be one that is slower than the line-building capacity of fire-suppression forces to encircle the fire. Slow-burning fires in forested fuel types spread at a rate of two to eight feet per minute.

### Residence Time

The residence time of a fire defines how long the leading edge of the fire burns in any one location. Usually grass fires are consumed quickly and have a short residence time (e.g. 30 seconds), in contrast to the residence time of fires in a deep duff layer, which can burn for hours. Foliage and *suspended dead material* are usually consumed in less than 90 seconds. Residence time is useful in predicting tree mortality and potential for fire-induced *hydrophobic* soils.

### Heat Per Unit Area

Heat per unit area is defined as the total heat produced by flaming combustion in any one location. This does not include long *burn-out times* and smoldering. This factor is especially important in determining soil heating and is a fairly good predictor of potential root damage and *cambium* heating, all indicators of fire severity. Smoldering produces the vast majority of smoke in a fire, but most fire behavior models don't include smoldering combustion.

## 3.3. General Wildfire Environment Descriptions

*Fire ecology* is the study of fire and its relationship to the physical, chemical, and biological components of an ecosystem. Within Lake County are several ecosystem types, all of which have evolved with fire *(see Chapter 4 for more information on these types)*. Lake County is located in a fire-dependent environment; in fact, fire has played a prominent role in shaping the natural environment here. Wildfire will happen; exclusion of wildfire is not an option.

The absence of natural fire events due to massive fire-suppression efforts over recent decades, compounded by historic logging and land-management practices and urban and suburban development, has lead to an increase in the density and type of live vegetation. This situation has also lead to an increase in the size, amount, and distribution of dead fuel within the county. As a result, forests and shrublands are more crowded, trees are unable to retain their vigor, and they are more vulnerable to insects, disease, and stand-destroying fires. In contrast, frequent, low-intensity surface fires (such as occurred historically) would have cleansed the forest floor of fuels,

and maintained open stands of trees and a mosaic of chaparral vegetation. Cool, frequent fires help keep forests healthy. A challenge for Lake County, and most areas of the West, is how to remove the unnaturally high levels of fuel, while maintaining ecosystem functions, processes, and health. This CWPP explores those options.

### 3.3.1. Topography

Topographic features such as slope, aspect, and the overall form of the land have a profound effect on fire behavior. Topography directly and indirectly affects the intensity, direction, and spread rate of wildfire. Fires burning in flat or gently sloping areas tend to burn more slowly, and to spread in a wider ellipse than fires on steep slopes. Streams, rivers, and canyons tend to channel local *diurnal* and general winds, which can accelerate the fire's speed and affect its direction, especially during *foehn* wind events. Local winds are greatly affected by topography, which "bends the wind" as it flows around or over landforms. Topography also causes daily upslope and downslope winds. The topographic features of aspect and elevation affect vegetation; solar exposure affects fuel moisture.

Lake County has a mixture of rugged mountains, rolling hills, and broad valleys. Elevations within the county range from 640 to 6,873 ft. Due to the remoteness and steepness of slopes within the county, fire equipment and personnel can be limited in their access to wildland fires. Drainages can act as chimneys, which can move wind and fire very quickly up a gentle and/or steep slope. This adds significant fire risks to Lake County communities.

### 3.3.2. Weather

This section describes common weather conditions and weather patterns that exist at the time the most damaging fires could occur, along with routine conditions during which serious fires may occur.

Weather conditions significantly impact the potential for fire ignition, as well as rates of spread, intensity, and the direction fire burns. Wind, temperature, and *relative humidity* are the weather variables used to predict fire behavior.[4] *Fire weather* refers to weather elements that influence *fire ignition,* behavior, and suppression; such as temperature, relative humidity*,* wind speed and direction, precipitation, atmospheric stability, and *aloft winds.*

Lake County's winters are usually cool and wet, contrasted with hot, dry summers. Average annual precipitation ranges from 24 inches in the lower areas to more than 70 inches in the mountainous regions. Temperatures range from an average low of 32˚ F in the winter to average highs of 95˚ F in the summer.

Pacific Ocean marine airflow has a profound influence on dry-season temperatures in the county, by providing high-moisture air and cooler temperatures to portions of the county. This marine influence may reduce fire hazards to those areas of the county that are affected by the moist air. Although much of the coastal interior mountains remain cool as a result of this air, areas not influenced by marine airflow may record temperatures well into the 100's during summer months. These climatic factors significantly increase the *fire hazard* within Lake County. In addition, the long growing season, approximately 230–260 days within the Clear Lake basin, creates a significant amount of vegetation.[5]

Lake County's microclimate influences potential fire risk. Westerly winds from the coast often influence how a fire may burn within the county.[6] These winds can move a fire very fast across the landscape as well as transport burning embers miles in front of the fire line, which can ignite structures.

Wind is considered the most variable and difficult weather element to predict. Wind increases the flammability of fuels by removing moisture through evaporation, by pre-heating fuels in a fire's path, and by increasing spotting distances (the distance at which a spot fire might be set by a flying ember). Wind velocities and directions may vary in vertical elevation, with somewhat different impacts on fire behavior. The direction and velocity of surface winds can directly control the direction and rate at which the fire spreads. Winds that blow

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[4] Husari, S., T. Nichols, N.G. Sugihara, and S.L. Stephens. 2006. "Fuel Management." In: N.G. Sugihara, J. van Wagtendonk, K.E. Shaffer, J. Fites-Kaufman, and A.E. Thode, editors. *Fire in California's Ecosystems*. Berkeley: University of California Press. Pp. 444–465.

[5] HMP. p. 15.

[6] Tunnell, Jeff. Bureau of Land Management. Fire Mitigation and Education Specialist. Personal Communication. September 12, 2008.

more than 20 feet above the ground can carry embers and firebrands downwind, causing spot fires to precede the primary front.

Prevailing winds during fire season (generally June through October) in Lake County are out of the northwest. Winds also blow north or northeast, moving hot air from the Central Valley; although rare foehn winds usually blow from the north. All of these winds help to create hot and dry fire conditions. Weather conditions can change rapidly as upper-level wind currents and pressure systems in the western states shift locations, and both dry and wet frontal systems move through the mountainous terrain. Frontal winds associated with low-pressure systems moving across the area can create hazardous fire conditions. Winds in advance of the frontal system can reach speeds exceeding 60 mph over ridges. The atmospheric instability dilutes and disperses smoke, but also creates torching (running crown fires are a result of strong winds) and spot fire problems (distances increase as winds increase).

Fires during foehn events—or subsiding winds—usually result in extreme fire behavior because they are particularly strong and dry, thus reducing fuel moistures. This leads to easier ignitions and increased fire behavior. Foehn winds can also cause extreme fire behavior at night, when fires normally die down.

### 3.3.3. Hydrology

The *hydrology* of an area describes the flow of water across and through the land. Lakes, ponds, streams, wetlands, and springs are just a few examples of features that contribute to the hydrology of an area. The presence of these features tends to increase the humidity of a local site and can make it more resistant to the effects of fire. In the case of ponds and lakes, their availability as water sources for suppression is also important.

Lake County's hydrologic features are abundant. Thousands of waterways flow through the region, from small *ephemeral* streams to large creeks and rivers, eventually making their way to the Pacific Ocean. As mentioned in Chapter 1, the four distinct watersheds of the county are: Upper Cache Creek, Upper Putah Creek, Upper Stony Creek, and the Upper Mainstem Eel River. Along with the numerous streams and rivers, there are many lakes, including Clear Lake, from which the county takes its name.

Clear Lake is a Clean Water Act Section 303(d) Impaired Watershed due to an overabundance of mercury and nutrients. This situation can be aggravated by fire and ash, either from wildfires or *controlled burning.* The Lake was impacted by the 1996 *Fork Fire,* which caused increased sediment in the lake, and resulted in several treatment plants not able to adequately treat water due to the high turbidity.

### 3.3.4. Vegetation and Fuels

Vegetation varies by size, height, and density; and combined with other flammable material on the site, it often provides the fuel that feeds wildfire. The volume and distribution of fuels, the *moisture content,* and the arrangement of fuels are all factors that greatly influence resulting fire behavior.

Fuel includes anything that can burn: grass, shrubs, and trees, as well as fences, decks, furniture, cars, and houses. These can be described either as *fuel models* (as described in section 3.4 below), or in terms of sizes, volumes, and arrangement: light fuels (consisting of grass, dry leaves, baskets, and kindling-size twigs), medium fuels (shrubs or fences), or heavy fuels (logs, trees, or homes). The arrangement of the volume and sizes of fuels in any one space, along with the moisture content, greatly influences fire behavior.

Nearly every major fuel type in California exists within Lake County. Examples include grasslands, oak woodlands, *brush,* mixed conifer forests, and hardwood forests.[7] Because of this diversity, Lake County can experience virtually any type of wildfire that can occur in California, from fast-spreading grass fires to full-scale forest fires. Adding to this vegetative fuel problem is the presence of Sudden Oak Death (SOD) within some parts of the county. SOD is a forest disease caused by the pathogen *Phytophthora ramorum.* This pathogen has caused widespread dieback of tanoak (*Lithocarpus densiflorus*) and several other oak species, especially in areas near the

[7] California Department of Forestry and Fire Protection (CAL FIRE), Sonoma-Lake-Napa Unit. Fire Management Plan 2005. *Mitigating Fire Loss through Community Level Pre-Fire Planning*. p. 19. http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf107.pdf.

Napa and Sonoma county borders. The presence of areas affected by this pathogen has increased the amount of hazardous fuels within the county.[8]

The virtual exclusion of widespread low- to moderate-severity fire has affected the *structure* and *composition* of Lake County vegetation types. Conifer stands are generally denser, mainly in small- and medium-size classes of shade-tolerant and *fire-sensitive* tree species. Fuels have become more vertically continuous, contributing to more spatially homogeneous forests. Selective cutting of large *overstory trees* and the relatively warm and moist climate during much of the twentieth century may have enhanced conditions for tree seedling establishment.

*See section 3.4 for a description of the planning area fuels. See Chapter 4 for more information on local vegetation types and their fire ecology.*

### 3.3.5. Wildlife

Wildlife in Lake County includes animals, plants, insects, other invertebrates, and fish. The variety of organisms in Lake County is extensive and a reflection of the overall landscape diversity found within the county. According to the California Department of Fish and Game's California Natural Diversity Database (CNDDB), there are at least 114 rare or endangered species of flora and fauna found within the county.[9] Rare and endangered species aside, the county's vegetative diversity is home to several hundred species of wildlife. All of the species found within the county, from the bald eagle and osprey, to Lake County western flax and Cobb Mountain lupine, depend on the environment around them to provide the food, water, and shelter they need to survive.

#### Threatened and Endangered Species

California has a large number of threatened and endangered species. While most biologists acknowledge that fire plays a role in the environment in which these species live, little is known about the relationship of these species to fire. Their response to fire of varying intensities, frequencies, and seasons is also not well understood; even less the effects of various hazard reduction treatments on rare species. All of the species found within the county have had to adapt to fire in some way in order to survive within this landscape. Some organisms learn to flee, others sprout as a result of fire, while others store extensive amounts of seed within the soil in order to re-occupy a site after a fire. These adaptations have helped to establish the flora and fauna found here.

In order to reduce potential adverse effects to flora and fauna, and especially to state and federally listed Threatened and Endangered (T&E) species, fuel reduction planners (such as Registered Professional Foresters) must use the best available information regarding each species within a project area, including considering critical habitat attributes that species need in order to survive. Information such as breeding period, migration patterns, blooming period, and much more, can help planners reduce fire threat while creating and/or enhancing or restoring necessary habitat within the county.

Within Lake County, there are at least thirteen species that are considered threatened or endangered. The following table lists these T&E species and the habitat attributes associated with each species that must be considered in planning fire prevention and suppression actions.

[8] CAL FIRE. Fire Management Plan 2005. p. 37.

[9] California Natural Diversity Database (CNDDB) Quick Viewer. http://imaps.dfg.ca.gov/viewers/cnddb_quickviewer/app.asp

***Figure 3-1. Threatened and Endangered Species Found in Lake County***

| Species and Status | Specific Habitat Requirements[10],[11] |
|---|---|
| **Bald eagle**<br>*Haliaeetus Leucocephalus*<br>SE | **FEEDING:** Requires large bodies of water, or free flowing rivers with abundant fish, and adjacent snags or other perches. Groups may feed gregariously, especially on spawning fish. Scavenges dead fish, water birds, and mammals such as voles. Open, easily approached hunting perches and feeding areas used most frequently. **COVER:** Perches high in large, stoutly limbed trees, on snags or broken-topped trees, or on rocks near water. Roosts communally in winter in dense, sheltered, remote conifer stands. In Klamath National Forest, winter roosts were 16-19 km (10-12 mi) from feeding areas.<br>**REPRODUCTION**: Nests in large, old-growth, or *dominant* live tree with open branchwork, especially ponderosa pine. Nests most frequently in stands with less than 40% canopy, but usually some foliage shading the nest. Often chooses largest tree in a stand on which to build stick platform nest. Nest located 16-61m (50-200 ft) above ground, usually below tree crown. Tree species apparently not so important as height and size. Nest usually located near a permanent water source. **WATER:** In California, 87% of nest sites were within 1.6 km (1 mi) of water. **PATTERN:** Requires large, old-growth trees or snags in remote, mixed stands near water. |
| **Boggs Lake hedge-hyssop**<br>*Gratiola heterosepala*<br>SE[12] | Grows in shallow water and the edges of *vernal pools.* Threatened by agriculture, urbanization, development, and grazing. Important to identify appropriate fire-fighting water drafting sites so as not to affect this species. |
| **Burkes goldfields**<br>*Lasthenia burkei*<br>FE[13]/SE | Grows in *meadows, seeps,* and vernal pools at an elevation between 45 and 1800 ft. Blooms between April and June. Threatened by agriculture, urbanization, development, and grazing. |
| **California Wolverine**<br>*Gulo gulo*<br>SE | **FEEDING:** Feeds primarily on small mammals and carrion. Prey includes marmots, ground squirrels, gophers, mice, deer carcasses, other vertebrates, berries, and insects. May kill large snowbound prey, but most large prey found by scavenging carrion. May drive bears or mountain lions from carcasses. Forage in open to sparse tree habitats on ground, in trees, burrows, among rocks, in or under snow, and sometimes in shallow water. May locate prey under deep snow. Cache food. **COVER:** Prefer areas with low human disturbance. Use caves, hollows in cliffs, logs, rock outcrops, and burrows for cover, generally in denser forest stages. **REPRODUCTION:** Den in caves, cliffs, hollow logs, cavities in the ground, under rocks; may dig dens in snow, or use old beaver lodges. **PATTERN:** Hunts in more open areas, using dense cover for resting and reproduction. |
| **Few-flowered navarretia**<br>*Navarretia leucocephala ssp. pauciflora*<br>FE/ST[14] | Grows in vernal pools at an elevation between 1200 and 2600 ft. Blooms between May and June. Threatened by altered hydrology, erosion, grazing, vehicles, and recreation. |

[10] California Department of Fish and Game. *Life History Accounts and Range Maps – California Wildlife Habitat Relationships System.* www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx.

[11] California Native Plant Society. *Inventory of Rare and Endangered Plants.* http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi.

[12] SE: State Endangered.

[13] FE: Federally Endangered.

[14] ST: State Threatened.

| Species and Status | Specific Habitat Requirements[10],[11] |
|---|---|
| **Indian Valley brodiaea**<br>*Brodiaea coronaria ssp. Rosea*<br>FE | Grows in chaparral and valley and foothill grasslands within Lake County at elevations between 1000 and 4350 ft. Blooms between May and June. Threatened by vehicles, dumping, and horticulture collection. |
| **Lake County stonecrop**<br>*Sedella leiocarpa*<br>FE/SE | Grows in vernal pools, and valley and foothill grasslands within Lake County at elevations between 1100 and 2400 ft. Blooms between April and May. Threatened by grazing, altered hydrology, development, and trampling. |
| **Lake County western flax**<br>*Hesperolinon didymocarpum*<br>SE | Grows in chaparral, woodlands, and valley and foothill grasslands within the county at elevations between 1000 and 1100 ft. Blooms between May and July. Threatened by grazing, agriculture, and urbanization. |
| **Loch Lomond button celery**<br>*Eryngium constancei*<br>FE/SE | Grows in vernal pools within the county at elevations between 1400 and 2600 ft. Blooms between April and June. Threatened by development and vehicles. |
| **Many-flowered navarretia**<br>*Navarretia leucocephala ssp. plieantha*<br>FE/SE | Grows in vernal pools at an elevation between 90 and 2900 ft. Blooms between May and June. Threatened by grazing, development, and vehicles. |
| **Northern spotted owl**<br>*Strix occidentalis caurina*<br>FT[15] | **FEEDING:** Feeds in forest habitats upon a variety of small mammals, including flying squirrels, woodrats, mice, voles, and rabbits. Also eats small birds, bats, and large arthropods. Usually searches from a perch and swoops or pounces on prey in vegetation or on the ground. May cache excess food. **COVER:** Uses dense, multi-layered canopy cover for roost seclusion. Roost selection appears to be related closely to thermoregulatory needs; intolerant of high temperatures. Roosts in dense overhead canopy on north-facing slopes in summer. In winter, roosts in oak habitats. In northern regions of the state, daytime roosts averaged 165 m (549 ft) from water; in southern regions, daytime roosts averaged only 51 m (173 ft) from water. **REPRODUCTION:** Usually nests in tree or snag cavity, or in broken top of large trees. Less frequently nests in large mistletoe clump, abandoned raptor or raven nest, in cave or crevice, on cliff or ground. Mature, multi-layered forest stands are required for breeding. Nest usually placed 9-55 m (30-180 ft) above the ground. **WATER:** Probably requires a permanent water source. May reduce heat stress by bathing. Drinks freely in captivity. **PATTERN:** Requires blocks of 40-240 ha (100-600 ac) of mature forest with permanent water and suitable nesting trees and snags. In northern California, apparently prefers narrow, steep-sided canyons with north-facing slopes. |
| **Slender orcutt grass**<br>*Orcuttia tenuis*<br>FT/SE | Grows in vernal pools within the county at elevations between 100 and 5300 ft. Blooms between May and September. Threatened by agriculture, residential development, grazing, vehicles, recreational activities, logging, fire, trampling, and non-native plants. |

[15] FT: Federally Threatened

| Species and Status | Specific Habitat Requirements[10],[11] |
|---|---|
| **Western yellow-billed cuckoo**<br>*Coccyzus americanus occidentalis*<br>SE | **FEEDING:** Gleans grasshoppers, cicadas, caterpillars and other larger insects from foliage. Occasionally preys on frogs or lizards, or feeds on fruit. **COVER:** Densely foliaged, deciduous trees and shrubs, especially willows, required for roosting sites. **REPRODUCTION:** Nests in dense cover as above; nest is a flimsy, open cup of twigs built on horizontal limb of tree or shrub at height of 0.6 to 7.8 m (2-25 ft). **WATER:** Restricted when breeding to riverbottoms and other mesic habitats where humidity is high.<br>**PATTERN:** Inhabits extensive deciduous riparian thickets or forests with dense, low-level or understory foliage, and which abut slow-moving watercourses, backwaters, or seeps. Willow almost always a dominant component of the vegetation. Also utilizes adjacent orchards, especially walnut. Nests typically in sites with at least some willow, dense low-level or understory foliage, high humidity, and wooded foraging spaces in excess of 93 m (300 ft) in width and 10 ha (25 ac) in area. |

## 3.4. Fuel: Description of Standard Fuel Models[16] [17]

A fuel model is a standardized description of fuels available to a fire based on the amount, distribution, and continuity of vegetation and wood.[18] Fuel models distinguish between vegetation such as tall and short chaparral, tall and short grass, timber with and without an understory, and oak woodland with and without understory vegetation. They describe the structure (or arrangement), and amount of the vegetative fuels primarily, as well as the kinds of plants that grow in the vegetation. Fire managers use fuel models within the Fire Behavior Prediction System (FBPS)—called FBPS #1, 4, 8, 9, and 10, etc.—to forecast how fast a fire will spread, how damaging the fire might become (in terms of fire intensity), or whether it is likely to torch in the area. Information regarding fuel volumes and fire behavior descriptions is available from the publication *How to Predict the Spread and Intensity of Forest and Range Fires*.[19]

Fuel models describe vegetation structure, in addition to typical species composition; structure largely determines the fuel that will actually support the fire. The understory is more important than the overstory. The most significant factor is the amount and distribution of smaller-diameter fuels, because these materials generally spread wildland fires. A grassy field, with oak trees that cover less than one-third of the slope, would be classified as a grass fuel model because the contribution of oak leaves and branches to fire behavior may be negligible (due to the minor amount of leaf drop or the relative height at which the first branches grow above the ground). Similarly, where chaparral covers less than one-third of a conifer stand, it would be classified as a conifer stand. The amount and size of dead material distinguishes among the three choices of conifer fuel models.

Another important factor in fuel models is the amount of dead biomass and the ratio of live-to-dead material where there is significant brush and tree stands. Dead biomass contributes fine fuel litter, as well as carrying flames more readily.

According to the 2005 Sonoma-Lake-Napa County Fire Management Plan of the California Department of Forestry and Fire Protection (CAL FIRE), many of the state's thirteen fuel models can be found within Lake County. Among other things, this information helps fire-suppression agencies to determine what kind of fire might be expected in different areas. Following is a map, description, and list of fuel models found within the county, as determined by CAL FIRE.

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[16] Harrel, Dick and Teie, William. 2001. *Will Your Home Survive? A Winner or Loser? A guide to help you improve the odds against Wildland Fire.* Pp. 17–26.

[17] Anderson, Hal E. 1982. *Aids for Determining Fuel Models for Estimating Fire Behavior*. General Technical Report INT-122.Published by the USDA Forest Service Intermountain Forest and Range Experiment Station.

[18] National Park Service. *Glossary of Fire Terms.* www.nps.gov/archive/seki/fire/fire_gloss.htm.

[19] Rothermel, Richard C. 1983. *How to predict the spread and intensity of forest and range fires.* General Technical Report INT-143. Published by the USDA Forest Service Intermountain Forest and Range Experiment Station.

The table below illustrates the relationship between fuel models and typical Lake County vegetation types. The vegetation types are broad classifications of vegetation communities. These vegetation types and their fire ecology are discussed in greater detail in Chapter 4.

***Figure 3-2. Relationship between Lake County Vegetation Types and Typical Fuel Models.***

| **Vegetation Type** | **Typical Fuel Model**[20] [21] |
|---|---|
| Grassland | Fuel Model 1, 2 |
| Chaparral | Fuel Model 4, 5, 6 |
| Chamise/Redshank Chaparral | Fuel Model 4, 5 |
| Foothill Woodland | Fuel Model 2, 8 |
| Ponderosa Pine/Mixed Conifer | Fuel Model 9, 10 |
| Closed-Cone Pine/Cypress | Fuel Model 4 |
| Montane Hardwood/Conifer | Fuel Model 8 |

## Model 1 – 2 Grass Models

**Fuel Model 1** – This model contains annual and perennial short grasses, about 1-ft tall, that are fairly uniform and homogenous. Less than 1/3 of the area contains other types of vegetation such as trees and shrubs. There is approximately 3/4 tons[22] per acre of fuel at a depth of about 1 foot. Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured vegetation and contain flame lengths approximately 4-ft high.

**Fuel Model 2** – This model is dominated by grasses approximately 1 to 2 feet tall, typical of Lake County's oak savannah. The grasses within this model generally occur under an open, wooded timber canopy. There is approximately 4 live/dead tons of <3" fuel per acre at a depth of about 1 foot. Also occurring within the 1-ft fuel bed are approximately 2 tons of 1/4" dead material as well as a 1/2 ton of live (foliage) material. Fire spread occurs in the live/dead fine surface materials. Areas with high fuel loads associated with the hardwood and conifer component can be intense and cause *firebrands.* Fires within this model can produce flames over 9 feet.

## Model 4 – 6 Shrub Models

**Fuel Model 4** – This model is characterized by stands of mature brush (mixed chaparral) 6 or more feet high with continuous, interlinking crowns. There is approximately 13 live/dead tons of <3" fuel per acre at a depth of 6 feet. Also occurring within the 6-ft fuel bed are approximately 5 tons/acre of 1/4" dead fuel as well as 5 tons/acre of live fuel. Fires within this model are very intense and spread quickly through this almost entirely closed canopy system. Burning embers created by these intense fires often create spot fires in front of the fire. Fires within this model can produce flames over 50-ft tall.

**Fuel Model 5** – This model consists of the same species composition as Fuel Model 4, but individual plants are shorter, usually sparser, and less mature with little or no dead material component. Most of the fuels within this model are alive, consisting of green vegetation that is not very volatile. This fuel model occurs on poor sites, on recent burns, and may occur under tree canopies. There is approximately 3.5 live/dead tons of <3" fuel per acre to a depth of about 2 feet. Also occurring within the 2-foot fuel bed are approximately 1 ton of 1/4" dead material as well as 2 live tons per acre. Fires in this fuel model do not burn intensely, or rapidly due to high concentration of live material. Flames can reach heights of over 13 feet.

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[20] There is a wide variety of fuel volume, structure, and size class distribution within vegetation types; fuel models should be determined by site-specific conditions. Fuel models can be classified by comparing photographs of fuel models with on-site conditions (Anderson 1982), by using expert opinion to translate vegetation types to fuel models, or by using a "key" provided in Rothermel (1983).

[21] Anderson, Hal E. 1983. *Predicting Wind-driven Wild Land Fire Size and Shape.* Res. Pap. INT-305. Ogden, UT. Intermountain Forest and Range Experiment Station. p. 26.

[22] This includes both live and dead vegetation. Dead vegetation, i.e. dead branches, responds quickly to weather conditions while live fuels, i.e. flowering branches, are slower to change with weather and are less flammable.

**Fuel Model 6** – This model consists of vegetation that is taller and more flammable than that of Fuel Model 5, but not as tall or as dense as Fuel Model 4. Interior live oak, young chemise, and manzanita are all considered species associated with this model. In many instances a Fuel Model 5 will evolve into a Fuel Model 6 by the latter part of the summer. There is approximately 6 live/dead tons of <3" fuel per acre to a depth of about 2.5 feet. Also occurring within the 2.5-foot fuel bed are approximately 1.5 tons of 1/4" dead material per acre. Fires in this model will burn in the foliage of standing vegetation, but only when wind speeds are greater than 8 mph. Fires within this model can produce flames about 12-ft tall.

Model 8 – 10 Timber Litter Models

**Fuel Model 8** – This model consists mainly of needles, leaves, and occasionally twigs below a conifer or hardwood canopy. Fuel loads can vary due to inhibited growth caused by overstory shade. There is approximately 5 live/dead tons of <3" fuel per acre to a depth of about 0.2 feet. Also occurring within the 0.2-ft fuel bed are approximately 1.5 tons of 1/4" dead material per acre. Fires within this model are generally slow burning and of low intensity within the compacted vegetation, although the fire may encounter an occasional "jackpot" or heavy fuel concentration that can flare up. Fires in this model do not pose a control threat unless high temperatures, low relative humidity, and high winds would allow the fire to spread into the canopy. This model represents what is created by a shaded fuel break. Fires within this model can produce flames about 2-ft tall.

**Fuel Model 9** – This model is similar to Fuel Model 8, except it has more fine fuels, which increase fire severity. There is approximately 3.5 live/dead tons of <3" fuel per acre to a depth of about 0.2 feet. Also occurring within the 0.2-ft fuel bed are approximately 2.9 tons of 1/4" dead material per acre. Autumn fires in the hardwoods in this model are predictable, but high winds will actually cause higher rates of spread than predicted, because of spotting caused by rolling and blowing leaves. Concentrations of dead and downed woody material will contribute to possible torching, spotting, and crowning. Fires within this model can produce 7-ft flames.

**Fuel Model 10** – This model consists of a shrub, sapling, or immature tree understory with a diseased and/or mature overstory. There is approximately 12 live/dead tons of <3" fuel per acre to a depth of about 1 foot. Also occurring within the 1-ft fuel bed are approximately 3 tons of 1/4" dead material as well as 2 live tons per acre. Fires in this model burn with a moderate rate of spread and can be very intense. *Crown scorch* (and/or torching) of individual trees and spot fires are common within Fuel Model 10. This fuel model poses the most control problem of all the fuel models within the three timber litter models. Fires within this model can produce flames over 100-ft high in extreme conditions.

Figure 3-3 below describes the distribution of fuel volume (also called fuel loading) by size class, along with the overall height of the fuel complex (fuel bed depth). Fuel loading is measured in tons per acre (noted as T/A, by 1-hour, 10-hour, 100-hour, and live fuels). It further indicates what the moisture is when fires tend to stop burning in dead fuels (Moisture of Extinction Dead Fuels). The table indicates the predicted rate of spread (ROS) in chains per hour, along with the flame length (FL) in feet per minute. A *chain* is 66 feet in length, so the measurement "chains per hour" is roughly equivalent to the measurement "feet per minute."

***Figure 3-3. Description of Fuel Models and Fire Behavior[23]***

| Fuel Model | Typical Fuel Complex | Fuel Loading (T/A) 1-H | 10-H | 100-H | Live | Fuel Bed Depth (ft) | Moist. of Extinction Dead Fuels (%) | ROS* ch/h | FL* (ft) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Short Grass | 0.74 | 0.00 | 0.00 | 0.00 | 1.0 | 12 | 78 | 4 |
| 2 | Timber | 2.00 | 1.00 | .50 | .50 | 1.0 | 15 | 35 | 6 |
| 3 | Tall Grass | 3.01 | .00 | .00 | .00 | 2.5 | 25 | 104 | 12 |
| 4 | Chaparral | 5.01 | 4.01 | 2.00 | 5.01 | 6.0 | 20 | 75 | 19 |
| 5 | Brush | 1.00 | .50 | .00 | 2.00 | 2.0 | 20 | 18 | 4 |
| 6 | Dormant brush | 1.50 | 2.50 | 2.00 | .00 | 2.5 | 25 | 32 | 6 |
| 7 | Southern rough | 1.13 | 1.87 | 1.50 | .37 | 2.5 | 40 | 20 | 5 |
| 8 | Closed timber litter | 1.50 | 1.00 | 2.50 | 0.00 | 0.2 | 30 | 2 | 1 |
| 9 | Hardwood litter | 2.92 | .41 | .15 | .00 | 0.2 | 25 | 8 | 3 |
| 10 | Timber | 3.01 | 2.00 | 5.01 | 2.00 | 1.0 | 25 | 8 | 5 |
| 11 | Light logging slash | 1.50 | 4.51 | 5.51 | 0.00 | 1.0 | 15 | 6 | 4 |
| 12 | Medium logging slash | 4.01 | 14.03 | 16.53 | .00 | 2.3 | 20 | 13 | 8 |
| 13 | Heavy logging slash | 7.01 | 23.04 | 28.05 | .00 | 3.0 | 25 | 14 | 11 |

*ROS and FL are represented under a fine dead fuel moisture of 8%, a mid-flame wind speed of 5 mph and live fuel moisture, if present, of 100%.

## 3.5. Fire History

The fire history of an area is a description of the time, space, and cause of fires in the area. In fire jargon, *"fire risk"* is often associated with fire history, as this term describes the events that cause a fire to start (i.e. ignitions).

Fire history is important because it illustrates the potential for future fires. Large fires often repeat themselves; thus it is useful to understand burning patterns over time. An area's fire history also portrays ignition patterns that can target effective prevention programs. For example, if there is a history of frequent fires along a well-traveled route, roadside vegetation management may be in order. Additionally, fire history discerned through fire scars on tree rings may indicate the way fires have changed over time, both in frequency and intensity. This may point to appropriate goals for future fuel conditions.

### 3.5.1. Fire Caused by Natural Lightning

Lightning fires in Northern California, including Lake County, are common in the summer and fall months, particularly in the higher elevations where strikes are more likely to occur. Fires ignite when lightning strikes coincide with rainless, windy weather; however, lightning fires rarely occur in the spring. Lightning fires pose a significant threat to Lake County and its many communities, especially during dry lightning events where burning conditions are met.

In the summer of 2008, over 2,000 fires burned throughout Northern California as a result of thunderstorms and dry conditions that occurred from the coast to the Sierra Nevada. Approximately 4,046 acres burned within Lake County at that time. These fires, fueled by extremely dry vegetation, quickly overwhelmed fire-fighting resources as they burned through thousands of acres. Lake County, as well as much of the rest of Northern California, experienced unhealthy, smoky days for a long period of time (over a month in some Northern California communities). When lightning starts multiple fires, suppression resources may not be adequate or available for new fires. This occurred in June of 2008 when the *Walker Fire (see below)* started in the middle of the lightning fire siege of Northern California. The *Walker Fire* was understaffed for many days while resources were committed elsewhere.

[23] Anderson 1982. p. 3.

### 3.5.2. Native American Period Fire History

It is widely understood that during the pre-settlement period, Native Americans used fire as a resource-management tool throughout California and the West. In fact,

> "When Spanish explorer Juan Rodriguez Cabrillo anchored in San Pedro Bay in October of 1542, it was the chaparral fires that gave him the signal that the coast was occupied by humans. A succession of explorers, missionaries, and settlers thereafter would continually note the 'smoky air' from these fires in their journals in every corner of the state – in the coastal redwood forests, the tule marshes of the Delta, the southern oak woodlands, the mixed conifer forests, and the northern hazelnut flats".[24]

The use of fire as a tool ranged from plant cultivation and land clearing to mast production and hunting. For example, in Lake County the native Pomo burned bracken fern patches to enhance them; the new fronds were eaten and the rhizomes used to create basket designs.

The acreage burned by California's earliest humans was significant; fire scientists Robert Martin and David Sapsis estimate that 5.6 to 13 million acres of California burned annually under both lightning and indigenous people's *fire regimes*.[25] However, fire scientist Scott Stephens, Sapsis, and others have now estimated lower numbers. They estimate that 4,447,896 acres burned annually in California prior to 1800, excluding the southwestern deserts.[26] This estimate of prehistoric annual area burned in California is 88% of the total annual "extreme" wildfire area burned in the entire United States within a single decade (1994–2004).[27] From 1950 to 1999, the average annual area burned by wildfire in all vegetation types in California was approximately 25,2047 acres/yr, only approximately 5.6% of what traditionally burned in a similar timeframe.[28] Regardless of errors in either estimation, prior to modern fire suppression very large amounts of land burned in California. Skies were likely smoky much of the summer and fall in California during this period.[29]

### 3.5.3. European Settlement Fire History

During European settlement, logging—primarily of the largest, oldest trees—became common, with subsequent changes in forest structure and fuel volumes. Many forms of land management during this era (such as logging, grazing, development, and most notably fire suppression) have influenced the fire history of Lake County.

As a result of large destructive fires in the West and Midwest in the early part of the 1900's, the perception of fire as a beneficial tool, such as seen by Native Americans, was overlooked and instead viewed as a major threat to lives, property, and natural resources. The outcome of this viewpoint was the "10 a.m. policy" adopted by the US Forest Service in 1935. This policy sought to aggressively suppress fires and have them extinguished by 10 a.m. the morning following a fire being discovered. This type of land management activity (intensive fire suppression), combined with increased development, a resulting lack of homeowner defensible space, logging of the largest trees, etc., has led to an increase in the amount of flammable materials now accumulated within Lake County. Today it is widely accepted that fires now burn longer and hotter than those prior to European settlement.

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[24] Anderson, M.K. 2006. "The Use of Fire by Native Americans in California." In: N.G. Sugihara, J. van Wagtendonk, K.E. Shaffer, J. Fites-Kaufman, and A.E. Thode, editors. *Fire in California's Ecosystems*. Berkeley: University of California Press. Pp. 417.

[25] Anderson, M.K. 2005. *Tending the wild: Native American knowledge and the management of California's natural resources.* University of California Press, Berkeley p. 136.

[26] Stephens, S.L., Robert E. Martin, Nicholas E. Clinton. 2007. *Prehistoric Fire Area and Emissions from California's Forests, Woodlands, Shrublands, and Grasslands*. Forest Ecology and Management 251 (2007) 205–216.

[27] Stephens, S.L., et al. 2007.

[28] Stephens, S.L., et al. 2007.

[29] Stephens, S.L., et al. 2007.

"More area is burning at high intensity, and this is related, in part, to higher quantities and more homogeneous fuels caused by accumulation during the fire-suppression period."[30]

However, a small amount of *prescribed fire* (controlled burning) has been used to some extent by local ranchers following European settlement. As well, Dr. Harold Biswell completed extensive burning at Cow Mountain and Hoberg's Resort during the late 1940's and into the 1960's. The burns were done to help demonstrate the use of controlled burning and the benefits it had on the landscape, increasing grazing, wildlife habitat, and tree growth. Many local ranchers, hunters, and other landowners supported these burns.

### 3.5.4. Recent Fire History

During the last century, fire history has changed dramatically. Forest fuels have changed through more modern cultural practices of timber harvesting, mining, and grazing. Fire control in the west, including Lake County, has been extremely effective, particularly since the 1930's. Wildfire now *escapes* less than two percent of the time—but those escaped fires cause the vast majority of damage.

Lake County fire history shows that there have been several major wildland-urban interface (WUI) fires. In the autumn of 1961, a 9,000+-acre fire burned through the Cobb Mountain area, destroying several structures. In the fall of 1964, the South County region again was subject to a 52,000-acre fire known as the *Hanley Fire* that started near the Lake/Napa County border northwest of Calistoga. This wildland fire ultimately burned all the way to the city limits of Santa Rosa, approximately forty miles southwest. That same year, a 15,000-acre wildland fire started at the Lake County dump (possibly the result of the past practice of burning garbage at the dump) and threatened the community of Middletown. In the fall of 1968, the Lower Lake area was subject to a 10,000-acre wildland fire. In 1981, the *Lang Peak Fire* consumed 11,000 acres. In 1981, the *Cow Mountain Fire* traveled eastward from the Bureau of Land Management (BLM) lands near Ukiah in Mendocino County and burned to the foothills near Lakeport. In 1985 an interface fire burned through the Hidden Valley residential community, leaving significant property damage.[31] The *Mendenhall Fire* burned approximately 70,000 acres in Lake and Mendocino Counties in 1987, while the *Fouts Fire* burned 19,000 acres in Lake and Colusa Counties.[32]

The most recent large fires in Lake County have been the 1996 *Fork Fire,* the 2001 *Trough Fire,* and the 2008 *Walker Fire*. The *Fork Fire* started on the southern end of the Mendocino National Forest and burned 83,000 acres and eleven structures. The fire threatened the northern shore of Clear Lake, including the communities of Nice and Lucerne, and burned east almost to the Colusa County line. The *Trough Fire* started in eastern Colusa County at an intersection of U.S Forest Service roads in heavy brush and moved into Lake County. This fire burned through 24,970 acres, including portions of the Snow Mountain Wilderness. The most recent large fire—the *Walker Fire*—started on June 22, 2008. The likely source of this fire was a vehicle being driven near Indian Valley Reservoir hitting a rock with its metal undercarriage. This fire burned 14,500 remote acres in the eastern portion of Lake County.

Maps 3-3 and 3-4 at the end of this chapter show Lake County fire history, both by the decade in which the fire occurred, and by the ignition source (where known). This is useful to compare fire history both temporally and by cause.

## 3.6. Fire Hazard

The term "hazard" is usually used in the fire community in relation to topography and *fuel complex* (the volume type, condition, arrangement, and location of fuels).[33] Fire hazard is influenced by past disturbances. The history of fire or management activities greatly alters the hazard for better or worse, by changing the overall moisture of the site, as well as the volume and spatial arrangement of the fuels. This history is characterized by three fire-management eras: the time before human occupation when lightning was the only ignition source, the

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[30] Skinner, C.N., A.H. Taylor, and J.K. Agee, 2006. "Klamath Mountain Bioregion" In: N.G. Sugihara, J. van Wagtendonk, K.E. Shaffer, J. Fites-Kaufman, and A.E. Thode, editors. *Fire in California's Ecosystems*. Berkeley: University of California Press. p. 179.

[31] Smith, G. 2005. Lake County Natural Hazard Mitigation Plan Risk Assessment. Pp. 13–14.

[32] Juntunen, L., and Hansmith, A. 2004. Fire Safe Plan for the Communities of Lake County. Pp. 2–3.

[33] Husari, et al. 2006.

era of Native American occupation when fire was used extensively, and the era after European Settlement when fire was largely suppressed (as discussed in the Fire History section above).[34]

### 3.6.1. Hazard Assessment

To quote from the CDF Fire and Resource Assessment Program (FRAP) website:

> "CDF [CAL FIRE] has developed a hazard assessment methodology for the California Fire Plan to identify and prioritize pre-fire projects that reduce the potential for large, catastrophic fires."[35]

The fuel hazard ranking tells us the expected behavior of fire in severe weather (when wind speed, humidity, and temperature make conditions favorable for a catastrophic fire). The method for determining the fuel hazard ranking is based on: a) fuel model, b) slope, c) brush density, and d) tree density.

Evaluation of fuel model and slope will result in a surface rank, which indicates the "rate of fire spread and heat per unit area associated with each unique fuel model-slope combination."[36] This describes how fast and hot a potential fire can burn in a given area. The methodology then measures how abundant ladder fuels and crown fuels are in the area. Coupled with potential fire behavior, CAL FIRE ranks the fire hazard in any location.

If an area has a very high surface rank (a very high rate of fire spread and heat per unit area), along with dense crown and ladder fuels, then it is highly probable that a fire could reach catastrophic proportions there during severe weather conditions. The area would receive a very high hazard rating. If an area has a moderate surface rank (a low rate of fire spread and heat per unit area) and has very little crown and ladder fuel, then there is a low probability of a catastrophic fire occurring there and it would receive a moderate hazard rating.

Lake County has delineated areas where fire protection responsibility is local (Local Responsibility Area/LRA), state (State Responsibility Area/SRA), or federal (Federal Responsibility Area/FRA). *See Chapter 6 for a full explanation of the county's fire protection agencies and a map of coverage areas.* Fire Hazard Severity Zones (FHSZs) were originally mapped for the SRA in 1985, and for LRA in 1996. CAL FIRE began updating these maps in 2006 in order to implement the new WUI building codes that have since been adopted by the California Building Standards Commission. This mapping also incorporates current scientific knowledge, most notably the consideration of firebrands as a source of fire spread and ignition. FHSZs represent areas of variable size, ranging from 20–200 acres for urban and wildland areas respectively. These zones consider homogenous characteristics based on climax fuel conditions over a 30–50 year period. *For more information on Hazard Mapping and associated Building Codes, please see: www.fire.ca.gov/fire_protection/fire_protection_prevention_planning_wildland.php.*

Much of Lake County is within what's termed the Very High Fire Hazard Severity Zone (FHSZ), as opposed to High or Moderate. Very High FHSZ is the most threatening of the three zones. In Lake County, most of the area designated Very High is not heavily occupied by residents and is in public ownership, such as the Mendocino National Forest and Cow Mountain Recreation Area. However, there are many residential communities that also lie within this zone. These areas include, but are not limited to, the Rivieras, Nice, Lucerne, and Cobb. While most of the county's residential communities lie within the High or Moderate FHSZ, these communities are unfortunately still in close proximity to the Very High FHSZ, and therefore still can be at major risk from wildfire. Map 3-5 at the end of this chapter displays the CAL FIRE fire hazard severity zones for Lake County.

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[34] Stephens, S.L., and N.G. Sugihara. 2006. "Fire Management and Policy Since European Settlement." In: Sugihara, N.G., J. van Wagtendonk, K.E. Shaffer, J. Fites-Kaufman, and A.E. Thode, editors. *Fire in California's Ecosystems.* Berkeley: University of California Press. Pp. 431–443.

[35] CAL FIRE. 2005. Fire and Resource Assessment Program (FRAP). "Hazards Maps and Data." http://frap.cdf.ca.gov/data/fire_data/hazard/mainframes.html.

[36] CAL FIRE. FRAP. "Fuel Ranks Maps and Data." http://frap.cdf.ca.gov/data/fire_data/fuel_rank/index.html.

## 3.7. Fire Regime

The fire regime is an objective measurement of fire's historic natural occurrence in the landscape, which is not necessarily the current condition or appearance. The fire regime includes the season, frequency, intensity, and spatial distribution of fires. There is quite a wide variability of "natural" intervals, intensities, and seasons, but some generalities can be made. Each vegetation type has its own fire regime. A standardized set of five fire regimes is used nationwide.[37,38]

The five historical fire regimes are classified based on the average number of years between fires (fire frequency) combined with the severity (amount of overstory replacement) of the fire on the dominant overstory vegetation. These five regimes include:

I: 0 to 35-year frequency and low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced);

II: 0 to 35-year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced);

III: 35- to 100+-year frequency and mixed severity;

IV: 35- to 100+-year frequency and high severity;

V: 200+-year frequency and high severity.

As scale of application becomes finer, these five classes may be defined with more detail, or any one class may be split into finer categories.

Although the fire regimes within Lake County have been altered due to fire suppression and other land management activities, there are at least two pre-settlement fire regimes found here. According to information collected and analyzed by CAL FIRE, Lake County has a natural *fire return interval* between 0-35 years of low severity fire (Fire Regime I), and between 35-100 years of mixed severity fire (Fire Regime III).[39] *See Map 3-6 at the end of this Chapter.*

### 3.7.1. Condition Class

The difference in fire regime between pre- and post-European settlement is described by the *condition class,* or degree of departure from the historical natural fire regime. Mapping of the fire regime condition class has been done nationwide and is widely used. Usually where the condition class indicates that fire has been absent for an unnaturally long time, the hazard and potential damages are high to both the environment and human developments in the area.

Condition class is based on a relative measure describing the degree of departure from the historical natural fire regime. The departure from natural fire regimes results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing, and drought). There are no wildland vegetation and fuel conditions or wildland fire situations that do not fit within one of the three classes.

The three classes are based on low (FRCC[40] 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime. "Low departure is considered to be within the natural

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[37] Hardy, K.M., C.C. Schmidt, J.M. Menakis, and N.R. Samson. 2001. "Spatial Data For National Fire Planning And Fuel Management." *International Journal of Wildland Fire* 10: Pp. 353–372.

[38] Hann, W.J., and D.L. Bunnell. 2001. "Fire And Land Management Planning And Implementation Across Multiple Scales." *Int. J. Wildland Fire* 10: Pp. 389–403.

[39] California Fire Alliance. *Fire Planning And Mapping Tools.* http://wildfire.cr.usgs.gov/fireplanning.

[40] *Fire Regime Condition Class* website. *Definition.* Hann et al. 2008. Interagency and The Nature Conservancy, USDA Forest Service, US Department of Interior, The Nature Conservancy, and Systems for Environmental Management. October 2006. www.frcc.gov.

(historical) range of variability, while moderate and high departures are outside."[41] Areas considered at a high or moderate departure from the natural regime are experiencing dramatic increases in fire behavior, intensity, severity, and fire size.[42]

The greater the departure from the natural fire regime, the greater the variations to ecological components and the higher the risk of losing *key ecosystem components.* For example, FRCC 3 classification means that fire regimes have been greatly altered from their natural range (e.g., from 3-10 years between fires prior to European settlement to 50-70 years since), and likewise, vegetation characteristics have been dramatically altered from their natural range. For example, an area may have experienced a fire regime of small, frequent, low-intensity fires prior to European settlement. However, because fire suppression has been successful, only one fire has burned the area in the past 100 years. The fuels have become voluminous and hence fire behavior is predicted to be intense, with the potential to kill trees that have survived other fires over the centuries. The fuels have also become more uniform, creating conditions that facilitate fire spread and result in a large fire. Therefore, the risk of losing key ecosystem components is high.

Fuel management projects can restore the vegetation type and structure through prescribed fire and/or other types of management techniques in a spatial distribution that can mimic the effect of natural fire regimes. Thus fuel management can move a condition class to one more closely resembling pre-European settlement, regardless of recent fire history.

Condition class does not relate directly to fire hazard but is designed to better predict the effects from a fire, specifically, fire-related risks to ecosystems. All three condition classes (1, 2, and 3) exist in Lake County, based on a natural fire regime of I and III, and a fire history interval of 0-35 and 35-100 years. This means that within Lake County there exist areas with low, moderate, and high departures from the historic natural fire regime. The largest area in Lake County (at 45%) contains those ecosystems with a low departure from their natural fire regime, and hence low risk of key ecosystem loss. Another 22% are at a moderate departure. Those areas with a significant departure and high risk of ecosystem loss, are 20% of the county lands, and located primarily in the mountainous regions of the north and south. Finally, 13% are not classified because they are not wildlands. Map 3-7 at the end of this chapter shows Lake County condition classes.

## 3.8. Fire Threat

> "Fire threat can be used to estimate the potential for impacts on various assets and values susceptible to fire. Impacts are more likely to occur and/or be of increased severity for the higher threat classes. Fire Threat is derived from a combination of fire frequency (how often an area burns) and expected fire behavior under severe weather conditions. Fire frequency is derived from 50 years of fire history data. Fire behavior is derived from fuels and terrain data. These data inputs are also catalogued within CERES and available via the CDF-FRAP web site. Detailed documentation is under development and will be posted on the FRAP web site."[43]

According to CAL FIRE, Lake County's fire threat ranges from Moderate to Extreme, but most of the county is considered High to Very High. Map 3-8 at the end of this chapter shows Lake County predicted fire threats.

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[41] National Wildfire Coordinating Group, Fire Regime Condition Class Definition. June 2003. www.nwcg.gov/teams/wfewt/message/FrccDefinitions.pdf.

[42] *Fire Regime Condition Class* website. 2006.

[43] California Department of Forestry and Fire Protection, Fire and Resource Assessment Program, Metadata Record: Fire Threat, 2005, frap.cdf.ca.gov/data/frapgismaps/output/fthreat_map.txt{ TA \l "http://frap.cdf.ca.gov/data/frapgismaps/output/fthreat_map.txt" \s "http://frap.cdf.ca.gov/data/frapgismaps/output/fthreat_map.txt" \c 1 }.

## 3.9. Changing Fuels in the Wildland-Urban Interface

The above information and assessments provide a context for and history of Lake County's changing wildfire environment. This changing fire environment, along with increasing urbanization and other human uses have created conditions where one can assume that human life and property, as well as key ecosystem components, are at increasing risk from the effects of high-intensity wildfires.[44]

Although there is variation among sites as to when fire suppression was successfully implemented, the temporal patterns of fire occurrence in the pre-fire suppression period indicate that most stands in California's Klamath *bioregion* experienced at least several fires each century. This suggests a general fire regime of frequent, low-to moderate-intensity fires.[45] Fire exclusion, logging, grazing, forest clearing, and urbanization have combined to alter fire regimes that are now quite different from their historical character. "More area is burning at high intensity, and this is related, in part, to higher quantities and more homogeneous fuels caused by accumulation during the fire-suppression period".[46]

This changing wildfire environment is most notable within the wildland-urban interface, where land management decisions of the past are now affecting fire behavior in the backyards and watersheds of rural and suburban developments. These problems were created over a long time, and they will not likely be solved rapidly. The use of defensible space, shaded *fuelbreaks,* and other fuel reduction efforts along the interface can reduce these wildfire risks.[47] This CWPP outlines actions to do just this in Chapter 8.

*See the following pages for the maps associated with this chapter.*

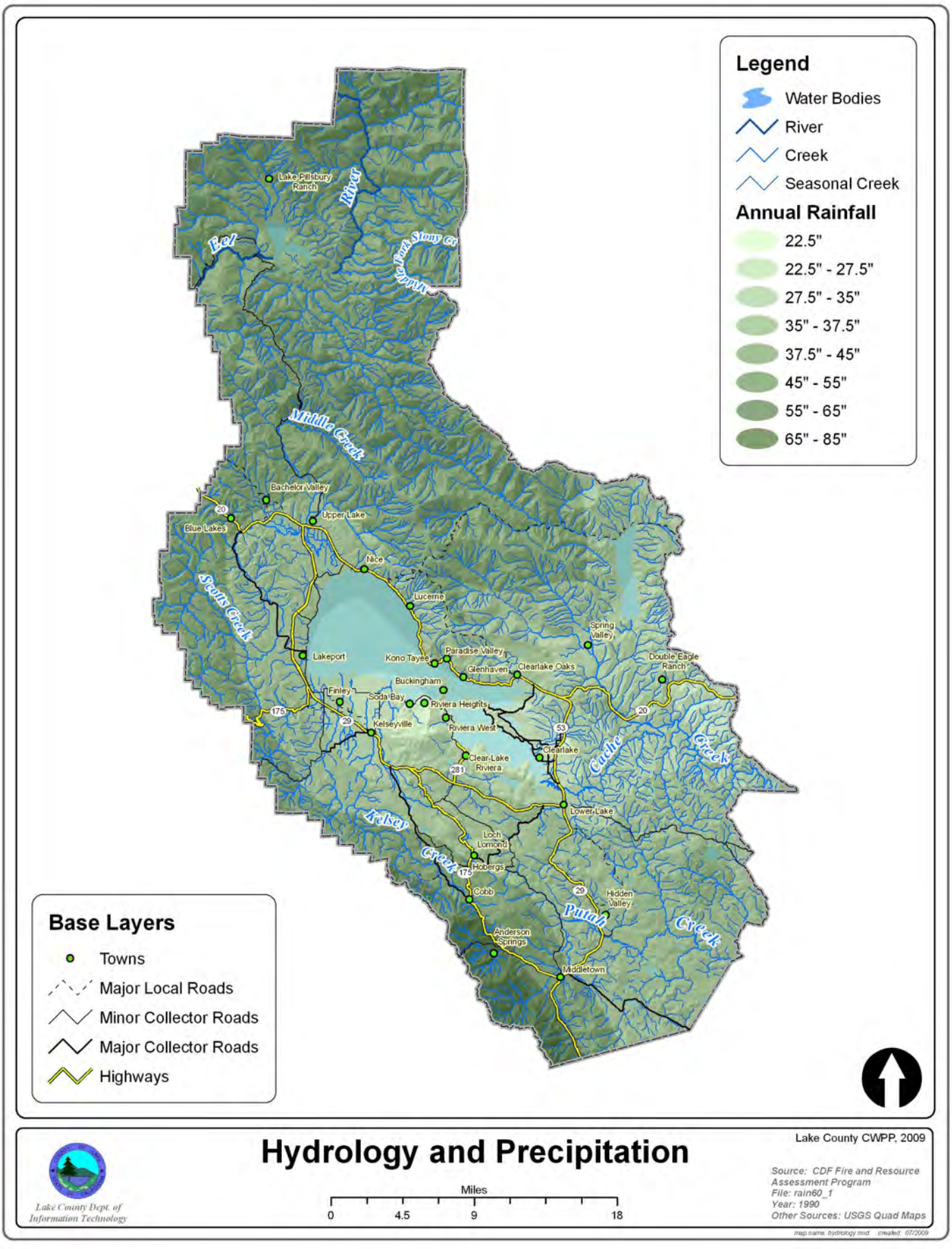
[44] Biswell (1989); Sierra Nevada Ecosystem Project (SNEP). (1996a). "Fire and Fuels." Final report to Congress, Vol. I. Assessment summaries and management strategies. Wildland Resources Center Report No. 36. Davis, CA: Centers for Water and Wildland Resources, University of California; Pp. 62–71.

[45] Skinner et. al. 2006.

[46] Skinner et. al. 2006.

[47] Husari et al. 2006.

***Map 3-1. Lake County Hydrology***




# Hydrology and Precipitation

Lake County CWPP, 2009

Lake County Dept. of Information Technology

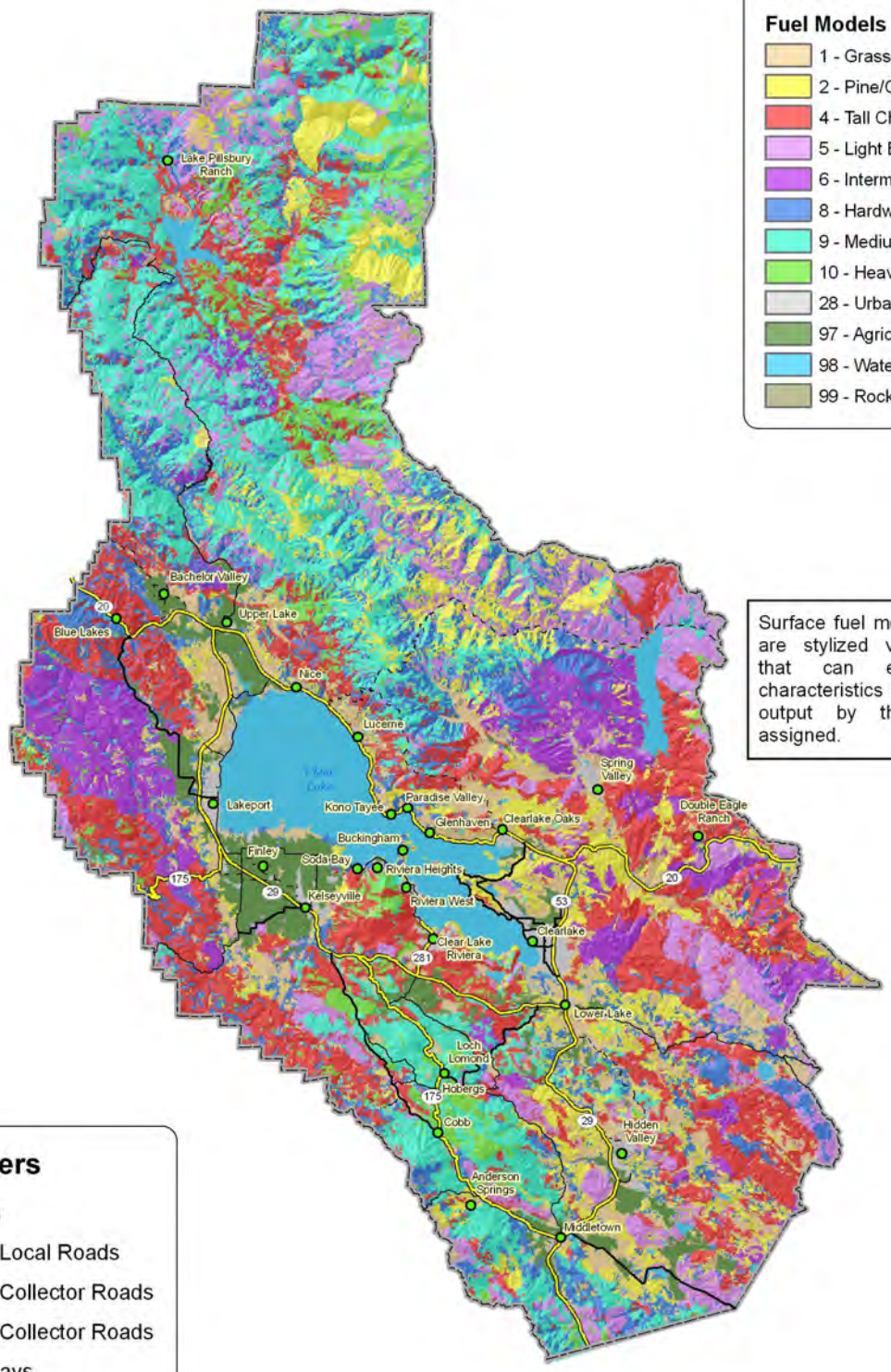
Miles

0 4.5 9 18

Source: CDF Fire and Resource Assessment Program
File: rain60_1
Year: 1990
Other Sources: USGS Quad Maps

map name: hydrology.mxd created: 07/2009

***Map 3-2. Lake County Fuel Models***




# Fuel Models

Miles

0 4.5 9 18

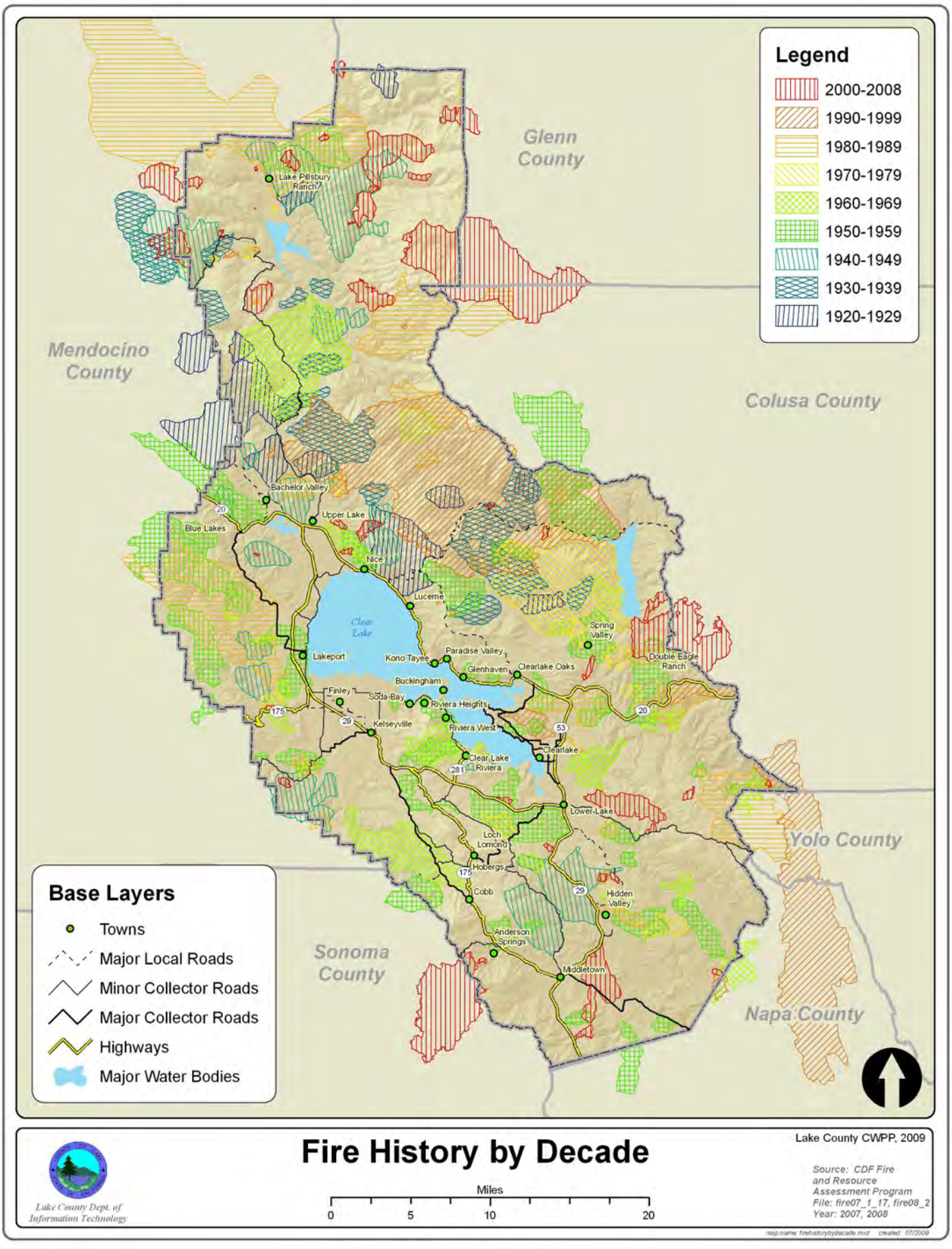
Lake County Dept. of Information Technology

Lake County CWPP, 2009

Source: CDF Fire and Resource Assessment Program
File: fmod05_1_17
Field: FUELMOD
Year: 2005

map name: fuelmodels.mxd created: 04/2009

***Map 3-3. Lake County Fire History by Decade***




# Fire History by Decade

Lake County CWPP, 2009

Lake County Dept. of Information Technology

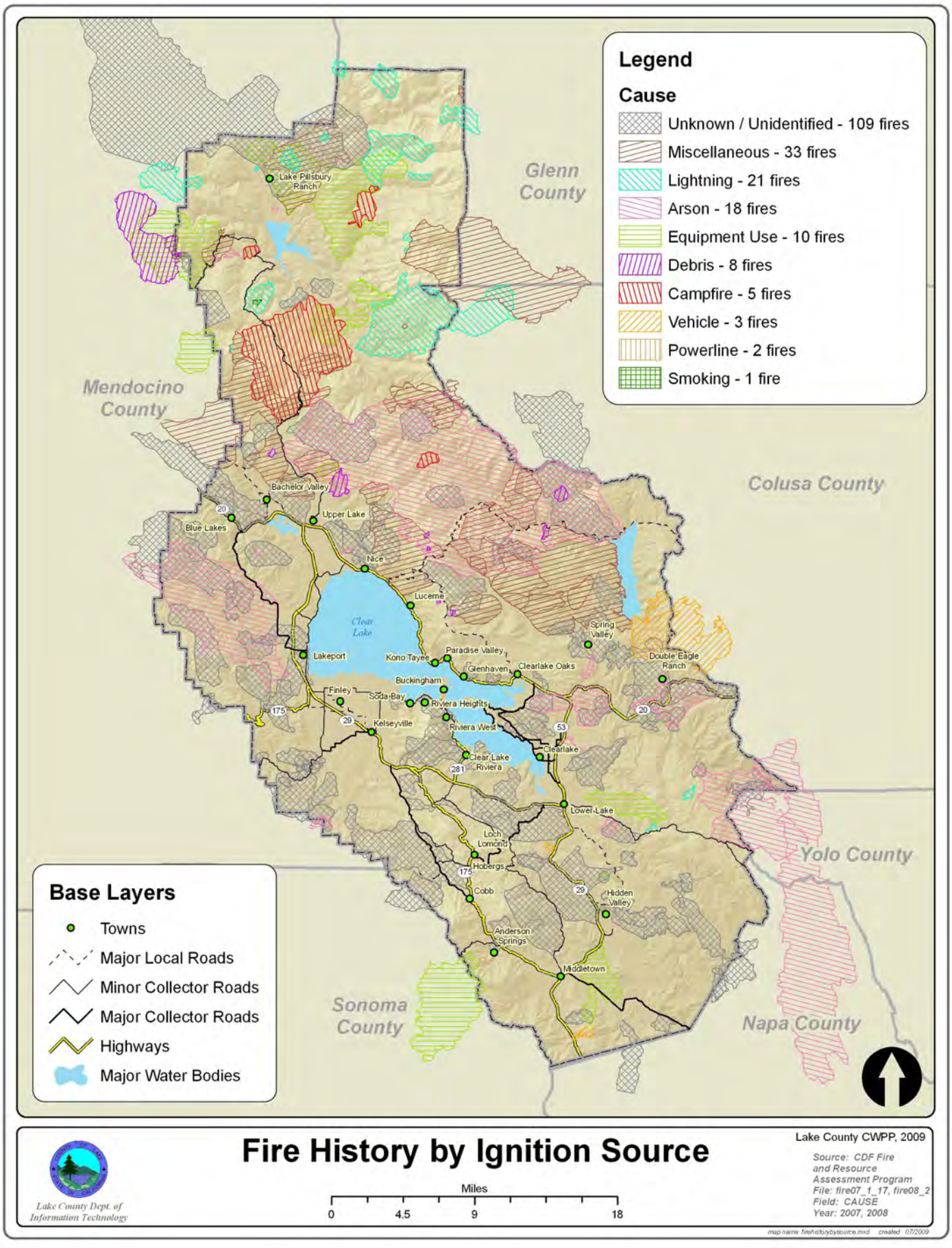
Miles

0 5 10 20

Source: CDF Fire and Resource Assessment Program
File: fire07_1_17, fire08_2
Year: 2007, 2008

map name: firehistorybydecade.mxd created: 07/2009

***Map 3-4. Lake County Fire History by Ignition Source***




# Fire History by Ignition Source

Lake County Dept. of Information Technology

Miles

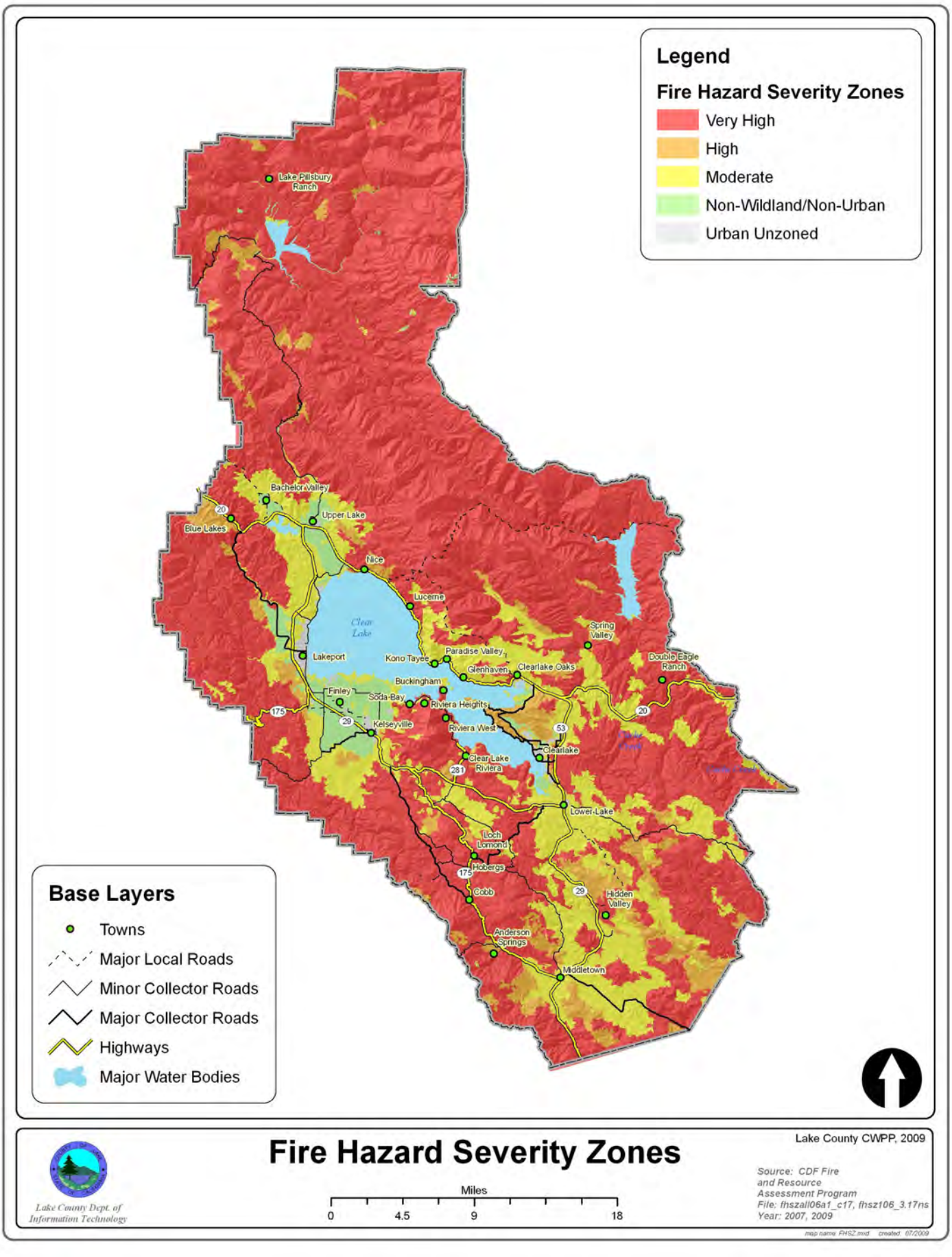
0 4.5 9 18

Lake County CWPP, 2009

Source: CDF Fire and Resource Assessment Program
File: fire07_1_17, fire08_2
Field: CAUSE
Year: 2007, 2008

map name: firehistorybysource.mxd created: 07/2009

***Map 3-5. Lake County Fire Hazard Severity Zones***




# Fire Hazard Severity Zones

Lake County CWPP, 2009

Lake County Dept. of Information Technology

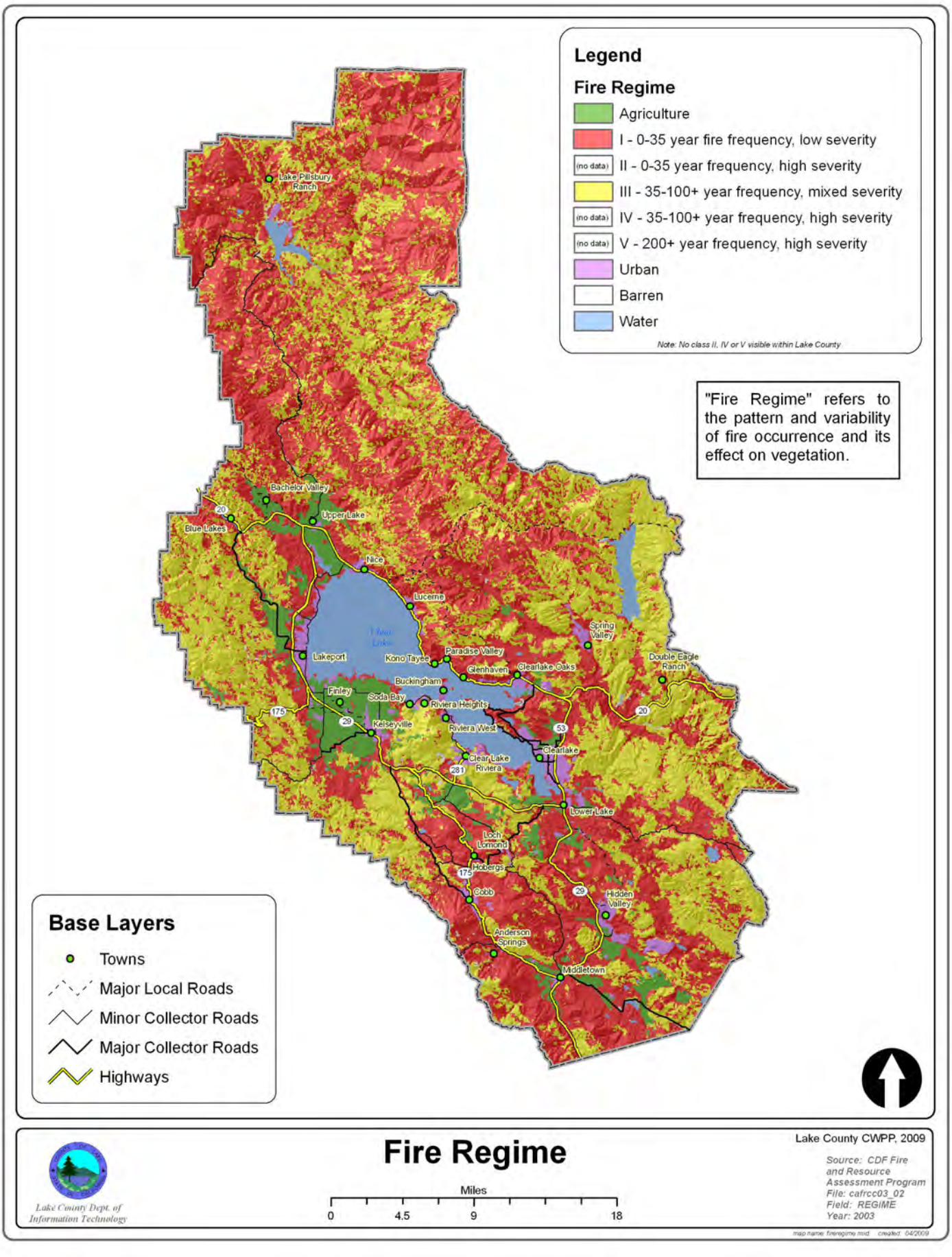
Miles

0 4.5 9 18

Source: CDF Fire and Resource Assessment Program
File: fhszall06a1_c17, fhsz106_3.17ns
Year: 2007, 2009

map name: FHSZ.mxd created: 07/2009

***Map 3-6. Lake County Fire Regime***




# Fire Regime

Miles

0 4.5 9 18

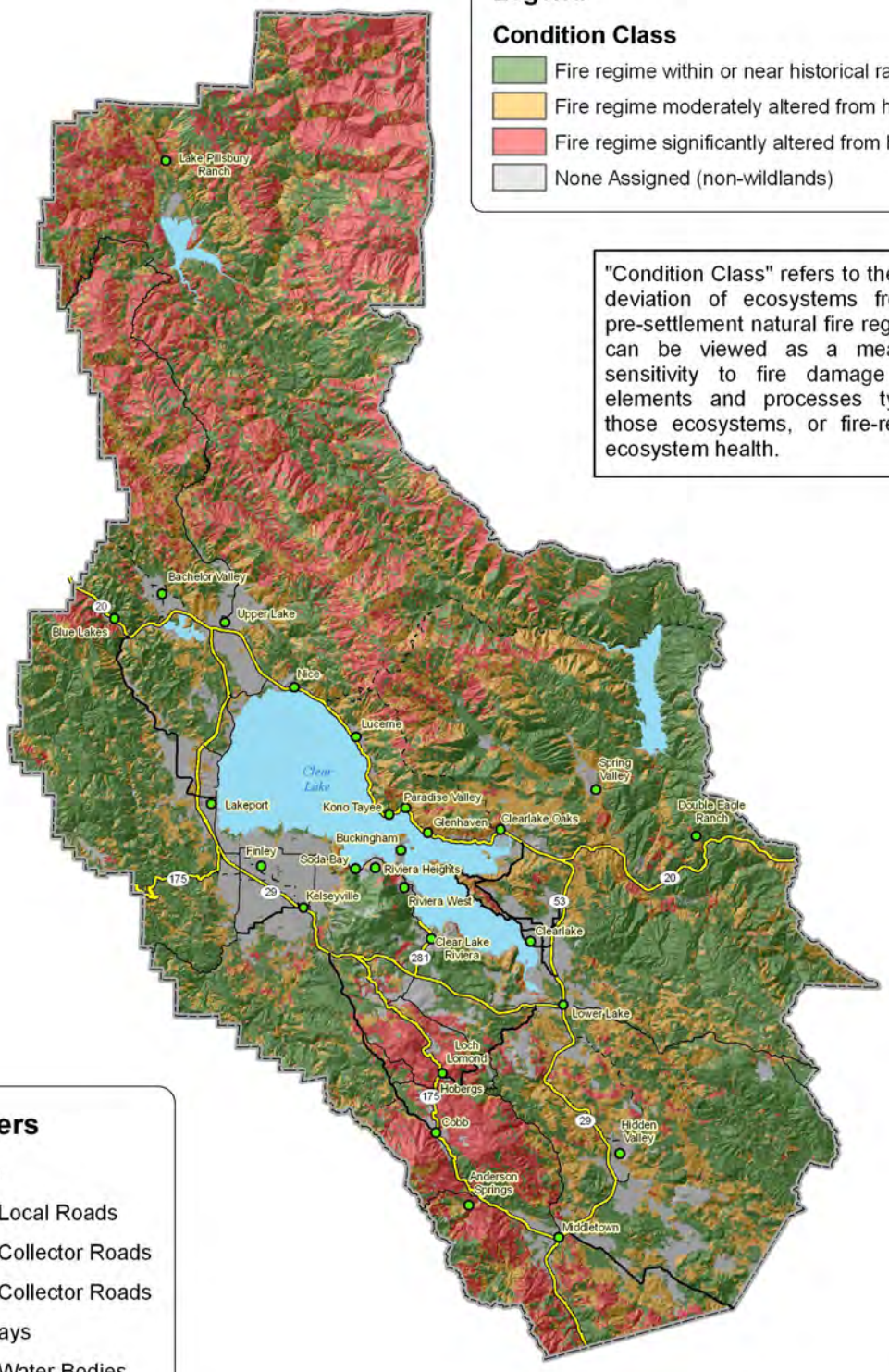
Lake County CWPP, 2009

Source: CDF Fire and Resource Assessment Program
File: cafrcc03_02
Field: REGIME
Year: 2003

Lake County Dept. of Information Technology

map name: fireregime.mxd created: 04/2009

***Map 3-7. Lake County Condition Class***




# Condition Class

Lake County Dept. of Information Technology

Miles

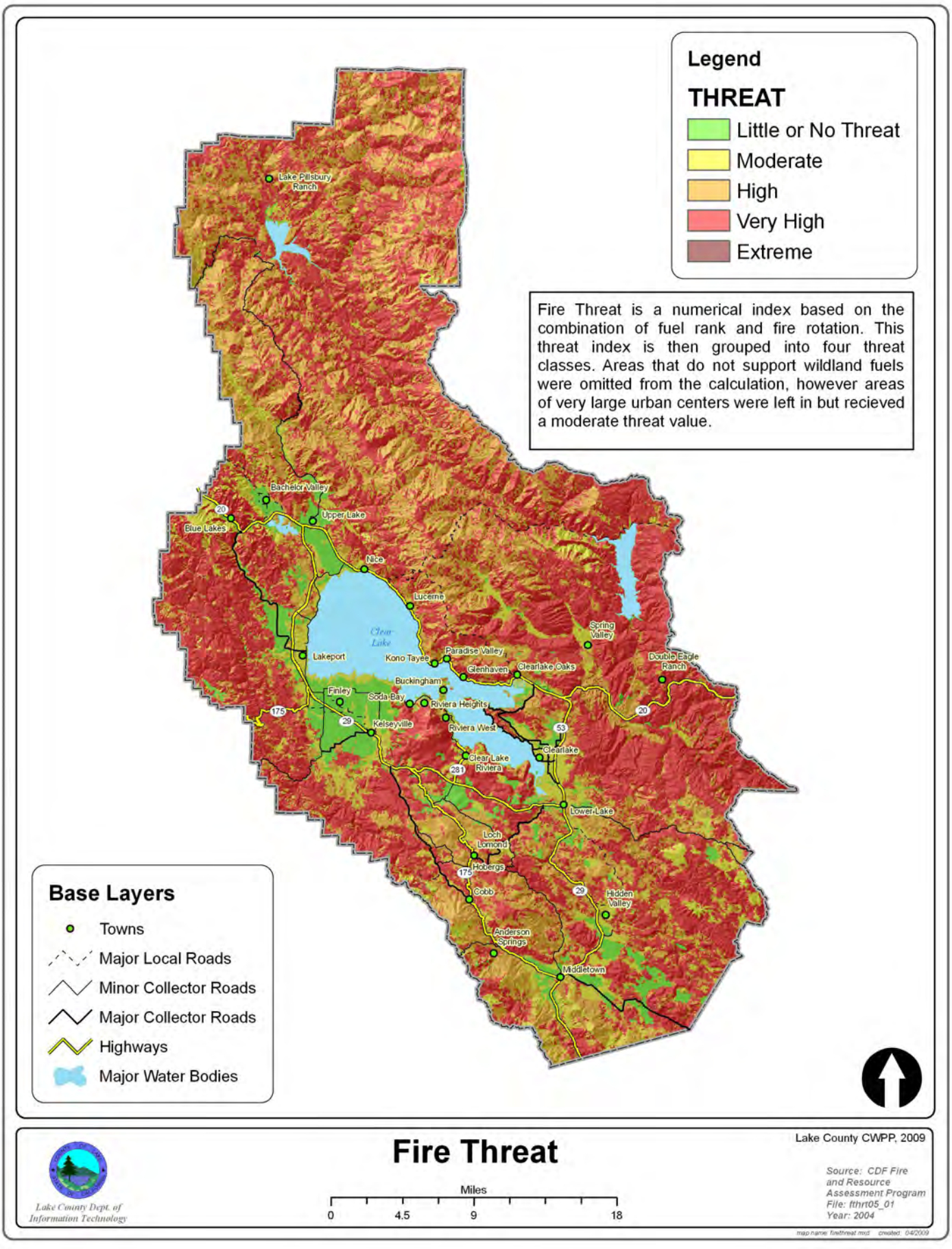
0 4.5 9 18

Lake County CWPP, 2009

Source: CDF Fire and Resource Assessment Program
File: cafrcc03_02
Field: CON_CLASS
Year: 2003

map name: conditionclass.mxd created: 04/2009

***Map 3-8. Lake County Fire Threat***




# Fire Threat

Lake County Dept. of Information Technology

Miles

0 4.5 9 18

Lake County CWPP, 2009

Source: CDF Fire and Resource Assessment Program
File: fthrt05_01
Year: 2004

map name: firethreat.mxd created: 04/2009

## 4. Fire Ecology and Management of Lake County Vegetation Types[1]

Fire is a natural and necessary *disturbance factor* for Lake County vegetation. Fire, like rain, soil and sunshine, has shaped the patterns of vegetation on the landscape for eons, determining in part the species composition, *spatial distribution,* age, and physical structure of plants. The process of fire has profoundly influenced most of Lake County's ecosystems. In the Lake County foothills and mountains, fire has historically been a dominating factor in the *disturbance regime* and has been key in the evolution of *plant communities.*

Many of the plant communities within this region are considered *fire-adapted*. Scientists have found that many common plants have very specific fire-adapted traits, such as thick bark and fire-stimulated flowering, sprouting, seed release and/or germination. Fire also affects the amount of duff and litter that accumulates on the ground; the density of trees, shrubs, and other plants; and the cycling of nutrients to soil and plants.

An over accumulation of vegetation has occurred throughout many of Lake County's ecosystems as a result of land management practices such as fire suppression. This has allowed unnatural changes to take place in the balance of plant communities, and caused fuels to build up. Fires burning in this scenario generally occur in large episodic events and release tons of particulate matter into the atmosphere. These fires are also difficult or at times even impossible to fight with existing county resources. Large fires often require a change in weather before they can be put out, or extinguish by themselves when they approach natural fuel breaks such as bodies of water, or recently burned areas.[2]

Fire suppression does not eliminate the carbon emissions caused by wildfire; it just delays them. Because wildfires tend to occur at the driest time of year when dead fuels and vegetation is also driest, they are more completely consumed and typically produce three to five times more emissions than early or late-season prescribed fires.[3] Smoke from these episodic events can threaten public health, cause smoke damage to buildings and materials, and disrupt community activities.[4] Reducing fuels may aid in the reduction of large wildfires that emit tons of carbon into the atmosphere. Thinning trees and other vegetation promotes growth and carbon uptake by remaining vegetation. The effects of wildfires on global warming are not fully clear yet and will have to be considered as new information comes forward. However, by decreasing fuel loads, the size and intensity of wildfires may be reduced resulting in less carbon emissions.

More fire-resilient ecosystems can be produced by using the many tools and approaches mentioned in this CWPP (such as thinning, brush removal, and controlled burning). Greater fire resiliency will actually improve air quality and vegetation. A wildfire burning through a fuel-choked area will produce much more smoke and particulate pollution than in an ecosystem which has been treated with management techniques encouraging fire resiliency. Reducing and restoring fire's ecological role in fire-adapted ecosystems will reverse many adverse trends that serve as important indicators of ecosystem sustainability.[5]

The following pages describe the vegetation types found in Lake County. For each type, the role of fire in shaping the assemblage of plants, the nature of the fire regime, and the common vegetative adaptations to fire are discussed. These features are then considered in the development of management prescriptions that a) are consistent with the natural role of fire expected for each type, b) promote the Conservation Principles identified in Chapter 1, and c) improve the fire resiliency of the vegetation type.

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[1] This section was written primarily by David Jaramillo, based on a previous version by Marko Bey, Lomakatsi Ecological Services, and Susan Britting, PhD. Technical review was provided by Greg Giusti, UC Cooperative Extension, Carol Rice, Wildland Resource Management, and Jeff Tunnell, Bureau of Land Management.

[2] USDA Forest Service. 2000. *Protecting People and Sustaining Resources in Fire Adapted Ecosystems A Cohesive Strategy.* p. 44.

[3] USDA Forest Service. 2000. p. 32.

[4] Sandberg, David, V.;Ottmar, Roger D.; Peterson, Janice L.; Core, John. 2002. *Wildland Fire on Ecosystems: Effects of Fire on the Air.* Gen.Tech Rep. RMRS-GTR-42-vol. 5. Ogden, UT: U.S Department of Agriculture, Forest Service. Rocky Mountain Research Station. p. 79.

[5] USDA Forest Service. 2000. p. 44.

Among the vegetation types, fire regimes and plant adaptations are quite varied. The role that fire plays in each type however, has some common themes. For example, fire burns the vegetation and releases nutrients to the soil and air that can be recycled into new plants or used by surviving plants. Vegetative removal by fire–or by thinning, grazing or other methods–creates space or openings that encourage the regrowth or reseeding of plants, allowing the stand to renew itself. Fire also has historically been able to *fragment* the vegetation and provide for both a vertical and horizontal *heterogeneity* over a given landscape. In addition to these general benefits and consequences of periodic fire, fire has played a unique role in shaping each vegetation type, as the sections below illustrate. Fires today, however, generally burn larger areas, making the volume of vegetation *(biomass),* species distribution, and age classes more uniform in larger patches. Diversity of vegetation, and the mosaic nature in which it grows on the landscape, is key to ecosystem health.

The prescriptions mentioned in this Chapter are meant to be a guideline for fuel modifications. Landowners should always, and in some cases *must*, seek the advice of Registered Professional Foresters or other resource managers regarding fuel-reduction projects. For example, individual plans need to be written for fuel-reduction projects such as shaded fuelbreaks and roadside clearing. The prescriptions found in this CWPP can be used as the basis for ecological fuel-reduction projects. However, due to the great variety among vegetation types, goals, and objectives of fuels treatments, it's always best to ask help from knowledgeable resource professionals.

In all cases, care should be taken to increase fire safety while maintaining, restoring, and/or increasing habitat diversity. Treatments should focus on reducing fire intensity, especially around communities. The following vegetation types have all adapted to wildfire. All of the fuels treatments described have been developed to mimic naturally occurring fire on the landscape, including the use of controlled fire itself, where appropriate. Creating landscapes where fire can occur in low or moderate intensity will help maintain healthy, productive ecosystems.

*Please see Map 4-1 at the end of this chapter for detailed vegetation types by Wildlife Habitat Relationship (WHR) classification.*

## 4.1. Grassland

Grasslands are a minor yet important vegetation type within Lake County. At lower elevations in the county, large expanses of grassland are often interspersed with stands of chaparral and oak woodland. Historically, perennial grasses were common in grassland vegetation communities.[6] Today, however, grasslands are dominated by non-native annual grasses that arrived following European settlement. Other introduced grasses and plants such as ripgut brome (*Bromus diandrus*) and yellow star thistle (*Centaurea solstitialis*) have invaded many native grasslands.

Vernal pools associated with wetlands and grasslands are also present in Lake County. They are a minor yet important ecosystem type within the county. Many vernal pools have been altered by agriculture and development**.** Loch Lomond and Boggs Lake are two well-known locations of vernal pools here. The Nature Conservancy manages Boggs Lake Preserve for the natural values of the approximately 120-acre vernal pool. Characteristic of the area are four rare, endemic vernal pool plants: Calistoga popcornflower (*Plagiobothrys strictus*), Loch Lomond button-celery (*Eryngium constancei*), many-flowered navarretia *(Navarretia leucocephala* spp. *plieantha*), and few-flowered navarretia (*Navarretia leucocephala* spp. *pauciflora*).[7]

### 4.1.1. Grassland Role of Fire

Fire in a grassland system serves to reduce the amount of accumulated dead plant material. This is important for annual grass species, as they often do not germinate well unless some of the plant material has been removed and the bare soil exposed for seed germination. Perennials generally respond well to fire, as an overabundance of thatch inhibits the spread and reproduction of these long-lived plants. In native bunchgrasses, fire often promotes

[6] Wills, R. 2006. "Central Valley Biogregion." In: Sugihara, N.G., J. van Wagtendonk, K.E. Shaffer, J. Fites-Kaufman, and A.E. Thode, ed. 2006. *Fire in California's Ecosystems.* Berkeley: University of California Press. Pp. 295–320.

[7] Keeler-Wolf, T.; Elam, D.; Lewis, K.; Flint, S. 1998. California Department of Fish and Game. *California Vernal Pool Assessment Preliminary Report.* p. 41.

*tillering,* or spread from the outside of the clumps, or bunches. Fire can change grass species composition by removing annual grass seed and providing more space for perennial bunch grasses.

### 4.1.2. Grassland Fire Regime

Grassland fires tend to be of moderate intensity and burn only briefly in a given area, with a low heat output and low severity because of the limited amount of biomass. Historically, fire size was likely highly variable, ranging from dozens to thousands of acres. There is little known about the pre-European fire return interval of grasslands. Burning initiated by natives and early settlers occurred in some areas as frequently as every one to three years (this practice occurred up to the 1960's in some areas of the county).

### 4.1.3. Grassland Plant Adaptations to Fire

The rapid and early seed germination of many annual grasses is well suited to a fire regime that results in most of the aboveground material being burned. This is true even in the absence of fire for annual grasses. Because grass fires burn quickly over an area, the heat rarely penetrates deep into the soil, leaving the *seed bank* viable. The interior of perennial grass bunches, rootstock, and underground *rhizomes* often survive brief fires. Bunchgrasses insulate the central portion of the bunch, helping to preserve individual plants. These living, interior portions of bunchgrasses, and the underground plant parts are then able to resprout quickly following the next rains. Bunchgrasses may be hundreds of years old, surviving several fires in this manner.

### 4.1.4. Grassland Conservation and Fuel Modification Objectives

Grasslands contribute to regional diversity and therefore are important to maintain in Lake County. The majority of grasslands here have been converted from native perennial grasses and forbs that carry shorter flame lengths, to annual non-native grasses that produce longer flame lengths and faster spread rates. This change increases the potential dangers of wildfire. Perennial grasses tend to shorten the ignition season and dampen fire intensity and spread.

Short-term fuel-reduction objectives for managing grasslands are to manage them in early to mid summer by methods of *weed-eating,* cutting, or mowing prior to the beginning of fire season. Long-term objectives are to convert back to native grasses (from exotic annuals) through fall or spring grazing or *broadcast burning (see Appendix D)* followed by native seed sowing. This is a very time-consuming task requiring meticulously scheduled seasonal activities and is more appropriate for highly focused areas due to the intensity of the work.

If grass conversion is not the focus, then careful, very temporary, selective, rotational livestock grazing can mitigate annual grass heights, reducing grassy fuels. Timing of fuel treatments is important in grasses. Selectively mow non-native annuals in the spring before seed set to retain and promote native perennials, as well as to enhance fire safety. Convert annual grasslands to perennials; the greater proportion of perennials, the more benign the fire effects.

Fuel-reduction efforts at the edges and within neighboring woodlands and shrublands will be an important activity for fire behavior modification plans. Similar to meadows, grasslands can serve as natural fuelbreaks and fire suppression *anchor points.*

### 4.1.5. Grassland Fuel Modification Treatment Prescription

- Focus on the perimeter of the grassland, in those areas adjacent to structures, roads and landscaping.
- Mow, graze *(see Grazing section below),* or weed-eat annual grasses prior to the plants going to seed. Before cutting grass, identify patches of native grasses and forbs, as well as any wildlife nests, in order to protect and buffer these locations. When needed, planting of native perennials in the late fall to late winter will help in the conversion back to native grasslands. The cool wet weather during these seasons aids in seedling emergence and root development. *Discing* should be avoided because it promotes non-native invasive weeds and surface soil erosion.
- In a large grassland area, prioritize grass cutting of 100–200 feet between structures, landscaping, and grasslands, and between grass and woodland/shrubland edges, in order to create a fuelbreak. Where grazing is desired in a strip pattern, use proper fencing to contain animals in the proper location.

- Treat fuels along edges and within neighboring woodlands or shrublands in an effort to separate grass and woody plant connections. *(See fuel treatment prescriptions below for whichever vegetation community borders the grassland.)*
- Following the treatment of fuels within neighboring woodlands and shrublands, carefully consider broadcast burning in defined *strip patch* portions of the grasslands, taking into consideration all burning regulations and the health and safety of others *(see Appendix D for more information).* This will refresh the seed bank of wildflowers and other plants that typically only thrive after fire. Prescribed fire experts should be consulted and a fire plan created in conjunction with cooperating agencies.
  Following burning, native grass seeds can be sowed into mineral-rich ashes at varied seeding rates, depending on the vitality of the seed source. When acquiring native grass seed from either a nursery or federal agency it is good to determine how old the seed is; be sure to find grass seed best suited for your specific area and elevation. Older grass seed will have less vitality than more recently harvested seed. It is best to keep grass seed stored in a cool place, preferably refrigerated or stored in a cooler at around 35°F. Successful establishment of native grass will require visual monitoring of the seeding response. Apply a variety of seeding rates in different burn locations, including both heavier (more seed spread) and lighter (less seed spread). Label these treatment areas with rebar and flagging to monitor effectiveness. Keep a journal of these details to assist future efforts. Consult local botanical experts for appropriate ratios and genetic sources.

## 4.2. Chaparral and Chamise/Chaparral

Most shrub communities in Lake County are referred to as chaparral. Chaparral often occurs on hot, dry slopes and on sites with less productive soil. Chaparral generally occurs at elevations below 5,000 feet and includes shrubs such as toyon *(Heteromeles arbutifolia),* manzanita *(Arctostaphylus ssp),* scrub oak (*Quercus berberidifolia*), chaparral pea (*Pickeringia montana*), poison oak (*Toxicodenron diversilobum*), *Baccharis spp*., *Ceanothus spp.*, and chamise *(Adenostoma fasciculatum).* Chamise/chaparral often forms pure stands of chamise, but it is identified as any stand with greater than 60 percent chamise cover.[8]

### 4.2.1. Chaparral Role of Fire

Chaparral has been described as a fire-adapted ecosystem; meaning it benefits from fire. Some chaparral plant species require fire for its regeneration and to reduce competition. In the absence of fire, chaparral forms tall, dense stands of shrubs that have a low diversity of both shrub and herbaceous species. Chamise can form impenetrable, nearly pure stands in the absence of fire. This situation is a high fire hazard, and has less ecological value than a high diversity of younger shrubs. However, the chaparral ecosystem is a productive part of the overall interconnection of Lake County's vegetation types and diversity. This vegetation type benefits greatly from fuel-management treatments.

### 4.2.2. Chaparral Fire Regime

Tall and mature chaparral generally produces high-intensity fires. Wildfires in chaparral communities often are stand-replacing events; fires burn sufficiently hot to consume all of the surface plant material.

In the past, frequent fire in chaparral communities led to heterogeneity, thereby reducing the continuity of the vegetation throughout the landscape. Generally, where plant cover is discontinuous in chaparral landscapes, fires were characterized as medium-sized, burning at varied intensities. Fires that burn through continuous dense stands of chaparral can lead to enormous high-intensity conflagrations. Fires in chaparral today generally are larger, less scattered, and more uniform than those in pre-settlement times.

Chaparral fires generally occur in summer and fall, depending on the dryness of the year and site. The time between episodes of fire—the fire return interval—in chaparral is highly variable, ranging from ten to more than one hundred years.

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[8] England, A. Sidney. "Chamise-Redshank Chaparral" In: Mayer, K.E., W.F. Laudenslayer Jr., ed. 1998. *A Guide to Wildlife Habitats of California.* p. 166.

### 4.2.3. Chaparral Plant Adaptations to Fire

Chaparral plant communities have developed important adaptations for fire survival and re-growth. Sprouting from the underground rootstock and the stimulation of seed germination are examples of such adaptations. Some shrub species that usually reproduce by seeds are able to re-sprout from rootstock after fire; these plants are called *facultative sprouters.* Other shrub species either only regrow from seeds *(obligate seeders)* or from rootstock *(obligate sprouters).*

Herbaceous plants in chaparral, which are often "fire followers," usually become conspicuous only during initial post-fire years. The seeds of many herbaceous plants remain dormant in the soil until germination is triggered directly or indirectly by fire. Examples of fire-related stimuli include heating of seeds for a particular amount of time or to a certain temperature in order to scar the seed coat to allow germination and sunlight. Smoke can cause seed germination in some species, whereas it is lethal to other species.

### 4.2.4. Chaparral Conservation and Fuel Modification Objectives

Chaparral plant communities in Lake County comprise an extremely important niche of regional biodiversity. Statewide chaparral plant communities support approximately 240 species of native plants. This plant community provides habitat for resident and migratory birds, amphibians, and reptiles, as well as food and cover for carnivores, rodents, and insectivores.

Prior to the implementation of fire-suppression policies, chaparral communities were rejuvenated by stand-replacing fires. However, because of the extended length of contemporary fire intervals, coupled with close proximity to WUI communities, fuel mitigation strategies must focus primarily around communities. This will not only increase community wildfire protection, but may also refresh chaparral stands.

Objectives are to retain and protect portions of this valuable habitat while still creatively reducing and modifying fire behavior. This can be achieved by reducing fire intensity through *mosaic thinning* prescriptions. In addition to meeting fuel-reduction objectives, both the retention and reduction of chaparral patches will support wildlife habitat enhancement by restoring a wide variety of plant communities to their *natural range of conditions.* Reinvigorating and maintaining chaparral will be advantageous to species dependent upon this habitat.

Avoid cutting obligate-seeding chaparral species such as hoary manzanita (*Arctostaphylos canescens*). While these plants generally have a long life in the seed bank, they may not continue to be present in the stand and produce more seeds when cut. These plants may be absent from the stand until the next fire. Avoid cutting species that are infrequent or unusual. If there is only one or two of a type of plant in the area, retain those specimens to maintain the present species diversity.

Mosaic or *patch-retention thinning* focuses on separating *fuel continuity* by incorporating fuelbreaks in strategic locations where fire-suppression efforts have a higher chance of effectiveness. Higher levels of chaparral reduction will be concentrated adjacent to structures, along main roads, key ridges, secondary roads, *spurs,* and other strategic areas within treatment boundaries. This will modify fire behavior and achieve increased community safety.

On steep- and mid-slopes where chaparral patches can be isolated, focus efforts on retaining *thickets.* Planning treatments for chaparral reduction or retention need to take into consideration fuel conditions, future desired conditions, and accessibility.

Prescribed fire, where feasible, may be incorporated into chaparral to refresh the species that require fire to perpetuate. Involve agencies, consultants, and/or land-owning resource managers within the community (including neighbors) to help plan, prepare, and implement the burn. All burning needs to conform to local, state, and federal regulations and be done in a safe and responsible manner. *See Appendix D for more on burning.*

*For information on spacing between shrubs, see Figure C-2, Plant Spacing Guidelines, in Appendix C.*

### 4.2.5. Chaparral Fuel Modification Treatment Prescription

## Treatment Preparation and Layout

Prior to beginning fuel reduction in chaparral plant communities, it is vitally important that the treatment area is pre-designated and flagged. Since chaparral tends to be contiguous and dense, it is easy to "over cut" and greatly reduce the vegetative cover. Remembering the Conservation Principle "you can always take more, but you can't put back what you have cut" is a key guiding concept for treatments in chaparral.

Begin the *layout* by selecting the strategic areas to clear chaparral and create openings. These areas are not always necessary to delineate with flagging. Select patches with a high proportion of obligate seeders to retain. Pine and oak trees, if established, can be somewhat protected by performing *drip-line thinning* technique described in Appendix D. Continue the layout by selecting the trees to keep and clearing chaparral around them. Planning and layout of fuel treatments in chaparral prior to beginning work will ensure that portions of this diverse habitat are conserved.

Following identification of "cut areas," identify *leave-patches.* These can be of varying sizes based on the site. Make leave-patches bigger at first; their size can be reduced later if needed. When selecting leave-patches, identify natural features that would benefit from retaining vegetation. For example, select leave-patches on steeper areas, or areas where there are native plant groupings, wildlife habitat zones, along ravines, etc. It is important to read the landscape.

For laying out chaparral fuel treatments, determine a leave-patch color; e.g. green. Patches may range in lengths between ten to thirty feet; flag in a random circumference. Be sure that flagging is clearly visible to whoever will be treating the site later. This leave-patch flagging will identify a "no-cut, no-entry" boundary in which all of the material both dead and alive will be retained.

## Thinning

- Implement mosaic thinning to reduce the abundance of some chaparral while conserving portions of this habitat. Such thinning creates a diversity of beneficial habitat types by creating islands, corridors, thickets, and open understory shrub and herbaceous communities of random shapes, sizes, and occurrences.
    - In chaparral fields, patches should be retained to enhance structural habitat diversity and to separate fuel continuity. Impenetrable and contiguously dense chaparral should be separated and thinned to create isolated islands, grouping fuels into clumps. Partial chaparral reduction will be created via random mosaics—or strip patches with the long axis oriented along contours—using a variety of spacing between strip patches of ten to thirty feet. Strip patches should be offset from one another so as not to lie directly up and down the slope (to lower fuel connectivity and erosion potential).
- Retain older chaparral individuals by leaving surrounding chaparral intact as a support structure and leave-patch. Within many chaparral zones, tree-form-sized manzanita may be present. Sometimes these individuals exceed fifteen feet in height. Heavy removal of shrubs around these tree-form specimens can result in wind or snow damage such as broken branches and uprooting. Careful consideration should be made to protect these individual locations.
- *Release* larger pines and oaks that have developed within the chaparral community by thinning *excessive stems,* chaparral, and small trees from under *drip lines.* (It's referred to as a drip line because rainfall generally drips from the leaves and branches at this point, creating a circular line around the tree.) Thin back encroaching chaparral beyond the larger pine and oak drip lines, approximately 10 feet. Place special emphasis on pine and oak enhancement during thinning treatments. When thinning or shrub removal is conducted around sun-loving pines, place thinning emphasis on the south and west, because pines thrive in open forest stands with abundant sun exposure. Younger pines and oaks less than eight inches *DBH*[9] can be cut to prevent increased chaparral encroachment. Consider thinning pines on ridge tops to reduce the distance of ember distribution.

[9] DBH: Diameter at Breast Height.

- In order to provide wildlife habitat and structural diversity, retain clumps and groupings of trees where appropriate. Focus thinning around the drip lines of the outer clumps of trees. Thin smaller stems beyond the clumps, and in between and around tree groupings. This will break up fuel connectivity between groups of trees in order to maintain structural diversity. Retain forked trees (another element of structural diversity) for wildlife. *"Limb up" leave-trees* to approximately ten feet from the ground.
- In locations outside chaparral leave-patches, smaller patches of *tip-sprouting* shrub species (e.g. deer brush *[Ceanothus integerrimus]* and buck brush *[Ceanothus cuneatus])* can be isolated from other fuels and cut at chest level (three to four feet from the ground) for the benefit of fresh wildlife browse. To vary this treatment, some root-sprouting shrubs, such as oceanspray *(Holodiscus discolor),* and eastwood manzanita (*Arctostaphylos glandulosa*) can be cut to the ground to encourage diversity through regeneration. Prior to implementing this treatment, research what tip-sprouting or stump-sprouting species grow on the site. Treatment ratios may vary depending on the ratio of sprouting shrubs. Mosaic treatments are recommended.
- Throughout chaparral, areas of trees may need thinning to achieve fuel-reduction goals. When thinning in tree stands—particularly conifers—a *variable density treatment* approach is recommended. Mosaic thinning pertains to areas of brush that are thinned into patches, while variable density or uneven-aged thinning is more specific to stands where representatives of all species and age classes will be retained throughout the treatment areas. Do this in a way that still meets fuel-reduction objectives.
- Smaller snags can be cut and left as downed wood. Leave larger snags standing for wildlife habitat. In areas where snags are not abundant, smaller snags may also be retained.

## Mastication

*Mastication* is a form of fuel reduction that uses heavy machinery with a rapidly circulating head attachment. The head is used to shred, crush, and grind up plant and tree material. The result of a masticated site is small pieces of woody material that lie on the forest floor. This can be a cost-effective, quick way to reduce fuels around community assets and/or to create fuelbreaks. Slope steepness, noise, soil stability, proximity to watercourses, accessibility, cost, and diurnal and seasonal effects on wildlife limit masticator use. Little is known about the affects of mastication on wildlife populations within treated sites. Mastication during the spring can harm ground-nesting birds and other wildlife.

## Slash Treatment

*Slash* accumulated from fuel treatments in chaparral will likely be abundant; the disposal of this material needs to be performed carefully. Regardless of which methods are used for slash treatment, it is important that a portion of the cut material be left on site and placed across the slopes of the treatment area for erosion control and soil productivity. This is often referred to as *lop and scatter.* Preferred materials for scattering on the slopes are the main chaparral trunks greater than four inches in diameter. The fine (smaller) branches are best removed. Ensure the main trunks make contact with the ground and are left as intact as possible, four to ten feet long. Manzanita trunks are generally smaller in diameter; combine them by laying them along the contour of the slope, placing them together (either on top of or below each other) to make ground contact. Lay them as close together as possible. Within a year they will sink into the ground and be naturally anchored. By combining four to six smaller-diameter pieces you can increase their total diameter, replicating a log. Place wood randomly in openings or at the edge of leave-patches. The goal is to have coarse woody material present to act as erosion control, without creating a fuel problem. The majority of the cut material will need to be chipped, utilized for biomass, or burned to adequately reduce fuel hazards.

Prior to planning treatments and utilization strategies, take into consideration each specific treatment location and estimate both the ecological and economic implications of your biomass and slash disposal strategies. Slash disposal can have greater impact than the initial treatment, such as steep areas with lengthy haul distances. Plan slash treatments in a site-specific manner. Within a twenty-acre property, three different slash treatment methods may be used. Several different slash disposal options follow.

## Burning

The careful, controlled use of fire as a tool to reduce excessive fuel and to help restore ecosystems is highlighted several times in this CWPP. However, it is just one available fuel modification treatment; mechanical removal and grazing are examples of other options. Each site requires analysis to determine which practice is most appropriate. Controlled burning often figures as an important option partly because the local ecosystems have evolved with fire, and in many cases require fire for the system to function properly.

Currently, thousands of acres throughout the county are being burned annually through a joint approach by Lake County Air Quality Management District (LCAQMD), the US Forest Service, local Fire Protection Districts, and CAL FIRE's Vegetation Management Program (VMP). This overall cooperative program is informally known as the Lake County Cooperative Burning Program. In 2008, approximately 6,600 acres were control-burned in the county through this cooperative program. The VMP aids private landowners (and the Bureau of Land Management) in the application of fire on the landscape. Under VMP, landowners are relieved of the risks associated with a possible fire escape and CAL FIRE does the actual burn. This assistance and relief of liability may cause more landowners to use controlled burning (also known as prescribed fire) as a vegetation management tool.

All burning conducted through the VMP or any other controlled fire program must be done in conformance with LCAQMD. Burning activities must be properly permitted by the appropriate local Fire Protection District or LCAQMD if a smoke management plan is needed. These regulatory and protection agencies can help landowners develop the best treatment alternative for a property. Prescribed fire is just one management tool, and before utilizing fire it is always important to consider the air quality health impacts, as well as safety of other residents and the environment. Landowners should consider alternatives such as chipping or mastication, along with desired restoration goals, before planning to burn. If fire is indeed utilized, it must always be done in a safe manner to decrease the risk of the fire escaping, as well as to minimize the amount of smoke put into the air. *(See Appendix D for more information on controlled burning).*

"Wildland fire is an integral part of ecosystem management and is essential in maintaining functional ecosystems, but air pollutants emitted from those fires can be harmful to human health and welfare."[10] However, for decades, Lake County has enjoyed some of the cleanest air in the nation.[11] Because care has been taken, it has maintained this status even with its cooperative burn program. In 2009 the county ranked third cleanest in the nation (better air quality than national parks or the island of Maui, for example) in terms of particulate pollution in the atmosphere.[12] Appropriate fuels reduction and fire use focused on ecosystem restoration can help maintain or enhance the high quality air found here, when done properly. According to a study by the US Forest Service, the relative risk to air quality was projected to decrease by about 25% as a result of improving the resilience of ecosystems.[13]

Prescribed fire, a.k.a. controlled burning, is a management option in chaparral systems. Following *initial-entry* chaparral fuel treatments, burning slash may be the most economical treatment option if planned and executed properly. In areas farther away from roads, burning is often the main method.

*Swamper burning* is generally the preferred method of burning initial-treatment chaparral slash. However, it has a limited application due to costs, slopes, proximity to watercourses, and diurnal and seasonal timing. It is a prescribed fire method in which fuels are gradually and continually added (over the course of a day) to a hand or machine pile. Ensure that all fuels have had time to properly dry following initial entry (this can take several weeks or more). Pay attention to weather conditions when initiating swamper burning. When possible, burn during or following rain. This is the preferred method to deal with chaparral slash, because material gradually added to the pile provides more control over burn operations. Since chaparral patches contain a high mixture of

[10] Sandberg, et. al. 2002.

[11] Lake County Air Quality Management District (LCAQMD): www.lcaqmd.net.

[12] American Lung Association. State of the Air Report 2009. p. 24. *See* www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf *for more information*.

[13] Sandberg, et. al. 2002.

dead fuels, prepare burn operations by building small ignition piles with dead materials. Stack smaller fine fuels together (mixing both dead and live). Stack half the pile two feet high then cover the pile with *slash paper (check with Lake County Air Quality Management District at 707-263-7000 for approved slash paper materials).* Complete the task by piling the remaining slash on top of the pile.

An effective method is to burn several piles at once, working in a rotating fashion from pile to pile. After adding slash to one pile, move to the next one, and then return to the first pile where the fuels will have been consumed and it is time to add more slash. This method mitigates the convection columns, so as not to damage the remaining vegetation by scorching it. It also reduces the heat pulse into the soil, preventing possible sterilization of the soil under the burn pile.

Following burning operations, after fires are *dead out,* native grass and wildflowers suited to the site can be sowed into the mineral-rich ashes of the burn spots. This follow-up method encourages herbaceous understory growth and helps prevent non-native grasses from invading and taking over the site.

Broadcast burning is another option for chaparral. Under the right circumstances, and with the appropriate expertise, it can be conducted in chaparral stands following initial entry, when the grass is green and foliar moisture is still low (in the late fall). As with grasslands, always involve agencies, local landowners, resource managers, and private industry to plan and carry out broadcast burning.

*For more detailed instructions regarding burning, see Appendix D.*

**Chipping**

Another way to dispose of slash is to chip it. Chipping can be expensive, although very effective, depending on the *site-specific* location of your treatment area. In areas closest to main roads, secondary roads, or trails, chipping can be cost-effective if planned correctly. However, it may not work where materials are generated far away from where a chipper can be located may need to be treated using other methods, such as lopping and scattering (see above), or burning. The added expense of either machine-*yarding* materials or hand-carrying them long distances to chip can be significant.

Choose areas within close proximity of a road or landing (this is where the chipper will be located), preferably on a downhill drag. Avoid carrying materials upslope. Where material must be dragged, remember that the dragging process "sweeps" the ground of all material, particularly in the haul routes. Try to limit the areas subjected to sweeping by designating only a few haul routes. There is a tradeoff between erosion potential and future germination of local native plants. The site will need to be re-covered with chips, other small local materials, or with commercial erosion-control products. Collected material can either be chipped into a truck for removal or blown back into the treated areas. Remaining chips should not exceed more than several inches in depth. In general, areas that are not economically feasible for chipping are usually those areas where activities would increase ecological impacts due to material-extraction difficulties. In these cases, alternatives such as lopping and scattering may be explored. In some cases larger material may be used for firewood. The Westlake Resource Conservation Districts runs a community chipping program in cooperation with the Lake County Fire Safe Council. Call 707-279-2968 to learn more, and to participate in the program.

**Grazing**

Grazing with goats (or other livestock) is sometimes used to reduce chaparral fire hazard and to remove weeds (they eat them). Within the county there are several goat herds available for fuel reduction. Goats are best used in areas that do not have a large number of plants to be retained, since all plants (other than large trees) will likely be damaged or killed unless protected. Grazing under contract with a large herd of goats is a possibility for larger acreages. One to three goats can be grazed on smaller parcels. In this situation, arrange alternate locations for additional grazing when they have eaten all undesirable plants on the site. Goats can be placed on any steepness of slope and can generally graze any shape or size of parcel. However, be careful on sites with steep slopes, as goats can quickly denude them and cause significant erosion.

## 4.3. Foothill Woodland

Foothill woodland is a diverse vegetation type associated with species such as gray pine *(Pinus sabiniana)* and California buckeye *(Aesculus californica)*. Numerous species of oak such as blue oak *(Quercus douglasii),* interior live oak *(Q. wislizenii),* scrub oak, canyon live oak (*Q. chrysolepis*), and California black oak *(Q. kelloggii)* dominate these woodlands. In many areas this vegetation type is diminishing as a result of conversion for development. The oaks and other tree species found in foothill woodlands often extend up into higher elevations along riparian areas. Foothill woodlands are characterized by a range of tree densities and canopy cover from very sparse (ten percent of the area covered by tree canopy) to dense (one hundred percent cover). A variety of herbaceous plants and shrubs grow in the understory and between the trees here, including poison oak, coyote brush, and toyon. Grass is often co-mingled with shrubs, especially in sparse, deciduous stands.

### 4.3.1. Foothill Woodland Role of Fire

Periodic fire creates openings in dense stands to allow sprouting and growth of new oaks and other tree species (e.g. gray pine). Periodic fire in foothill woodlands can reduce the competition for water and nutrients by killing shrubs and small trees found in the pine and oak understory. Fire also renews the understory shrub component, providing lush wildlife forage.

### 4.3.2. Foothill Woodland Fire Regime

Historically, fires in these woodlands were frequent, and usually of low to moderate intensity, with occasional high-intensity areas. Woodland understory strongly influences the intensity of the burn. Those with continuous leaf litter, and those dominated by grass and herbaceous plants, tend to burn less intensely than those dominated by shrubs. Historically, perennial plants dominated the herbaceous understory. Today shorter-lived annuals dominate, primarily being introduced grasses. Annual grasses can promote an earlier onset to burning season because they dry and cure earlier than perennials.

Only a few studies have examined the time between foothill woodland fires. Prior to European settlement, fire return intervals ranged from 8 to 49 years.[14] The shorter fire-return intervals were noted where site conditions were drier and warmer.

### 4.3.3. Foothill Woodland Plant Adaptations to Fire

Tree response to fire in foothill woodlands is varied. Bark thickness, tree structure, and sprouting response each affect the ability of a given species to resist or recover from fire. For example, canyon live oak and interior live oak have thin bark, and their tops are more sensitive to heat damage from fire. These live oaks however, can vigorously re-sprout from their stumps following fire. California black oak and Oregon white oak have thicker bark and hence are better able to resist the damaging effects of fire. These species, as well as California buckeye, vigorously re-sprout from rootstock following fire. Gray pine is damaged by fire although dependent on it to clear the understory for seed germination. Shrubs and grasses in the understory have similar adaptations as those discussed in the chaparral and grassland sections above.

### 4.3.4. Foothill Woodland Conservation and Fuel Modification Objectives

Oak woodlands in California provide habitat for more than two hundred vertebrate species, in addition to thousands of species of invertebrates. Oak trees provide shade, fertile organic matter, perches, forage sites, and nesting cavities that together increase wildlife diversity. Understory native plant diversity is abundant within an intact woodland ecosystem. Pines offer increased diversity for those species that require coniferous features.

Objectives for fuel treatments within oak stands should focus on the reduction of excessive shrubs and smaller conifers. In some cases the careful and selective thinning of oaks can take place. Oaks can be carefully thinned when the stands are very dense, there are numerous smaller oaks crowding larger leave-trees (e.g. a larger oak or

[14] Skinner, C.N., and C. Chang. 1996. "Fire Regimes, Past and Present." Sierra Nevada Ecosystem Project. *Final Report to Congress. Volume II, Assessments and Scientific Basis for Management Options.* Davis: University of California, Centers for Water and Wildland Resources. Pp. 1048–1049.

pine), and/or there are several side sprouts around a dominant stem. In treatment areas, shift species composition to increase proportions of oaks, to reduce flammability and potential ember production and distribution.

Fuel-reduction activities within the foothill woodland zone can be a significant proactive step not only to reduce fire hazard and increase community wildfire safety, but also to aid in the process of ecological recovery for these valuable diminishing ecosystems.

### 4.3.5. Foothill Woodland Fuel Modification Treatment Prescription

**Understory Thinning**

- Remove understory shrubs and small trees under drip lines. Prune lower branches of trees to a height of about eight feet when the canopy is dense and closed.
- In some closed-canopy woodland habitats not directly adjacent to a community, select isolated *retention patches* (as under multi-stemmed oaks) of productive shrub habitat and understory vegetation for wildlife. Diversify this mosaic thinning treatment by reducing shrubs and *thinning from below* other closed-canopy areas. In areas adjacent to communities the understory vegetation may be cut under multi-stemmed oaks in order to provide a shaded fuelbreak.
- Incorporate a variety of treatments based on strategic fuel modification locations. For example, if working near a skid road that can serve as an area where firefighters can suppress fire or set a *backfire,* thin the understory more thoroughly. If on a mid slope or more distant corner of the property away from roads, consider retaining more patches of multi-stemmed oaks and brush in large clumps for wildlife habitat.

**Thinning**

- Consider the necessity to thin within the canopy of oak woodlands where there are many small trees or sprouts. However, if the canopy is closed or nearly so, thinning may encourage undesirable understory growth, necessitating more frequent maintenance. If you decide to thin the canopy, be conservative and use the Precautionary Principle. You can always thin more later on, but you can't put back what you've taken, especially where oak regeneration is problematic.
- In order to restore this ecosystem type, favored leave-trees in decreasing order of preference should be: California black oak, blue oak, canyon live oak, interior live oak, and gray pine. Large trees and vigorous oaks with full crowns will be the main targets to be protected, retained, and released. Release by clearing encroaching conifers, shade-tolerant species (e.g. Douglas-fir and incense cedar), and shrubs from below the drip line of desired leave-trees.
- Reducing oak density will follow the removal of less-desirable species and should be performed carefully. Ecological fuel treatments will typically remove twenty percent of the oaks under eight inches DBH for a given treatment area. Spacing in between oaks can vary while still effectively reducing overall fuel hazards. This should only be considered where there is adequate regeneration.
- Within oak stands that have a diversity of size and age classes, select a variety of trees to leave, considering dominant trees, snags, and clumps to persist in the stand. Thin smaller oaks under approximately eight inches from beneath the drip line of larger leave-trees. The practice of *mixed-structural thinning* can be accomplished by a diversified treatment where clumps of oaks are retained as a group, and fuels are reduced by thinning outside these groups, beyond their drip lines. This practice combines the selection of individual oaks and clumps to be released. Both groups and individual trees are retained as habitat. This practice should take into consideration the proximity to communities, as high intensity fire can burn through retained clumps, threatening communities.
- Retain as much canopy closure as possible in ephemeral and *perennial* stream corridors.
- Many oak trees will sprout from the stump after being cut. This can result in an even greater fuel hazard because they form multi-stemmed brush patches requiring frequent maintenance. To minimize this, focus your actions on cutting up to twenty percent of the oak density. Portions of *stump sprouting* areas from previously cut oaks will benefit wildlife by creating fresh nutritious browse. Over-cutting of oaks should always be avoided. Areas designated for wildlife browse should be placed under gaps in the tree canopy.

- Closed-canopy, multi-stemmed, even-aged woodlands are often diverse biological strongholds for understory plant communities. Therefore, thinning within these oak groups can be detrimental to these native plant communities. This can cause a decline in productive native vegetation, which can lead to the introduction of noxious and invasive species. In certain locations select and maintain (i.e. don't cut) the closed-woodland habitat type within the treatment area by isolating these clusters and *thinning away (vertically and horizontally) contiguous fuels* around the outside perimeter of your chosen patch. Similar to chaparral treatments, this can be performed by encircling these locations and creating a mini fuelbreak around them.
- Maintain the important diversity created by openings and edges within woodland zones. The ladder fuels on the edges of these *ecotones* should be eliminated to reduce the potential for torching. Ecotone edges are where oak groves transition into grassy openings. As a result of fire suppression, many of these valuable openings are being closed in by the encroachment of shrubs and, to a lesser extent, conifers. Hardy shrub species will take hold and over time eliminate these valuable ecological niches. Prescriptions for these areas will be site-specific based on slope and aspect. However, aggressive vegetation reduction for these sites will both maintain them and create a natural fuelbreak. Such sites can serve as a location for prescribed fire ignition for the long-term maintenance of fuel hazards in neighboring oak groves, as well as anchor points for fire-suppression activities.
- Considerations should be made to protect oak seedlings within a stand. Young oaks are a valuable resource for expanding the oak stand and replacing older trees. In some areas, regeneration can be limited due to a number of factors. As with any ecological fuel prescription, retaining a diversity of ages will support the long-term health of the stand. Maintain vertical discontinuity by reducing ladder fuels while retaining seedlings.
- Snags—standing dead trees—are critical components of a functional woodland. Therefore special emphasis should be placed on retaining a diversity of age classes of standing snags. *Cavities* present in oak snags serve as long-term habitat for many wildlife species. In those areas where snags are less abundant, you can cut oaks ten to fifteen feet above the ground to create valuable snag habitat. Select conifers for snag creation by *girdling*.
- Reduce ladder fuels by *high-pruning* branches eight feet above the woodland floor. Reduce excessive ground fuels and surface fuels. Trees less than twenty-four feet high should be pruned up from the ground for one-third the total height (i.e. leave two-thirds of the total height in canopy). This treatment will reduce the possibility of fire spreading into tree crowns. In young trees, prune branches on the lower one-third of the tree (e.g. if a tree is ten feet, prune the lower three to four feet and keep the understory plant material to less than one foot in height. As the tree grows up to twenty-four feet, it can achieve the eight-foot distance from the ground, and the understory plant material can reach 2½-feet high.).
- Treatment emphasis will focus on thinning from below (i.e. understory thinning) in an effort to reduce and separate both vertical and horizontal fuel layer continuity.
- Canopy thinning is recommended only if the fire hazard cannot be reduced adequately through treating the surface and ladder fuels. Understory thinning is the preferred treatment.[15,16]

## Slash Treatment

### Burning

- Follow initial entry into foothill woodlands zones with a combination of swamper burning or hand-pile burning, where slash is gathered into piles and located in open areas and burned *(see "Burning" in Chaparral section above, or Appendix D for more information)*. Following this reduction of initial treatment slash, broadcast burning can be a beneficial tool for the long-term management of woodlands.
- In combination with burning, the practice of lopping and scattering slash at different locations (away from tree canopies and the burning) throughout the treatment area can facilitate the construction of wildlife piles. Create a wildlife pile by using slash from the fuel treatment and stacking it at a density of two per acre. Best locations for wildlife piles are within natural pits caused by tree blowdown, along nurse logs, or at the edge of retained

[15] Stephens, S.L. 1998. "Effects of Fuels and Silviculture Treatments on Potential Fire Behavior in Mixed Conifer Forests of the Sierra Nevada, CA." *Forest Ecology and Management.* 105: Pp. 21–34.

[16] Stephens, S.L. and J.J. Moghaddas. 2005a. "Experimental Fuel Treatment Impacts on Forest Structure, Potential Fire Behavior, and Predicted Tree Mortality in a Mixed Conifer Forest." *Forest Ecology and Management.* 215: Pp. 21–36.

vegetation patches. Wildlife piles can be made of various sizes (ranging from ankle or knee height to five feet high), keeping in mind fuel-reduction objectives.

**Chipping**

See Chipping in chaparral section 4.2.5 above.

**Mastication**

See Mastication in chaparral section 4.2.5 above.

## 4.4. Ponderosa Pine/Mixed Conifer

Ponderosa pine and mixed-conifer forest types contain a variety of conifer species, including ponderosa pine *(Pinus ponderosa),* incense cedar *(Calocedrus decurrens),* sugar pine *(Pinus lambertiana),* Douglas fir *(Pseudotsuga menziesii),* California black oak*,* canyon live oak*,* tanoak (*Lithocarpus densiflorus*), and Pacific madrone (*Arbutus menziesii*), with herbaceous and shrub species intermixed.

### 4.4.1. Ponderosa Pine/Mixed Conifer Role of Fire

Fire in this forest type is particularly important for maintaining species composition. Pine species are generally *shade-intolerant.* Therefore, fire that creates gaps or openings in the vegetation can support pine germination and growth. With early logging practices that removed the large, fire-resistant tree species (e.g. pine), and the general exclusion of fire, shade tolerant species (i.e. Douglas fir and to some extent white fir *[Abies concolor]*) have become more abundant in many of Lake County's forests. This has often resulted in overly dense stands of trees with many surface and ladder fuels. Some conifer species (e.g. ponderosa pine) also germinate best when there are low amounts of litter and duff; periodic fire keeps these levels low enough to support germination. Fire kills understory trees and top-kills shrubs, simplifying the structure to consist of a tree overstory with an herbaceous understory.

### 4.4.2. Ponderosa Pine/Mixed Conifer Fire Regime

These forest types are often characterized by a historic regime of frequent fires of low to moderate intensity. Exceptions to this have been noted where topographic position, vegetation, and other site factors led to more severe fires. A great deal of variation in fire intensity and effect has been noted among similar sites, even within a single fire. Fire return intervals for these types range from two to forty years, with median values ranging from five to twenty years. Variability in fire return intervals is linked to the species composition of the stand, disturbance history, and landscape location (i.e. types dominated by pine, as well as hotter and drier sites, often have shorter fire-return intervals).

### 4.4.3. Ponderosa Pine/Mixed Conifer Plant Adaptations to Fire

Ponderosa pine is especially well adapted to periodic fire. Adaptations for seedlings include the rapid development of thick insulating bark, deep taproots, and high moisture content of living needles.[17] Similarly, mature trees have thick bark, deep roots, and *crown structures* that are less vulnerable to flames. This pine is also more tolerant of crown scorch than other conifer species such as incense cedar, and Douglas fir.[18] Ponderosa pine also has an effective wound response in which resin is produced to seal off any wounds that are made in the bark.

### 4.4.4. Ponderosa Pine/Mixed Conifer Conservation and Fuel Modification Objectives

Treatment activities within ponderosa pine/mixed conifer stands will result in the reduction of tree density and volume of understory and mid-story fuels. It will also work toward the restoration of natural plant composition and structure. Recruitment of forest stands with older characteristics is another recommended

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[17] Fitzgerald, Stephen A. 2005. *Fire Ecology of Ponderosa Pine and the Rebuilding of Fire-Resilient Ponderosa Pine Ecosystems.* Gen. Tech Report PSW-GTR-198. Redmond, OR. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. p. 246.

[18] Stephens S.L., and M.A. Finney. 2002. "Prescribed Fire Mortality of Sierra Nevada Mixed Conifer Tree Species: Effects of Crown Damage and Forest Floor Combustions." *Forest Ecology and Management.* 162: Pp. 261–271.

objective for long-term fire safety and ecosystem health. One of the main objectives for the long-term maintenance and health of this forest type is the reintroduction of low- to moderate-intensity fire. This is based on the work of Brown, Agee, and Franklin (2004) who state:

> "A forest that is fire-resilient has characteristics that limit fire intensity and increase the resistance of the forest to mortality. The first principle is to manage surface fuels to limit flame length…The second principle is to make it more difficult for canopy torching to occur by increasing the height to flammable crown fuels...The third principle is to decrease crown density by thinning overstory trees, making tree-to-tree crowning less probable. This will not be necessary on all sites and will be effective only if linked to the application of the first two principles."[19]

### 4.4.5. Ponderosa Pine/Mixed Conifer Fuel Modification Treatment Prescription

**Thinning**

- Treatment emphasis should focus on thinning from below (i.e. understory thinning) in an effort to reduce and separate both vertical and horizontal fuel layer continuity.
- Canopy thinning is recommended only if the fire hazard cannot be reduced adequately through treating the surface and ladder fuels. Understory thinning is the preferred treatment.
- Favored trees to leave in decreasing order of preference are: California black oak, Pacific madrone, ponderosa pine, incense cedar, Douglas fir, canyon live oak, and tanoak. Thinning treatments will focus on the retention of species diversity, making allowances for favoring species best suited to a given location.
- Create overall structural characteristics (arrangement of live and dead fuels) appropriate for restoration of the historical fire regime of frequent, low- to moderate-intensity forest *underburns.* This structure includes an overstory with low fuel volumes and a sparse understory with patches of interspersed even-aged young trees, shrubs, and native perennial grasses. This structure will facilitate maintenance by future low-intensity fires by creating gaps where fuel connectivity is low (both horizontal and vertical).
- Pine and oak leave-trees can be released by thinning small trees and brush from under the drip lines. Emphasis will be placed on thinning on the southern and western exposures because pines thrive in open forests stands with abundant sun.
- Variable density treatment is a thinning practice to create diversity in a forest stand, leaving portions of the stand un-thinned, with other areas thinned more thoroughly. It can be implemented within mixed-conifer forest types by reducing both understory and crown density within the stand. Separate fuel continuity through the creation of *repeating skips and gaps* of varying sizes and shapes. Treatments will emphasize the retention of randomly spaced tree groupings by identifying the largest recruitment trees, moisture retention, and wildlife habitat. Release around the drip lines of groupings and some individual trees by thinning excessive stems, pole-sized trees, and shrubs. The objectives are to release individual trees, limit competition, reduce fuel loads around groupings (clumps) of trees, and enhance site structural diversity.[20]
- To reduce the possibility of beetle infestation, consider not cutting pines until autumn. Beetles are attracted to the scent of fresh-cut pine and could infest the stand. Mark pines to be cut when implementing fuel treatments earlier in the year, then return between October to May to remove pines and their slash, as beetles tend to be dormant during this period. *See www.fire.ca.gov/rsrc-mgt_pestmanagement_socalbeetle.php for more information on beetle infestations in California.*
- In areas with no overstory, small conifer saplings and poles will be thinned to fifteen by fifteen feet between live trees. In more open, arid, savannah-type locations, pine and oak should be favored. In some openings, shrub species may be favored or complete vegetation removal may occur to create variable density.

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[19] Brown, Richard T., James K. Agee, and Jerry Franklin. 2004. "Forest Restoration and Fire: Principles in the Context of Place." *Conservation Biology.* 18(4): Pp. 903–912.

[20] Stephens, S.L. and P.Z. Fule. 2005. "Western Pine Forests with Continuing Frequent Fire Regimes: Possible Reference Sites for Management." *Journal of Forestry.* 103(7): Pp. 357–362.

- Retain all age and *size classes* of all native species for *vertical and horizontal structural diversity* throughout the landscape (not within the same stand). Thin around the edges of multi-canopied, vertically structured tree groupings of varying sizes to separate them from other fuels.
- Retain seedlings and saplings of favored species to replace future tree mortality.
- Retain a wide variety of age, size, and *decay classes* including dead and dying vegetation, consistent with fire-hazard reduction goals. Retain some deformed trees (e.g. *pistol butts,* forked tops, trees with a low *live-crown percentage*, etc.) for genetic diversity and wildlife habitat.[21]
- Create or maintain light conditions (sun, shade, or *dappled light*) that are site-specific to species currently less common to the site. Prevalence of native species tends to discourage weedy exotic or native *generalist* species and favors native endangered or threatened wildlife and plants. *Sensitive species* likely require very specific habitat *niches* and are hence generally uncommon, rare, or threatened. *Conservative species* have restricted distribution on a particular site, but the site could support more individuals. Generalist species are those that are already everywhere on the site.
- Retain vegetation with evidence of wildlife use (e.g. bird or woodrat nests, burrows, cavities, and hollows, etc.). Retain *sheltered connectivity* and major game trails between selected tree and vegetation patches. Retain lichen and moss species diversity, including some mistletoe-infected trees and live trees with heart rot *(conks)*. Retain large *downed woody debris* for moisture retention, *mycorrhizal* inoculation sites, and wildlife habitat. Retain or create large snags for wildlife.[22]
- Leave *green islands,* or patches of tree or shrub thickets (e.g. *doghair* conifer patches), for wildlife habitat. Retain an average of one patch per acre no greater than approximately twenty by twenty feet. Protect green islands by reducing fuels around it.
- Retain as much canopy closure as possible in ephemeral and perennial stream corridors.
- Enhance productive understory shrub and herbaceous vegetation by thinning conifers to allow dappled sunlight. Retain ten to thirty percent of understory shrub cover as scattered and isolated patches.
- When thinning in scattered stands of oak and Pacific madrone clumps, thin clumps to leave dominant stems. Cut stems will create fresh, nutritious shoots for wildlife browse.
- Thin and/or remove *codominant* species in order to release dominant pines or oaks (possibly for *merchantable* materials). If these trees cannot be economically utilized, leave on site to serve as downed wood for wildlife habitat. Remove all material less than three inches.

## Slash Treatment

- *See Appendix F: California Forest Practice Rules, Board of Forestry Technical Rule Addendum NO 3. Brood Material for an explanation of pine slash disposal.*
- For pine, cut stems and branches into less than three-foot sections to increase the drying of the cut material. This will help reduce beetle populations.
- Ensure surface fuels are less plentiful and more compact than before treatment. Do this by lopping into small pieces, weighing them down with larger pieces, and ensuring that all slash is in direct contact with the ground to facilitate quick decomposition. Cutting material from the mid-story and crown and placing it on the surface will increase short-term fire hazard, but reduce long-term hazards.
- Chipping of cut material can also be used as a tool for slash treatment where feasible. *See Chipping in chaparral section 4.2.5 above.*

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[21] Stephens, S.L., and D.L. Fry, E. Franco-Vizcaino, M.M. Collins, and J.J. Moghaddas. 2007. "Coarse Woody Debris and Canopy Cover in an Old-Growth Jeffrey Pine–Mixed Conifer Forest from the Sierra San Pedro Martir, Mexico." *Forest Ecology and Management.* 240: Pp. 87–95.

[22] Stephens, et. al. 2007. And: Stephens, S.L. and J.J. Moghaddas. 2005b. "Fuel Treatment Effects on Snags and Coarse Woody Debris in a Sierra Nevada Mixed Conifer Forest." *Forest Ecology and Management.* 214: Pp. 53–64.

**Burning**

- Allow cut vegetation to properly dry prior to initiating any burning (this can take several weeks or more).
- Burn pine slash prior to spring if possible. This will help minimize the possibility of beetle infestations.
- When cutting pine between October and May, treat fuels immediately by burning.
- Always use caution when burning in pine stands with thick duff depth (greater than 4 inches). When broadcast burning, pull duff back from the base of trees approximately ten feet to prevent steaming of the roots that grow into the duff.
- Follow general chaparral and foothill woodland burning prescriptions as described above for treatment of slash in ponderosa pine/mixed conifer forests.

*For more detailed information on burning, see Appendix D.*

**Mastication**

*See Mastication in chaparral section 4.2.5 above for a brief introduction to this management tool.* Follow the same thinning principles identified for this vegetation type when using a masticator. The masticator may take the place of hand crews where feasible, generally on slopes below 30% and away from watercourses. It is important to select a unit that is capable for the work needed. Typically an equipment operator is needed, not hand crews. However, due to limitations of masticators, such as slope and tree size, hand crews may need to work in conjunction with them, in order to create the desired fuel-reduction objective.

## 4.5. Closed-Cone Pine/Cypress[23]

Closed-cone pine/cypress forest types contain a variety of species, although principally dominated by knobcone pine (*Pinus attenuata).* McNab cypress (*Cupressus macnabiana*) can be found within the county although it is limited in its distribution. These two species generally do not occur together. Instead, they are usually associated with chaparral species, grasses and forbs, and gray pine and scrub oak. This type can form pure, even-aged stands surrounded by chaparral and/or mixed-conifer stands.

### 4.5.1. Closed-Cone Pine/Cypress Role of Fire

Periodic, often stand-replacing fire is essential for the survival of this vegetation type. These vegetation types are fire dependent and considered *climax.* Pine and cypress species are generally shade intolerant and grow best with full sun exposure. Fires that create gaps or openings in the vegetation can support their germination and growth. This vegetation type generally forms nearly pure stands due to its stand-replacing fire characteristic. The trees are generally short lived (less than100 years) with natural fire-return intervals between 35–50 years, although fire can occur during any time during stand development. Following a stand-replacing fire, the burned area is generally re-occupied by nearly pure stands of pine or cypress.

### 4.5.2. Closed-Cone Pine/Cypress Fire Regime

Regardless of the dominant species (i.e. pine or cypress), mature stands generally produce high-intensity fires similar to those found in chaparral ecosystems. Wildfires in this type are generally stand-replacing events; fires burn sufficiently hot to consume all of the above-ground plant material. If fire is too frequent within a stand, usually within two to ten years following a stand replacing event, the dominant knobcone pine or cypress trees may be eliminated from the site. This is due to a lack of viable seed. These vegetation types will often burn in association with surrounding vegetation types, most of which is chaparral.

### 4.5.3. Closed-Cone Pine/Cypress Plant Adaptations to Fire

Closed-cone pine/cypress tree communities have developed important adaptations for fire survival and re-growth. The major adaptation is the presence of *serotinous* cones that can persist on the branches for the duration of the life of the tree. These cones contain large amounts of seeds, which are released when the cone opens up due

[23] Much of the information found in this section was taken from: Jensen, B.D. "Closed-Cone Pine-Cypress" In: Mayer, K.E., W.F. Laudenslayer Jr., ed. 1998. *A Guide to Wildlife Habitats of California.* p. 166.

to the extreme heat of a wildfire. Another major adaptation associated with the dominant tree species is the early creation of cones during the life cycle of the tree. Cones are generally produced within two to ten years for knobcone and cypress. This allows the trees to secure a seed crop within a site early, which will allow them to gain a foothold on the site, should a fire come through within those first two to ten years.

Fire adaptations for associated chaparral plants can be found in section 4.2.3 above.

### 4.5.4. Closed-Cone Pine/Cypress Conservation and Fuel Modification Objectives

Closed-cone pine/cypress communities in Lake County comprise an extremely important niche of regional biodiversity, providing habitat for a variety of wildlife species.

Prior to the implementation of fire-suppression policies, these vegetation types experienced periodic stand-replacing fire, which was the historic natural fire regime. Because of high-intensity fire intervals of 35–50 years, and its common presence within WUI communities, it is important that fuel mitigation strategies are combined with the conservation and protection of this important vegetation community. Fuel-reduction objectives should focus on increasing community wildfire protection as well as maintaining these significant vegetation types into the future. In addition to meeting fuel-reduction objectives, both the retention and reduction of knobcone pine/cypress patches should focus on maintaining and enhancing wildlife habitat. Reinvigorating and maintaining these vegetation types will be advantageous to species dependent upon it.

Objectives for fuel treatments are to maintain the vegetation types while reducing excessive understory shrubs. Live and dead biomass of pine and cypress can also be carefully reduced by thinning the lower branches, helping to reduce the fuel ladder. Fuel treatments should focus on areas immediately adjacent to roads and/or communities. When these vegetation types occur far away from roads and/or communities (not a direct threat to life or property) they should be left in their natural state and allowed to regenerate through stand-replacing fires.

### 4.5.5. Closed-Cone Pine/Cypress Fuel Modification Treatment Prescription

#### Thinning

- Thinning treatments should focus on surface fuels and ladder fuels, such as the lower branches and chaparral shrub component associated with this type. Implement mosaic thinning of understory species to create a diverse, beneficial wildlife habitat.
- Select patches of shrubs and trees within fuelbreaks to be retained in order to maintain wildlife habitat.
- When creating shaded fuelbreaks along roads or directly adjacent to communities, as with ponderosa pine, selective thin knobcone pine to help reduce fire threat. Thin to favor the largest and most structurally sound trees. Focus removal on suppressed or unhealthy trees. Separate canopies of individual trees within fuelbreaks. Prune lower limbs of pine and cypress to a height of approximately eight feet, to help eliminate ladder fuels. Avoid removal of McNabb Cypress unless it poses an immediate threat to life or property.

#### Burning

Because fire is a requirement for seed dispersal, it is important to use fire as a vegetation management tool where local conditions permit. Focus burning within these vegetation types on the replenishment of native trees. To reduce the intensity of fire and risk of escape, fall trees, then lop and scatter in order to reduce the height of the vegetation within the burn unit. Always use the Precautionary Principle. Be sure that cut material is properly dry before burning. Broadcast burning can be used in late fall to reduce the intensity of fire while still allowing cones to open and release the next seed crop.

#### Slash Treatment

- Chipping can be used to treat slash within fuelbreaks (i.e. shaded fuelbreaks and roadside clearing). Chips can either be removed for biomass utilization or blown back onto the site to a depth of no more than four to six inches. *See Chipping in chaparral section 4.2.5 above.*
- Swamper-burn pine slash prior to spring when possible, to prevent beetle infestations.
- Follow general chaparral and foothill woodland burning prescriptions as described above for treatment of slash in these vegetation types.

- Mastication can be used to treat stands that are significant threats to communities and/or community assets. *See mastication description in chaparral section 4.2.5 above.*

## 4.6. Montane Hardwood/Conifer[24]

Montane hardwood/conifer forests form dense canopies of intermixed hardwood and conifer species. Stands are made up of at least one-third conifer and one-third broadleaf species. Dominant species associated with this vegetation type are ponderosa pine, Douglas fir, Pacific madrone, California black oak, and canyon live oak. This habitat type forms mosaic-like forests with small pure stands of conifer interspersed with small pure stands of broad-leafed trees. Conifers are the typical overstory vegetation while broad-leafed trees make up the lower canopy. There is very little understory due to the dense bi-layered canopy.

### 4.6.1. Montane Hardwood/Conifer Role of Fire

Periodic fire in montane hardwood/conifer forests can reduce the competition for water and nutrients by reducing the understory tree and shrub component. It can also reduce the amount of shade-tolerant conifer species that can dominate a site when fire is lacking. Finally, it also causes small patches and openings where shrubs and trees can both regenerate. These patches and openings are critical for wildlife diversity.

### 4.6.2. Montane Hardwood/Conifer Fire Regime

Historically, fires were generally frequent in this vegetation type. Fire intensity and frequency varies throughout this type because of variations in moisture content and structural diversity. Dryer areas with longer fire seasons tend to have more frequent and higher intensity fires. The natural fire regime favored broad-leafed vegetation by killing fast growing conifers. Today, with less fires burning through this type, conifers are becoming more dominant in many areas.

### 4.6.3. Montane Hardwood/Conifer Adaptations to Fire

Tree responses to fire in montane hardwood/conifer systems are varied. Bark thickness, tree structure, and sprouting response each affect the ability of a given species to resist or recover from fire. Species such as canyon live oak have thin bark, and their tops are sensitive to the heat of a fire. In order to survive frequent fire, these species are able to vigorously re-sprout from burned stumps. Ponderosa pine and Douglas fir have thick bark that protects them during wildfire events. Shrubs and grasses in the understory have similar adaptations to those discussed in the chaparral and grassland sections above.

### 4.6.4. Montane Hardwood/Conifer Conservation and Fuel Modification Objectives

With its structural diversity and landscape heterogeneity, montane hardwood/conifer forests provide essential habitat for a variety of wildlife species. Oak tree patches provide cavities and nesting habitat for migrating birds, and den sites for mammals. Conifers, like the broad-leaved species associated within this vegetation type, provide essential nesting, foraging, and perching habitat for many wildlife species.

Objectives for fuel modification treatments within this type are to reduce the conifer component. In some cases, objectives will include carefully and selectively thinning broad-leafed trees. Fuel-reduction activities within montane hardwood/conifer forests can be a significant proactive step to both reduce fire hazard and increase community wildfire safety, as well as aiding in the process of ecological recovery.

### 4.6.5. Montane Hardwood/Conifer Fuel Modification Treatment Prescription

**<u>Understory Thinning</u>**

- Remove understory shrubs and small trees under drip lines. Where canopy is dense and closed, prune lower branches of trees to a height of approximately eight feet.

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[24] Much of the information found in this section was taken from: Anderson, R. "Montane Hardwood-Conifer" In: Mayer, K.E., W.F. Laudenslayer Jr., ed. 1998. *A Guide to Wildlife Habitats of California.* p. 166.

- In some closed-canopy habitats, select productive shrub habitat and understory vegetation as isolated retention patches under multi-stemmed oaks and conifers. Diversify this mosaic thinning treatment by reducing shrubs and thinning from below other closed-canopy areas.
- Incorporate a variety of treatments based on strategic fuel modification locations. For example, if working near a road or trail that can serve as an area where firefighters can suppress fire or set a backfire, thin the understory more thoroughly. If on a mid slope or more distant from roads, consider retaining more patches of multi-stemmed oaks and brush in large clumps for wildlife habitat.

## Thinning

*See thinning prescriptions described for Foothill Woodland in Section 4.3.5 above.*

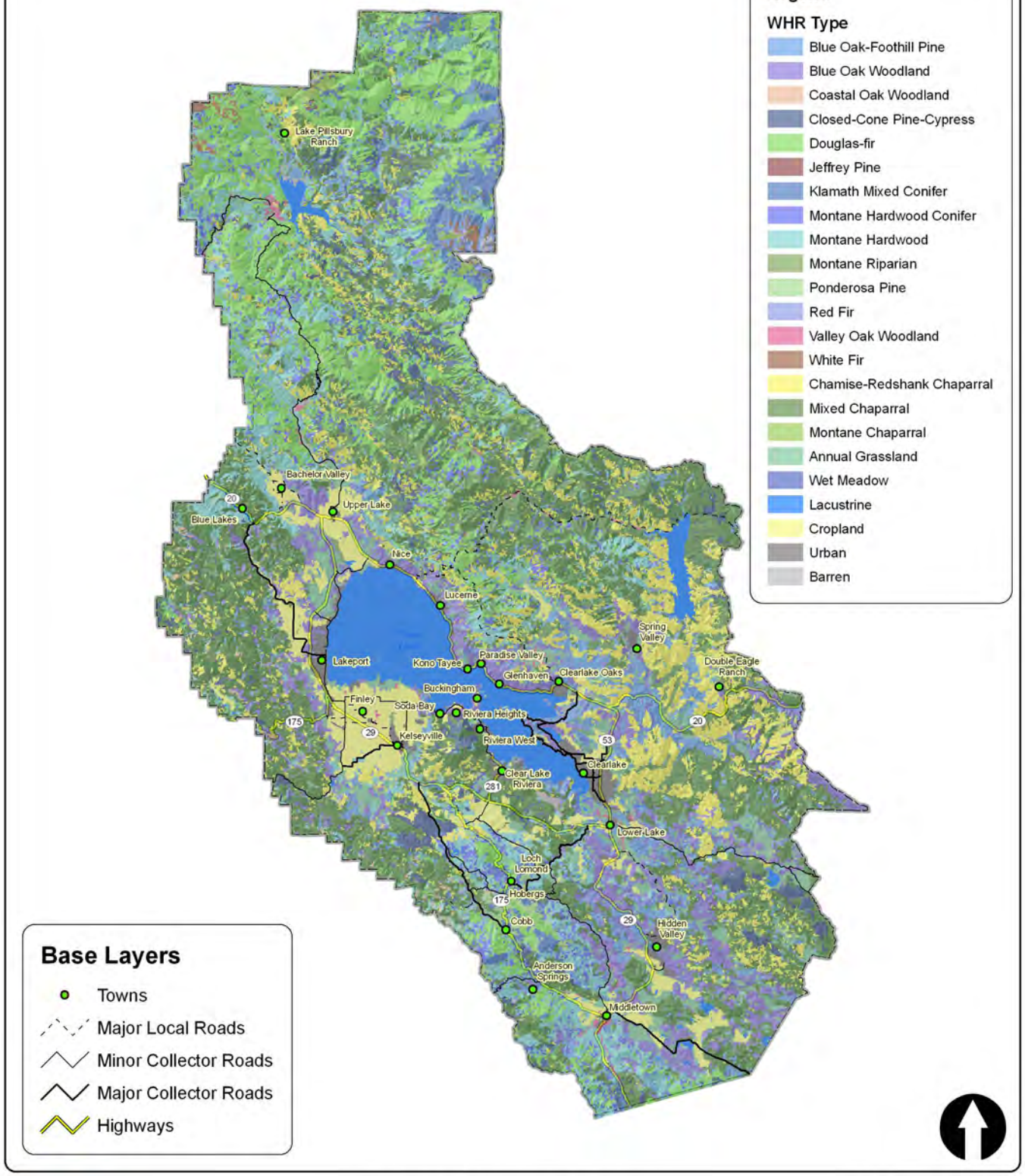
## Slash Treatment

### Burning

- Follow initial entry into montane hardwood/conifer forests with a combination of swamper burning or hand pile burning *(see Burning in Chaparral section 4.2.5 above, or Appendix D, for more information)*. Following initial treatment, maintenance can be done with a variety of methods, including broadcast burning. Under shaded fuel breaks, grazing is also a maintenance option.
- In combination with burning, the practice of lopping and scattering slash at different locations (away from the burning) throughout the treatment area can facilitate the construction of wildlife brush piles. Be sure to follow the guidelines for the treatment of pine slash mentioned in section 4.3.5 Slash Treatment above.

Chipping and Mastication can also be used to treat slash. These treatments should be located where access permits it, such as close to roads or on gentle slopes. *See Chipping and Mastication in chaparral section 4.2.5 above.*

***Map 4-1. Lake County Vegetation Types***




# Vegetation Types

Lake County Dept. of Information Technology

Miles

0 4.5 9 18

Lake County CWPP, 2009

Source: CDF Fire and Resource Assessment Program
File: cveg98_2_17
Field: WHRTYPE
Year: 2005

map name: veg mxd created: 04/2009

# 5. Lake County Community Context

## 5.1. Social and Political Setting[1]

Lake County is a regional, geopolitical unit of the State of California. A Board of Supervisors consisting of five members governs the county, each elected for a four-year term of office. Each of the five supervisors is responsible for representing one of the five districts in the county. The terms of office are staggered so that two are elected in one general election and three in the next.

*District 1* – The 'South County' includes the communities of Middletown, Hidden Valley, Cobb, Lower Lake, and a portion of the City of Clearlake, and is currently represented by Supervisor Jim Comstock.

*District 2* – This district's northern border is Highway 20 to Colusa County, which forms the district's eastern border. It includes the majority of the City of Clearlake, Clearlake Park, Windflower Point, and a large stretch of Clear Lake's shoreline. Supervisor Jeff Smith currently represents it.

*District 3* – This 'Northshore' District includes Blue Lakes, Upper Lake, Nice, Lucerne, Glenhaven, Clearlake Oaks, Lake Pillsbury, and Spring Valley, and is currently represented by Supervisor Denise Rushing.

*District 4* – This district includes Lakeport, Scotts Valley, Finley, Lampson Airport area, Highland Springs, part of the reclamation area near Upper Lake, and a large area of Clear Lake Shoreline. It is the largest agricultural area in the county. Supervisor Anthony Farrington currently represents it.

*District 5* – This district includes Kelseyville, Clear Lake Rivieras, Buckingham, Loch Lomond, and parts of the Cobb Mountain area. It has a large agricultural area known for pears, wine grapes, and wineries. Supervisor Rob Brown currently represents it.

### 5.1.1. Community Legal Structure and Jurisdictional Boundaries

Lake County is within the US 1st Congressional District, State Senate District 2, and the 1st State Assembly District. As stated above, there are five districts within the county. These districts represent the two incorporated cities, Lakeport and Clearlake, as well as eleven unincorporated areas and six areas of special interests.

Aside from Lakeport and Clearlake, the rest of the county is unincorporated. The County is responsible for providing services such as police, libraries and more. The County of Lake is also responsible for building and maintaining county infrastructure such as parks, county buildings, roads, etc. There are approximately 600 miles of roads that are county-maintained, in addition to the many privately maintained roads.

Lake County and the two cities maintain their own building departments. The county's governs the unincorporated areas. These departments regulate building standards and codes throughout the county. Lake County adopted the 2007 California Fire Code and additionally made changes to chapter 5 of the Lake County Code to adopt defensible space. The County has also adopted the International Wildland-Urban Interface Code. Finally, they enforce chapter 7A of the 2007 California Fire Code with respect to the WUI building standards.

There are a variety of state, federal, and county jurisdictions within the county. For example, CAL FIRE, USFS, BLM, and county Fire Protection Districts (FPDs) have individual jurisdictions in regards to emergency response. Potential jurisdictional conflicts are generally resolved through mutual aid or other such agreements *(see Chapter 6 for more information on fire protection and mutual aid)*.

[1] Information for this section came from the County of Lake website: www.co.lake.ca.us.

## 5.2. Public Lands Fire Management

There are several land management agencies in Lake County who manage properties for the public. They are generally funded from taxpayer dollars.

### 5.2.1. Federal Lands

**USDA Forest Service: Mendocino National Forest**

Within Lake County, the USDA Forest Service's Mendocino National Forest (MNF) manages 256,725 acres. The MNF consists of most of the northern portion of the county. The general land use activity is primarily recreation, although some timber management occurs. There are many designated trails and roads for hiking and off highway vehicle (OHV) use. There are also several campgrounds within the forest.

The 1995 Mendocino National Forest Plan guides MNF management. A Fire Management Plan was developed in 2008. MNF has an active fuels management plan that incorporates thinning and prescribed fire. It is also in the process of developing a formal prevention program to participate in public events and school programs, a signage program, and direct contact with forest users.[2] Currently MNF fire prevention staff are providing education to area schools. Smokey Bear is often used to help educate children about the proper use and risks of fire (e.g. be careful with matches).

MNF is active in fire suppression, as well as using fire on the landscape. They use prescribed fire as a tool for fuels reduction and ecological restoration, and allow some natural fires to burn ("wildland fire use"). These natural occurring fires are monitored and suppressed if they threaten communities.

Fire as a tool for public lands management is supported by many, including a collection of resource professionals with the *Restore the Mendo* campaign.[3] In 2007, the Lake County Board of Supervisors signed a resolution[4] supporting prescribed fire and mechanical thinning in the Mendocino National Forest stating that they:

> "Support an increase in additional funding, staffing, and efforts to restore a fire management program utilizing, when appropriate, low-severity fire and/or mechanical thinning in the MNF and which recognizes and manages wildfire use in a manner that balances and protects the healthful air quality and good prevailing visibility of the Lake County Air Basin."[5]

MNF has implemented several projects to reduce fuels around wildland-urban interface communities. These include pre-commercial thinning in High Valley (180 acres) and Horse Mountain (400 acres). The Twin Valley Timber Stand Improvement (TSI) project focuses on thinning knobcone pine in order to protect plantations that were planted prior to the 1996 *Fork Fire*. The Elk Mountain Road fuelbreak (approximately 600 acres) was designed to protect the communities of Lake Pillsbury and private property in the fuelbreak area, as well as a *Late Successional Reserve* (LSR) around Pine Mountain. Work for this project began in the Howard Mill area in 2002. Most is now completed from lower Deer Valley Road to the 17N74 Road. Fuel reduction around Lake Pillsbury summer homes and Sunset Campground provides defensible space around homes that have 100-year leases with the USFS. Pre-commercial thinning—the removal of small non-merchantable trees—around Lakeview Campground was completed in order to reduce surface and ladder fuels. *See Figure 5-1 for more information.*

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[2] U.S Forest Service Pacific Southwest Region, Mendocino National Forest. 2008 Fire Management Plan.

[3] Restore the Mendo. *The Mendocino National Forest – Controlled burns protect people and property, restore forests, and save taxpayer dollars.* www.restorethemendo.org.

[4] Lake County Board of Supervisors. *Resolution in Support of a Fire Management Plan.* July 17, 2007. http://restorethemendo.typepad.com/my_weblog/files/lake_county_resolution.GIF. http://restorethemendo.typepad.com/my_weblog/files/lake_county_resolution_page_2.GIF.

[5] Lake County Board of Supervisors. July 17, 2007.

MNF is proposing several more projects here. The Westshore Hazardous Fuels Reduction project will create a fuelbreak along approximately 1.5 miles of Erickson Ridge, just northwest of Lake Pillsbury along Forest Service Road 20N04. This area is heavily used for recreation, which can lead to increased human-caused ignitions. It will utilize hand thinning, prescribed burning, and a timber sale to reduce fuels. However, the project has been put out to bid two times, with no current bids. It is anticipated that the fuels reduction component (about 50% of the entire project) will be contracted this year (2009). A shaded fuelbreak, along with prescribed fire, has been proposed along High Valley Road. Two additional projects are the Boardman Ridge and South Ridge Understory Burns. These projects are proposed in order to treat vegetative fuels and reduce the risk of catastrophic wildfires.

Two additional projects are proposed to help restore the ecosystem and reduce fuel loads. The Round Burn project proposes to thin 35-year-old plantations established after the 1966 *Round Fire*. The goal is to control tree densities, improve forest health, and reduce vegetative fuels. The Pine Mountain project will focus on thinning fuels in order to protect, enhance, and maintain LSRs within the forest.

Finally, there is the approximately 11,000-acre prescribed burn north of the Eel River and west of Soda Creek. The MNF also plans on continuing pre-commercial thinning in High Valley in order to reduce fuel loads and minimize the chances of catastrophic wildfires.

In addition to fuel reduction projects and fire suppression activities, personnel from the MNF participate in the Lake County Fire Safe Council. Their expertise regarding fire management and forest health is useful in planning fuel reduction projects, as well as public education and outreach.

***Figure 5-1. Mendocino National Forest Existing Projects***

| Community, Structure, or Area at Risk | Project Name | Method of Treatment | Acres Treated | Expected Completion Date |
|---|---|---|---|---|
| Upper Lake/Lake Pillsbury | Elk Mountain Fuelbreak | Hand/Mechanical Thin Fuelbreak | 762 | 2011 |
| Lake Pillsbury | Southridge Prescribed Fire | Prescribed Fire Only | 1141 | 2012 |
| Lake Pillsbury Ranch | Booth Crossing Fuelbreak | Hand/Mechanical Thin Fuelbreak | 200 | 2012 |
| Lake Pillsbury | Pillsbury Ranch Fuelbreak | Hand/Mechanical Thin Fuelbreak | 32 | 2010 |
| Lake Pillsbury Home Sites | Pillsbury Home Sites Fuel Reduction | Hand/Mechanical Thin | 536 | 2011 |

## USDI Bureau of Land Management: Ukiah Field Office

Within Lake County, the US Department of Interior, Bureau of Land Management (BLM) manages 117,157 acres. This includes the Cache Creek Natural Area (27,245 acres), Cow Mountain Recreational Area (52,000 acres), Knoxville Recreational Area (approximately 4,000 acres), Indian Valley Recreation Area (approximately 31,000 acres), a portion of The Geysers (approximately 2,000 acres), and the Black Forest/Mt. Konocti (912 acres). The primary land-use activity within these areas is recreation such as hiking, OHV use, horseback riding, bird watching, and other outdoor activities, in addition to resource conservation

The 2006 Ukiah Resource Management Plan (URMP) guides management of BLM lands within the county. Regarding fire management, the URMP provides direction for the creation of a Fire Management Plan (FMP) which would provide guidance regarding wildfire suppression; fuels management (prescribed fire and mechanical treatments); fire rehabilitation, stabilization and restoration; and prevention and risk management education. The relevant fire goals of the URMP are:

- The goal of wildfire suppression on BLM properties is to: "provide an appropriate management response on all wildland fires, emphasizing firefighter and public safety."[6]
- Some of the many important management actions associated with this goal are to: "Prioritize fires based on values to be protected commensurate with cost… Identify high priority wildfire risk areas (e.g., wildland urban interface, critical habitats, and cultural areas) in the FMP… Limit the intensity of fire suppression efforts to the most economical response consistent with human and resource values at risk, prohibit the use of bulldozers and other heavy equipment in sensitive areas, protect sensitive cultural resource sites from damage by fire and/or fire suppression actions... Coordinate with tribes if known Traditional Cultural Properties are involved in wildland fires based on resource specialist information."[7]
- The goals of fuels management on BLM properties are to: "Manage fuels to mimic the natural role of fire while enhancing resource values, reduce fire risk to the wildland urban interface (WUI) communities, promote greater diversity within plant communities with the use of fire, protect riparian and wetland areas, improve ecological conditions and reduce the risk of catastrophic wildfire through the use of prescribed burning, and improve ecological conditions and reduce the risk of catastrophic wildfire through mechanical treatments."[8]
- Some of the management actions identified to obtain these goals are to: "Monitor fire/fuels treatment effects and adjust plans as needed…Develop prescribed burn units within the Cache Creek, Cow Mountain, and Indian Valley management units that will be treated on a rotational basis, develop and maintain fuel breaks along the WUI using prescribed fire, mechanical, hand, biological and/or chemical treatments…Use fire as a natural land management tool for the control and eradication of noxious weeds…Utilize prescribed burning to manage the chaparral community for fuel hazard reduction, wildlife habitat improvement, increased local water yield and watershed enhancement, and to work collaboratively with managing partners to design and implement prescribed fire and fuels management projects across agency boundaries, where this interaction will improve the overall success of the project."[9]
- The goal for fire prevention and risk mitigation and education is to: "Increase [the] public's knowledge of the natural role of fire in the ecosystem, and hazards and risks associated with living in the WUI."[10]
- The management actions associated with this goal are to: "Work with communities, Fire Safe Councils, and other federal and state agencies in the development and implementation of risk assessment and community protection plans, educate the public on fire risk and prevention measures, employ fire prevention strategies that reduce human ignition occurrence on public land within the Ukiah Field Office."[11]

As mentioned above, some of the methods for fuels management used by the BLM include prescribed burning, mastication, and grazing. In order to reduce fuels around WUI communities, BLM has implemented many projects, including the Black Forest shaded fuelbreak, Little Cow Mountain fuelbreak, and several other prescribed fire and mechanical applications. Most of BLM's prescribed fire applications

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[6] Ukiah Resource Management Plan (URMP). U.S. Department of the Interior Bureau of Land Management Ukiah Field Office. 2006. p. 16.

[7] URMP. Pp. 16-17.

[8] URMP. Pp. 17-18.

[9] URMP. Pp. 17-18.

[10] URMP. p. 19.

[11] URMP. p. 19.

are completed in cooperation with CAL FIRE's Vegetation Management Program (VMP). All prescribed fire applications are done in cooperation with Lake County Air Quality Management District (LCAQMD) to properly identify and mitigate air quality issues. This cooperation helps create prescribed fire applications that can span several different public and private ownerships, with positive results on the landscape and for air quality.

BLM is currently planning on several additional fuel reduction projects within the county. Mechanical mastication is being planned to expand the Little Cow Mountain Fuelbreak by 60 acres. BLM is also planning to use prescribed fire on Pyramid Ridge and The Geysers. These two prescribed fire applications will treat 4,000 acres and 228 acres respectively. Both of these prescribed fire applications will be in coordination with CAL FIRE and the LCAQMD.

In addition to these fuel management activities, BLM is involved with the Lake County Fire Safe Council in the form of a technical advisor and planning partner.

***Figure 5-2. BLM Existing Projects***

| Community, Structure, or Area at Risk | Project Name | Method of Treatment | Funding Needs | Acres Treated | Expected Completion Date |
|---|---|---|---|---|---|
| Scott Valley, Lakeport, Ukiah, Talmadge | Little Cow Mountain Fuelbreak | Mechanical Mastication | $40,000 | 40 | 1st Phase Complete, Maintenance Begun |
| Buckingham, Mt. Konocti | Black Forest Shaded Fuel Break | Thinning | $12,500 | 12 | 9/30/2009 |
| Clearlake | Payne Ranch Interior Meadows | Prescribed Burn | $10,000 | 175 | 9/30/2009 |
| Scott Valley, Lakeport, Ukiah, Talmadge | Pyramid Ridge VMP | Prescribed Burn | $75,000 | 4000 | 9/30/2011 |
| Cobb, Middletown, Kelseyville, Lakeport | Geysers VMP | Prescribed Burn | $10,000 | 228 | 9/30/2011 |
| Scott Valley, Lakeport, Ukiah, Talmadge | Little Cow Mountain Fuelbreak Extension | Mechanical Mastication | $63,000 | 60 | 9/30/2012 |
| Kelseyville | Black Forest Fuelbreak | Mechanical Thinning | $7,000 | 25 | 9/30/2012 |
| Scotts Valley, Lakeport | Pyramid Ridge VMP | Prescribed Burn | $30,000 | 300 | 9/30/2012 |
| Spring Valley | Indian Valley Units 3&4 | Prescribed Burn | $60,000 | 6000 | 9/30/2012 |
| Scotts Valley, Lakeport | Little Cow Mountain | Mastication/Mowing | $7,000 | 20 | 9/30/2012 |
| Anderson Springs | Geysers VMP | Prescribed Burn | $93,000 | 308 | 9/30/2014 |
| Spring Valley | Indian Valley Units 1&2 | Prescribed Burn | $60,000 | 6000 | 9/30/2018 |
| Blue Lakes, Scotts Valley | North Cow Mountain VMP | Prescribed Burn | $180,000 | 5,000 | 9/30/2020 |
| Clearlake | Payne Ranch VMP | Prescribed Burn | $45,000 | 300 | 9/30/2020 |

### 5.2.2. California State Lands

#### California Department of Fish and Game

The California Department of Fish and Game (DFG) manages lands throughout California for their natural values, recreational opportunities, and wildlife habitat. Within Lake County, DFG manages Loch Lomond Vernal Pool Ecological Reserve, as well as the Clear Lake, Indian Valley, and Cache Creek

Wildlife Areas. DFG also cooperatively manages Boggs Lake Ecological Reserve with The Nature Conservancy. Loch Lomond and Boggs Lake Ecological Reserves are managed primarily for recreation and natural resource protection. Clear Lake Wildlife Area is only accessed by boat and is used for hunting, sight seeing, wildlife viewing, etc.

The Cache Creek Wildlife Area is cooperatively managed with BLM under a Memorandum of Understanding agreement. The 2004 Cache Creek Coordinated Resource Management Plan provides direction for the management of this area, along with the BLM's Ukiah Resource Management Plan (URMP). The primary use of this area is the protection of natural resources, education, and primitive recreational opportunities.

According to the URMP, several goals regarding habitat improvement and wildfire mitigation are identified for this area. Such goals include the removal of invasive species, such as yellow star thistle, and implementing an average annual and decadal prescribed fire application of 1,000 to 10,000 acres. Along with these prescribed fire application goals, the URMP aims to treat 500 acres per decade using mechanical methods. The URMP also aims to maintain the current level of habitat development to benefit game species and fisheries.

The Indian Valley Wildlife Area is also cooperatively managed with the BLM. This area consists of high-water lands surrounding Indian Valley Reservoir, and is managed for recreational use and wildlife habitat.

The URMP goals regarding habitat improvement and wildfire mitigation for the Indian Valley area include the implementation of annual and decadal prescribed fire application of 600 and 6,000 acres respectively. They also include treating up to 300 acres per decade using mechanical methods. The plan aims to remove up to 20 acres annually of non-native species, such as medusa head and arundo, to benefit both game and non-game species' habitat development.

## California Department of Forestry and Fire Protection (CAL FIRE)[12]

CAL FIRE operates eight Demonstration State Forests in California, including Boggs Mountain Demonstration State Forest (BMDSF) in Lake County. BMDSF is a 3,493-acre mixed conifer forest.

> "The primary State Forest management objective for demonstration forests is two-fold: "1) achieve an active research and demonstration program, and 2) achieve maximum sustained production of high quality timber products, while developing an all-aged forest with the widest possible diversity of forest structures."[13]

In addition to these objectives, the forest provides recreational activities such as hiking, camping, and hunting. The Boggs Mountain Management Plan (2008) provides direction on forest management forest.

> "The timber management program under this plan is expected to produce a sustainable harvest, maintaining the productive capacity of the soils in perpetuity. Harvest levels help to support the research programs attributed to the forest."[14]

Silvicultural methods aimed at fire hazard reduction are the cornerstones of planned management at Boggs Mountain. Maximization of forest health and productivity is another major goal at BMDSF. Fire resilience is managed through controlling vegetation density found within the forest. Well-designed

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[12] Information for this section was taken primarily from the 2008 Boggs Mountain Demonstration State Forest Management Plan. www.fire.ca.gov/resource_mgt/downloads/Boggs Mtn/Boggs_2008_DraftMgtPlan_HE_060408.pdf.

[13] Boggs Mountain Demonstration State Forest Management Plan (BMDSFMP). California Department of Forestry and Fire Protection. The Resource Agency of the State of California. 2008. p 5.

[14] BMDSFMP. p 24.

fuelbreaks will alter the behavior of wildland fire entering the fuel-altered zone. Both surface and crown fire behavior may be reduced.[15] This reduction in fire behavior may allow firefighters to control a fire.

In order to lower the fire risk at BMDSF,

> "Shaded fuel breaks are being constructed along the entire 22 mile-Forest road system by Conservation Camp Crews. Forest fuels reduction through timber harvesting and stocking control, as well as brush and slash control will be ongoing programs which will supplement and eventually replace the fuel break system as the Forest's main defense against wildfire."[16]

BMDSF will continue to use prescribed fire on the forest in order to reduce fuel loads and maintain a natural ecosystem. A smoke management plan is created annually with the LCAQMD to initiate prescribed burning. Under this plan up to 600 acres can be burned annually; due to weather issues generally half of this gets completed. According to BMDSF:

> "Fire is a natural ecosystem process within the Forest. Fire exclusion over the long run is not possible and is generally not desirable in maintaining natural ecosystem processes. The use of prescribed fire can facilitate fire hazard reduction, silvicultural and habitat research, and ecosystem management research."[17]

These activities are designed to assist in reducing wildfire threats to the greater Cobb Mountain area. Removal of small vegetation (small trees and other vegetative fuels) can be expensive. However, BMDSF has committed to taking an active role in exploring the economic feasibility of harvesting these low-value resources, for stand improvement and fire-hazard reduction.

## California State Parks

Within Lake County, California State Parks manages Clear Lake State Park (300 acres) and Anderson Marsh State Historic Park (870 acres). Both of these parks receive thousands of visitors annually. Clear Lake State Park is located on the lakeshore, and provides recreational opportunities such as fishing and sight seeing.

Anderson Marsh State Historic Park (AMSHP) is located on the southeast end of Clear Lake and contains some of the oldest archeological sites in the state park system. Interpretative trails, wildlife viewing, cultural site viewing, and other recreational opportunities like boating are available to visitors. This park is mostly undeveloped and is guided by the 1998 AMSHP General Plan. As a result of fire suppression, vegetative fuels have accumulated in many areas, leading to an increased fire risk for both the park and surrounding communities such as Clearlake. The AMSHP General Plan identifies the need to develop a fire management plan for the reintroduction of fire as well as proper fire suppression activities. This has yet to be accomplished. A policy within the AMSHP General Plan regarding fire use states:

> "In accord with the department's prescribed fire management policies, fire shall be restored to its natural role in suitable ecosystems at AMSHP. A fire management plan that details an ongoing program of prescribed fire use shall be prepared and maintained.
>
> "The plan for prescribed fire use shall contain program objectives, guidelines and treatment constraints, specific burning plans, and provisions for monitoring and evaluation. Particular care shall be taken to minimize deleterious effects of the unit's natural, cultural, and scenic resources. Artificial modifications and processes shall be minimized. A program of prescribed fire use shall not preclude in any way the necessity for wildfire prevention and suppression."[18]

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[15] Agee, J.K. et al. 2000. "The Use of Shaded Fuelbreaks in Landscape Fire Management." *Forest Ecology and Management* 127: Pp 55-56, p. 1.

[16] BMDSFMP. p 38.

[17] BMDSFMP. p 38.

[18] Anderson Marsh State Historic Park General Plan. 1998. Pp. 61-62.

The AMSHP General Plan identifies the need to create a plan for prevention, pre-suppression, and suppression activities. This plan will focus on avoiding aesthetic impacts to the natural area by using the least environmentally damaging fire suppression activities, and the proper placement of fuelbreaks and fire access roads. Fire mitigation activities such as these will help keep the park in its most natural state, while helping to keep visitors safe.

### 5.2.3. Tribal Lands

With approximately 10,000 to 12,000 years of human presence in the vicinity of Clear Lake, there is a significant amount of Native American heritage in Lake County. The indigenous populations were diverse across landscape and culture. At least seven different languages and dialects were associated with this area, with ties to tribes as far south as Peru. The Pomo Nation was one of the largest Native American nations in Northern California prior to European settlement. The county is now home to seven Native American tribes: six Pomo, and one Miwok tribe (Middletown Rancheria).

Today Native American land ownership in Lake County ranges from very small plots to approximately 1,200 acres (owned by the Robinson Rancheria of the Pomo Indians). Robinson Rancheria includes a casino and a housing development. Big Valley (approximately 240 acres) and Middletown Rancherias (approximately 110 acres) each have a casino as well. Elem Indian Colony and Scotts Valley Band of Pomo Indians both maintain property ownerships of approximately 52 acres and 35 acres respectively. The Habematolel Pomo of Upper Lake has 29 acres, 18 are located on the original Rancheria. Vegetative fuels on individual home sites and community property are cleared every year and firebreaks are maintained annually. The remaining tribes do not presently own land in Lake County.

In order to maintain cultural and natural resources, reduce vegetative fuels, and restore ecosystems, several projects have been initiated throughout the county. Robinson Rancheria is implementing fuels reduction on their lands. To protect homes, a ten-foot-wide fuelbreak is maintained around the subdivision annually. A firebreak (in the form of a tractor line put in prior to tribal ownership) located behind the casino and up to the Hogback Ridge is maintained by tribal members. Vegetative fuels on private roads behind the casino leading up the ridge are also reduced in order to provide access for tribal members and emergency personnel. However, some county roads near the Rancheria are not maintained. They have a buildup of vegetative fuels and are a fire risk. Stream restoration, the cultivation of native vegetation, and removal of exotic species such as Scotch broom are also taking place here. This includes restoration along Middle Creek, Alley Creek, and the casino land.

The Middletown Rancheria owns the Twin Pine Casino south of Middletown. In 2006 the South Lake Council Fire Safe Council built a 1.2-mile shaded fuelbreak around rancheria lands, to help protect the casino and surrounding properties.

Other than these larger fuel reduction and restoration projects, and the smaller-scale reduction of fuel and noxious weeds around homes, tribal lands within the county remain mostly in their undeveloped state. Many tribes are actively trying to generate a land base to provide homes and services for tribal members. Many historical land practices gained from the indigenous communities, such as the use of fire as a management tool, are no longer practiced due to a minimal (or nonexistent) land base among these tribes.

## 5.3. Community Planning Context

There are several planning documents in Lake County that address wildfire issues. These include:

- 2008 Lake County General Plan (GP)
- 2005 Natural Hazard Mitigation Plan (HMP)
- 2007 Local Agency Formation Commission (LAFCO) Report
- 2009 Emergency Operations Plans (draft), including the 2004 Interface Wildland Fire Contingency Plan.

Integrating this CWPP planning effort with these other plans is important to the success of wildfire prevention in Lake County. Below is a summary of some of the relevant components of each of these other plans.

### 5.3.1. General Plan

The Lake County General Plan was approved in 2008. It guides planning and development activities. Pertinent goals and policies within the General Plan are identified below.

**Land Use**

The General Plan (GP) identifies several different land use categories. The two that are most relevant for wildfire interface issues are Rural Lands and Rural Residential.

> Rural lands are areas that are "primarily in their natural state, although some agricultural production, especially vineyards, can occur on these lands. The category is appropriate for areas that are remote, or characterized by steep topography, fire hazards, and limited access. Typical uses permitted by right include, but are not limited to, animal raising, crop production, single family residences, game preserves and fisheries."[19]
>
> Rural Residential land "is designed to provide single-family residential development in a semi-rural setting. Large lot residential development with small-scale agricultural activities is appropriate. These areas are intended to act as a buffer area between the urban residential development and the agricultural areas of the County. Building intensity should be greater where public services such as major roads, community water systems, or public sewerage are available."[20]

Rural and Rural Residential lands tend to occur in the interface areas around the county, *(see General Plan Land Use Map[21] for more information)*. The GP recognizes the fire threats to these rural areas and has created specific policies to address them, including Policy HS-7.6. Development Guidelines:

> "The County should consider fire hazards in evaluating development proposals. Within designated areas where population or residential building densities may be inappropriate to the hazards present, measures should be developed and adopted to mitigate risk to life and property loss. Lands designated as having high and extreme wildfire hazards may be developed provided that the following guidelines are satisfied:
>
> - Development should be limited to Rural Residential or Rural lands only; and cluster development is encouraged.
> - Developers and/or subsequent owners must assume responsibility for ongoing fire prevention maintenance activities for the project, including; abatement of fuel buildup, fire break maintenance, access provision, and provision of adequate water supply to meet fire flow.
> - Separately developed dwellings with an individual private water supply shall provide an acceptable guaranteed minimum supply of water[22], in addition to the amount required for domestic needs."[23]

Several actions are identified in Chapter 8 of this CWPP regarding ensuring defensible space, and reducing fuels in these areas.

The other relevant component of the GP Land Use element is regarding paper lot consolidation. The General Plan defines paper lots as "Preexisting nonconforming parcels created during the 1920s. The lots are typically small and irregularly shaped in multiple ownership with a lack of infrastructure. Most of Lake

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[19] Lake County General Plan (GP). 2008. Pp. 3-10.

[20] Lake County General Plan (GP). 2008. Pp. 3-10.

[21] General Plan Land Use Map. www.co.lake.ca.us/Assets/CDD/2008+General+Plan+Final+Version/2008+General+Plan+Docs/Maps2.pdf.

[22] 2,500 gallons minimum required by CAL FIRE, for those not on municipal water system.

[23] GP. Pp. 7-19.

County's paper lots are located in Nice, Lucerne, and Clearlake Oaks."[24] They tend to be in areas with high fuels and narrow winding roads, and pose a threat to the neighboring communities. GP Policy LU 1-6. Paper Lot Consolidation addresses this issue as follows:

> "Paper subdivision lots that are in tax default should be considered for use as open space, trail access or watershed protection and held by an appropriate entity for that purpose. If determined not to be feasible, then alternatively the County shall encourage consolidation of paper lots into developable lots, especially those lots with an irregular shape, inadequate size for practical uses, and lack of infrastructure."[25]

Actions have been identified in Chapter 8 of this CWPP to minimize WUI fire threats on paper lots. Additional GP land use goals and policies regarding smart growth and clustered development are clearly in line with the goals and policies of this CWPP.

## Health and Safety

Chapter 7, the Health and Safety element of the General Plan begins with Goal HS-1: "To ensure the County is protected from injury and damage resulting from natural catastrophes, man-made events, and hazardous conditions."[26] Policies HS-1.1 through 1.5 are especially relevant to wildfire mitigation:

> "Policy HS-1.1 Development Constraints: The County shall permit development only in areas where the potential danger to the health and safety of people can be mitigated to an acceptable level.
>
> Policy HS-1.2 Maintain Emergency Public Services: The County shall ensure that during natural catastrophes and emergency situations, the County can continue to provide essential emergency services.
>
> Policy HS-1.3 Building and Fire Codes: The County shall ensure all buildings for human habitation are designed in compliance with the Uniform Building Code and other requirements based on risk (e.g., seismic hazards, flooding), type of occupancy, and location (e.g., floodplain, fault).
>
> Policy HS-1.4 Hazard Awareness and Public Education: The County shall continue to promote awareness and education among residents regarding possible natural hazards, including soil conditions, earthquakes, flooding, Naturally Occurring Asbestos and fire hazards, and emergency procedures.
>
> Policy HS-1.5 Interagency Coordination: The County shall work with other federal, state and local agencies to assure the continued presence and operation of services essential to public health and safety during times of emergency."[27]

Section 7.7 Urban and Wildland Fire Hazards, is the most relevant to this plan, and includes the following:

> "Goal HS-7: To minimize the possibility of the loss of life, injury, or damage to property as a result of urban and wildland fire hazards.
>
> Policy HS-7.1 Consultation with Fire Service Districts: The County shall consult with the appropriate fire service district or California [Department] of Forestry [and Fire Protection] in areas designated as high and extreme fire hazard, for particular regulations or design requirements prior to issuance of a building permit or approval of subdivisions…

[24] GP. Pp. 3-3.

[25] GP. Pp. 3-16.

[26] GP. Pp. 7-4.

[27] GP. Pp. 7-4.

Policy HS-7.2 Encourage Cluster Development: In areas designated as high or extreme fire hazard, the County should encourage cluster developments to provide for more localized and effective fire protection measures such as consolidations of fuel build-up abatement, firebreak maintenance, fire fighting equipment access, and water service provision.

Policy HS-7.3 Fuel Modification Programs: The County shall actively support fuel modification and reduction programs on public and private lands throughout the County, and shall encourage methods other than burning in order to minimize air quality impacts.

Policy HS-7.4 Wildland Fire Management Plans: The County shall require the development of wildland fire management plans for projects adjoining significant areas of open space that may have high fuel loads.

Policy HS-7.5 Fuel Breaks: Fuel breaks of at least 30 feet should be maintained around all structures. Additional fuel breaks or fuel modifications up to 100 feet around structures should be required when the fire officials find that extra hazardous conditions exist. Secondary fuel breaks up to 200 feet in width should be required when the fire authority finds that additional precautions are necessary. Fire buffers should be created along heavily traveled roads within high and extreme hazard areas by thinning, discing, or controlled burning. Parks, golf courses, utility corridors, roads, and greenbelts should be located so that they may serve a double function as fuel breaks.

Policy HS-7.6 Development Guidelines *(see Land Use above).*

Policy HS-7.7 Fire Resistant Building Materials: The exterior of residential units should be composed of fire-resistant materials and designed to reduce fire vulnerability within high and extreme fire hazard areas."[28]

Section 7.8 Emergency Response relates to fire protection as described in Chapter 6 of this CWPP. The Emergency Operations Plan is addressed in 5.3.4 below. The following are the relevant Goals and Policies.

"Goal HS-8: To ensure the maintenance of the Emergency Operations Plan in order to maintain its effectiveness in preparing and responding to a natural or human-made disaster.

Policy HS-8.1 Coordinate Emergency Response Services with Local Agencies,

Policy HS-8.2 Emergency Response Exercises,

Policy HS-8.3 Maintain Emergency Evacuation Plans,

Policy HS-8.4 Develop Interim Disaster Plan,

Policy HS-8.6 Insurance Provisions,

Policy HS-8.8 Coordinate with Cities and Other Local Agencies,

Policy HS-8.10 Mutual Aid Agreement, and

Policy HS-8.11 Critical Facilities."[29]

Several action items in Chapter 8 are related to enhancing emergency response to better prepare Lake County communities for wildfire.

[28] GP. Pp. 7-16-17.

[29] GP. Pp. 7-19-20.

## Open Space and Recreation

Finally, policies in the Open Space and Recreation element are germane to this plan generally in that they deal with management and use of wildlands. The following policies are discussed in Chapter 8 of this CWPP.

> "Policy OSC-1.7 Encourage Planting of Native Vegetation: The County shall encourage the planting of native trees, shrubs, and grasslands in order to preserve the visual integrity of the landscape, provide habitat conditions suitable for native vegetation, and ensure that a maximum number and variety of well-adapted plants are maintained.
>
> Policy OSC-1.8 Native Vegetation for Landscaping: The County shall develop a list of native vegetation to be used as a landscaping palette for use by citizens and developers.
>
> Policy OSC-1.9 Open Space Buffers: The County shall require buffer areas between development projects and significant watercourses, riparian vegetation, and wetlands.
>
> Policy OSC-2.1 Design Guidelines for Structures in Rural Areas: In the rural areas of the County (located outside of Community Growth Boundaries) structures built within the immediate foreground view of a scenic roadway should reflect the following guidelines.
>
> - Structures should be sited back, to the extent feasible, from the roadway edge a sufficient distance to minimize intrusion upon the natural features and backdrops as viewed from the roadway or adjacent residences.
> - Structures should be sited to minimize obstruction of views of significant natural features, such as Clear Lake and Mt. Konocti. Increased height should only be allowed when building orientation provides for increased side-setbacks that provide view corridors.
>
> Policy OSC-2.3 Signage Program: The County should establish a coordinated Countywide roadway signage program which would provide the following: identification of routes and major destinations; traffic information on speed, signalization, etc.; and identification and directional information for both public and commercial facilities serving the community and recreation visitors.
>
> Policy OSC-2.7 Landscaping Techniques: Landscaping should be utilized to help frame and direct attention to major views, away from unattractive developments, and these developments should be screened from public views to the extent practical. Additionally, selective cutting and pruning should be permitted to enable establishment or improvement of roadway views.
>
> Policy OSC-2.15 Ridgeline Protections / Hilltop Protections: The County shall develop an ordinance that provides guidelines for development on or near ridgelines and hilltops.
>
> Policy OSC-6.12 Open Space Preservation: The County shall preserve natural open space resources through the concentration of development in existing communities, use of cluster development techniques, maintaining large lot sizes in agricultural areas, avoiding conversion of lands currently used for agricultural production, and limiting development in areas constrained by natural hazards.
>
> Policy OSC-6.15 Ridgeline Trails: Locate trails, where feasible, along the ridgelines to enhance scenic viewpoints of Clear Lake, Mt. Konocti, low-lying valleys and the distant wilderness areas."[30]

Much of the direction of the General Plan is in line with this CWPP. Policies such as the building and maintaining of fuelbreaks, support of fuel modification programs, use of fire-resistant building material, and others help communities become more prepared for wildfire. The preservation of open space, watersheds, and viewsheds, and limits to urban sprawl help protect Lake County's scenic and natural

[30] GP, Pp. 9-7; 8; 10; 11; 14; 17.

resource values. On the other hand, development within rural residential and rural lands could create emergency response access issues if not planned carefully. Homes built in these areas may be hard to defend during wildfire because of their large distribution over the landscape. Therefore, excellent defensible space and access will be crucial in these areas. Mitigation measures such as those described in this CWPP should take place on all of these types of developments. This will be further addressed in Chapter 8's Action Plan.

### 5.3.2. Natural Hazard Mitigation Plan

The Lake County Natural Hazard Mitigation Plan (HMP) was published in 2005, in conformance with the Disaster Mitigation Act 2000. The HMP is particularly relevant to this CWPP, as it directly addresses wildfire issues. The HMP also provides eligibility for Lake County to various federal funding sources (e.g. FEMA Pre-Disaster Mitigation Grants), which can be used to mitigate wildfire in the county.

The HMP determines that there is a "High to Very High Probability of a wildland fire in Lake County, and a High Risk associated with this natural hazard."[31]

> "The greatest natural hazard threat to lives and property is a wildland interface fire. Wildland fire is the highest-scoring natural hazard threat in the Natural Hazard Probability/Risk Assessment Scoring Matrix and also is identified as the greatest natural hazard threat in the Natural Hazard Rating Table by every participant of the Lake County HMP. Therefore, it is clearly indicated that mitigation actions focused toward reducing the threat of wildland fire in the County have the greatest cost-to-benefits ratios and will provide the greatest mitigative relief for the residents of Lake County."[32]

Thus, the actions identified in this plan are critical to the health and safety of Lake County. Following are the applicable actions from the HMP:

> "Action 1.1.1: The County should encourage development and dissemination of maps relating to fire hazard to help educate and assist builders and homeowners to comply with wildfire interface mitigation activates.
>
> Action 1.1.2: The County should coordinate with the California Department of Forestry & Fire Protection and countywide Fire Districts in developing GIS-based maps of fire access trails, firebreaks, water sources, and structures within moderate to very-high fire severity zones.
>
> Action 1.1.3: The County should prepare Structure Protection and Mutual Aid Fire Contingency Plans for each of the identified Urban Interface Communities in coordination with the California Department of Forestry & Fire Protection and local Fire Districts.
>
> Action 1.1.4: The County should prepare Evacuation Route Contingency Plans for each of the identified Urban Interface Communities in coordination with the California Department of Forestry & Fire Protection and local Fire Districts.
>
> Action 1.2.1: The County should continue to review new development in high fire-hazard areas to assure that adequate access roads, onsite fire protection systems, signage, flame-retardant building materials, defensible space, and firebreaks are provided as required by state regulations and county ordinances.
>
> Action 1.2.2: The County should develop comprehensive defensive space ordinances to minimize risk throughout the identified urban interface zones. The ordinance is expected to include homeowner's insights, regulatory requirements, and best practices. The ordinance will incorporate the Hazardous Fire Areas Fire Protection Standards.
>
> Action 1.2.3: The County should investigate the development and adoption of minimum standards to location, design, and construction of buildings and structures or

[31] Lake County Natural Hazard Mitigation Plan (HMP). p. 18.

[32] HMP. p. 79.

portions thereof for the protection of life and property, to resist damage from wildland-interface fires, and to mitigate building and structure fires from spreading to wildland fuels.

Action 1.2.4: The County should develop criteria and a process for a Fire Protection Plan.

Action 9.1.1: Provide community education though service programs offered by the County Office of Emergency Services and training for the Community Emergency Response Team (CERT) program.

Action 9.1.3: The County should continue to support the education and awareness programs developed and distributed by public services organizations such as the Red Cross."[33]

As will be shown later in this CWPP, especially the Action Plan in Chapter 8, many of the actions proposed in the 2005 HMP remain applicable. Implementation measures are addressed in Chapter 8. Incorporating this CWPP into the next update to the Natural Hazard Mitigation Plan will be an important step towards policy integration.

### 5.3.3. LAFCO Municipal Service Review and Sphere of Influence

The 2007 Lake County Fire Protection Districts, Municipal Service Review and Sphere of Influence document was adopted on October 19, 2007. Its relevance to this document is mainly in its analysis of the state of fire protection agencies in the county. Similar, and more current, information is presented in Chapter 6 of this plan. Resources in the Local Agency Formation Commission (LAFCO) report were used to confirm and expand information in Chapters 6 and 7 in this CWPP.

The LAFCO report states following components should be in a "Fire Safe Plan:"

"The overall purpose of a Fire Safe plan is to clearly identify a policy statement and implementation program leading to elimination of loss of life and reduction of property loss from wildfires through pro-active efforts countywide. Purposes (anticipated outcomes) of the plan are:

1. To minimize property loss and prevent the loss of life from wildland fire through prescribed fuel treatments, the identification of safety zones, development of evacuation procedures, identification of evacuation routes, fire-safe education, and public outreach.
2. To provide a framework for identification and prioritization of fuels-reduction projects within and adjacent to communities.
3. To establish and prioritize overall countywide fire-safe planning guidelines for determining the need for and priority of fuels treatments.
4. To identify feasible biomass utilization projects. Economic values of biomass removal projects can range from value-added industries such as furniture building to the production of chips, saw logs, and firewood.
5. To establish a sustainable implementation program. The plan proposes an implementation program that requires community leadership and land stewardship to ensure sustainability."

This CWPP addresses these five items throughout this document, principally in Chapters 7, 8, and 9.

### 5.3.4. Emergency Operations Plans

A series of Emergency Operations Plans (EOPs) are being revised in 2009 at the same time as this CWPP document. The EOPs, and the previous version (2004) of the Interface Wildland Fire Contingency Plan, were reviewed for this CWPP. The EOPs are written to provide direction to local emergency service

[33] HMP. Pp. 69-70-78.

providers in the event of an emergency. This CWPP, on the other hand, is designed in large part to prevent or minimize those emergencies. The CWPP also identifies needed resources and actions to assist in effective emergency response, in line with the county's EOPs, as outlined in the Action Plan in Chapter 8.

### 5.3.5. Land Use Goals and Objectives

The overall land use goals of the Lake County General Plan are:

- "To encourage the overall economic and social growth of the County while maintaining its quality of life standards.
- To clearly differentiate between areas within Lake County appropriate for higher intensity urban services and land uses (i.e., high density residential, high density commercial and industrial) from areas where rural or resource use should be emphasized.
- To provide adequate land in a range of residential densities to accommodate the housing needs of all income groups expected to reside in the County, and ensure a high quality of development.
- To maintain economic vitality and promote the development of commercial uses that are compatible with surrounding land uses and meet the present and future needs of Lake County residents, the regional community, and visitors.
- To designate adequate land for, and promote development of, industrial uses to meet the present and future needs of Lake County residents for jobs and to maintain economic vitality.
- To maintain a healthy and diverse local economy that meets the present and future employment, shopping, recreational, and service needs of Lake County residents.
- To preserve Lake County communities' character and scale, including their design heritage and historic character.
- To provide for the ongoing administration and implementation of the General Plan."[34]

As stated elsewhere in this document, integrating wildfire prevention planning into over all land-use planning is essential for the success of both. This CWPP attempts to create actions that are in support of these overall goals.

#### Land Use and Development Trends

Lake County is in the interface between the bedroom communities of the Bay Area and the more resource-dependent communities to the north. Its history as an agricultural community based on orchards is rapidly being changed into a landscape of wineries, bringing with it a different set of land managers. Recreation is now the principal activity on most of the public lands in the county.

New Lake County residents are principally retirees and Bay Area commuters (especially in Sonoma and Napa). People are retiring to Lake County for several reasons, among them the scenic beauty and clean air. Therefore, actions need to be taken to minimize wildfire conflagrations, in ways that will not negatively affect this population, especially those who are susceptible to air-pollution impacts.

The Lake County population is not growing as quickly as in neighboring counties, however development is happening here, often at a rapid pace. Ensuring that any new development meets clear fire safety and defensible space guidelines, including adequate water supply and storage, and safe emergency ingress and egress, is a fundamental step in ensuring the fire safety of current and future residents.

## 5.4. Community Infrastructure to Address and Implement Objectives

The Lake County Fire Safe Council (LCFSC) was established in order to educate residents on wildfire threats and actions to ameliorate such threats. The LCFSC will also pursue grants and other funding sources to implement fuel-reduction projects, and to provide services as described in this CWPP. Working in conjunction with Lake County Fire Protection Districts, the USFS, CAL FIRE, BLM, South Lake County FSC, and other groups, the LCFSC will move forward with expertise and guidance from a variety of stakeholders and service providers. The LCFSC will provide the leadership to implement this CWPP.

[34] Rein, Jeff. Personal communication. County of Lake. February 23, 2009.

## 6. Fire Protection

In Lake County there are six county Fire Protection Districts (FPDs), as well as one state and one federal fire protection agency:

- Kelseyville FPD
- Lake County FPD
- Lake Pillsbury FPD
- Lakeport FPD
- Northshore FPD
- South Lake County FPD
- California Department of Forestry and Fire Protection (CAL FIRE), Sonoma-Lake-Napa Unit
- US Forest Service, Mendocino National Forest (MNF)

**GENERAL INFORMATION FOR RESIDENTS REGARDING FIRE PROTECTION**

In order to best continue their effective service, Fire Protection Districts and other fire agencies need all Lake County residents to provide safe access to properties in the event of an emergency. A clearance of 20-ft. wide by 15-ft. high is needed along roads and driveways. Additionally, they need a turnaround of a minimum 45-ft. radius, or a Hammerhead Turnout (or "T") measuring 60-ft. long, 10-ft. wide, and facing perpendicular to the driveway.

**AN IMPORTANT REMINDER—THE NUMBER TO CALL TO REPORT A FIRE IS ALWAYS 911.**

Calling a Fire Departments' number (as listed below) only causes delays. Every second counts in an emergency!

In order to ensure that fire agencies operate in an efficient and cost-effective manner, these agencies have "mutual aid" and "auto aid" agreements, as well as one "Amador" agreement in place. (*Information regarding Lake County mutual aid, auto aid, and Amador Plan agreements are described in each agency's section below.)* Mutual aid means that a fire department can request the services of another nearby fire department based upon predetermined agreements to provide such services. Mutual aid agreements exist among the agencies for backup in large or multiple-fire scenarios as well as for general emergencies.

Auto aid means that participating agencies will be automatically dispatched to respond to incidents outside their regular district or jurisdiction. One or multiple parties (e.g. Fire Projection Districts, US Forest Service, CAL FIRE) are automatically dispatched at the same time.

Many rural fire departments around the state find it financially beneficial to contract emergency services outside of fire season (generally the rainy season) with CAL FIRE. The purpose is to provide sufficient services during winter, when CAL FIRE reduces its workforce. These "Amador Plans," such as the one between CAL FIRE and the South Lake County Fire Protection District, help increase the overall protection in the district. CAL FIRE provides emergency personnel to certain stations all year long under a "Schedule A Contract." Under these "Amador Plans" a local agency will contract with CAL FIRE to staff local facilities and use local equipment. This is a cost effective way for counties to provide extra fire (and other emergency) services to citizens.

Areas that are not within a "district" boundary, such as those west of Lakeport FPD boundaries, are within a "Sphere of Influence." They are covered by CAL FIRE, as well as local FPDs. Kelseyville FPD, Lake Pillsbury FPD, and Lakeport FPD each have a Sphere of Influence (SOI), as shown on Map 6-1 (at the end of this chapter.).

There is also a contract agreement between the Bureau of Land Management (BLM) and CAL FIRE. When there is a wildland fire on BLM property, CAL FIRE will provide fire-fighting services.

Map 6-1 also shows Local Responsibility Area (LRA) boundaries as defined by CAL FIRE, State Responsibility Areas (SRAs), and Federal Responsibility Areas (FRAs). CAL FIRE is primarily responsible for wildland fires in the SRA as well as structure fires that threaten wildlands. The Mendocino National Forest is responsible for wildland fires in the FRA.

## 6.1. Lake County Fire Protection Agencies

Lake County's Fire Protection Districts (FPDs) originally started as eleven individual fire departments, the first being the Lakeport Fire Department, originating in 1894. These fire departments were later consolidated, beginning in 1959 with the merger of Kelseyville Fire District with the Big Valley County Fire Department. Since then many departments, as well as the Lucerne Recreation and Park District and the Nice Community Services District, have merged to share resources and responsibilities. The original Middletown Fire Department began in 1925, changing its name in 1985 to the South Lake County FPD. The Lakeport FPD was formed in 2000 with the merger of the Lakeport Fire Department and the Lakeport County Fire Protection District. The Lake County FPD formed in 2001 with the consolidation of the Lower Lake FPD and the Lakeshore FPD. The Lake Pillsbury FPD, originally serviced by the US Forest Service and CAL FIRE, was encouraged to form in 1983 following a letter from the US Forest Service stating that private structure protection was not a priority. In 1998, the Lake Pillsbury Volunteer Fire Department began, becoming a district in 2002 (remaining volunteer). The last merger in the county took place in 2006 when the former Upper Lake, Nice, Lucerne, and Clearlake Oaks Fire Departments merged into the Northshore FPD (now the county's largest FPD).

All of the departments take pride in the work they do for the communities they serve. The support given by the approximately 160 volunteers echoes a long tradition of service that makes each department unique and productive. The following FPDs provide emergency fire and medical services in Lake County.

### 6.1.1. Kelseyville Fire Protection District

The Kelseyville FPD provides first-response fire and medical service to approximately 11,000 residents in their 90-square-mile district in Lake County, which includes the communities of Kelseyville, the Rivieras, and the western Cobb Mountain area. Summer populations can rise to approximately 16,000. The district also contains a Sphere of Influence on its southeastern border. CAL FIRE provides emergency services within the SOI although the FPD will respond if needed. Fifteen local residents currently volunteer with Kelseyville FPD, five of which are "active" firefighters, with more volunteers needed. There are twenty paid staff members. The Kelseyville FPD is funded through property taxes, ambulance transport, impact fees, and other miscellaneous sources, totaling approximately $2.8 million annually.

Kelseyville FPD has three fire stations located throughout the district, as shown in the following table. Currently the FPD has five fire engines: three structural (those used for homes and structure fires), and two wildland (used for wildland fires). They also have two water tenders, one fire boat, one HazMat (hazardous materials) vehicle, four ambulances, five utility vehicles, and one squad vehicle (this is an engine that has automobile extrication equipment). One of the structural engines is more than 30 years old and needs replacing, as does one of their wildland engines. A table of Kelseyville FPD's currently available equipment resources follows the station information.

***Figure 6-1. Kelseyville Fire Protection District Stations***

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Main Station 55 | 4020 Main St.<br>Kelseyville, CA 95415 | Robert L. "Mike" Stone, Fire Chief | 707-279-4268 | 24/7/365 | 4 |
| Clear Lake Riviera Station 56 | 9757 Hwy. 281<br>Kelseyville, CA 95415 | | | 24/7/365 | 1–2 |
| Riviera Heights Station 57 | 2816 Riviera Heights Dr.<br>Kelseyville, CA 95415 | | | Seasonal | Special Events & Red Flag days[1] |

[1] Red Flag days are announced during high fire-danger conditions, when no burning is permitted.

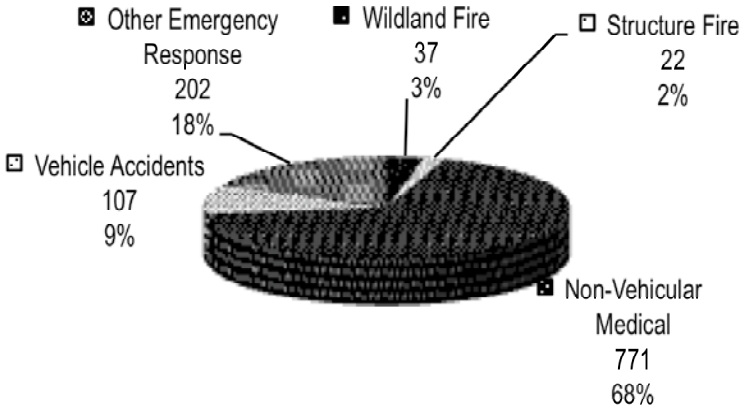
***Figure 6-2. Kelseyville Fire Protection District Equipment Resources[2]***

| Resources | | |
|---|---|---|
| **Structural Engines Type/ID/Capacity** | **Wildland Engines** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| E5511, 750 Gallons | E5522, 500 Gallons | Water Tender 5511, 3600 Gallons |
| E5521, 600 Gallons | E5731, 250 Gallons | Water Tender 5512, 2000 Gallons |
| E5621, 500 Gallons | | Squad Vehicle, 300 Gallons |
| | | HazMat Vehicle |
| | | Fire boat |
| | | 5 Utility Vehicles |
| | | 4 Ambulances |

The amount of time it takes first responders to arrive at a scene affects firefighters' ability to save a structure from fire or a person with a medical emergency. Kelseyville FPD can respond to most incidents within the district within fifteen minutes. 75% of the area can be reached within ten minutes, 50% within five minutes, and 25% of the area is within a three-minute response from one of the Kelseyville FPD stations or engines.

In 2008, Kelseyville FPD responded to a total of 1,139 incidents within Lake County. The following chart summarizes the type and frequency of incidents.

***Figure 6-3. Kelseyville Fire Protection District, Number of Incidents by Type of Incident in 2008***




Kelseyville FPD occasionally responds outside their boundaries, especially to incidents in Lakeport, and to all fire district areas within the county. The district has mutual aid agreements with Lakeport FPD, South Lake County FPD, and CAL FIRE.

Wildland-urban interface training, Arson Investigator I and II course availability, and continuous research into alternative funding sources have been identified as priority needs for Kelseyville FPD. Lack of, or abundance of, tax revenue leads to increases or decreases in the overall FPD budget.

[2] This table is adopted from: Texas Forest Service, Texas A&M University. *A Guideline for Developing Community Wildfire Protection Plans.* http://txforestservice.tamu.edu/uploadedFiles/FRP/UWI/CWPPGuideFinalDraft(1).pdf.

### 6.1.2. Lake County Fire Protection District

The Lake County FPD provides first-response fire and medical service to approximately 17,955 residents in their 165-square-mile district, which includes the communities of Clearlake and Lower Lake.

Twenty-one local residents currently volunteer with Lake County FPD and all are "active" firefighters. There are an additional 23 paid staff. The Lake County FPD has identified a need for more volunteers. The Lake County FPD is funded primarily through property taxes, development taxes and servicing fees, totaling approximately $3,772,661 annually.

Lake County FPD has six fire stations located throughout the district. They currently have eight fire engines (four structural, four wildland), a 75-ft. ladder truck, a water tender, 2 type-two ambulances, 2 type-three ambulances, and a rescue vehicle. One of the structural engines is more than 28-years old, and one of the wildland engines is more than 34-years old. Both of these engines are in need of replacement. The following two tables list Lake County FPD station information and equipment resources.

***Figure 6-4. Lake County Fire Protection District Stations***

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Clearlake Station 70 | 14815 Olympic Dr.<br>Clearlake, CA 95422 | James<br>McMurry, Chief | 707-994-2170 | 24/7/365 | 5<br>Minimum |
| Lower Lake Station 65 | 16354 Main St.<br>Lower Lake, CA 95422 | Charlie Diener,<br>Battalion Chief | 707-994-2531 | 24/7/365 | 3<br>Minimum |
| Point Lakeview Station 66 | 13065 Anderson Rd.<br>Lower Lake, CA 95422 | | | | Volunteer |
| Airport Station 71<br>(at Pierce Airport) | 6905 Old Hwy. 53<br>Clearlake, CA 95422 | | | | Volunteer |
| Park Station 72 | 13428 Lakeshore Dr.<br>Clearlake, CA 95422 | | | | Volunteer |
| Pinedale Station 73 | 10682 Lakeshore Dr.<br>Clearlake Park, CA 95424 | | | | Volunteer |

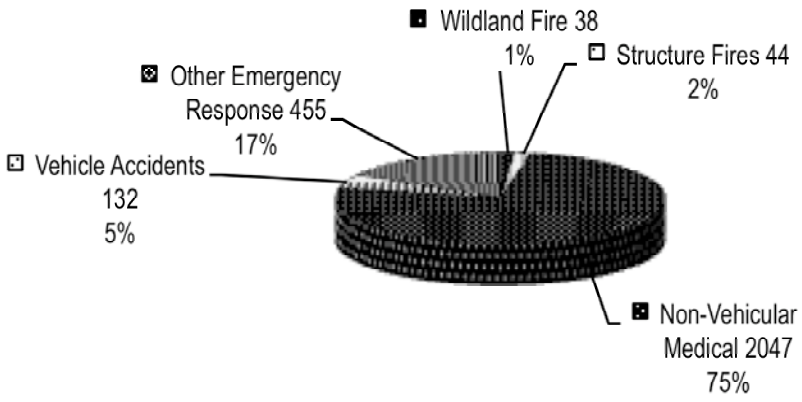
***Figure 6-5. Lake County Fire Protection District Equipment Resources***

| Resources | | |
|---|---|---|
| **Structural Engines Type/ID/Capacity** | **Wildland Engines** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| E7011, 750 Gallons | E6531, 500 Gallons | Water Tender 7011, 3000 Gallons |
| E6511, 750 Gallons | E7121, 1400 Gallons | Ladder 7011 (75 ft.) |
| E7221, 750 Gallons | E7231, 400 Gallons | Medium Rescue Vehicle |
| E6521, 500 Gallons | E7021, 500 Gallons | 2 Type-Two Ambulances, 2 Type-Three Ambulances |

Within Lake County, Lake County FPD can respond to 20% of incidents in the district within fifteen minutes. Thirty percent of the district can be reached within ten minutes, 30% within five minutes, and 20% of the district is within a three-minute response from one of the Lake County FPD stations or engines.

In 2008, Lake County FPD responded to a total of 2,743 incidents within the district. The following chart summarizes the type and frequency of incidents.

*Figure 6-6. Lake County Fire Protection District, Number of Incidents by Type of Incident in 2008*




In addition to providing service within the district, approximately 3% of the time Lake County FPD will respond to incidents outside its boundaries around the county, or even the state. It has mutual aid agreements with Lakeport FPD, Kelseyville FPD, South Lake County FPD, Northshore FPD, and CALFIRE.

Increased revenue to pay additional personnel has been identified as a priority need for Lake County FPD. This would allow the district to staff additional stations, 24 hours a day, seven days a week.

### 6.1.3. Lake Pillsbury Fire Protection District

The Lake Pillsbury FPD provides first-response fire and medical service to approximately 300–500 residents in their 14,329-square-mile district/SOI in Lake County; however, summer populations can range from 500 to 3,500 people, with peaks up to 12,000.

Twenty-two local residents currently volunteer with Lake Pillsbury FPD, 21 being "active" firefighters. An additional four volunteers are support personnel. None of the volunteers are paid, and more are needed . This FPD is funded primarily through property taxes, totaling approximately $18,000 annually.

Lake Pillsbury FPD has two stations, with six fire engines (two structural, four wildland), two water tenders, two ambulances, and a boat. One of the structural engines is over 34-years old. One of the wildland engines is over 43-years old. Both of these engines need to be replaced. The following two tables list Lake Pillsbury FPD station information and equipment resources.

*Figure 6-7. Lake Pillsbury Fire Protection District Stations*

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Station 95-1 | 29501 Fuller Dr., Bldg. B<br>Potter Valley, CA 95469 | Mike Josephson, Chief | 707-824-9532<br>707-799-5876 | N/A | Volunteer |
| Station 95-2<br>(under construction) | 2260 Rice Fork Rd.<br>Potter Valley, CA 95469 | | | N/A | Volunteer |

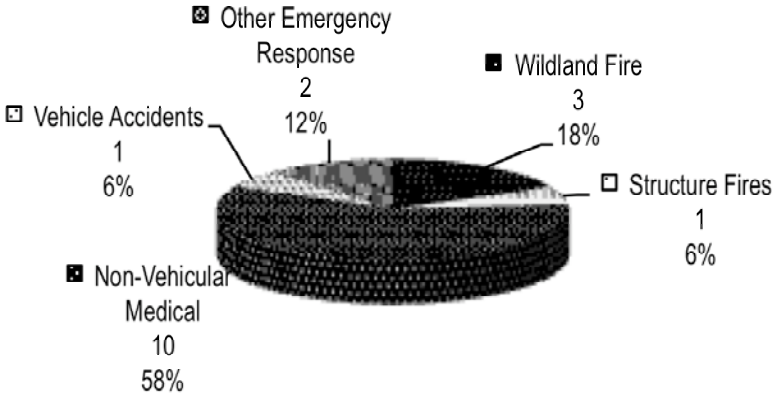
*Figure 6-8. Lake Pillsbury Fire Protection District Equipment Resources*

| Resources | | |
|---|---|---|
| **Structural Engines Type/ID/Capacity** | **Wildland Engines** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| 9521, 1000 Gallons | 9532, 500 Gallons | Water Tender 9511, 2500 Gallons |
| 9523, 750 Gallons | 9534, 500 Gallons | Water Tender 9521, 1500 Gallons |
| | 9542, 250 Gallons | Ambulance 9521 & 9522 |
| | 9543, 250 Gallons | Boat 9511 |

Within Lake County, Lake Pillsbury FPD can respond to incidents in the Pillsbury Ranch area within three to four minutes. Outside of Pillsbury Ranch there is a five to twenty minute response time.

In 2008, Lake Pillsbury FPD responded to a total of seventeen incidents. The following chart summarizes the type and frequency of incidents.

***Figure 6-9. Lake Pillsbury Fire Protection District, Number of Incidents by Type of Incident in 2008***




Approximately 75% of the time, Lake Pillsbury FPD will respond outside their boundaries to incidents in the Mendocino National Forest, Northshore FPD, Mendocino County and elsewhere if requested. Lake Pillsbury FPD has mutual aid agreements with Northshore FPD and the USFS.

In order to continue effective emergency service, Lake Pillsbury FPD has identified several needs. All of their equipment is old and needs to be replaced. In addition to the equipment replacement they also need three type-one fire engines, another water tender, and one type-three engine. Training needs have also been identified to make the district more effective. These include live fire, rope rescue, swift water rescue, and emergency medical technician (EMT) training. The most important needs for the district are the addition of paid firefighters, radio communications, a receiver for 911 communications, and more money for the general fund.

### 6.1.4. Lakeport Fire Protection District

The Lakeport Fire Protection District provides first-response fire and medical service to approximately 11,680 residents in their 49-square-mile district in Lake County. The district includes the communities of Lakeport, North Lakeport, Scotts Valley, and Finley. Summer populations can reach 16,000 people.

Twenty-five local residents currently volunteer with Lakeport FPD (with approximately 20 who are "active" firefighters, 13 paid). These 13 volunteers are paid for each fire call they make. More volunteers are needed for the Lakeport FPD. The FPD is funded primarily through property taxes, ambulance fees, and fire benefit fees totaling approximately $2 million annually.

Lakeport FPD has two fire stations, with a total of seven fire engines (five structural, two wildland), a water tender, and a 5011 air-compressor truck. One of the structural engines is over 30-years old and needs replacing, as does one of the wildland engines. The next two tables list station information and equipment resources.

***Figure 6-10. Lakeport Fire Protection District Stations***

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Station 50 | 445 N. Main St.<br>Lakeport, CA 95453 | Kenneth D. Wells,<br>Chief | 707-263-4396 | 24/7/365 | 4 Minimum |
| Parkway Station 52 | 3600 Hill Rd. East<br>Lakeport, CA 95453 | | | N/A | Volunteer |

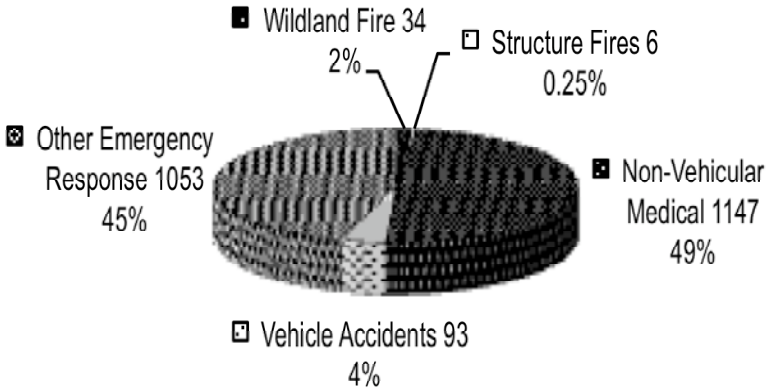
*Figure 6-11. Lakeport Fire Protection District Equipment Resources*

| Resources | | |
|---|---|---|
| **Structural Engines Type/ID/Capacity** | **Wildland Engines** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| E5011, 1500 Gallons | E5021, 500 Gallons | Water Tender 5211, 3000 Gallons |
| E5012, 1250 Gallons | E5031, 300 Gallons | Air 5011 Truck |
| T5011, 1500 Gallons with 75-ft. Ladder | | |
| T5012, 1500 Gallons | | |
| E5211, 1000 Gallons | | |

The ability for Lakeport FPD to respond to emergencies can vary greatly within the district. Variables such as season of year (e.g. tourist season), weather, road conditions, and more will affect the ability for emergency personnel to respond to a call. Within the average remote areas, response time is approximately eight minutes.

In 2008, Lakeport FPD responded to a total of 2,333 incidents within Lake County. The following chart summarizes the type and frequency of incidents.

*Figure 6-12. Lakeport Fire Protection District, Number of Incidents by Type of Incident in 2008*




Within the countywide mutual aid agreement, Lakeport FPD responds outside of their boundaries to incidents in Kelseyville, Upper Lake, Nice, Lucerne, Clearlake Oaks, Clearlake, and the South Lake area, as well as areas within Lakeport FPD's own Sphere of Influence (SOI). The SOI is an area not directly funded, although it is covered by the FPD. For Lakeport FPD this area is located west of the district boundaries to the county line. Both Lakeport FPD and CAL FIRE service these SOI areas in a coordinated effort. They both respond to emergencies there. Lakeport FPD has mutual aid agreements with Kelseyville FPD, CAL FIRE, and USFS.

Replacement of one structural engine and one wildland engine as well as the addition of another wildland engine are priority needs for Lakeport FPD. The engines that need replacing are over 30-years old. The addition of another wildland engine will help Lakeport FPD respond more effectively to wildland fires.

### 6.1.5. Northshore Fire Protection District

The Northshore FPD provides first-response fire and medical service to approximately 13,000 residents in their more than 350-square-mile district in Lake County. The district includes the communities of Blue Lakes, Upper Lake, Nice, Lucerne, Paradise Valley, Kono Tayee, Glenhaven, Clearlake Oaks, Spring Valley, and Double Eagle. Populations can be over 20,000 during peak seasons.

Fifty-one local residents currently volunteer with Northshore FPD, and all are "active" firefighters, with 14 as paid staff. The Northshore FPD needs more volunteers to cover its large district. It is funded primarily through local taxes and charges from ambulance calls, totaling $2,715,140 annually.

Northshore FPD has seven fire stations. Currently it has 18 fire engines (ten structural, eight wildland), two water tenders, three utility vehicles, seven ambulances, four command vehicles, and two rescue vehicles. The next two tables list Northshore FPD station information and equipment resources.

***Figure 6-13. Northshore Fire Protection District Stations***

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Lucerne Station 85 (and District Office) | 6257 7th Ave., Lucerne, CA 95458 | James Robbins, Chief | 707-274-3100 | 24/7/365 | Min. 1, but usually 2 |
| Clearlake Oaks Station 75 | 12655 E. State Hwy. 20, Clearlake Oaks, CA 95423 | Pat Brown, Battalion Chief | 707-274-3100 | 24/7/365 | 2 |
| Nice Station 85 | 3708 Manzanita Ave., Nice, CA 95464 | | 707-274-8834 | 24/7/365 | Min.1, but usually 2 |
| Upper Lake Station 90 | 9420 Main St., Upper Lake, CA 95485 | | 707-275-2446 | Mon.–Fri. 8–5 PM | 1, with volunteers or another paid staff |
| Glenhaven Station 76 | 9458 E. State Hwy. 20, Glenhaven, CA 95457 | | | N/A | Volunteer |
| Spring Valley Station 77 | 3178 Tamarack Way, Clearlake Oaks, CA 95423 | | | N/A | Volunteer |
| Blue Lakes Station 91 | 5200 W. State Hwy. 20 Upper Lake, CA 95485 | | | N/A | Volunteer |

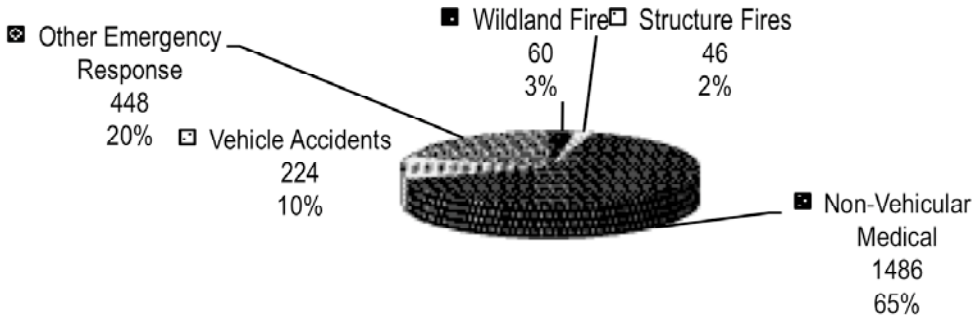
***Figure 6-14. Northshore Fire Protection District Equipment Resources***

| Resources | | |
|---|---|---|
| **Structural Engines Type/ID/Capacity** | **Wildland Engines** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| E9132, 500 Gallons | E9131, 350 Gallons | Water Tender 9011, 3200 Gallons |
| E9011, 650 Gallons | E9031, 300 Gallons | Water Tender 7511, 3000 Gallons |
| E9021, 500 Gallons | E8531, 300 Gallons | Utility 8011 |
| E8511, 1000 Gallons | E8031, 300 Gallons | 8 Ambulances |
| E8512, 500 Gallons | E7631, 300 Gallons | 4 Command Vehicles |
| E8011, 750 Gallons | E7631, 300 Gallons | Boat 7511, Fire and Rescue |
| E8021, 500 Gallons | E7531, 300 Gallons | Utility 8511, Pickup Truck |
| E7511, 650 Gallons | E7741, 300 Gallons | Utility 7511, Pickup Truck |
| E7521, 1250 Gallons | | Res. 9011, Drive Truck |
| T8011, Pump Truck with 50-ft. Ladder | | Res. 7511, Rescue Vehicle |

Within Lake County, Northshore FPD can respond to most incidents in the district within fifteen minutes. Fifteen percent of the district can be reached within ten minutes, 15% within five minutes, and 65% of the area is within a three-minute response from one of the Northshore FPD stations or engines.

In 2008, Northshore FPD responded to a total of 2,264 incidents within Lake County. The following chart summarizes the type and frequency of incidents.

*Figure 6-15. Northshore Fire Protection District, Number of Incidents by Type of Incident in 2008*




Approximately two percent of the time Northshore FPD will respond outside their boundaries to incidents at Lake Pillsbury. Northshore FPD has mutual aid agreements (auto aid agreements during Red Flag days) with all Lake County FPDs, as well as CAL FIRE.

Replacement of a 2,000-gallon water tender, SCBAs (Self Contained Breathing Apparatuses), turnouts, radios, and personnel training have been identified as priority needs for Northshore FPD.

### 6.1.6. South Lake County Fire Protection District

The South Lake County FPD provides first-response fire and medical service to approximately 16,000 residents year-round (up to 30,000 in summer), throughout their 289-square-mile district. Communities here include Loch Lomond, Cobb, Anderson Springs, Middletown, Hidden Valley, Coyote Valley, and The Geysers.

All of South Lake County FPD's staffed stations are serviced by CAL FIRE personnel. Twenty local residents currently volunteer with South Lake County FPD, approximately twelve of which are "active" firefighters; eleven are paid staff. In order to meet staffing needs there are 22 paid South Lake County FPD part-time employees. These 22 part-time employees receive an hourly rate for calls. More volunteers are needed. The district is funded through county secured and unsecured tax rolls, parcel assessments, plan inspections, burn permits, and transportation fees, totaling approximately $2.78 million annually.

South Lake County FPD has four fire stations located throughout the district. The FPD's equipment currently includes seven fire engines (five structural, two wildland), two water tenders, a rescue vehicle (this vehicle carries equipment for auto extraction, flood lights, generators, and other emergency equipment that cannot fit on the fire engines), four ambulances, five utility vehicles, and a Mass Casualty Incident (MCI) trailer. This MCI trailer contains items for multi-casualty incidents (e.g. bus crashes or multi-car accidents). It also has a Snow Cat, used primarily for the snow-covered areas around The Geysers. The snow cat is available for any FPD under a mutual aid agreement. One structural engine is over 20-years old, but still in working condition. One of the wildland engines is more than 25-years old, also still in working condition. The FPD's station information and equipment resources are found in the next two tables.

*Figure 6-16. South Lake County Fire Protection District Stations*

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Main Station 60 (and Training Ground) | 21095 Hwy. 175 Middletown, CA 95461 | Jim Wright, CAL FIRE, Fire Chief<br>David Miinch, Fire Inspector | 707-987-3089 EXT. 3 | Mon.–Fri. 8–5 PM | Not Staffed with Fire Fighters |
| Hidden Valley Station 63 | 19287 Hartmann Rd. Hidden Valley Lake, CA 95467 | | 707-987-2953 | 24/7/365 | 2 Minimum |
| Cobb Station 62 | 16547 Hwy. 175 Cobb, CA 95426 | | 707-928-5411 | 24/7/365 | 2 Minimum |

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Loch Lomond Station 64 | 10331 Redwood Rd. Loch Lomond, CA 95461 | | | N/A | Volunteer |

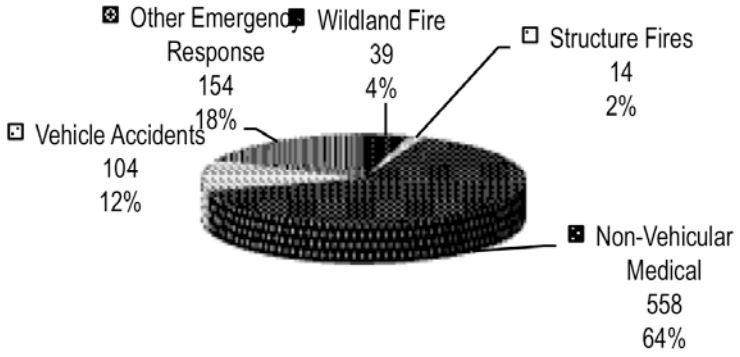
***Figure 6-17. South Lake County Fire Protection District Equipment Resources***

| Resources | | |
|---|---|---|
| **Structural Engines Type/ID/Capacity** | **Wildland Engines** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| E6221, 500 Gallons | E-6031, 500 Gallons | Rescue Vehicle |
| E6321, 500 Gallons | E-6032, 500 Gallons | 2 Water Tenders (3500 and 2000 Gallons) |
| E6421, 500 Gallons | | Snow Cat, MCI Trailer, 5 Utility Vehicles |
| E6011, 600 Gallons | | 4 Ambulances |
| OES359, 850 Gallons[3] | | |

Within Lake County, South Lake County FPD can respond to most incidents in the district within fifteen minutes. Fifteen percent of the district can be reached within ten minutes, 65% within five minutes, and 30% of the district is within a three-minute response from one of the South Lake County FPD stations or engines.

In 2008, South Lake County FPD responded to a total of 869 incidents. The following chart summarizes the type and frequency of incidents.

***Figure 6-18. South Lake County Fire Protection District, Number of Incidents by Type of Incident, 2008***




South Lake County FPD responds outside their coverage areas to incidents in Napa and Sonoma counties 8% of the time . The district has mutual aid agreements with Napa County, Kelseyville FPD, Lake County FPD, and CAL FIRE. There are no auto aid agreements. The district has an Enhanced Services Agreement with Calpine Corporation (who operates most of The Geysers area) to provide fire, emergency medical services, and safety training to The Geysers area, and to Calpine Corporation's 350 employees.

South Lake County FPD pays for two Amador contracts. One is in the community of Middletown and the other is located at the Kelsey-Cobb Forest Fire Station serving the communities of Loch Lomond and Cobb. This agreement requires South Lake County FPD to pay the expense for staffing two CAL FIRE "Firefighter I" positions for seven months during the non-fire season period, and a small expense for use of the type-three engine. In addition, CAL FIRE provides the station as well as three additional operators to staff the type-three engine. The total cost amounts to approximately $100,000 annually per contract. Without this contract, it would

[3] This engine stays at Station 60 and is owned by the Office of Emergency Services (OES). The engine is provided to the SLCFPD at no cost, with the understanding that it will be staffed with at least four people to respond to emergencies within California if needed.

cost approximately $500,000 to provide non-CAL FIRE staffing, not including benefits. This provides an engine to the fire district 365 days a year, 24 hours a day, and 7 days a week. During the winter months the engine is usually staffed by at least two individuals, and in summer by at least three. These engines respond to all incidents within the South Lake County Fire Protection District, and can be called on to cover mutual aid requests anywhere in the county, as well as in the state, should the need arise.[4]

Continued support from the Board of Supervisors in the adoption of Fire Codes and a fire sprinkler ordinance, development of emergency water supplies, ongoing funding, and continued commercial and wildland fire training have been identified as priority needs for South Lake County FPD. Additional staffing and an addition of two more stations within the district is a high priority for this district.

## 6.2. State Fire Protection Agency: California Department of Forestry and Fire Protection (CAL FIRE)

CAL FIRE provides wildland fire protection for private, industrial, county, state, and municipal forestlands. It provides wildland fire protection to approximately 20,290 residents in their 753-square-mile service area in Lake County, within its Sonoma-Lake-Napa Unit. CAL FIRE provides wildland fire protection within State Responsibility Area (SRA) land surrounding the communities of Upper Lake, Nice, Lucerne, Clearlake Oaks, Clearlake, Lower Lake, Kelseyville, Lakeport, Cobb, and Middletown.

CAL FIRE's Sonoma-Lake-Napa Unit has two battalions within Lake County. Battalion 1417 includes the SRAs around Middletown, Cobb, Loch Lomond, Hidden Valley Lakes, Jerusalem Grade, Lower Lake, and extending south and east to the Napa County line. Battalion 1418 includes the SRA lands around Clearlake, Spring Valley, Clearlake Oaks, Nice, Lucerne, Upper Lake, Lakeport, Kelseyville, and Clear Lake Riviera, extending out to the Colusa County line on the east and the Mendocino County line to the west. Battalion 1418 also provides direct protection to the BLM properties at Cow Mountain, Black Forest, and Cache Creek. Staffing within Lake County has 23 year-round personnel with up to 85 crew members during fire season, including nine Fire Captains, eleven Fire Apparatus Engineers (six permanent), 54 Seasonal Firefighters, four Heavy Equipment Operators, two Pilots, and two Battalion Chiefs.

CAL FIRE is primarily funded by the state's General Fund (GF). The GF is budget revenue not specifically designated or accounted for by any other fund. Primary GF sources are income, sales, and corporate taxes.

There are four CAL FIRE stations located within Lake County, along with a fire lookout on Mt. Konocti and a Conservation Camp. Currently CAL FIRE has seven wildland fire engines, two bulldozers, two bulldozer tenders, two bulldozer transport vehicles, five utility vehicles, one helicopter, and one helitender. CAL FIRE's station information and equipment resources are listed in the following two tables.

***Figure 6-19. CAL FIRE Stations***

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Kelseyville-Cobb Station 34 | 8948 Hwy. 175 Kelseyville, CA 95453 | Linda Green, Battalion Chief 1418 | 707-279-4924 | 24/7/365 | Minimum 2 (winter) & 3 (summer) |
| Clearlake Oaks Station 40 | 140 Spring St. Clearlake Oaks, CA 95423 | Linda Green, Battalion Chief 1418 | 707-998-3711 | Seasonal | No staff in winter, Min. 3 in summer |
| Middletown Station 31 | 15522 Lake St. Middletown, CA 95461 | Rich Boehm, Battalion Chief 1417 | 707-987-3089 | 24/7/365 | Min. 2 (winter) & 3 (summer) |
| Boggs Mountain Helitack Base Station 32 | 500 Forestry Rd. Cobb, CA 95426 | Rob Sonsteng, Battalion Chief 1403 | 707-928-5484 | Seasonal | Minimum 9 during summer |

[4] Miinch, Dave. South Lake County Fire Protection District. Personal Communication. February 17, 2009.

| Station Name & # | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Konocti Conservation Camp | 13044 Hwy. 29 Lower Lake, CA 95457 | Jim Wright Division Chief 1403 | 707-994-2441 | 24/7/365 | Minimum 11 Also ~110 Inmates |
| Konocti Lookout | Top of Mt. Konocti on Konocti Rd. Kelseyville, CA 95453 | Linda Green, Battalion Chief 1418 | | | Not Staffed |

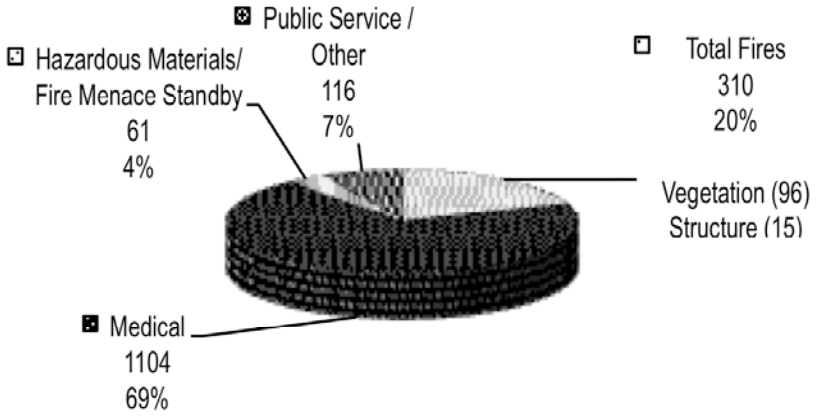
***Figure 6-20. CAL FIRE Equipment Resources***

| Resources | | | |
|---|---|---|---|
| **Facility Name / #** | **Wildland Engines** | **Dozers and Tractor Plows Type/ID/Capacity** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| Kelseyville-Cobb Station 34 | E1468, 500 Gallons | | Battalion Utility 1418 (pickup for B.C.) |
| | E1478, 500 Gallons | | Utility 1459 |
| | E1498 (reserve), 650 Gal. | | |
| Clearlake Oaks Station 40 | E1458, 500 Gallons | Dozer 1444 | Dozer Tender 1444 |
| | E1473, 500 Gallons | Dozer Transport 1444 | |
| Middletown Station 31 | E1451, 500 Gallons | Dozer 1448 | Battalion Utility 1417 |
| | E1452, 500 Gallons | Dozer Transport 1448 | Utility 1450 |
| | | | Dozer Tender 1448 |
| Boggs Mountain Helitack Base Station 32 | | | Helicopter 104 |
| | | | Utility 104 |
| | | | Utility 1461 |
| | | | Helitender 104 |

CAL FIRE maintains stations within approximately 30 minutes of reaching a fire within SRA, a system that was established in the 1940-50's. This helps to ensure a quick response to wildfire within their jurisdiction.

At times, CAL FIRE responds to more than just wildland fires. This occurs when a structural fire threatens wildlands, and usually during fire season. The following table summarizes the type and frequency of the 1,591 incidents that CAL FIRE responded to in Lake County in 2008.

*Figure 6-21. CAL FIRE, Number of Incidents by Type of Incident in Lake County in 2008*




In addition to providing service within Lake County, CAL FIRE responds to incidents all over the state, which means staffing can change quickly during fire season. CAL FIRE has mutual aid agreements with all the Lake County FPDs except for Lake Pillsbury, and an automatic aid agreement with Northshore FPD.

CAL FIRE provides fire suppression services to BLM within Lake County. BLM does not maintain fire suppression resources within the county. During a fire on, or which threatens, BLM lands, CAL FIRE will notify BLM and work with their managers regarding suppression tactics. This ensures that appropriate and planned tactics will be applied to the landscape. For example, BLM may request that certain tools not be used in areas of sensitive habitat. The relationship of CAL FIRE and BLM is part of the statewide 4-Party Agreement (AKA Cooperative Fire Protection Agreement).

CAL FIRE identified a need for additional funding for training, equipment replacement and upgrades, and repair, maintenance, and staffing of the Konocti Lookout. Establishment of stronger mutual-aid agreements and cross training with Fire Protection Districts were also identified.

## 6.3. Federal Fire Protection Agency: USDA Forest Service, Mendocino National Forest

Within Lake County, the US Forest Service provides wildland fire protection on Mendocino National Forest (MNF) lands and private in-holdings within the boundaries of the Forest. MNF's service area includes the community of Lake Pillsbury. The MNF provides wildland fire protection to approximately 20,000 residents in their 256,725-square-mile service area in Lake County.

The MNF Upper Lake Ranger District has 20 permanent fire staff, and 35 seasonal firefighters from March to November. All are paid through federal government funding. These fire personnel make up a 22-person Hotshot (hand) crew, and four engine crews (each engine crew has a minimum of 5 personnel when responding to a fire).

MNF Upper Lake Ranger District has two fire stations in the county. MNF's current local equipment includes four wildland fire engines, one water tender, and two crew carriers (crew transport vehicles). One of the engines is in need of replacement. The following two tables list MNF's station information and equipment resources.

*Figure 6-22. Mendocino National Forest Fire Protection Stations*

| Station Name | Station Address | Contact & Title | Phone | Hours | Staffing |
|---|---|---|---|---|---|
| Upper Lake Ranger Station | 10025 Elk Mtn. Rd. Upper Lake, CA 95485 | Joe Koschik, Fire Prevention | 707-275-1400 | Winter 7–5:30 Summer 9:30–6 | Winter, 5 Min. Summer, ~10 & 20-person Hand Crew |
| Soda Creek Ranger Station | 27355 Road M1 Potter Valley, CA 95469 | Maggie Prochazka, Engine Cptn. 43 | 707-743-1582 | Winter N/A Summer 9:30–6 | 5 Minimum |

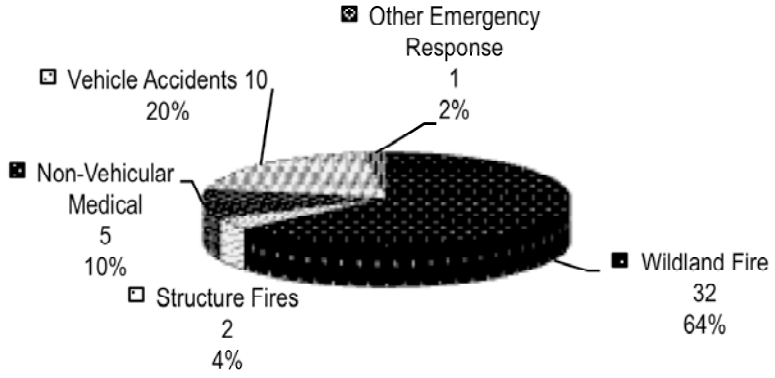
*Figure 6-23. Mendocino National Forest Fire Protection Equipment Resources*

| Resources | |
|---|---|
| **Wildland Engines** | **Miscellaneous Capacity (Tankers, Tenders, Aircraft, etc.)** |
| MNF42 | Water Tender 45, 1500 Gallons |
| MNF43 | 2 Crew Carriers |
| MNF44 | |
| MNF45 | |

Overall, it will take more than fifteen minutes for emergency personnel to respond to approximately 90% of the district area within Lake County. This is due to the remoteness of the area within and surrounding the MNF.

In 2008, the MNF responded to approximately fifty incidents within their local service area. At times, the MNF does respond to more than just wildland fires. For instance, they will respond to vehicle fires because such incidents have the potential to become wildland fires, and these vehicle fires often require medical response. The following table summarizes the type and frequency of incidents responded to by MNF in 2008.

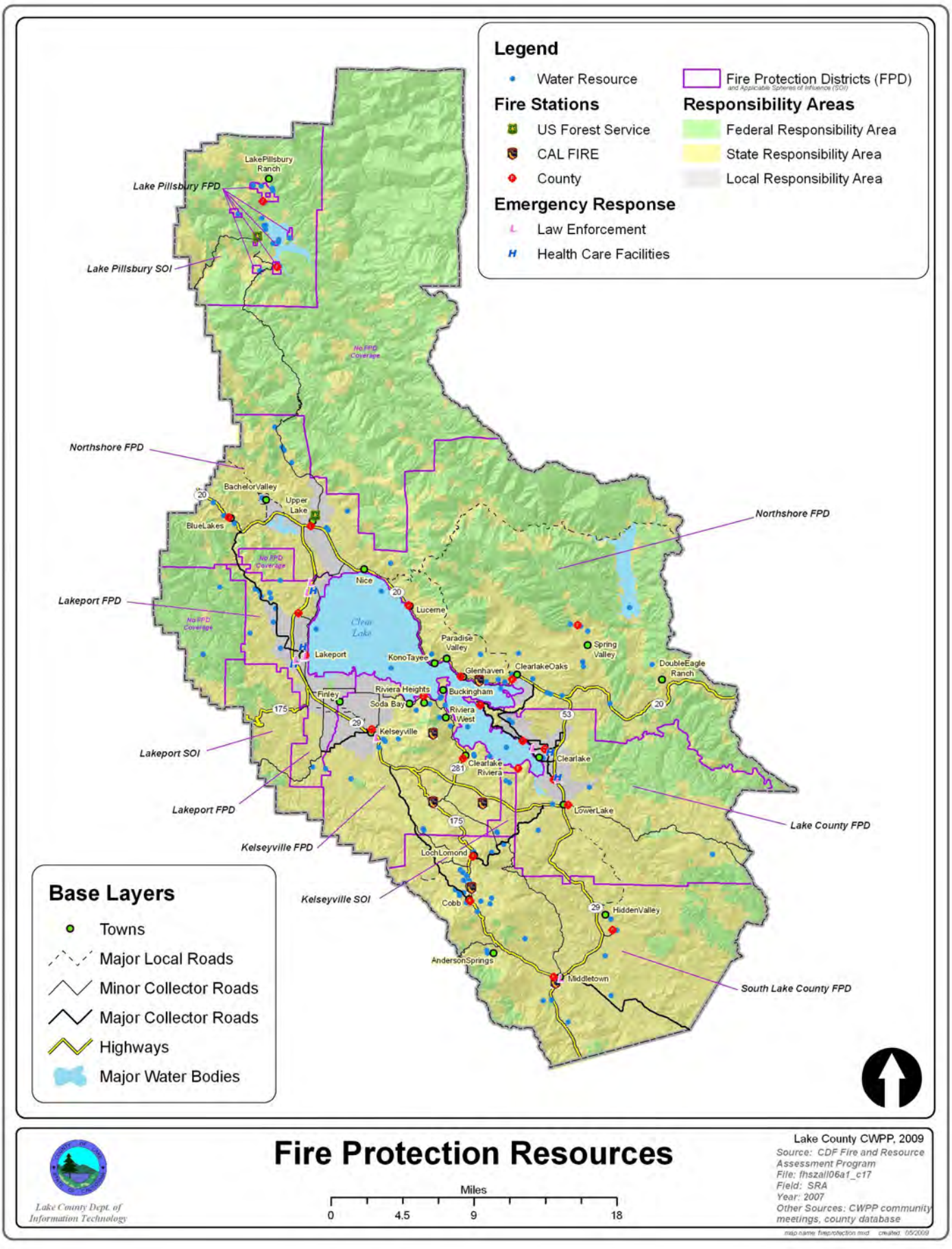
*Figure 6-24. USFS Mendocino National Forest, Number of Incidents by Type of Incident in 2008*




The MNF has mutual aid agreements with other federal agencies, CAL FIRE, Lakeport FPD, and Northshore FPD. The MNF is also signatory to the statewide OES "California Fire Assistance Agreement," which has access to all resources that are in the "California Fire Service and Rescue Emergency Mutual Aid System."

In order to provide efficient emergency fire services, the MNF has identified the need to replace Engine MNF43, as well as to add a bulldozer and some transportation vehicles to the fleet. Cross training with other FPDs and filling fire-fighting positions with qualified personnel will help MNF provide efficient emergency fire services. MNF also requests to be utilized more often as first responders to emergencies within the county.

***Map 6- 1. Lake County Fire Protection Resources***




# Fire Protection Resources

Lake County Dept. of Information Technology

Lake County CWPP, 2009

Source: CDF Fire and Resource Assessment Program
File: fhszall06a1_c17
Field: SRA
Year: 2007
Other Sources: CWPP community meetings, county database

map name: fireprotection.mxd created: 05/2009

# 7. Risk Assessment: Identifying and Evaluating Assets at Risk

## 7.1. Assets at Risk in Lake County

Assets (or values) at risk are those things that are important to quality of life that can be threatened with destruction or loss from wildfire. These include homes, infrastructure, cultural sites, wildlife habitat, natural resources, air quality, recreational facilities and areas, historical structures, and any other important attribute that individual communities rely on for their well being.

The term "assets" however may not fully convey the community value found in them. They are the precious and often unquantifiable elements that make up the quilted fabric of community life. Like much of Northern California, Lake County's communities have evolved with a connection to the land and its history. This has created what could be described as high community value, springing from a shared sense of place, strong family and neighbor ties, and enjoying community life with a bioregional flavor.

Communities can suffer greatly if highly valued or essential infrastructure is damaged or destroyed during a wildfire or other disaster. Some communities contain infrastructure that is critical to the entire county (e.g. hospitals or utilities), which naturally makes the risk of loss much graver in the event of a wildfire. Many of the more populated areas in Lake County contain the county's most critical facilities: water sources/storage, major thoroughfares, schools, fire stations, hospitals, government facilities, etc. These areas, such as the cities of Lakeport and Clearlake, have a higher concentration of community assets, thus having a higher asset value. When a high-value concentration area combines with the presence of hazardous fuels and a high fire threat, it is an area the community considers more at risk of loss due to wildfire. *(For more information regarding fire hazards, see Maps 3-4 Fire Hazard Severity Zones and 3-7 Fire Threat in Chapter 3).*

In October 2008, eleven CWPP public meetings were held throughout Lake County. At these meetings, local community assets were identified. Some of the most important community assets and values identified at these meetings included schools, churches, fire stations, hospitals, senior centers, neighborhoods, commercial districts, golf courses, campgrounds, and more. *See maps in Appendix B-2.*

### 7.1.1. Homes and Structures

In addition to protecting human lives, homes are considered one of the highest priorities for protection within Lake County. All homes are considered of equal community importance or value. According to projections from the US Census in 2007, there were approximately 34,982 homes in Lake County.[1] Homes within the county are generally concentrated within town centers (especially around Clear Lake) and along the major roadways, such as Highway 20 and State Routes 53, 29, and 175.

Much of Lake County's population surrounds Clear Lake. Some populated areas, however, are more remote and may be harder to defend than the more localized and compact communities surrounding the Lake and along the main transportation corridors. Populated but remote areas such as Lake Pillsbury, Spring Valley, Double Eagle, the communities on Cobb Mountain, and other outlying areas are considered valuable assets within the county. Even though homes not directly adjacent to wildlands often burn during wildfire events, it is the remote homes and those on the edges of communities that are at the greatest risk, because they are generally the first to be reached by a wildfire. Homes with untreated wood shake roofs are at the highest risk, even when they are in the middle of a community. The sparks created from a fire often land on roofs and ignite the structures that are well away from the approaching fire. This is why Senator Feinstein introduced in 2009 her "Fire Safe Communities" legislation to support communities that make replacement of wood shake roofs mandatory.

Map 7-1 at the end of this chapter shows property values by parcel for the county. Higher property values generally occur in the more modern populated areas. However, the highest property values shown are those associated with large landholdings (ranches, etc.). This does not mean that these properties have the highest value per acre, rather that their large number of acres increases their total value. This information was used on a rough scale to compare property values countywide.

[1] U.S. Census Bureau. *Lake County Quickfacts.* http://quickfacts.census.gov/qfd/states/06/06033.html.

### 7.1.2. General Infrastructure Assets

As each individual community has developed in Lake County, vital infrastructure has been built in order to serve the needs of the growing population. Infrastructure includes all of the roads, utilities, water, and all other services that help Lake County residents live here. The major road systems within the county—Highway 20 and State Routes 29, 53, and 175—are essential assets. Erosion and landslides following a wildfire event can pose a significant threat to the transportation infrastructure. Fire suppression efforts often utilize roads to strategically place equipment and personnel during wildfires.

Airstrips are important infrastructure in the county. They provide recreational opportunities, emergency landing sites, potential evacuation sites, and help create a destination for visitors. There are two airstrips that can be used as emergency landing or evacuation destinations. These airstrips include Lampson Field south of Lakeport, and the USFS Gravelly Valley Airstrip in Lake Pillsbury.

> "Lampson Field is a general aviation airport and the sole public use facility in Lake County. The Public Works Department oversees the operation, maintenance and improvements to the Airport…. The airport runway, designated Runway 10-28, is 3,600 feet long and 60 feet wide with; an 85-foot displaced threshold at the east end. The runway is lighted. A full length parallel taxiway is located on the south side of the runway."[2]

Gravelly Valley Airstrip however is a primitive landing site used mostly by small, fixed-wing aircraft and helicopters. It is roughly 75-100 yards wide and ¾-mile long. It is unstaffed, has a gravel surface, and is without lights, communications, or hangars. Lake Pillsbury FPD uses it as an emergency evacuation site with helicopters.

The public and private utilities within Lake County are also important assets. Geothermal power plants, electrical transmission lines, and communication towers are all at risk from wildfire. Many of these are in remote areas that have high fire threats, which causes them to be at higher risk.

Lake County is home to The Geysers, the largest geothermal power generation facility in the world. The Geysers consists of several power-generating sites within a thirty-square-mile stretch along the Sonoma/Lake County boarder. These facilities produce enough electricity to power approximately 850,000 homes. Energy produced at The Geysers provides energy to customers south of the Golden Gate Bridge and up to the Oregon border. Wildfire is a major threat to these facilities because of their remoteness and adjacency to highly flammable vegetative fuels. In 2004, the *Geysers Fire* burned roughly 12,500 acres here. In its path this fire burned 6 residences, 14 outbuildings, 1 commercial property, and 12 vehicles. For this and other reasons, The Geysers is included as a "Community At Risk" from wildfire *(see Chapter 1 for more information on Communities at Risk).*

Pacific Gas and Electric (PGE) maintains transmission lines and a dozen substations within Lake County. Some of the substations are active while others are for future use, located in both rural and suburban areas. All substations are maintained to meet the minimum state requirements of 100 feet of clearance. In most instances all of the vegetation is removed and gravel is placed on the ground, for access and to eliminate flammable material.

Communication towers have traditionally been located on top of peaks (such as Mt. Konocti) and can be threatened by wildfire. Some of the towers receive power from underground lines, while others have aboveground lines. Aboveground power lines can pose a wildfire threat as a possible ignition source, for example if a tree falls on the lines. All communication towers have backup power supplies (batteries or propane). They are required to have fire alarms, fire extinguishers, and maintain a minimum fuel clearance of 100 ft. Within this 100' clearance, many of the towers are void of vegetation or have gravel for access and to limit the amount of flammable material. Fire Protection Districts have access to all communication towers.

The communication tower on Mt Konocti is being rebuilt to provide more space for communications infrastructure. This tower is one of the most centrally located in the county and contains emergency communications systems.

[2] Lampson Airport, www.co.lake.ca.us/Residents/Roads-Transportation/Airport.htm.

Domestic gas usage within the county is in the form of propane. There are several propane distributors, generally with large storage tanks (e.g. 30,000 gallons or more, located both in suburban and rural settings. Tanks are inspected yearly for both function and to ensure they meet their minimum 100' fuel-clearance requirement.

The security of clean water is fundamental to all communities. Increased surface runoff following a wildfire can cause inputs of nutrients, ash, and other particulate matter into the county water sources. These inputs can also cause water treatment facilities to function incorrectly; this happened following the 1996 *Fork Fire*.

There are approximately 95 different water service providers of varying size found throughout the county, supplying domestic water to residents and visitors. All of the water suppliers are site-specific and service the needs of a certain location, often a subdivision. Facilities maintained by these providers, such as treatment plants, pumps, and storage facilities can be damaged during or following a wildfire.

### 7.1.3. Commercial Assets

The primary commercial centers within the county are the incorporated and unincorporated metropolitan areas surrounding Clear Lake. Areas not directly adjacent to Clear Lake, such as Middletown, Kelseyville, and Coyote Valley, also have important commercial centers.

Lake County is also a year-round tourism and recreational destination, although tourism peaks in summer. Boating, fishing, camping, wine tasting, sight seeing, and many other recreational activities help bring in monies that aid in the development of community infrastructure and services. During wildfire events, tourism and recreational opportunities are often reduced or eliminated due to actual or perceived dangers visitors may face, and compromised air quality.

Major recreation areas include the county's lakes; most notably Clear Lake. Other important recreational locations include Snow Mountain, Yuki, Sanhedrin, and Cache Creek Wilderness Areas; Cow Mountain Recreation Area; Mendocino National Forest; Anderson Marsh; Boggs State Demonstration Forest; and numerous campgrounds, casinos, and hot springs throughout the county. Areas within the Mendocino National Forest, wilderness areas, Cow Mountain, hot springs, and the Demonstration Forest are the most vulnerable to wildfire because of their remoteness as well as their natural association with fire.

### 7.1.4. Schools

There are seven school districts in Lake County: Kelseyville Unified, Konocti Unified, Lakeport Unified, Lucerne Elementary, Middletown Unified, Upper Lake Union Elementary, and Upper Lake Union High School. There are also three parochial schools and two community colleges within the county to make up a total of 53 schools. Many schools are located in areas that have medium to high fire hazard.

### 7.1.5. Medical Facilities

Two hospitals and three nursing homes exist within the county, with six senior assistant centers. These facilities are essential to the health, safety, and lifestyle of local residents. The following table lists these sites.

***Figure 7-2. Lake County Medical Facilities and Senior Centers***

| Name | Address | Emergency Power Supply |
|---|---|---|
| Sutter Lakeside Hospital | 5176 Hill Rd. East, Lakeport | Generator |
| Saint Helena Hospital | 15630 18th Ave., Clearlake | Generator |
| Meadowood Nursing Center | 3805 Dexter Lane, Clearlake | Generator |
| Evergreen Lakeport Healthcare Center | 1291 Craig Ave., Lakeport | Generator |
| Lakeport Skilled Nursing Center Inc. | 625 16th St., Lakeport | Generator |
| Highlands Senior Service Center | 3245 Bowers Ave., Clearlake | Handheld lights w/ batteries |
| Kelseyville Seniors, Inc. | 5245 3rd St., Kelseyville | Handheld lights w/ batteries |
| Lakeport Senior Center | 527 Konocti Ave., Lakeport | Handheld lights w/ batteries |
| Live Oak Senior Center | 12502 Foothill Blvd., Clearlake | Handheld lights w/ batteries |
| Lucerne Alpine Senior Center Inc. | 10th and Country Club Dr., Lucerne | Handheld lights w/ batteries |
| Middletown Senior Citizens, Inc. | 15299 Central Park Rd., Middletown | Handheld lights w/ batteries |

### 7.1.6. Cultural Assets

People have been living in Lake County for 10,000 to 12,000 years. The most notable human habitation here is that of the Pomo Indians, several bands of which still remain, *(see Chapter 1 for more information)*. More than 10,000 years ago, the land that is now Lake County was occupied and managed entirely by Pomo Indians. Today, approximately 1,600 acres remain in tribal ownership in the county.

Throughout this time of human habitation cultural resources have accumulated throughout the county, including: bedrock mortars, grassland sites for basket making, oak trees for acorn gathering, ceremonial gathering places, and more.

Threats to these valuable resources are due primarily to development and subdivisions. Many of the cultural gathering sites for items such as sedges, which provide valuable basket material, are within private land holdings, leaving these sites out of reach as a cultural resource to local tribal members. High-intensity fire poses a threat to resources such as oak stands that provide acorn-gathering sites for local tribes. These types of fires can kill oaks, while low-intensity fire can help with oak regeneration and seed protection. Low-intensity fire was used for thousands of years to help reduce insect damage to mast crops.

Post-settlement assets are abundant within the county as well. There are many historical buildings such as barns, schools, and churches that are valued by local residents and visitors. Some of these buildings were identified in the community meetings *(see Appendix B-2)*: the Brickhouse Tavern, Loch Lomond General Store, and Lower Lake School. Historical resorts such as Forest Lakes Resort, the resorts in Blue Lakes, and Pine Grove Resort are all valued within the county. Historic downtown areas are found in Kelseyville, Lakeport, Lower Lake, and Upper Lake. Historic ranches and farm equipment are also at risk from wildfire. Efforts are being made to preserve and consolidate many of these resources through collection for a museum.

### 7.1.7. Natural Assets

Lake County is ecologically rich; there are many natural assets to protect and steward. Natural assets can be as important and valuable as property or material assets. Natural assets directly and indirectly contribute significantly to the quality of life, economy, and ecological diversity of the county. Many of these natural assets are located in remote areas that have associated high fire threat and hazard conditions.

During the community meetings, many of the county's natural assets were identified. Some of these include (in no particular order of importance): scenic vistas, Harbin Hot Springs, High Valley Ranch, Boggs Lake Reserve, Clear Lake, and Big Pines Campground.

The state parks, state forest, national forest, and wilderness areas are all important ecological areas within the county. They provide critical habitat for threatened and endangered plants and wildlife such as the bald eagle, Northern spotted owl, and Boggs Lake hedge-hyssop. *See Chapter 3 for more information on threatened and endangered species in the county, and Chapter 4 for vegetation types.*

Recreational and research opportunities, scenic vistas, and more are associated with these natural assets. An overall lack of fire as a result of fire suppression has caused many of these areas to become overly dense, with high fire threats. In many cases this overcrowding causes plants and trees to become stressed and unhealthy, leaving the site at greater risk of high-intensity wildfire.

Among the natural resources of every community is air. Lake County is fortunate to have exceptionally clean air. The county is known for its nineteen years of Designated Clean Air Achievement.[3] The American Lung Association (ALA) found in 2007 that Lake County's air quality ranked 3rd cleanest in the nation for particulate pollution.[4] In 2009, ALA reaffirmed that Lake County ranked an "A" grade in air quality standards, with the third healthiest air in the nation.[5] This air quality is a treasured asset that needs to be protected. Wildfires can burn out

[3] Lake County Air Quality Management District. www.lcaqmd.net.

[4] California Air Pollution Control Officers Association (CAPCOA) Newsletter. Volume 19, Issue 9. September 2007.

[5] American Lung Association. State of the Air Report 2009. p. 24 and p. 54. www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf.

of control for days or weeks, and the ash and smoke pollution in the air is a risk to the community as well as the natural environment. Vegetation and plant life can also be harmed by atmospheric pollution and smoke.

The major natural resource businesses within the county include agriculture and wineries. Lake County currently has 24 local wineries that offer scenic views, recreational and tourism opportunities, local products, revenue, and jobs. Ranches within the county provide grazing land, recreational activities, and local food**.** Both of these natural resource-based industries can be affected by wildfire. The wineries may be at risk from wildfire because of their dependence on long-lived grape vines. Due to the arrangement of grape vines within vineyards, fire is not likely to burn through them, although during the late summer months, dry and brittle vines can pose a fire risk. If a wildfire was to burn through a vineyard, it could destroy valuable natural resources.

Cattle ranches may be at greatest risk from wildfire because of their fairly natural arrangement. Fire can quickly sweep through thousands of acres of ranchland, potentially damaging grazing habitat. However, ranches also benefit from wildfire as new growth and essential nutrient recycling resulting from a wildfire replenishes the burned-over area. Thus, controlled burning is used as a management tool on many ranchlands.

Agricultural lands that are managed for food crops (such as strawberries, pumpkins, etc.) are not at great risk from wildfire because of the heavy management that takes place there. However, fruit and nut tree orchards, such as Lake County's walnut orchards, could sustain damage from direct flame contact or even the heat of a wildfire. Although the understory vegetation tends to be eliminated in orchards, making it very difficult for a fire to move through, the heat of a fire could damage a portion, or all, of a tree.

### 7.1.8. Conflicts Between Natural Assets and Human Occupation

Human encroachment into highly flammable wildland areas creates a conflict that often threatens life, property, and the natural environment. Most vegetation types found within Lake County have the potential to carry high-intensity wildland fires. In fact, most are dependant to some extent on fire to remain vigorous *(see Chapter 4 for more information*). At the same time, these areas are often aesthetically pleasing and provide an atmosphere in which many seek to live. This is quite apparent in Lake County, as residents slowly expand into these beautiful but highly flammable and remote areas such as Cobb Mountain, and the wildland-urban interface around the shoreline communities. The greatest threat generally occurs where the wildland meets the community, although wildfire can burn down houses well inside communities, especially in the case of large ember storms.

The various Rivieras communities are built within and adjacent to highly flammable vegetation. This vegetation, combined with steep slopes, very limited access, and expensive investments (i.e. homes and other community infrastructure), creates a major conflict between human habitation and the natural values, or assets, that make it a desirable place to live. Therefore, the Rivieras area is one of the most problematic in the county in terms of wildfire prevention and protection.

On Cobb Mountain, homes continue to be built in remote areas with highly flammable vegetation. Many are summer residences or vacation homes that are not well maintained for fire protection. Access is often on thin and windy roads, problematic during evacuations and other emergencies. This type of encroachment into wildland areas can be a significant threat to both the people and the ecosystem in which they live.

Concurrently, positive work is occurring throughout the county to address these issues and conflicts. The South Lake Fire Safe Council has implemented several projects in the Cobb Mountain area. The Clear Lake Riviera Community Association in cooperation with the Kelseyville Fire Protection District has implemented a simple and effective fire safety program that can be a model for other developments throughout the county.

Other examples include shaded fuelbreaks and fuel-reduction projects around areas such as the Lakeview Campground, Konocti Lookout, and Boggs State Forest. These projects will not eliminate fire, but minimize the intensity of fire in these communities. These projects help to address some of the conflicts between natural assets and human occupation. If residents, agencies, and relevant organizations implement the projects proposed in this CWPP, the risk associated with wildfire to Lake County's assets can truly be minimized.

## 7.2. Assessing Risks in Lake County

The following table summarizes the communities, assets, risks, and fire-fighting capabilities in Lake County to develop an overall risk ranking for all included communities. Each of these areas is explained below.

### Community, Structure, or Area at Risk

These are generally the communities at risk from wildfire in Lake County, both existing and proposed CARs. Additional populated areas were identified if their overall risk rating was either "Medium" or "High." Middletown, Kelseyville, Finley, Clear Lake Keys, and Bachelor Valley/Witter Springs resulted in a "Low" overall risk rating from this analysis; therefore they were not included in this table. Where there were clearly differing areas of risk within the same community, those communities were separated out. For example, Lower Lake, Morgan Valley, and Twin Lakes were identified separately as they have distinct wildfire issues.

### Assets at Risk

This was compiled from this chapter, local property values, and the information gathered at community meetings. All neighborhoods and population centers are assumed to be equally important local assets and values. The ratings in this column compare overall assets countywide based on the information described above.

### Fuel Hazard

Fuel hazards describe the amount of fuels in a given area that could burn during a fire. Fuel hazards were based principally on fire history and fire hazard severity zones as developed by CAL FIRE and described in Chapter 3. This was combined with information gathered through local field tours in October 2008, and aerial imagery on Google Earth. Further information was provided from data gathered at the community meetings.

### Risk of Wildfire Occurrence

Risk of wildfire occurrence refers only to the possibility of a wildfire occurring in the given community. It does not reflect the possibility of a fire starting locally, including one that may simulate wildfire conditions. This information was taken from CAL FIRE's fire threat information, information gathered through local field tours, and topographical and wildland vegetation analysis using Lake County GIS data and Google Earth.

### Structural Ignitability

Structural ignitibility means the ability of buildings, especially homes, to burn. This information was based on visual surveys and local information. Older, wooden homes generally have higher structural ignitability than newer homes–especially those homes with tile or metal roofs.

### Fire-fighting Capability

Fire-fighting capability describes the ease with which firefighters can get to a community to fight a fire. This information was taken largely from Chapter 6. Supplemental water flow (and other information) was also taken from the 2007 LAFCO Final Report[6]. It is based on factors such as how close a fire station is, the level of equipment and/or staffing, and the amount and pressure of water available for firefighting. A high ranking in this category would decrease the overall risk ranking of a community.

### Overall Risk

The overall risk category is a sum of the above categories, and the analysis done for each. The higher the ranking in each of the categories (except fire-fighting capability) leads to a higher overall risk. The higher the ranking in the fire-fighting capability column brings the overall risk down.

### Observations

These include a summary of key ranking factors in the various categories, especially in the case of anomalies.

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[6] Lake Local Agency Formation Commission (LAFCO). *Lake County Fire Protection Districts Municipal Service Review and Sphere of Influence.* October 19, 2007.

*Figure 7-3. Summary of Assets and Associated Wildfire Risks for Medium and High Risk Communities in Lake County*[7,8]

| Community, Structure, or Area at Risk | Assets at Risk | Fuel Hazard | Risk of Wildfire Occurrence | Structural Ignitability | Fire-Fighting Capability | Overall Risk | Observations |
|---|---|---|---|---|---|---|---|
| **Anderson Springs** | Med | High | High | High | Low | **High** | High fuels, older wooden homes, small and windy roads, remote, significant wildfire threat. Good local FSC. Limited water. |
| **Clear Lake Riviera** | High | High | High | Med | Med | **High** | High-value real estate, with high fuels in a dense development. Wildfire threat from Hwy 29 could threaten rest of Rivieras. Fire station with limited staffing. Water is limited. |
| **Double Eagle** | Low | High | High | High | Low | **High** | Very remote development, surrounded by fuels with high wildfire threat. Very bad roads/access. Minimal fire protection. Limited water. |
| **Greater Cobb Area including Loch Lomond** | High | High | High | High | Med | **High** | High fuels, older wooden homes, fire stations staffed only during fire season. Includes surrounding areas and forested landscape. Significant wildfire threat, access issues. Limited water. Good local FSC. |
| **Harbin Hot Springs and Other Springs** | Med-High | High | High | High | Low | **High** | High fuels, important tourist/recreational destinations, high ignition risk from many visitors, very limited access/evacuation. |
| **Jago Bay, Point Lakeview** | High | High | Med | High | Low | **High** | Tight roads, heavy fuels, older homes. Wildfire threat from Hwy 29 could threaten Rivieras. Difficult access/evacuation. Limited water. |
| **Lake Pillsbury** | Low | High | High | High | Low | **High** | High wildfire threat, surrounding fuels. USFS in-holding community, limited fire protection capacity. Limited water supply outside LP Ranch. |
| **Lakeport** | High | Med | High | Med | High | **High** | High values and historical areas, with significant wildfire threat from BLM to east, some urban areas with high fuels and density. |
| **Spring Valley and Long Valley** | Med | Med-High | High | Med-High | Low | **High** | Good clearance, limited fuels within Spring Valley development. Higher fuels, wildfire threat in surrounding areas. Limited water supply. Remote. |

[7] This table is adapted from Step 5a of the CFA Simplified CWPP Template. p. 5. http://cafirealliance.org/cwpp.

[8] Communities that obtained an Overall Risk of "Low" were not included in this list; see text in 7.2 for the list of these communities.

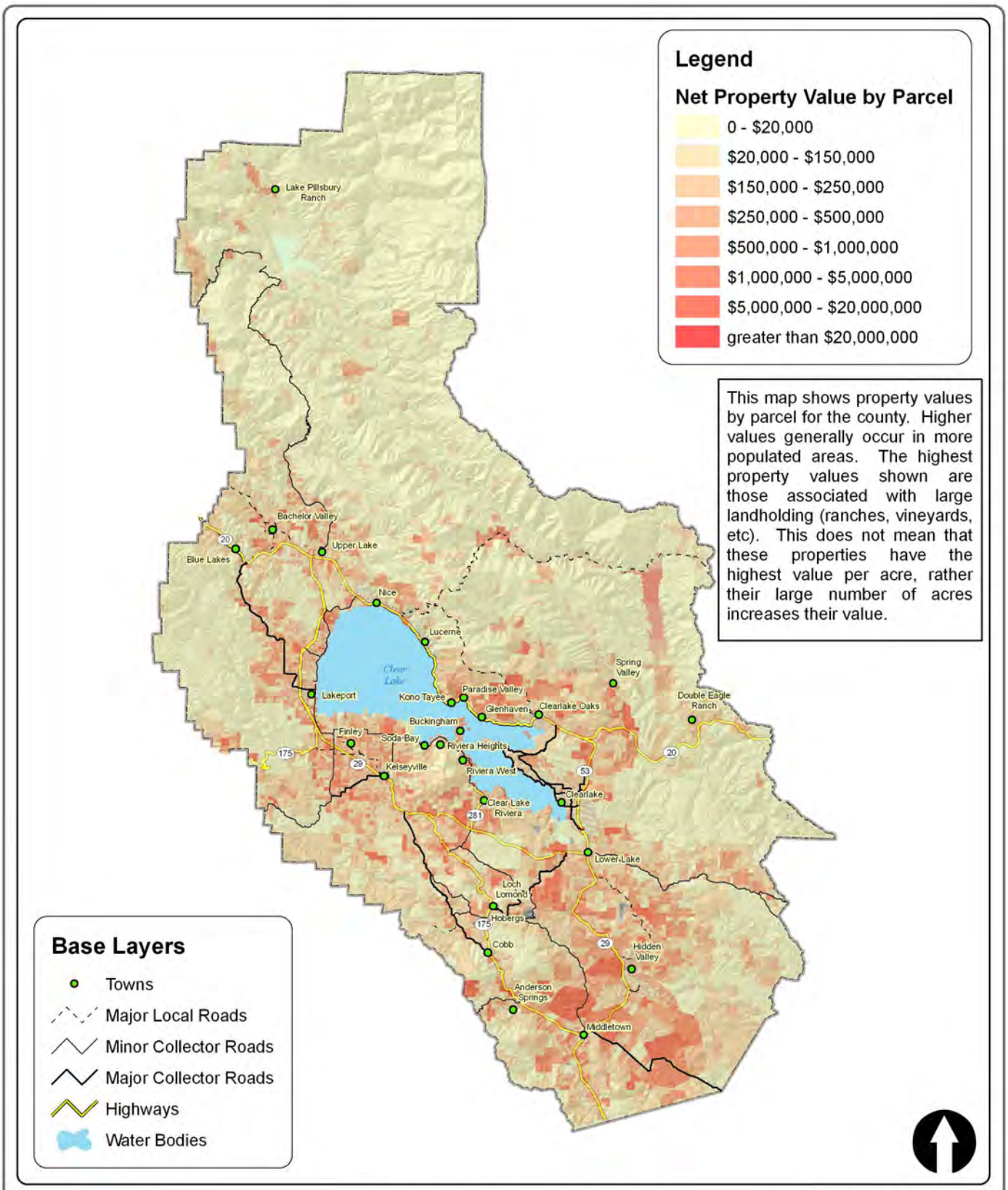
| Community, Structure, or Area at Risk | Assets at Risk | Fuel Hazard | Risk of Wildfire Occurrence | Structural Ignitability | Fire-Fighting Capability | Overall Risk | Observations |
|---|---|---|---|---|---|---|---|
| **Clearlake Oaks** | Med | High | High | Med | Med | **High-Med** | Wildfire threat during extreme fire weather, with high interface fuels and ignition potential. Good fire protection, limited water supply. |
| **Glenhaven** | Med | High | High | Med | Med | **High-Med** | Narrow strip along Hwy 20, potentially blocked to limit evacuation. High wildfire threat during extreme fire weather, high interface fuels. High ignition potential. Limited water. |
| **Hidden Valley and Coyote Valley** | High | Med-High | Med-High | Med | Med-High | **High-Med** | High fuels in the interface. Threat of wildfire from east/northeast. HV Lake HOA great fuel reduction program. Other areas have access and water issues. |
| **Hilderbrand District** | Med | High | High | High | Med | **High-Med** | Residential area along southern end of Highway 29. Older homes. No hydrants, local fire history. |
| **Lucerne** | Med | High | High | High | High | **High-Med** | High wildfire threat from FS during extreme fire weather, with high interface fuels. Some historic sites. Good fire protection and water supply. |
| **Nice** | Med | High | High | High | High | **High-Med** | High threat of wildfire from FS during extreme fire weather event, combined with high fuels in the interface. Good fire protection and water supply. |
| **Riviera Heights*** | High | High | Med | Med | Low | **High-Med** | High-value real estate, with high fuels in a dense development. Not significant wildfire threat, but significant ember threat from local ignitions. Fire station with limited staffing. Good water supply. |
| **Riviera West*** | High | High | Med | Med | Low | **High-Med** | High-value real estate, with high fuels in a dense development. Access issues. Not significant wildfire threat, but significant ember threat from local ignitions. Good water supply, no fire station. |
| **Blue Lakes** | Low | High | High | High | Low | **Med-High** | High fuels and windy roads behind Lakes. Potential evacuation/access issues. No community water system, water source is the lakes. |
| **Clearlake** | High | Med | High | High | High | **Med-High** | Principal urban center. High fuels to east, some subdivisions with high fuels, many older homes. Good local fire protection. |
| **Morgan Valley** | Med | Med-High | High-Med | High | Med | **Med-High** | Rural interface east of Lower Lake, potential wildfire threat from public lands to east. Water and fire protection issues. |

| Community, Structure, or Area at Risk | Assets at Risk | Fuel Hazard | Risk of Wildfire Occurrence | Structural Ignitability | Fire-Fighting Capability | Overall Risk | Observations |
|---|---|---|---|---|---|---|---|
| **Scotts Valley** | Med | Med | High | Med | Med | **Med-High** | Agricultural valley between Lakeport and BLM. Excellent controlled-burn history and interest. Wildfire threat from BLM lands. Water issues. |
| **Buckingham*** | High | Med | Med | Med-Low | Low | **Med** | Very high-value real estate, limited water supply. Limited wildfire threat. Access/evacuation issues. |
| **Jerusalem Valley** | Low | Med | High | High | Low | **Med** | Access/evacuation issues, surrounding fuels. |
| **Kelseyville Interface** | Med | High | Med | Med | Med | **Med** | Fuels and wildfire threat from SW and SE, some remote neighborhoods. Mount Konocti fuel issues. |
| **Kono Tayee** | Med | Med | Med | High | Low-Med | **Med** | Some fuels on steep slopes, wildfire threat during extreme weather events. Adequate water. |
| **Lower Lake** | Med-High | Med | Med-High | Med | High | **Med** | Small community with historical district. Heavier fuels and windy roads at outskirts (see Morgan Valley and Twin Lakes). Local fire protection. |
| **Soda Bay*** | Med | High | Med | Med | Med | **Med** | Some fuels, history of local ignitions. Some wildfire threat from State Park to west. |
| **Twin Lakes** | Med | Med | Med | Med | Med | **Med** | Some fuels. Many homes and roads. |
| **Upper Lake** | Med | Low | High | Med | Med | **Med** | Historic, town center, limited fuels. Higher fuels in interface. National Forest wildfire threat during extreme weather events. Water system issues. |

***The Exception: The Rivieras**

The most obvious distinction in Lake County between "risk of wildfire occurrence" as shown in this table, and the possibility of a large wildland urban interface conflagration is that of the Rivieras communities (Soda Bay, Riviera Heights, Buckingham, and Riviera West). Everyone in the county by and large agrees that the Rivieras would be the worst place for a rural fire to occur. There are large, expensive homes, with a lot of local fuels, and limited access, water supply, and fire-fighting capabilities. However, the chance of a fire coming into the Rivieras from the neighboring wildlands is not high. A fire would need to come down Mount Konocti, or around it from the Highway 29 corridor. The probability of either of these occurring is not high. (However, this could happen in the eastern end of the Rivieras, in Clear Lake Riviera, Point Lakeview, and Jago Bay.) Therefore, the Rivieras area is not ranked as having a high risk of wildfire occurrence, even though a local fire there would quickly simulate extreme wildfire conditions. That said, prioritizing treatment of fuels, implementing defensible space, and reducing structural ignitability are all actions that must happen in the Rivieras, and as soon as is feasible. As stated here and elsewhere in this document, the potential damage from an interface fire in the Rivieras would likely be greater than anywhere else in the county. It is for this reason that the Rivieras area is listed as a top priority area for action within the Action Plan (Chapter 8) even though it did not receive a "high" overall risk ranking in this analysis.

***Map 7-1. Net Property Values***




# Net Property Value

Lake County CWPP, January 2009

Lake County Dept. of Information Technology

Miles

0 4.5 9 18

Source: Lake Co. land records
File: M.dbf
Year: 2009

map name: net_val.mxd created: 04/2009

# 8. Lake County Community Wildfire Protection Plan, Action Plan

This CWPP is based on the collaboration of the Plan Partners and the many Lake County residents who participated in the process, either through attending a public meeting or commenting on drafts of this document *(see Chapter 2 for more information on the collaborative process).* Based on this collaboration, and the analysis done in Chapters 3 through 7, the following action plan was developed.

Each topic is introduced, and a set of action steps is identified, including the lead organizations and/or Plan Partners to implement each item. The action items are then ranked in terms of short (1-2 years), medium (2-5 years), long (5-10 years), or ongoing implementation priority, as well as their ease of implementation.

In an ideal world, all of these action items would be implemented expeditiously. However, this Plan is being released in one of the greatest economic downturns in our recent history. Funds for public projects are scarce. Although it is the intention of Plan authors and signers that all the action items in this document be implemented as so designated, implementation will need to be done subject to the availability of funds and other resources.

➢ *Action items are identified with this arrow throughout this chapter. They are followed by an "**S**" (short, 1-2 years), "**M**" (medium, 2-5 years), "**L**" (long, 5-10 years), or "**O**" (ongoing), for implementation priority. In addition, a "★" indicates those items that will be relatively easy to implement or are already completed.*

## 8.1. Designation of Wildland-Urban Interface Areas

As described throughout this CWPP, the wildland-urban interface (WUI) is a general term describing the area where homes and wildland meet. It also has a federal definition as the "line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel as defined in the Federal Register."[1] It is within the WUI that specific federal management actions take place in order to reduce fuel risks based on guidelines established by the Healthy Forest Restoration Act (HFRA). "The HFRA provides administrative procedures for hazardous-fuel-reduction projects on [USFS] and BLM lands in the WUIs of at-risk communities. The act encourages the development of Community Wildfire Protection Plans under which communities will designate their WUIs, where HFRA projects may take place."[2] Concurrently, federal agencies are charged with developing WUI designations for the properties they manage.

As per HFRA, this Plan proposes WUI designations for Lake County, California. These designations were developed combining CAL FIRE's WUI designation, Mendocino National Forest's Proposed WUI Defense Zones,[3] Community-Identified High Risk and Project Areas, Community-Identified Values and Assets, and issues of topography, landscape characteristics, access, fire threat designation, fire weather, etc. Projects in these designated areas should be prioritized for funding and implementation under the National Fire Plan.

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[1] *Federal Register*. "Implementation Direction for Identifying and Prioritizing Hazardous Fuel Reduction in Wildland-Urban Interface/Intermix." Region 5. January 4, 2001. Vol. 66, No. 3. Pp. 751–754.

[2] Healthy Forests Initiative and Healthy Forests Restoration Act. February 2004. *Interim Field Guild, Title I, Wildland-Urban Interfaces Within or Adjacent to At-Risk Communities.* FS-799. p. 15.

[3] "WUI Defense Zones were created off of the WUI boundaries designated by the California Fire Alliance using 1990 Census Block data. The Mendocino National Forest used these boundaries and adjusted the lines topographically (along ridgelines, drainages, roads, etc) while staying close to the original boundaries set by the Fire Alliance. Fire and fuels management often use topographical features for fire suppression as well as for project boundaries. It is generally the most efficient and safest way to suppress fires as well as keep prescribed burns within project boundaries due to how fire behaves to topography." Caves, Tom. Mendocino National Forest. Personal communication. March 4, 2009.
"The forest's WUI boundaries are meant to be adjustable as needed by collaborating with local Fire Safe Councils and other user groups in meeting their needs and the Forest's needs to create projects and boundaries that best serve and protect communities and the National Forest. When these WUI boundaries were created, Lake County did not have an official Fire Safe Council that served the Upper Lake Ranger District area. The intent was that when there was one, we could adjust the boundaries if and when there was a need determined by the Fire Safe Council and the Upper Lake District fire/fuels management." Darner, Hinda. Mendocino National Forest. Personal communication. March 4, 2009.

Map 8-1 at the end of this chapter outlines the Lake County WUI designation developed for this CWPP. Additional WUI areas were added in the Double Eagle, Morgan Valley, High Valley, and Harbin Hot Springs areas, as well as infilling gaps along Highway 29, north of Scotts Valley, and around Spring Valley.

- *Federal agencies accept CWPP WUI designations, including those previously identified by CAL FIRE*. **S, ★**
- *Federal agencies work with Lake County Fire Safe Council, South Lake Fire Safe Council, and other interested community members to agree on projects proposed within Lake County WUI areas.* **S, ★**

## 8.2. Designation of Communities at Risk

As described in Chapter 1, many eligible communities in Lake County have already been designated as a Community at Risk (CAR), either by federal or state designation. Existing Lake County CARs are: Anderson Springs, Blue Lakes, Cobb, Clear Lake, Clear Lake Oaks, Glenhaven, Hidden Valley Lake, Kelseyville, Lakeport, Little Valley, Loch Lomond, Lower Lake, Lucerne, Middletown, Nice, The Geysers, Upper Lake, and Witter Springs. Additional communities were identified in this CWPP to add to this list. The California Fire Alliance has a process to add new communities to this list, which is found on their website: www.cafirealliance.org/communities_at_risk/communities_at_risk_addtolist.

- *Lake County Community Development Department add the following Lake County communities to the Communities at Risk list.* **S, ★**

- Buckingham
- Clear Lake Riviera
- Coyote Valley
- Double Eagle
- Harbin Hot Springs
- Kono Tayee
- Lake Pillsbury
- Morgan Valley
- Riviera Heights
- Riviera West
- Soda Bay
- Spring Valley
- Twin Lakes

## 8.3. Advancing Defensible Space

Defensible space works, hence it is the law in California. Defensible space is also known as the *home ignition zone.*[4] Others prefer the term *survivable space,* as it's all about surviving, or living 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.
>
> Research shows that a home's ignition potential during extreme wildfires is determined by the characteristics of its exterior materials and design and their response to burning objects within one hundred feet and firebrands (burning embers)."[5]

The Lake County Natural Hazard Mitigation Plan (HMP) identified the following related actions in 2005:

> "Action 1.2.2: The County should develop comprehensive defensive space ordinances to minimize risk throughout the identified urban interface zones. The ordinance is expected to include homeowner's insights, regulatory requirements, and best practices. The ordinance will incorporate the Hazardous Fire Areas Fire Protection Standards."
>
> "Action 1.2.3: The County should investigate the development and adoption of minimum standards to location, design and construction of buildings and structures or portions thereof for

[4] *See Appendix C for more information on the home ignition zone.*

[5] Cohen, Jack. "The Wildland-Urban Interface Problem–A Consequence of the Fire Exclusion Paradigm." *Forest History Today.* Fall 2008. p. 23. www.foresthistory.org/Publications/FHT/FHTFall2008/Cohen.pdf.

the protection of life and property, to resist damage from wildland interface fires, and to mitigate building and structure fires from spreading to wildland fuels"[6]

The following statement from the California Attorney General's office provides the legal framework for local governments to take action to ensure local fire safety:

> "The Legislature of the State of California hereby finds and declares that the unrestricted use of grass-, grain-, brush-, or forest-covered land within the State is a potential menace to life and property from fire and resulting erosion…. Counties, cities and counties, cities, and districts may adopt ordinances, rules, or regulations to provide fire prevention hazard conditions."[7]

Through this process, several areas in Lake County have been identified as being either especially hazardous, with high wildfire risk, or with both high hazard and risk. It makes sense to focus enforcement of existing regulations in these target areas as well as to place stricter regulations on any new development there.

Furthermore, the Clear Lake Riviera Community Association, in association with the Kelseyville Fire Protection District, has taken positive steps in this direction by identifying priority areas for treatment and reducing fuels there through their Fire Safe Committee *(see Appendix F).* This local initiative can provide a positive example for other Homeowner's Associations around the county.

**Target Areas in Lake County for Defensible Space, Fire Safe Construction, and Alternate Access Programs:**

- Rivieras: Soda Bay, Riviera West, Riviera Heights, Buckingham, Clear Lake Riviera, Point Lakeview, Jago Bay
- Hidden Valley and Coyote Valley, especially outlying areas beyond Hidden Valley Lakes
- Cobb Mountain Area, including Cobb, Loch Lomond, and Anderson Springs
- Harbin Hot Springs and neighboring resorts
- Double Eagle Ranch
- Lake Pillsbury
- Northshore communities interface, especially around Nice and Lucerne
- Lakeport interface

➢ *County, Cities, Federal Agencies, Fire Safe Councils, and other related agencies, focus fire safety and prevention efforts in the Target Areas listed above, including defensible space, fire-resistant building, and providing for alternate access routes.* **S**

➢ *County and City Community Development Departments work with the Lake County Fire Safe Council and other Plan Partners to develop a comprehensive defensible-space ordinance.* **S**

➢ *Homeowner's Associations in Target Areas work with Lake County Fire Safe Council and Fire Protection Districts to develop fire safe guidelines for all residents.* **S**

➢ *County apply General Plan (GP) Policy HS-7.6, Development Guidelines to these target areas.* **M**

### 8.3.1. Residential Fuel-Reduction Ordinance

Efforts are underway within the county to update the current countywide weed-abatement ordinance and make it enforceable. This ordinance is being tied into current defensible space regulations. Successful programs in other communities allow local jurisdictions to undertake fuel-reduction efforts and charge landowners for actual costs. Development of the fuel-reduction ordinance includes the following objectives and action steps:

➢ *County work with Fire Protection Districts and other interested parties to develop countywide residential fuel-reduction ordinance based on current state law, with county enforcement, that ensures appropriate defensible-space clearance around all structures.* ***S***

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[6] Lake County Natural Hazard Mitigation Plan (HMP). 2005. p. 70.

[7] Office of State Fire Marshal. *Structural Fire Prevention Field Guide, Appendix F.* p. F-2 and F-3. http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fppguidepdf92.pdf.

- *County Code Enforcement work with Fire Protection Districts and other interested partners to ensure abatement ordinance applies to clearance on abandoned lots and absentee-owned parcels that threaten neighboring parcels.* **S**
- *County develop provisions in ordinance language to place liens against properties to cover incurred costs.* **S**
- *County provide a funded, countywide enforcement officer to enforce ordinance, in cooperation with Fire Protection Districts*. **M**
- *Lake County Fire Safe Council develop a list of known, local fee-for-service contractors to implement residential fuel-reduction ordinance.* **S**
- *Cities work with same partners to implement similar fuel-reduction ordinance programs within their jurisdictions.* **M**

### 8.3.2. Defensible Space and New Development

Development pressures are increasing in most of the counties surrounding Lake County. Surprisingly, the Lake County population has remained fairly stable. However, the 2008 Lake County General Plan projects a two-percent growth over the short term that would double the population by 2030. As is typical elsewhere in the region, those areas that are experiencing the most development are generally within the WUI.

The General Plan identifies Community Growth Boundaries for the following communities: Clearlake Oaks, Clear Lake Riviera, Coyote Valley, Kelseyville, Lower Lake, Lucerne, Middletown, Nice, North Lakeport, Soda Bay, and Upper Lake. As shown in Chapters 3 and 7 of this document, several of these communities have high wildfire risk and hazard.

The 2005 Lake County Hazard Mitigation Plan (HMP) identifies:

> "Action 1.2.1: The County should continue to review new development in high fire hazard areas to assure that adequate access roads, onsite fire protection systems, signage, flame-retardant building materials, defensible space, and firebreaks are provided as required by state regulations and county ordinances."[8]

Finally, the General Plan includes Policy HS-1.1 Development Constraints, "The County shall permit development only in areas where the potential danger to the health and safety of people can be mitigated to an acceptable level."[9]

- *In addition to the policies set forth in GP Policy HS-7.6, Development Guidelines, and in accordance with GP Policy HS-7.5, Fuel Breaks, the County will require new developments in high risk and hazard areas as defined in this CWPP[10] to create fire-safe landscaping within the 100-foot[11] defensible space zone of all structures*. **M**
- *County Community Development will work with the Lake County Fire Safe Council, Fire Protection Districts, and other Plan Partners to identify the requirements for Wildland Fire Management Plans for new developments as required by GP Policy HS-7.4. In addition to those outlined in the General Plan, these plans will be required for all new developments within the Target Areas as identified in this CWPP. Plans will include the following minimum components. Description of:*
    - *Ingress, egress, and primary and alternate evacuation routes, and safety zones/evacuation sites.*
    - *Adequate water storage and pressure to meet fire flows during drought conditions.*
    - *Fire-safe building to minimize structural ignitability.*

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[8] HMP. 2005. p. 70.

[9] Lake County General Plan. 2008. p. 7–4.

[10] High risk and hazard areas are identified in Chapters 3 and 7 of this plan.

[11] 100 feet—or to the property line if less than 100 feet. See Senate Bill 1595 for current state regulations regarding this distance: www.leginfo.ca.gov/pub/07-08/bill/sen/sb_1551-1600/sb_1595_bill_20080927_chaptered.pdf.

- *Fire-free zone within first 5 feet surrounding structures.*
- *Fire-resistant landscaping, including easy-to-maintain defensible space in the first 30 feet.*
- *Fire protection coordination, including access through gates, to water, fuels shut-off, landing zones, safe zones, etc.*
- *Strategic landscape fuel treatments to reduce wildfire ingress or egress, based on Conservation Principles.* **M**

- *General Plan Policy LU-3.2 Rural Development, Policy LU-3.3 Clustering of Rural Development, and Policy HS-7.2 Encourage Cluster Development shall focus development in areas of highest potential fire safety within parcels or clusters, while maximizing efficient use of fire protection resource (e.g. access and water). Road standards should include adequate evacuation capability, unhindered access for emergency vehicles, and wherever possible shaded fuelbreaks along roadways, perimeters, and around development clusters, planned with respect to conservation-based principles and local aesthetics.* **M**
- *County ensure Policy OSC-2.1 Design Guidelines for Structures in Rural Areas and Policy OSC-2.7 Landscaping Techniques are done in conjunction with creating adequate defensible space around all new structures in high hazard or risk areas as identified in this plan, and favor fire-resistant landscaping.* **M**
- *Cities of Lakeport and Clearlake model similar defensible space and new development programs for their jurisdictions to those developed countywide.* **M**

The HMP further identifies "Action 1.1.1**:** The County should encourage development and dissemination of maps relating to fire hazard to help educate and assist builders and homeowners to comply with wildfire interface mitigation activates."[12]

- *County Community Development Department will provide applicants for new building permits with copies of the current Fire Hazard Severity Zone maps (see Chapter 3) as well as copies of relevant policies from this plan and others regarding construction in high hazard areas.* **S**

### 8.3.3. Community Defensible Space and Fuel-Reduction Programs

The most effective fire prevention action in wildland-urban interface communities is to reduce the fuels immediately within and adjacent to homes and other structures—defensible space and the home ignition zone.[13] Hence, in the event of a wildfire, there will be limited fuels to carry the fire, and damage will be minimized.

> "Preventing WUI fire disasters requires that the problem be framed in terms of home ignition potential. Because this principally involves the home ignition zone, and the home ignition zone primarily falls within private ownership, the responsibility for preventing home ignitions largely falls within the authority of the property owner. Preventing wildfire disasters thus means fire agencies helping property owners mitigate the vulnerability of their structures."[14]

Residents have the primary responsibility in ensuring they have defensible space around their homes and properties. As stated in Appendix C, it's not only the law—it makes sense. In some cases however, residents are unable to do this themselves, whether for physical, financial, or other reasons. Community-based programs can facilitate creation of defensible space for these vulnerable populations.

The Humboldt County Fire Safe Council was recently awarded grant funds to conduct a pilot program called the "Firesafe Homes and Forests Cost Share Program." The program is funded by Title III[15] and the U.S. Forest Service, and is being managed by Humboldt's Community Development Services Department, in conjunction with local Fire Safe Councils and interested property owners. It provides a cost-share match to landowners working with a local FSC to implement fuel-hazard reduction activities.

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[12] HMP. 2005. p. 69.

[13] *See Appendix C for more information.*

[14] Cohen. 2008. p. 25.

[15] Secure Rural Schools and Community Self-Determination Act. 2000. www.fs.fed.us/srs/Title-III.shtml.

Programs targeted at assisting residents to join together to make their neighborhoods fire safe can also be very successful. This is especially important where parcels with absentee owners abut residential parcels. In some communities, neighboring residents have contacted these owners to get permission to clear these neighboring properties in order to increase defensible space around their own homes.

- *Lake County residents implement defensible space around all structures, and on all residential parcels within the county.* **S, O**
- *Lake County residents work with neighbors, and on neighboring properties (with the owner's permission) to create neighborhood-wide defensible space.* **S, O**
- *Lake County Fire Safe Council work with Plan Partners to provide information and resources to help residents create defensible space around their homes and in their neighborhoods.* **S, ★**
- *Lake County Fire Safe Council work with Plan Partners to explore incentive programs to help residents create defensible space around their homes and in their neighborhoods.* **M**
- *Lake County Fire Safe Council work with Plan Partners, Social Services, Senior Centers, schools, and other community and social service organizations to develop programs to create defensible space for elderly and disabled residents who are not able to do this for themselves.* **S, O**
- *Lake County Community Development Department work with Humboldt County to explore possibility of a similar "Firesafe Homes and Forests Cost Share Program" in Lake County.* **M**

### 8.3.4. Community Chipping Program

Lake County is fortunate to have an established community chipping program in place. The West Lake Resource Conservation District (RCD), which owns the chipper, manages this program, in cooperation with LQAMD. *(See www.recycling.co.lake.ca.us/news/ChippingProgram.pdf for more information, and Appendix D for a history of the chipping program)* Funding had been previously provided in part by the County, but with changes in Title II[16] and III spending restrictions, ongoing funding is in question. However, other funding is being sought**.** Both local Fire Safe Councils actively interface with residents to promote these programs.

- *Lake County Fire Safe Council work with West Lake RCD to develop a program to provide community chipping days throughout the county, in partnership with the South Lake FSC for its area of influence, and other interested partners throughout the county, including Homeowners Associations.* **S, O**
- *All interested partners support the countywide community chipper program of the Lake County Fire Safe Council, by contributing resources and helping to secure ongoing funding as possible.* **S, O**

*For more information on chipping, Green Waste, and biomass, please see section 8.10 below.*

### 8.3.5. Firewise Communities Program

Changes in federal funding programs in 2008 have favored programs certified under the Firewise Communities program (www.firewise.org). Eligibility for Title III projects, as well as other federally funded programs, may now require Firewise status.

- *County work with Fire Safe Councils, MNF, and BLM to assist in the development and implementation of Firewise Communities Programs for all applicable and/or interested areas within Lake County.* **S, M**

[16] US Forest Service. *Title II–Special Projects on Federal Land.* www.fs.fed.us/srs/Title-II.shtml.

## 8.4. Reducing Fuels

Reducing hazardous fuel is a challenge for most communities in the western United States. The amount of accumulated fuel is far greater than most communities can afford to tackle, hence the need to prioritize projects. The research is still unclear regarding the most effective and efficient way to reduce fuel without compromising ecosystem health. To address this uncertainty, this CWPP promotes using the Precautionary Principle and following the Conservation Principles as described in Chapter 1.

In terms of prioritizing fuel treatments across large landscapes, research by Dr. Mark Finney at the Fire Science Lab[17] challenges previous theories in landscape-level fuel treatments and models strategic locations for fuel-reduction treatments. Regardless, it is generally agreed that such treatments should be focused first around communities in the wildland-urban interface. Many residential areas in Lake County qualify for such treatments, and thus were identified at the community meetings and are listed in this document.

As stated in section 8.1 above, fire safety must begin in the areas immediately surrounding homes. As one moves farther out from structures, fuel-reduction treatments begin within the Wildland Fuel Reduction Zone, or that area closest to homes and structures and beyond the defensible space zone. *(See Appendix C for a more detailed explanation of these zones, and Appendix D for more detailed explanations of appropriate treatments in the Wildland Fuel Reduction Zone).* Beyond homes and the defensible space zone, strategic locations around neighborhoods and communities need to be identified and prioritized for creating fuelbreaks, shaded wherever there is a canopy. "Fuelbreaks are never designed to stop fires but to allow suppression forces a higher probability of successfully attacking a wildfire."[18] The combination of home construction modifications with effective defensible space and shaded fuelbreaks around communities is one of the best-known strategies to protect communities from wildfire.

There is no "one size fits all" prescription for shaded fuelbreaks. For example, the width can vary widely, generally ranging from 50 to 300 feet. "A shaded fuelbreak is created by altering surface fuel, increasing the height to the base of the live crown, and opening the canopy by removing trees."[19] Sample prescriptions are described in Appendix D. In addition to initial implementation, maintenance of fuelbreaks is often costly, and needs to be considered with the initial project. Maintaining the canopy cover (hence, "shaded" fuelbreak) helps to reduce these costs by slowing regeneration.

> "Manual treatment is very expensive, and mechanical treatment is only feasible on gentle terrain. Prescribed fire can be effective but there is potential for fire escape along the edges. Late winter burns, where the previous year's production is cured, the perennials have not yet greened up, and the adjacent forest is not very flammable, may be a possible cost-effective treatment to avoid risk of escape from maintenance burns and achieve effective maintenance at low cost."[20]

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[17] Firelab.org. Fire, Fuel, and Smoke Science Program. www.firelab.org/content/view/812/352/. And, Finney, Mark A. *Creating Fire-resilient Landscapes: Improving our Understanding and Application.* March 2004. http://outreach.cof.orst.edu/resilientfire/finney.htm.{ TA \l "http://www.firelab.org/fbp/fbpstaff/mfinney.htm, http://outreach.cof.orst.edu/resilientfire/finney.htm" \s "http://www.firelab.org/fbp/fbpstaff/mfinney.htm, http://outreach.cof.orst.edu/resilientfire/finney.htm" \c 1 }

[18] Agee, J.K.; Bahro, B.;.Finney, M.; Omi, P.; Sapsis, D.; Skinner, C.; Wagtendonk, J.; Weatherspoon, C. 2000. "The Use of Shaded Fuelbreaks in Landscape Fire Management." *Forest Ecology and Management* 127: Pp. 55–66.{ TA \l "Agee et al, \"The use of shaded fuelbreaks in landscape fire management,\" Forest Ecology and Management 127 (2000) 55-66, p. 56." \s "Agee et al, \"The use of shaded fuelbreaks in landscape fire management,\" Forest Ecology and Management 127 (2000) 55-66, p. 56." \c 1 }{ TA \l "Agee et al, \"The use of shaded fuelbreaks in landscape fire management,\" Forest Ecology and Management 127 (2000) 55-66, p. 56." \s "Agee et al, \"The use of shaded fuelbreaks in landscape fire management,\" Forest Ecology and Management 127 (2000) 55-66, p. 56." \c 1 }

[19] Agee et al. 2000. p. 56.

[20] Agee et al. 2000. p. 60.

In Lake County, there is widespread support for a well-managed, controlled burning program, especially on public lands.[21] This is a phenomenon not necessarily found in neighboring counties. A cooperative program exists between CAL FIRE, LCAQMD,[22] the Bureau of Land Management, and the Mendocino National Forest to regularly maintain shaded fuelbreaks and other fuel-reduction areas through burning and other methods on public lands. This is an important program to continue and be enhanced. Given Lake County's national reputation for its clean air, this must be done in close cooperation with LCAQMD.

To most effectively maintain the various fuelbreaks proposed on non-federal lands throughout the county, an "Adopt a Fuelbreak" program can be developed by the Lake County FSC in cooperation with community/neighborhood groups, homeowner's associations, and others. Each group would be responsible for ongoing maintenance of their adopted fuelbreak. This would need to be done in cooperation with experienced fire and resource professionals to ensure participant safety and fuelbreak effectiveness.

- *Lake County FSC work with appropriate land management agencies to obtain funding to maintain existing cooperative fuel-reduction projects throughout the county.* **O**
- *Public land-management agencies, tribal experts, and CAL FIRE in cooperation with LCAQMD and Fire Safe Councils educate residents on the positive and negative aspects of controlled burning and prescribed fire and other fuel-reduction options.* **S**
- *Lake County Fire Safe Council work with land-management agencies to develop an "Adopt a Fuelbreak" program for maintenance of fuelbreaks. Work with CAL FIRE, tribal experts, and other fire and resource professionals to employ appropriate maintenance practices.* **M**
- *County support fuel-reduction efforts, consistent with GP Policy HS-7.3 Fuel Modification Programs, by streamlining permitting processes wherever applicable and/or providing in-kind support, such as Public Works resources.* **M**
- *County work with state and federal agencies and Lake County Fire Safe Council to promote creation of shaded fuelbreaks along perimeters and ridges of open space buffers, planned with respect to conservation-based principles and local aesthetics, and consistent with GP Policy OSC-1.9 Open Space Buffers and Policy OSC-2.15 Ridgeline / Hilltop Protections.* **L**
- *County work with state and federal agencies and Lake County Fire Safe Council to explore the creation of a system of ridgeline shaded fuelbreaks or firebreaks planned with respect to conservation-based principles and local aesthetics, and in accordance with GP Policy OSC-6.15 Ridgeline Trails.* **L**

### 8.4.1. Priority Fuel-Reduction Projects

Figure 8-1 at the end of this chapter includes the shaded fuelbreaks and other fuel-reduction projects that were prioritized for implementation in Lake County. These projects were generally identified at a community meeting, or otherwise resulted from this planning process. Projects were prioritized based on CAL FIRE's identified fuel hazards and fire threat, terrain, values at risk, level of community support, and population density, with an emphasis on interface areas.

- *Lake County Fire Safe Council work with applicable agency and Plan Partners, (including MNF, BLM, CAL FIRE, RCDs, etc.), to explore funding and to implement the strategic fuelbreaks and fuel-reduction efforts identified in this CWPP throughout Lake County.* **S, M, L**

*Please see Figure 8-1. Lake County Fuel-Reduction Priorities at the end of this chapter.*

[21] Restore the Mendo. *The Mendocino National Forest – Controlled burns protect people and property, restore forests, and save taxpayer dollars.* www.restorethemendo.org.

[22] Lake County Air Quality Management District

## 8.5. Reducing Structural Ignitability

Reducing the chance that structures (our homes, businesses, etc.) will burn is an important component of any fire-safety action plan. New federal funding sources are being tied to implementation of policies such as these at the local level. The following sections identify specific actions that will be taken to reduce structural ignitability.

### 8.5.1. WUI Building Standards

The State of California through the State Fire Marshal's Office has developed state-of-the-art building standards[23] for development within the WUI. Local government officials shall become familiar with these WUI standards, if they are not so already, and identify specific steps to implement these throughout their jurisdictions.

- *County implement GP Policies HS-1.3 Building and Fire Codes, and HS-7.7 Fire Resistant Building Materials by continuing to adopt the most current the California Wildland-Urban Interface Building Code, especially Chapters 7 and 7A.* **S, O, ★**
- *County and Cities stay current on applicable wildland-urban interface standards and new legislation through the State of California Fire Marshal's Office.* **O, ★**
- *County and Cities Community Development, Fire Protection Districts, and Fire Safe Councils educate decision-makers and residents on the importance of and implementation of WUI Building Codes, including appropriate building materials.*[24] **S**
- *Fire Agencies work with Fire Safe Councils to perform risk assessments within their jurisdictions.* **M**

### 8.5.2. Roofing

Efforts should continue to be made to eliminate all untreated wood-shake roofs. Shake roofs are a leading cause of home loss in wildfires. Research shows that homes with a non-combustible roof and clearance of at least 30 to 60 feet have an 85-95% chance of survival in a wildfire.[25]

- *Fire Agencies, County Community Development, federal partners, and Fire Safe Council continue to educate residents on the importance of replacing untreated wood-shake roofs.* **S**
- *County and Cities develop incentive-based programs for residents to replace untreated wood-shake roofs.* **M**

### 8.5.3. Windows

Double-pane windows are far more effective in their ability to survive a wildfire, as well as being smart for energy conservation within the home. Current WUI building standards require tempered glass for new construction.

- *Fire Safe Councils, utilities, and interested partners educate residents on need to have double-paned windows throughout their homes with recommendations to upgrade to tempered glass for fire safety where possible.* **O**
- *Fire Safe Councils, utilities, and interested partners explore incentive programs to upgrade windows to double pane or higher standards.* **M**

### 8.5.4. Decks

With adequate defensible space, most solid wood decking is fire-resistant enough to withstand short-term heat loads. However, this requires both horizontal and vertical fuel clearance around and below decks.

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[23] See *California's Wildland-Urban Interface Code Information* at www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php for more information.

[24] Further information on this available through the California State Fire Marshal's Building Materials Listing. www.osfm.fire.ca.gov/strucfireengineer/strucfireengineer_bml.php.

[25] Foote, Ethan. "Wildland-Urban Interface Ignition-Resistant Building Construction Recommendations." Community Wildfire Protection Plan Workshops. California Fire Alliance and the California Fire Safe Council. August 2004.

- *Fire Safe Councils and other Plan Partners educate residents on importance of fire-safe decking.* **O**

### 8.5.5. Outbuildings

Outbuildings (e.g. storage, wood, and tool sheds) with less than thirty feet of separation from main structures place homes at a high risk of loss. If they catch fire, they can often catch the home on fire as well.

- *Fire Safe Councils and others educate residents on need for separation of heat loads from residences.* **O**
- *County Code Enforcement, work with Fire Protection Districts and CAL FIRE to enforce clearing 30-100 feet (or to the property line) around structures, as per State law and the proposed countywide residential fuel-reduction ordinance.* **M**

### 8.5.6. Woodpiles and Other Fuel Sources

Many fuel sources are found around homes, especially in rural communities. These include woodpiles, fencing, decks, propane tanks, and other fuel-storage areas. Storing items closer than thirty feet from homes and structures increases risk of fire damage.

- *Fire Safe Councils and other Plan Partners educate residents on need to have a minimum of thirty feet separation of firewood piles and woodsheds from residences.* **O**
- *Fire Safe Councils and other Plan Partners educate residents on need to have vegetative and flammable material clearance around propane tanks and other fuel storage areas near residences, and keep these at least thirty feet from homes and outbuildings.* **O**
- *Fire Safe Councils and other Plan Partners educate residents on the risks of having wood fences attached to homes.* **O**

## 8.6. Enhancing Fire Protection

### 8.6.1. Resources for Fire Protection

Lake County is fortunate in that it has six funded, organized fire protection districts (FPD). However, there are areas within the county that are lacking in sufficient fire protection resources. Virtually all districts have a stated need for additional funding and resources to meet their mission. The Rivieras area (within the Kelseyville and Lake County FPDs) is one such area. This is likely the highest risk area in the county for a fire to quickly become a conflagration. Yet, the area has limited local fire protection staffing and resources.

South Lake FPD is working with CAL FIRE under a Schedule A Contract. Outside of fire season, additional resources are brought in through an "Amador Plan," which provides extended low-cost staffing for several of its stations . Amador Plans can apply to areas with existing CAL FIRE services. Beyond the South Lake FPD, CAL FIRE has stations in Clearlake Oaks and on Highway 175 near Kelseyville. CAL FIRE also manages the Mount Konocti Lookout. However, staffing there is not currently funded; it is only occasionally staffed, during anticipated lightning or other extreme fire conditions.

Some of the outlying fire stations—such as Lake Pillsbury, Spring Valley, Point Lakeview, Blue Lakes, Upper Lake, Glenhaven, and Loch Lomond—depend entirely or largely on volunteers. Like many other communities, volunteer fire fighters are becoming less available. This leaves some of the most remote – and most at-risk to wildfire – communities with overextended fire protection resources.[26]

- *County, Kelseyville FPD, and CAL FIRE explore the possibility of an Amador Plan to provide additional coverage in the Rivieras area.* **M**
- *County, Northshore FPD, and CAL FIRE explore the possibility of an Amador Plan to provide additional coverage in the Glenhaven area.* **M**

[26] A 2006 study in rural Pennsylvania provides good information regarding how to successfully recruit volunteers: www.ruralpa.org/Volunteer_firefighters06.pdf.

- *County work with Kelseyville FPD, Lake County FPD, and local Homeowner's Associations to provide additional fire protection staffing and resources to the Riviera Heights, Point Lakeview, and Clear Lake Riviera fire stations.* **M**
- *Lake Pillsbury FPD, County, Forest Service, Pacific Gas and Electric (PGE), and Fire Chiefs explore options for additional funding and other resources for Lake Pillsbury FPD, including volunteer training opportunities on weekends.* **M**
- *Mendocino National Forest and PGE work with Lake Pillsbury FPD to provide additional equipment and fire protection services in the Lake Pillsbury areas.* **M**
- *Fire Protection Districts work with Lake County Fire Safe Council, and city, county, and federal agencies to develop a countywide volunteer firefighter recruitment program, especially targeting those communities with primarily volunteer staffing.* **M**
- *CAL FIRE evaluate options for repair and staffing of Mt. Konocti Lookout.* **M**

### 8.6.2. Water

Water is critical for successful fire suppression. California's minimum fire-fighting water requirement for developments that are not on a hydrant system is 2,500 gallons of accessible water. Rural residents ideally would have up to 10,000 gallons of available water for fire protection. *(See Appendix C for more information on water storage options.)*

Several areas within the county are lacking in sufficient water for fire protection. Those communities with water system issues for adequate fire protection include: Buckingham, Clearlake Oaks, Cobb Mountain area, Double Eagle, Glenhaven, Hidden Valley Rancho, Jerusalem Grade, Lake Pillsbury, Lower Lake, Morgan Valley, Nice, Noble Ranch, Paradise Valley, Point Lakeview, Rivieras West, Scotts Valley, Spring Valley, and Upper Lake.

- *Lake County Fire Safe Council, RCDs, watershed councils, and other interested partners educate rural residents on the needs and benefits of water storage.* **S**
- *Plan Partners encourage RAC[27]-funded program to place water storage tanks for fire protection on lands adjacent to federal lands, especially in Cobb Mountain, Scotts Valley, Double Eagle, and Lake Pillsbury areas.[28]* **M**
- *Lake County Fire Safe Council and Plan Partners explore funding for a water storage program (water tanks or water tenders) in rural lands, especially on private lands not adjacent to federal lands, in areas such as Cobb Mountain, Hidden Valley Rancho, Jerusalem Grade, Morgan Valley, and Noble Ranch.* **M**
- *Fire Safe Councils, CAL FIRE, local governments, watershed councils, and other interested partners explore incentives for increasing water storage on private properties.* **L**
- *County and city governments, Fire Safe Councils, CAL FIRE, LCAQMD, social service agencies, and other interested partners explore options and incentives for funding low-income, rural water storage.* **M**
- *County, South Lake FPD, CAL FIRE, Calpine, and South Lake Fire Safe Council work with Cobb Area County Water District to develop additional water sources and capacity for fire protection.* **M**
- *County and Kelseyville FPD work with Buckingham Homeowner's Association to develop adequate water for fire protection within the development.* **M**
- *County and Kelseyville FPD work with Homeowner's Associations in the Rivieras to improve their hydrant systems.* **M**

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[27] Mendocino National Forest Resource Advisory Committee

[28] Contact the Del Norte Fire Safe Council for an example of a successful program: 707-951-1116; email: dnfsc@charterinternet.com.

- *Clearlake Oaks County Water District improve the hydrants on Widgeon Way and the Avenues.* **L**
- *Glenhaven Community Water develop a hydrants system for Glenhaven.* **L**
- *County work with Lakeport FPD, CAL FIRE, BLM, and other partners to explore water sources for fire protection in Scotts Valley, including the purchase of additional water tenders.* **M**
- *County work with Northshore FPD, CAL FIRE, USFS, and other partners to explore water sources for fire protection in Upper Lake, including the purchase of additional water tenders.* **M**
- *Upper Lake Water District support the project to increase water line capacity and storage in the Upper Lake water system, including closing the loop from Old Lucerne to Main Street.* **M**
- *County, South Lake FPD, and CAL FIRE explore options to expand the hydrant system to the east side of Middletown and out Butts Canyon Road.* **L**
- *Callayomi County Water District work with South Lake FPD to explore hydrant system for Hilderbrand District, along Highway 29 south to the Napa County border, if and when service becomes available.* **M**
- *County work with Fire Chiefs to develop a policy whereby the County Assessor will not increase property values and taxes when water storage is added to private properties for the purpose of fire protection.* **M**
- *County Community Development ensure water for fire suppression needs is included in the development of the Integrated Water Management Plan, especially in terms of future development.* **M**

### 8.6.3. Roads

Roads provide emergency response access to county residents. Where bridges are narrow or unstable, and land slides result in limited passage, fire trucks and other emergency response vehicles are slowed in their response. Several areas were identified in the community meetings as needing bridge or road repair work. Priority areas for improvements include: Widgeon Way, Sulphur Bank Slide, Burns Valley Creak, San Juaquin Slide, Perini Creek Culvert Bridge, Ettawa Springs Bridges, Old Long Valley Road, and Garner Creek Road.

- *County and Cities Public Works Departments work with Fire Chiefs, Law Enforcement, Caltrans, Lake County/City Area Planning Council (APC), and CHP to identify road ingress and egress issues that increase emergency response times.* **S**
- *County and Cities Public Works Departments work with Caltrans, APC, and interested partners to secure funding and other resources to repair priority ingress and egress sites.* **O**

### 8.6.4. Signage of Roads and Structures (Addressing)

Throughout the county, firefighters and other emergency personnel are faced with the challenge of finding homes quickly and safely during an emergency. At a minimum, existing city and county standards that require streets and homes to be visibly addressed must be enforced. These standards include signs to be four inches high, with a contrasting backing, and in accordance with the CA Building Code.

- *Law Enforcement, CAL FIRE, federal agencies, County, and Cities collaborate to enforce existing signage requirements for streets and residences.* **O**
- *Law Enforcement, CAL FIRE, Fire Chiefs, federal, county, and city agencies, and Fire Safe Councils explore incentives for private road and address signage conformance, including public education.* **M**
- *Fire Agencies implement model signage program, similar to that developed by South Lake FPD, to expand it to other areas of the county.* **S**
- *County ensure all signage created in accordance with GP Policy OSC-2.3 Signage Program meets fire protection standards.* **O**

## 8.7. Evacuation Planning and Emergency Preparedness

### 8.7.1. Developing Evacuation Routes and Sites

Effective evacuation planning facilitates safe and orderly evacuation during emergencies. The South Lake County Fire Safe Council has developed an exemplary informational brochure on evacuation planning for the south county. No such resources currently exist for other parts of the county. The 2005 HMP identifies "Action 1.1.4: The County should prepare Evacuation Route Contingency Plans for each of the identified Urban Interface Communities in coordination with [CALFIRE] and local Fire Districts."[29]

Alternative evacuation routes and sites were identified at the 2008 community CWPP meetings. This information was reviewed, and Map 8-2 at the end of this chapter was developed as the basis for a countywide evacuation plan. *(See Appendix B for more information on community meeting data and maps.)*

- *County OES, Law Enforcement, CAL FIRE, Lake Transit Authority, Caltrans, CHP, Red Cross, federal agencies, Fire Chiefs, and Fire Safe Councils collaborate to develop a detailed evacuation plan and update it as needed, using the information generated in this plan as a base.* **M**
- *County OES, Law Enforcement, CAL FIRE, federal agencies, Fire Chiefs, Fire Safe Councils, Red Cross, and Senior Centers develop and distribute evacuation-planning materials for all areas of the county based on the South Lake FSC Evacuation Plan model to educate residents on evacuation options in their communities.* **O**
- *County Social Services, OES, Senior Centers, Lake Transit Authority, Lake Family Resource Center, Law Enforcement, Fire Protection Districts, Redwood Coast Regional Center, Red Cross, Lake County Fire Safe Council, and other interested local, state, and federal agencies identify leadership and resources to develop evacuation programs for vulnerable populations.* **M**
- *County OES, Law Enforcement, CAL FIRE, APC, Caltrans, CHP, Red Cross, federal agencies, Fire Chiefs, and Fire Safe Councils explore roles and needs of using the county airport, airstrips, and heliports in evacuation planning.* **M**

#### Gates

Gates can pose a serious obstacle to safe and effective evacuation. Automatic gates that do not open during power outages are especially dangerous.

- *Law Enforcement, CAL FIRE, Fire Chiefs, federal agencies, Fire Safe Councils, and Homeowners Associations initiate informational programs to educate residents about the importance of easily passable gates during emergencies.* **S**
- *County, Law Enforcement, Fire Chiefs, CAL FIRE, Fire Safe Councils, and Homeowners Associations explore incentives and options for fire-safe gates.* **M**
- *Hidden Valley Lakes Homeowners Association work with South Lake FPD to provide access through gates to Hidden Valley Ranchos for evacuation and fire protection.* **S**

#### Alternate Evacuation Routes

Through the series of community meetings and analysis done for this plan, the following areas were identified as in need of additional or alternative evacuation routes.

- *County OES, Fire Chiefs, Law Enforcement, Lake Transit Authority, Caltrans, CHP, CAL FIRE, federal agencies, and Fire Safe Councils collaborate to explore the following evacuation routes:* **M**
  - Alternate evacuation routes out of Riviera West and Clear Lake Riviera subdivisions to the south.
  - Alternate evacuation route out of north side of Clear Lake Riviera subdivision to Soda Bay Road.

[29] HMP. 2005. p. 69.

- Alternate evacuation route out of Riviera Heights subdivision off of Westridge Drive or Circle to Soda Bay Road.
- Alternate evacuation route out of Anderson Springs to Socrates Mine Road.
- Alternate evacuation route out of Double Eagle to Benmore Canyon or Walker Ridge Roads.
- Alternate evacuation route between Twin Lakes Subdivision and Perini Road.
- Alternate evacuation route out of Donovan Valley.
- Additional evacuation routes out of Gifford Springs and Jerusalem Grade.
- Improve Point Lakeview Road for evacuation.
- Brush back Seigler Canyon Road to improve it as evacuation route.
- Options for evacuating lakeside communities with boats.

➢ *Mendocino National Forest, County, and Northshore FPD explore feasibility of opening Garner Ranch Road to make safe evacuation route out of New Long Valley and Spring Valley.* **L**

➢ *Mendocino National Forest, BLM, County, and Northshore FPD explore feasibility of opening Wolf Creek Road north to Bartlett Springs to make safe evacuation route out of Spring Valley.* **M**

➢ *County Public Works, Fire Chiefs, Caltrans, Law Enforcement and APC explore options to improve roads and signage in Anderson Springs, Widgeon Way, Jerusalem Grade, Double Eagle, Blue Lakes Road, and Laurel Dell Road.* **M**

**Evacuation Sites**

A series of evacuation sites were identified at the community meetings. They are shown on Map 8-2 at the end of this chapter. *(See Appendix B for more information on community meeting data and maps.)*

➢ *County OES, fire chiefs, law enforcement, CAL FIRE, federal agencies, Fire Safe Councils, Red Cross, County Social Services, and Senior Centers develop and/or upgrade appropriate sites identified at community meetings to function as evacuation sites and/or disaster centers during emergency situations.* ***M***

### 8.7.2. Emergency Notification and Communications

The county and related agencies have a well-rehearsed process for communication among first responders. There are still issues regarding how to effectively and rapidly alert residents in the most remote areas. Options need to be explored to improve emergency communication in these areas.

➢ *County OES, Fire Chiefs, Law Enforcement, CAL FIRE, and federal agencies explore options for emergency alert sirens and other emergency communication options for remote areas such as Lake Pillsbury and Double Eagle Ranch, and upgrading sirens in Cobb and Loch Lomond.* **M**

### 8.7.3. Emergency Planning and Coordination

Collaboration is the key to effective planning and implementation, especially in terms of emergency response. Regular and consistent communication among participating entities is fundamental to successful prevention and emergency response programs. This is a vital component to implementing General Plan Policy HS-1.5 Interagency Coordination, HS-8.1 Coordinate Emergency Response Services with Local Agencies, and HS-8.2 Emergency Response Exercises.

➢ *County OES organize regular coordination meetings (quarterly at a minimum) between Law Enforcement, Fire Protection Districts, County Community Development, Cities, APC, Fire Safe Councils, other emergency response providers including relevant state and federal agencies, and other interested partners to coordinate joint prevention and emergency response activities.* **S**

➢ *County OES organize regular, periodic, documented emergency response trainings and exercises, ranging from local to regionally synchronized, and from tabletop to detailed simulations. Follow sessions with after-learning period to facilitate effective communication and learning among partners, including Law*

*Enforcement, Fire Protection Districts, County Community Development, Cities, APC, Fire Safe Councils, and other emergency response providers.* **S**

- *County explore and identify appropriate local structure for seeking state and national emergency response and pre-disaster funding.* **S,** ✯

Updated emergency response information is a basic component of an effective response strategy. Lake County has the capacity to manage and maintain this information within its Information Technology Department. Local and federal agencies need to ensure that their information is continually updated with the county.

The Hazard Mitigation Plan identifies "Action 1.1.2: The County should coordinate with [CAL FIRE] and countywide Fire Districts in developing GIS-based maps of fire access trails, firebreaks, water sources and structures within moderate to very high fire severity zones."[30]

Among other things, this information can be used to create and update Fire Run map books. These map books provide both local and out-of-area firefighters, as well as other emergency responders, detailed maps of all residential areas in the county including water sources, and other fire-fighting resources. Updated information for these books was collected at the community CWPP meetings.

- *County OES, Law Enforcement, Fire Protection Districts, and applicable city, state, and federal agencies maintain and update Lake County emergency response data with the County Information Technology Department (IT) to be shared with all participating agencies in accordance with GP Policy HS-8.8 Coordinate with Cities and Other Local Agencies and Policy HS-8.11 Critical Facilities.* **O**

- *County IT provide current available data and maps to any and all agencies and organizations (including Fire Safe Councils) participating in emergency response in Lake County.* **O**

- *Fire Protection Districts, CAL FIRE, law enforcement, and Fire Safe Councils work with County IT to update and maintain the Fire Run map book.* **S, O**

- *County IT work with OES, Law Enforcement, FPDs, CAL FIRE, APC, FSCs, and other interested partners to develop a GIS-based database of existing and proposed evacuation routes, sites, medical facilities, emergency call boxes, and other relevant evacuation resources.* **M**

### 8.7.4. Residential Emergency Preparedness

Effective evacuation planning depends on residents being prepared. This is especially important for families with small children, and elderly and disabled citizens. Residents in remote areas of Lake County must be especially prepared for evacuation. To this end, all residents should create a Family Disaster and Evacuation Plan. Information is available from the American Red Cross at: *www.redcross.org/preparedness/cdc_english/evac-plan.html* regarding how to do family disaster planning, and *www.redcross.org/preparedness/cdc_english/evac-1.html* for how to create a family evacuation plan. Additional information is available from the Department of Homeland Security at: *www.ready.gov/america/index.html*.

In remote, rural neighborhoods or communities, phone trees can be an effective local strategy for disseminating information quickly. Homeowner's associations, road associations, and local schools are all good venues for setting up a phone tree. Simple steps regarding how to establish a phone tree can be found at: www.ehow.com/how_4325_set-emergency-phone.html.

- *Lake County residents should be prepared for wildfire and other emergencies by creating family disaster and evacuation plans.* **S. O**

- *Residents in remote, rural areas and Target Areas (see 8.3 above) consider storing their most valuable items in a fire-safe urban area during extreme fire weather conditions.* **S. O**

[30] HMP. 2005. p. 69.

Lake County has a strong and effective network of Senior Centers in place, and a large senior community, many of whom are interested in volunteer community service. These are both excellent resources to support effective emergency preparedness within the county.

- *County of Lake, Social Services, Red Cross, and other interested partners work with Seniors Centers to upgrade to Disaster Center Readiness level.* **M**
- *County OES and Social Services work with Senior Centers and other interested local, state, and federal partners to develop emergency planning resources and potential evacuation sites for all county residents.* **M**

Finally, the County HMP identifies the following actions: "Action 9.1.1: Provide community education though service programs offered by the County Office of Emergency Services and training for the Community Emergency Response Team (CERT) program; and Action 9.1.3: The County should continue to support the education and awareness programs developed and distributed by public services organizations such as the Red Cross."[31]

- *County OES and Social Services work with local Senior Centers, Lake County Family Resource Center, and Red Cross to help residents plan and prepare for emergencies.* **O**
- *County OES, Law Enforcement, CAL FIRE, federal agencies, Fire Chiefs, Fire Safe Councils, Red Cross, Senior Centers, and Lake County Family Resource Center conduct disaster preparedness and emergency response drills for high-risk communities countywide.* **S, O**
- *County OES work with Spring Valley CERT to enhance and improve services.* **M**
- *County OES work with high-risk communities and Target Areas to develop new or enhance existing CERT programs.* **M**

### 8.7.5. Sheltering in Place

Sheltering in Place is a controversial subject. It means that residents could not evacuate, and instead stay at home or wherever they are when a wildfire happens. This is only feasible with excellent defensible space and fire-safe construction. The liabilities associated with sheltering in place can be tremendous.

The 2004 Lake County Interface Wildland Fire Contingency Plan recognized that there may be circumstances when residents may be forced to shelter in place at their homes during a conflagration. As a general rule however, sheltering in place is not recognized by California fire agencies as a viable course of action. Firefighters working to protect structures are placed at greater risk; many have been injured in spite of having the proper protective clothing and enhanced training relative to their jobs.

Following the 2009 wildland-fire events in Australia, the FIRESCOPE32 and the Blue Ribbon Task Force33 reviewed the shelter in place concept. This panel included local fire chiefs, the Director of CAL FIRE, and officials from federal agencies. They issued a joint statement in February 2009 that emphasized the following:

> "The preeminent duty of the fire service is protection of human life. For that reason, the California fire service stands united in the position that early evacuation in the face of life-threatening wildfire is the single most important thing any homeowner can do to protect lives.
>
> The guiding principle of California's approach remains consistent and unwavering: Prepare your property, leave early, and follow all evacuation orders."34

- *County OES and Red Cross work with Fire Safe Councils, Fire Protection Districts, Law Enforcement, CAL FIRE, MNF, and BLM to develop local safety information in the event citizens are unable to evacuate.* **M**

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[31] HMP. 2005. p. 78.

[32] www.firescope.org

[33] http://firescope.org/blue-ribbon/blue-ribbon.htm

[34] California Professional Firefighters. www.cpf.org/go/cpf/news-and-events/news/ca-fire-service-prepare-leave-early-follow-evacuation-orders/.

### 8.7.6. Evacuation Plans for Pets and Livestock

Lake County is a rural, agricultural community. Many residents have pets, livestock, or both. A system of evacuation sites for pets and livestock needs to be developed to address this need. Many shelters will not allow animals other than assistance or service dogs. The Red Cross and Humane Society are two good resources on this subject; see *www.hsus.org/hsus_field/hsus_disaster_center/index.html* for more information.

- *Lake County Fire Safe Council work with Plan Partners, Red Cross, Humane Society, and local veterinarians to identify existing options for local pet and livestock emergency evacuation. Work through local feed stores, veterinarians, boarding facilities, and animal associations to educate residents on options.* **M**

## 8.8. Integrating Policy

Integrating wildfire prevention and planning into other planning efforts and policies is a cost-effective, long-term fire prevention strategy for Lake County and the cities of Lakeport and Clearlake. According to the 2005 Lake County Natural Hazard Mitigation Plan,

> "The potential for wildland interface fire increases as residential and recreational developments encroach further into wildlands. Many steps can be taken to reduce this potential loss to life and property by wildfire. Enforcement of proper building fire safe codes; use of green belting (removal of vegetation around structures or replacing with fire-resistant vegetation); prescription burning control fuel load; implementation of fire safe practices, including proper road construction and adequate water systems; and perhaps more important, proper land use planning and zoning."[35]

The 2007 LAFCO Report[36] states:

> "While not part of specific MSR determination for a district the principals of Fire Safe planning must be a priority in the County's updated General Plan calling for collaboration with all local, state and federal agencies."[37]

At the county level, several current planning documents address wildfire issues in one form or another. These include the: 2008 General Plan, 2007 LAFCO Report, 2005 Natural Hazard Mitigation Plan (HMP), and the draft 2009 Emergency Operations Plans, including the 2004 Interface Wildland Fire Contingency Plan. The relevant sections of these documents are summarized in Chapter 5. In addition to those integrated planning actions already described in this chapter, the following is a list of policy actions that will further the goals of this CWPP and fire prevention efforts in Lake County.

- *County Community Development work with OES, Mendocino National Forest, Bureau of Land Management, CAL FIRE, APC, and other relevant partners to ensure integration between planning efforts in Lake County that could affect the county's long-term fire safety, including at the community and Area Plan planning level.* **O**
- *County develop mandatory, enforceable disclosure regulations for all local real estate transactions regarding the wildfire risks and hazards identified in this CWPP.* **M**
- *County prioritize GP Policy LU-1.6 Paper Lot Consolidation in order to minimize WUI fire threats, especially to the communities of Nice and Lucerne. In those areas where paper lots are turned into open space, management plans shall include creation of shaded fuelbreaks along perimeters or ridges using conservation-based principles.* **M**

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[35] HMP. 2005. p. 19. Emphasis added.

[36] Lake Local Agency Formation Commission (LAFCO). *Lake County Fire Protection Districts Municipal Service Review and Sphere of Influence.* October 19, 2007.

[37] LAFCO. 2007. p. 9.

- *Lake County Fire Safe Council work with Community Development and the local insurance industry to educate the industry on appropriate local defensible space practices, and provide materials for them to share with policyholders in accordance with GP Policy HS-8.6 Insurance Provisions.* **S**
- *Community Development work with Lake County Fire Safe Council to develop a fire-safe landscaping document to distribute to Lake County residents, in accordance with GP Policy OSC-1.7 Encourage Planting of Native Vegetation and Policy OSC-1.8 Native Vegetation for Landscaping.* **S**
- *County incorporate the fire planning concepts and actions outlined in this CWPP in its planning for Mount Konocti Public Lands.* **M**

## 8.9. Promoting Fire Safe Education

Many people are enthusiastic to create a fire-safe home once they understand why it is to their advantage. To this end, educational programs targeted at local residents can be very successful.

The General Plan states in Policy HS-1.4 Hazard Awareness and Public Education,

> "The County shall continue to promote awareness and education among residents regarding possible natural hazards, including soil conditions, earthquakes, flooding, Naturally Occurring Asbestos and fire hazards, and emergency procedures."[38]

- *Lake County Fire Safe Council work with CAL FIRE, MNF, BLM, NRCS[39], County, Cities, insurance industry, and others to implement a countywide community fire-safety education program, including Public Service Announcements in all local media.* **S**
- *Lake County Fire Safe Council work with federal agencies, County, Cities, and other interested partners to develop and fund a regular "Living with Wildfire" newspaper or magazine for Lake County residents.* **S, O**
- *Lake County Fire Safe Council work with CAL FIRE, MNF, BLM, and tribal experts to develop and implement a countywide education program on the benefits and risks of using controlled burning/prescribed fire, including the importance of minimizing air pollution during burning.* **M**

The Trinity County Fire Safe Council created a "Big Red Truck Program." In it they take a fire truck to homes as part of a defensible space assessment. This is a very graphic and effective way to show homeowners whether or not their home could be defended in a fire by first seeing if the truck can even safely make it to and from their home. This has also served as a fundraiser for local fire departments, as they get paid for each assessment. A similar program within the various Fire Protection Districts in Lake County could be developed.

- *Lake County Fire Safe Council work with FPDs to explore a "Big Red Truck Program" for defensible space education and assessments. Research state and federal funding options for the program.* **M**

### 8.9.1. Fire-Safety Education in Schools

Educational programs in the local schools are a great way to get the word out about fire safety and emergency preparedness. Several curricula exist that would need minimal adjustments to be used in Lake County. The Butte County Fire Safe Council has developed a successful 6th grade curriculum (www.buttefiresafe.org/education.php). Community projects such as fire-safety education signs created by local schoolchildren can also be very effective. These informative signs can be placed in high fire-risk and hazard areas throughout the community to educate residents and visitors regarding the potential fire risks associated with their activities.

- *Lake County Fire Safe Council work with agencies and school districts to implement fire-safety curricula in all grade levels throughout the county, in conjunction with community educational projects.* **M**
- *Lake County Fire Safe Council work with 4-H chapters to develop local fire-safety educational programs.* **S**

[38] Lake County General Plan (GP). 2008. p. 7–4.

[39] USDA Natural Resources Conservation Service

- *Lake County Fire Safe Council work with Chamber of Commerce and local industries to fund and develop a service-learning program in local high schools focused on fire safety and defensible space.* **M**

### 8.9.2. Fire-Safety Education for New Residents and Tourists

Lake County experiences large influxes of tourists visiting the county each year, most of these during fire season. Some of these visitors return to relocate to Lake County, many from urban areas. These new inhabitants often do not have experience with fire in the wildland-urban interface. Educational programs are needed targeting the tourism, development, and real estate industries, as well as their clients.

- *Lake County Fire Safe Council, CAL FIRE, MNF, BLM, Fire Chiefs, and local governments develop fire-safety educational programs for real estate and development industries.* **M**
- *Lake County Fire Safe Council, County Visitor Information Center, CAL FIRE, MNF, BLM, Fire Chiefs, Chamber of Commerce, and local governments develop fire-safety educational programs for local tourism industries.* **S**
- *Lake County Fire Safe Council, CAL FIRE, MNF, BLM, Fire Chiefs, County Community Development, and local governments target fire-safety educational efforts to new residents, especially those coming from urban areas and others with little experience with fire in the wildland-urban interface.* **M**
- *Fire Safe Councils work with Senior Centers to develop a welcome-neighbor program—offering a welcome basket with fire-safety information for new residents.* **S**

## 8.10. Utilizing Excess Fuels

Under preferable conditions, fuels removed from hazardous areas can be utilized in some form to help defray fuel-reduction costs. Lake County no longer has an intact timber industry; therefore there is very limited capacity for utilization of small-diameter wood products (e.g. creating finished products such as furniture). Nor is there a local biomass facility. However, research into biomass is occurring in many neighboring counties. Local economic development efforts should include these possibilities in their focus areas. Research and development into this field will likely be beneficial for the long-term sustainability of fuel-reduction efforts.

Lake County Public Services runs a Green Waste program. Residents using curbside waste collection can request a special container and leave green waste at no extra cost. Furthering this program to be available to low-income families—those who often do not participate in curbside waste collection—will help successfully implement defensible space.

The Resource Conservation District/Lake County Fire Safe Council's community chipper program will also be generating significant quantities of wood chips, much of which can be utilized within the county.

- *Local economic development interests, Resource Conservation Districts, and Lake County Fire Safe Council explore options for utilization of materials generated from hazardous fuel-reduction efforts, including those collected through the County Green Waste program.* **L**
- *Lake County Fire Safe Council and Resource Conservation Districts work with landscaping community to utilize materials generated from the chipping and Green Waste programs, potentially as a funding source for these programs.* **M**
- *County and Cities Public Services work with Social Services to develop a voucher program to utilize Green Waste collection for low-income residents who are not already participating in refuse pickup service.* **S**
- *County and Cities Public Services work with Social Services to develop volunteer green waste pickup program for low-income, senior, and disabled residents who are unable to use other programs.* **S**
- *Fire Safe Councils work with local governments and LCAQMD to develop Green Waste collection days.* **S**
- *Lake County Fire Safe Council, MNF, and BLM investigate biomass options in neighboring counties for utilization of fuels from Lake County fuel-reduction efforts.* **M**

## 8.11. Facilitating Lake County Fire Safety in the Long Term

The existence of both the Lake County Fire Safe Council (LCFSC) and South Lake Fire Safe Council (SLFSC) is a critical component to improving fire safety in Lake County. Through their collaborative processes, many varied partners have come to the table to implement fuel reduction and fire-safety projects in the county. Hence, ongoing support for and participation in these Fire Safe Councils is fundamental for their development and continuing success.

- *Public and private sector organizations, agencies, and individuals work with LCFSC and SLFSC to develop ongoing financial and in-kind support for FSC activities and development.* **O**
- *Lake County Board of Supervisors appoint county representatives to actively and regularly participate in the Lake County Fire Safe Council. These appointees could represent Community Development, Emergency Services, the Planning Commission, Social Services, Public Works, and/or the Board of Supervisors.* **S, ★**
- *All local, state, and federal public and private land management agencies appoint a representative to actively and regularly participate in the Lake County Fire Safe Council.* **S, ★**
- *Public and private sector organizations, agencies, and individuals (including County, RAC[40], MNF, BLM, and CAL FIRE) facilitate long-term funding to maintain a staff coordinator position at LCFSC.* **O**
- *Lake County FSC work with members and local, state, and federal partners to develop a strategic plan for the FSC to identify a successful long-term management structure and funding sources.* **S**

As described in Chapter 9, project and plan monitoring is an integral element to the long-term success of this plan. Monitoring strategies need to be developed early on to ensure useful data collection.

- *Lake County and South Lake FSCs work with MNF, BLM, RCDs, NRCS, and others to develop a long-term ecological monitoring program to track the effects of project activities on ecological processes and functions.* **M**
- *Lake County FSC work with Plan Partners to develop and implement a Strategic Planning Matrix to track project implementation.* **S, O, ★**

Finally, no plan is ever permanent. This plan was written in 2009 based on current conditions and best available information. The field of fire safety is rapidly changing. It is likely new developments will occur in the coming years. Therefore, it will be important to review this plan at least every five years and update it as needed. This can be done as an Appendix to this document. Additionally, acquiring and updating countywide data at a local scale will ease in readability and use of GIS data and maps.

- *Lake County FSC, County, Cities, Fire Chiefs, and all plan signatories review the Lake County CWPP at least every five years and update it as needed, using a collaborative public process.* **M**

[40] Mendocino National Forest Resource Advisory Council

***Figure 8-1. Lake County Fuel-Reduction Priorities***[41]

| Community, Structure, or Area at Risk | Overall Risk | Project Area/Description | Treatment | Agency/ Land-owner | Priority 1[42], 2, 3 |
|---|---|---|---|---|---|
| All | | Ongoing Fuelbreak Maintenance | Maintenance | | 1-2-3 |
| All | | Ongoing Prescribed Burning in MNF | Control Burn | USFS | 1-2-3 |
| Anderson Springs | High | Anderson Valley Road | Shaded Fuelbreak | Private | 1 |
| Anderson Springs | High | BLM Lands around The Geysers, CAL FIRE VMP[43] | Control Burn | BLM | 1 |
| Blue Lakes | Med-High | Ridgeline Fuelbreak from Blue Lakes to Highway 20 E | Shaded/Fuelbreak | Private, BLM | 1 |
| Buckingham | Med | Soda Bay Road (Black Forest) | Shaded Fuelbreak | Private | 1 |
| Clear Lake Riviera | High | Fuelbreak around Development, into and around Community Growth Boundary | Fuel Reduction, Shaded Fuelbreak | Private | 1 |
| Clearlake | Med-High | Chapman Tract | Fuel Reduction and Defensible Space | Private | 1 |
| Clearlake Oaks | High-Med | Cerrito and Alta Vista Drives Clearance; Opening of Evacuation Site at Top-water tank | Clearance, Shaded Fuelbreak | Private | 1 |
| Clearlake Oaks | High-Med | Widgeon Way, Lakeview, Konocti Roads | Clearance | Private | 1 |
| Cobb | High | Whispering Pines Fuel Reduction and Defensible Space | Shaded Fuelbreak with Defensible Space Assistance | Private | 1 |
| Cobb | High | Bottle Rock Road | Shaded Fuelbreak, VMP | Private | 1 |
| Cobb | High | Highway 175 Evacuation, Roadside Fuelbreak | Shaded Fuelbreak | Private | 1 |
| Double Eagle | High | Double Eagle Road and Spurs | Roadside Clearance Above and Below | Private | 1 |
| Harbin Hot Springs and Neighboring Springs | High | Brush Clearing on Harbin Springs Road | Brush Clearing | Private | 1 |
| Harbin Hot Springs and Neighboring Springs | High | Defensible Space and Fuel Reduction in the Various Hot Springs Resorts in the Area | Defensible Space and Fuel Reduction | Private | 1 |
| Hidden Valley | High-Med | Hidden Valley Fuel Break, Phase 1 | Fuelbreak /Defensible Space | Private | 1 |

[41] Priorities are approximately considered as 1: 0-5 years, 2: 6-10 years, 3: 11+ years.

[42] Existing projects that are deemed important are also listed as short-term priorities if they will be ongoing for several years.

[43] VMP: Vegetation Management Program of CAL FIRE

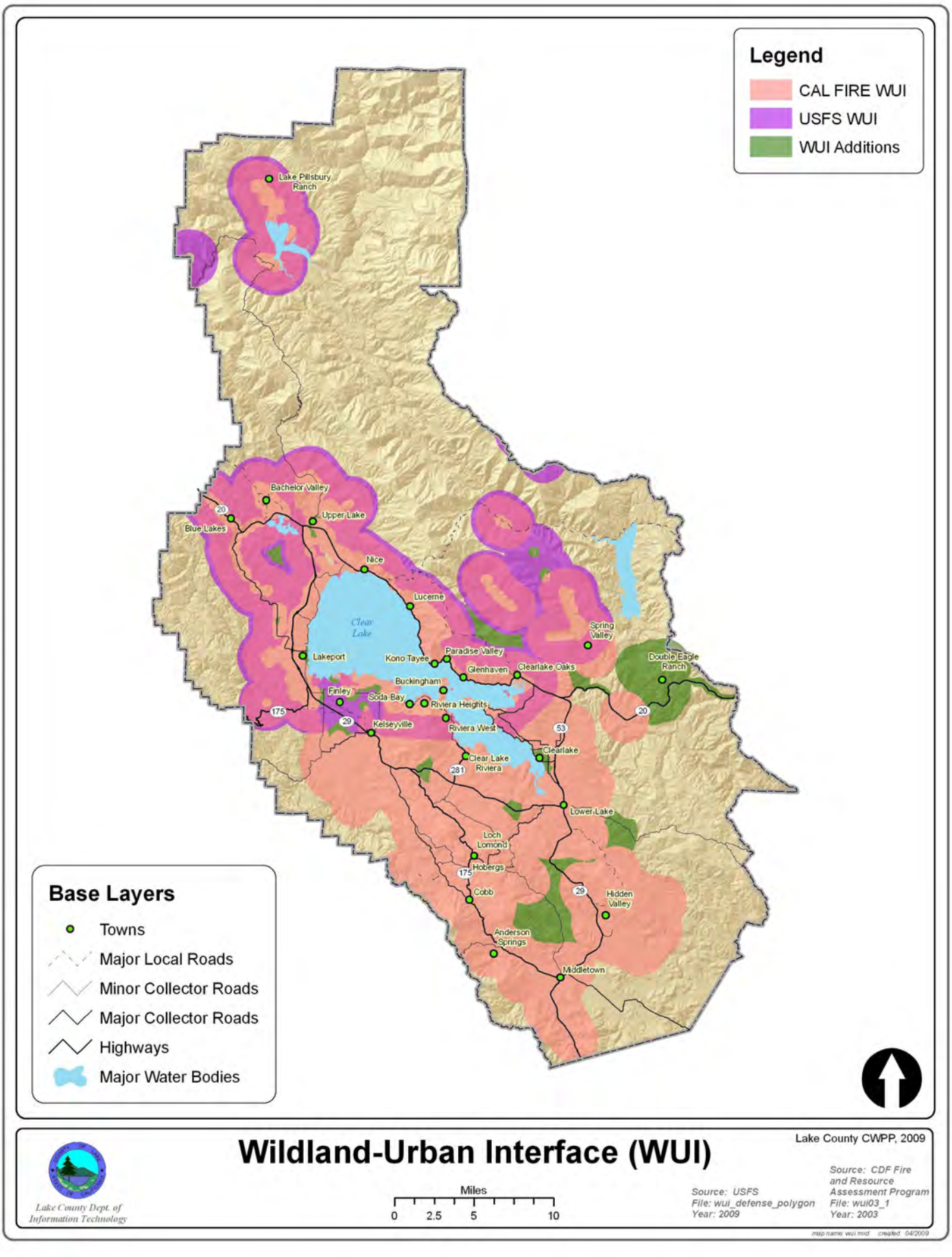
| Community, Structure, or Area at Risk | Overall Risk | Project Area/Description | Treatment | Agency/ Land-owner | Priority 1[42], 2, 3 |
|---|---|---|---|---|---|
| Hidden Valley and Coyote Valley | High-Med | West of Yankee Valley Road and Honey Hills Drive | Fuelbreak and/or Control Burn | Private | 1 |
| Kelseyville Interface | Med | Highway 29 to Lower Lake, Where Fuels are Dense | Shaded Fuelbreak | Caltrans, Private | 1 |
| Kelseyville, Soda Bay, Buckingham, Riviera Heights, Riviera West, Clear Lake Riviera, Point Lakeview | High to Med | Soda Bay Road | Shaded/Fuelbreak | Mixed | 1 |
| Lake Pillsbury | High | Lake Pillsbury Ranch Road | Fuel Reduction | USFS | 1 |
| Lake Pillsbury, Upper Lake | High to Med | Elk Mountain Road | Fuelbreak | USFS | 1 |
| Loch Lomond | High | Loch Lomond Road | Shaded Fuelbreak | Private | 1 |
| Lower Lake, Cobb Mountain, Rivieras, Kelseyville | High to Med | Highway 175 | Shaded/Fuelbreak | Caltrans, Private | 1 |
| Lucerne | High-Med | Fuel Reduction on Paper Subdivisions off of Ogden Road, South of Town | Fuel Reduction | Private, County | 1 |
| Lucerne | High-Med | High Valley Road Shaded Fuelbreak | Shaded Fuelbreak | USFS | 1 |
| Morgan Valley | Med-High | Rocky Creek Road | Fuel Reduction, Shaded Fuelbreak | Private | 1 |
| Nice | High-Med | Fuel Reduction on Paper Subdivisions Northwest of Town (between/around Sherman to Pyle Road) | Fuel Reduction | Private, County | 1 |
| Nice, Lucerne, Upper Lake | High to Med | Hogback Ridge Shaded Fuelbreak | Shaded Fuelbreak | Private, BLM | 1 |
| Point Lakeview | High | Point Lakeview Road | Shaded/Fuelbreak | Private | 1 |
| Point Lakeview | High | Anderson to Panorama to Sunrise Road | Shaded/Fuelbreak | Private | 1 |
| Riviera Heights | High-Med | Fuelbreak between Development and Soda Bay | Fuel Reduction, Shaded Fuelbreak | Private | 1 |
| Riviera West | High-Med | Fuelbreak around Development | Fuel Reduction, Shaded Fuelbreak | Private | 1 |
| Scotts Valley | Med-High | Continue Control Burn Program for Westside Scotts Valley | Control Burn | BLM, Private | 1 |

| Community, Structure, or Area at Risk | Overall Risk | Project Area/Description | Treatment | Agency/ Land-owner | Priority 1[42], 2, 3 |
|---|---|---|---|---|---|
| Scotts Valley | Med-High | Hendricks Road | Brushing/Road Clearance | County Road, Private | 1 |
| Scotts Valley | Med-High | Cow Mountain Fuelbreak | Maintenance | BLM, Private | 1 |
| Spring Valley | High | Wolf Ridge and Quartz Canyon | Control Burn | BLM | 1 |
| Upper Lake | Med | Fuelbreak East Side of Rancheria | | Private, Tribal | 1 |
| Upper Lake | Med | Pitney Ridge (East of Upper Lake) | Shaded/Fuelbreak | USFS, Private | 1 |
| Upper Lake, Nice, Lucerne, Glenhaven, Clearlake Oaks | High-Med to Med | High Glade Lookout to High Valley | Fuelbreak | USFS, Private | 1 |
| Glenhaven | High-Med | Glenhaven Drive and Leila Drive | Clearance, Shaded Fuelbreak | Private | 2 |
| Blue Lakes | Med | Control Burn North of Blue Lakes | Control Burn | Private, BLM | 2 |
| Buckingham | Med | Little Borax Lake Road | Fuel Reduction, Shaded Fuelbreak | Private | 2 |
| Clear Lake Riviera | High | Wheeler Point | Fuel Reduction | Private | 2 |
| Clearlake | Med-High | Highway 53, Evacuation Route | Fuel Reduction, Shaded Fuelbreak | Private, County | 2 |
| Clearlake | Med-High | Clearlake Park | Fuel Reduction and Defensible Space | Private | 2 |
| Clearlake | Med-High | Sulfur Bank/Borax Lake | Fuel Reduction | Private | 2 |
| Clearlake Oaks, Glenhaven | High-Med | Hazardous Fuel Reduction in Hills behind Towns | Fuel Reduction | Private | 2 |
| Cobb | High | Westside 175 and Bottle Rock Area | Shaded Fuelbreak, Fuel Reduction | Private | 2 |
| Cobb | High | Gifford Springs Fuel Reduction and Defensible Space | Shaded Fuelbreak with Defensible Space Assistance | Private | 2 |
| Cobb | High | Pine Grove, Hobergs, and Other Populated Areas Not Yet Treated | Fuel Reduction | Private | 2 |
| Double Eagle | High | Walker Ridge | Fuelbreak | BLM, Private | 2 |
| Glenhaven | High-Med | Harvey Drive | Clearance, Shaded Fuelbreak | Private | 2 |
| Harbin Hot Springs and Neighboring Springs | High | Fuelbreak and Improved Access along Ridge Road Northwest of Harbin Springs Road | Shaded/Fuelbreak | Private | 2 |

| Community, Structure, or Area at Risk | Overall Risk | Project Area/Description | Treatment | Agency/ Land-owner | Priority 1[42], 2, 3 |
|---|---|---|---|---|---|
| Hidden Valley | High-Med | Hidden Valley Fuel Break, Phase 2 | Fuelbreak/Defensible Space | Private | 2 |
| Hidden Valley and Coyote Valley | High-Med | Spruce Grove Road | Shaded Fuelbreak | Private | 2 |
| Hilderbrand District | High-Med | 29 Fire Fuels Clearance | Fuel Reduction | Private | 2 |
| Jerusalem Valley | Med | Jerusalem Grade Road | Shaded/Fuelbreak, Clearance | Private | 2 |
| Kelseyville Interface | Med | Upper Kelsey Creek along Roads | Shaded Fuelbreak | Private | 2 |
| Kelseyville Interface | Med | Highland Springs Recreational Area, Highland Springs Road | Shaded Fuelbreak | County, Private | 2 |
| Kelseyville Interface | Med | Mount Konocti | Fuel Hazard Reduction | County, BLM, Private | 2 |
| Kelseyville Interface | Med | Adobe Creek, Fuel Reduction along Roads and Adjacent to Defensible Space Areas | Wildland Fuel Hazard Reduction, Shaded Fuelbreaks | Private | 2 |
| Lake Pillsbury | High | Rice Fork Fuel Reduction, South of Scott Dam | Fuel Reduction | Private, USFS | 2 |
| Lake Pillsbury | High | Northeast of Lake Pillsbury Ranch | Control Burn | USFS | 2 |
| Lakeport | High | Brewery Hill | Fuel Reduction, Defensible Space | Private | 2 |
| Lakeport | High | North Lakeport Fuelbreak and Defensible Space | Shaded/Fuelbreak, Defensible Space | Private | 2 |
| Loch Lomond | High | Cooper and Water Company Lands | Shaded Fuelbreak | Private, Water Co. | 2 |
| Loch Lomond | High | Parady Property | Control Burn | Private | 2 |
| Loch Lomond | High | Bonanza Springs | Shaded Fuelbreak | Private | 2 |
| Loch Lomond | High | Siegler Springs North | Shaded Fuelbreak | Private | 2 |
| Loch Lomond | High | Siegler Canyon | Shaded Fuelbreak | Private | 2 |
| Loch Lomond | High | Shenandoah Road | Shaded Fuelbreak | Private | 2 |
| Long Valley, New Long Valley | High | Garner Ranch Road | Shaded Fuelbreak, Clearance, Road Repair | Private, USFS | 2 |
| Lower Lake, Morgan Valley | Med-High to Med | Ridge Southwest of Dry Creek | Shaded Fuelbreak, Control Burn | BLM, Private | 2 |
| Lucerne | High-Med | Fuel Reduction on Hillside behind Town, between Bartlett Springs and High Valley | Fuel Reduction and Eventual Control Burn | USFS, Private | 2 |

| Community, Structure, or Area at Risk | Overall Risk | Project Area/Description | Treatment | Agency/ Land-owner | Priority 1[42], 2, 3 |
|---|---|---|---|---|---|
| Lucerne | High-Med | Fuel Reduction on Paper Subdivisions off of Bartlett Springs and Foothill Drive, North of Town | Fuel Reduction | Private | 2 |
| Lucerne | High-Med | Fuel Reduction in North Side Canyon behind Rancho Vista | Fuel Reduction | Private | 2 |
| Middletown | Low | Dry Creek Road | Brush Clearing | Private | 2 |
| Middletown | Low | Middletown Rancheria | Brush Clearing, Control Burn | Tribal | 2 |
| Riviera Heights | High-Med | Fuelbreak around Development | Fuel Reduction, Shaded Fuelbreak | Private | 2 |
| Riviera West | High-Med | BLM Buckingham Bluff Properties between Riviera West, Buckingham, and Riviera Heights, Fuel Reduction with Control Burn Where Possible | Hazardous Fuel Reduction, Control Burn | BLM | 2 |
| Scotts Valley | Med-High | Cow Mountain Fuelbreak Expansion | Fuelbreak | BLM, Private | 2 |
| Scotts Valley | Med-High | Upper Scotts Creek Watershed | Control Burn Mosaic | BLM, Private | 2 |
| Twin Lakes | Med | Twin Lakes Defensible Space and Neighborhood Fuel Reduction | Defensible Space, Fuel Reduction | Private | 2 |
| Twin Lakes | Med | Murphy Springs/Perini Hill – Organize Neighborhood through LCFSC | Fuel Reduction and Defensible Space | Private | 2 |
| Guenoc Ranch | | Northwest of Proposed Development, between McCreary Lake and Coast Guard | Shaded/Fuelbreak | Private | 3 |
| Finley | Low | Ecologically Appropriate Tule Fuel Reduction | Fuel Reduction | Private | 3 |
| Harbin Hot Springs and Neighboring Springs | High | Shaded Fuelbreak North of Harbin | Shaded Fuelbreak | Private | 3 |
| Kono Tayee | Med | Bruner Road | Shaded Fuelbreak | Private | 3 |
| Lower Lake, Morgan Valley | Med-High to Med | Ridge between Herndon Creek, Ferris Canyon, and Cache Creek | Shaded Fuelbreak | Private | 3 |

***Map 8-1. Lake County Wildland-Urban Interface Designation***




# Wildland-Urban Interface (WUI)

Lake County CWPP, 2009

Lake County Dept. of Information Technology

Miles

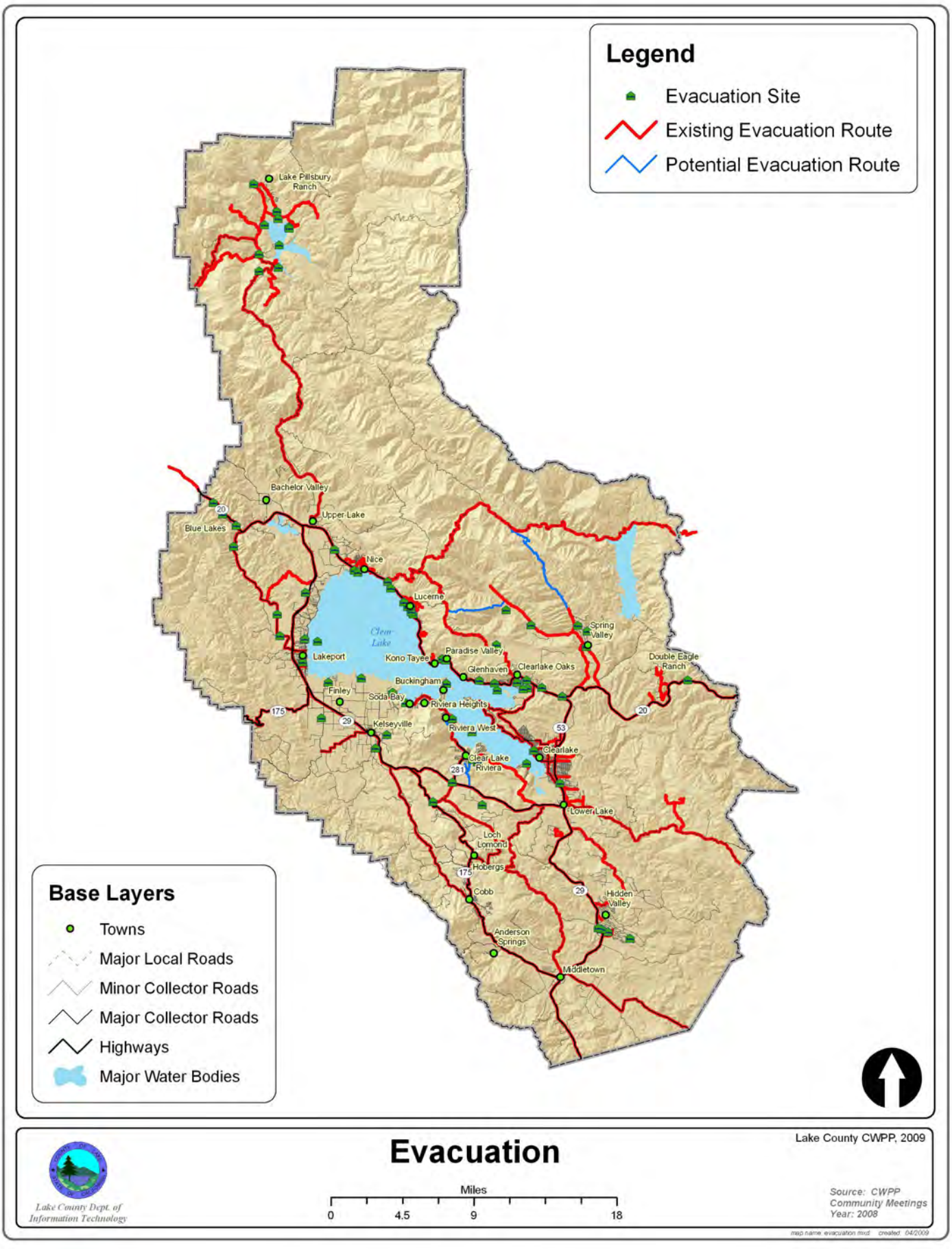
0 2.5 5 10

Source: USFS
File: wui_defense_polygon
Year: 2009

Source: CDF Fire and Resource Assessment Program
File: wui03_1
Year: 2003

map name: wui.mxd created: 04/2009

***Map 8-2. Lake County Evacuation Routes and Sites***




# Evacuation

Lake County CWPP, 2009

Lake County Dept. of Information Technology

Miles

0 4.5 9 18

Source: CWPP Community Meetings Year: 2008

map name: evacuation.mxd created: 04/2009

# 9. Facilitating Lake County Fire Safety in the Long Term

A Community Wildfire Protection Plan (CWPP) is only as effective as the community charged with implementing it. Lake County is fortunate to have many people and resources committed to fire safety over the long term. Creating fire-safe communities is a continuing commitment.

> "Communities across the country have invested countless hours and significant funds to develop CWPPs. Communities now have an opportunity to consider how these plans have helped reduce their wildfire risk, while also meeting state and national goals for wildfire risk reduction. Effective monitoring and evaluation of wildfire planning efforts at the local, state, and national level will provide important opportunities to evaluate the overall strategy of CWPPs in reducing wildfire risk and improving planning processes…
>
> A CWPP does not end when it is adopted; a thorough process should involve a continuous cycle of collaborative planning, implementation, monitoring, and adapting strategies based on lessons learned. As communities learn from successes and challenges during the development and implementation of their CWPP, stakeholders may identify new actions, propose a shift in how decisions are made or actions are accomplished, and evaluate the resources necessary for successful CWPP implementation."[1]

## 9.1. Monitoring

Monitoring the success of CWPP-identified actions is important to the ongoing success of these fire safety and prevention efforts. This CWPP is based on the collective experience of participants, Lake County knowledge, lessons learned from Fire Safe Councils statewide, and the best available science. However, community fuel reduction and fire safety is an evolving field. Restoring landscapes to be more fire adaptive is a long-term process. Mistakes will be made; they are part of re-learning how to live in balance with wildfire, rather than trying to control and suppress it regardless of the cost. Monitoring successes and failures will help in better understanding wildfire ecology and achieving responsible stewardship of fire-adapted ecosystems. Hence, it is important to monitor actions identified in this CWPP to comprehend the actual impact they are having meeting its objectives: to minimize ignitions, decrease intensity, decrease damage, increase permeability, and increase resiliency.

As stated in the quote above, CWPPs are monitored on a national scale to evaluate their effectiveness in addressing wildfire issues. A standardized format for participating in the national-level evaluation can be found at: http://ri.uoregon.edu/documents%20and%20pdfs/eval_9-8-08_web.pdf.

Resources are also becoming available for community-scale monitoring. A valuable online source can be found at the Partnership Resource Center: www.partnershipresourcecenter.org/resources/monitoring-evaluation.

### 9.1.1. Project Monitoring

There are many types of monitoring. Two of the most applicable to CWPPs are project monitoring and ecological monitoring. Project monitoring, as it implies, is for tracking projects through their completion.

> "What Goes into Monitoring and Evaluating a CWPP Locally?
>
> • Only monitor what matters! (Communities may lack resources to engage in a long or complex monitoring process.) Community partners should identify key goals and objectives, and make decisions to monitor what is most important to the long-term sustainability of their CWPP.
>
> • Track accomplishments and identify the extent to which CWPP goals have been met.
>
> • Examine collaborative relationships and their contributions to CWPP implementation, including existing participants and potential new partners.[2]

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[1] Community Wildfire Protection Plan (CWPP) Task Force and Wildland Fire Leadership Council. *Community Guide to Preparing and Implementing a Community Wildfire Protection Plan.* August 2008. p. 18. www.forestsandrangelands.gov/communities/documents/CWPP_Report_Aug2008.pdf.

[2] For more information on collaboration resources, see the Red Lodge Clearinghouse, http://rlch.org/content/section/4/27.

• Identify actions and priority fuels reduction projects that have not been implemented, and why; set a course for future actions and update the plan."[3]

Table 9-1 at the end of this chapter provides a format for the Lake County Fire Safe Council and others to track project progress. It is based on a matrix developed by the El Dorado Fire Safe Council, and can be reproduced in Excel to effectively track projects over time.

Another simple project-monitoring method is photo point monitoring. This is the monitoring required with most California Fire Safe Council Clearinghouse grants. Photos are taken of a given place before, during, and after treatments and then compared, providing a basic physical comparison.

Finally, a true test of fire-safety projects is how they affect wildfire behavior. This means comparing areas after a wildfire that have had treatments with those that haven't, and documenting the change. Photo points are an excellent method to document this difference.

### 9.1.2. Ecological Monitoring

In addition to how successful projects are to reduce fuels and the impact of fire, monitoring also refers to tracking how projects affect ecological process and function. From the outset, projects need to be designed to have minimal adverse ecological impact.[4] The Conservation Principles identified in Chapter 1 provide guidance in how to minimize such impacts. However, this is an evolving field. No one is clear yet regarding the long-term ecological impacts of fire-safety actions. It is important to be aware of potential negative environmental impacts. Ecological monitoring is the most effective way to understand these impacts.

> "A critical outcome related to CWPPs is related to the change in fire behavior, as affected by the number and type of fuels treatments that occur as a result of priorities identified within the CWPP. The HFRA* (Section 102(g)(5)) instructs the USFS and DOI to establish a collaborative multiparty monitoring, evaluation, and accountability process when significant interest is expressed in such an approach. (The Healthy Forests Initiative and Healthy Forests Restoration Act Interim Field Guide www.fs.fed.us/projects/hfi/field-guide/web/page16.php.)
>
> Multiparty monitoring gives communities an opportunity to assess environmental, social, and economic outcomes related to fuels reduction projects. Multiparty monitoring also builds trust and provides an opportunity for residents to learn about fire-adapted ecology. The USFS Collaborative Forest Restoration Program [CFRP] in the Southwest offers a set of guidelines for monitoring community-based forest restoration. Communities engaged in ecological monitoring of hazardous fuels reduction projects can use these guidelines. They provide an overview of the multiparty monitoring process, ecological and socioeconomic goals and indicators, and examples of measures, data sources, and tools that can be used in conducting this kind of monitoring. The CFRP program also developed a series of handbooks to help communities conduct this monitoring. These resources can be downloaded directly at www.fs.fed.us/r3/spf/cfrp/monitoring/index.shtml.
>
> There are also tools used by state and federal agencies to conduct ecological monitoring and monitor maintenance of treated areas. One such program is the Fire Effects Monitoring and Inventory Protocol (FIREMON). FIREMON is an agency-independent plot-level sampling system designed to characterize changes in ecosystem attributes over time (http://frames.nbii.gov/portal/server.pt?open=512&objID=286&&PageID=495&mode=2&in_hi_userid=2&cached=true).
>
> Other methods for conducting ecological monitoring for fuels reduction projects may include using photo points, modeling changes in fire behavior, and measuring change in fire regime and condition class. There are a wide range of approaches to ecological monitoring; FIREMON and

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[3] CWPP Task Force et al. 2008. p. 18.

[4] In addition to the Conservation Principles in Chapter 1, several communities are now developing Best Management Practices for fuel treatments. See www.myfirecommunity.net/Neighborhood.aspx?ID=666 for more information.

* Healthy Forests Restoration Act.

other modeling systems are mostly within federal purview, but community organizations and citizens have many monitoring options available and simple methods like comparing photo points and conducting vegetation surveys that are valuable and important."[5]

The Lake County Fire Safe Council has both project and ecological-monitoring expertise in its partner organizations, including the Mendocino National Forest, Bureau of Land Management, Natural Resources Conservation Service, and the local Resource Conservation Districts. These organizations can help to develop a monitoring strategy to track the long-term success of both the projects identified herein, and ultimately this CWPP. Additional resources can be found online, such as the Ecosystem Management Initiative of the University of Michigan: www.snre.umich.edu/ecomgt/evaluation/tools.htm.

## 9.2. Project Maintenance

Project maintenance strategies are most effective when designed into projects from the beginning. This is true for both the maintenance activities and the resources to support them.

In terms of large-scale fuel-reduction projects, one of the most effective and economical long-term maintenance strategies for programs in Northern California is prescribed fire (AKA controlled burning). Once fuels are reduced to levels where "cool" fires can be safely introduced, this strategy should be explored and, when appropriate, implemented. Lake County is fortunate to have both a population that supports the use of prescribed fire, and local expertise in using it. The controlled-burning efforts of the Hendricks family in Scotts Valley over the last several generations is an excellent example of how to use fire over time to maintain and enhance ecosystem conditions while improving community fire safety.

The Action Plan in Chapter 8 identifies an "Adopt a Fuel Break" strategy that can be used to maintain fuel treatments around neighborhoods and communities. It will be the responsibility of land management agencies leading a project, as well as the Lake County Fire Safe Council, to ensure that long-term project maintenance is included (and budgeted for) in all project implementation. The Strategic Planning Matrix at the end of this document can help facilitate monitoring of maintenance needs.

## 9.3. Updating This Plan

No plan is ever permanent. This CWPP was written in 2009 based on current conditions and best available information. The field of fire safety is rapidly changing. It is likely that new developments will occur in the coming years. Therefore, it will be important to review this CWPP at least every five years and update it as needed. The Strategic Planning Matrix in this chapter can be used between CWPP updates by the FSC to document implementation progress. Copies of this CWPP will be available for public review at the Lake County Administrative Office (Courthouse), public libraries, and other locations throughout the county.

## 9.4. Resources Needed to Support Ongoing Efforts

The Lake County Fire Safe Council will be the principal organization charged with implementing this CWPP. The recent efforts and actions of the FSC and its leadership have shown it to be capable of successfully facilitating both the CWPP's implementation and leading fire-safety efforts in Lake County over time.

To ensure the FSC's success, and the CWPP's effectiveness, the Lake County FSC will need to develop a structure for plan implementation. A coordinator was hired in 2009 with county funding. It will be critical to maintain and augment this funding source over time to ensure CWPP and project continuity. A strategic plan for the Council needs to be developed to identify a successful long-term management structure that maximizes both resident and agency participation, and a long-term funding strategy to ensure its survival.

Finally, the success of the FSC will also depend on the ability of participating organizations to contribute resources to the Council and its projects. The will to succeed and the *social capital* exist now within Lake County for the effective implementation of this CWPP. Plan authors and cooperating stakeholders are confident that Lake County is quickly becoming a positive example for fire safety throughout California.

[5] CWPP Task Force et al. 2008. p. 22.

*Figure 9-1. Strategic Planning Matrix*[6]

| Project # or Code | Start Year | Project Title & Description | Estimated Resources Required | Proposed Funding Source | Current Status (Date) | Current Funding Required & Potential Source | Year 1 Project Status & Update | Year 2 Project Status & Update | Project Completed Date | Long-Term Maintenance Required? Responsible Party | Funding Source(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
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[6] Adopted from El Dorado County Fire Safe Council Strategic Planning Project Matrix. www.edcfiresafe.org/documents/edc_wpp_appendix_m_2006-08-23.pdf.

## Appendix A: Community Meeting Notes

The following notes were taken by County of Lake and Lake County Fire Safe Council staff at the community meetings held in October 2008.

### A.1. Lake Pillsbury, Upper Lake, and Blue Lakes

*Odd Fellow's Hall, October 20, 2008*

Community Attendees

- Alex & Chauncy Irvine
- Alex Straessle
- Betsy Cawn
- Carol Binkley
- Cecil Prack
- Chuck Morse
- Debbie Ickes
- Denise Rushing
- Dianna Wellington
- Don Davison
- Doris Harville
- Erica Lundquist
- Glenn Roe
- Grant Murray Jr.
- Greg Dills
- Harry Zabel
- Joe Koschik
- Korinn Woodard
- Laura Davison
- Loretta McCarthy M. Quere
- Mike Josephson
- Mo Fitch
- Pat Brown
- Pat Ickes
- Rich Burns

PRC 4290: no money to enforce. FSC and educating public: how effectively are we using the tool? Look at absentee owners. Want to educate public and get action; need county crew to clear property and add to taxes.

Pat Brown, Battalion Chief, Northshore Fire Protection District—Local Fire Protection Update
Northshore is very active; weed abatement expanded into Lucerne, Spring Valley, Nice. Triage (evaluate) house before a fire to see if they can safely protect it. Upper Lake usually staffed by volunteers; Nice and Lucerne always have medic and staff. Main stations on 24/7. Top priority now is customer service. Federal grant to replace water tender at Upper Lake. Trying to get more personnel—growing pains, but trying. Will come about and give advice if someone's available. Districts working together more and more. Supervisor Rushing & Pat Brown: 2009 new ordinance in fire district. Following Santa Clara County and bringing it up here. If problem with neighbor, talk to neighbor first. Fire district can come out, call Lucerne in Upper Lake area. Someone will go look at it. Looked at 200 houses this summer. Northshore Fire main number: 274-3100.

Local Fire History Remembered

- Cow Mountain Fire; Hunter Fire both in 1981.
- Fork Fire 1996; 87000 acres. Hunters on Fork and Hunter fires. Burned for 11 days.
- Town burned on west side of street 1910.
- Two fires from lake Pillsbury this summer.
- Clover Fire: welding, 3 years ago.
- Variety of causes of fires. August big month.
- Mendenhall Fire in 1987, dry lightening. Highly inaccessible. Air support elsewhere.
- Fouts Fire, August.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 15 | Prescribed/Controlled Burning in National Forest |
| 2 | 14 | Ongoing Fuelbreak Maintenance/Program |
| 3 | 13 | Education and Outreach—Defensible Space |

| Priority # | # Votes | Project Description |
|---|---|---|
| 4 | 12 | New Water Tender for Upper Lake |
| 4 | 12 | Program to Assist Residents with Defensible Space |
| 5 | 9 | Weed Abatement Program |
| 6 | 8 | Upgrade Upper Lake Water System |
| 6 | 8 | Expand Chipper Program to Make Available |
| 7 | 5 | Additional Staff (Full Time) at Upper Lake Station |
| 8 | 4 | Address Signage Program, 5" Letters, Reflective |
| 9 | 3 | Hogback Ridge Fuelbreak |
| 9 | 3 | Fuelbreak on East Side of Rancheria |
| 9 | 3 | Cow Mountain Fuelbreak—Maintenance and Expansion |
| 10 | 2 | Prescribed Fire in Chaparral North of Blue Lakes |
| 11 | 1 | Education and Outreach—Evacuation Routes and Shelter in Place |
| 11 | 1 | Develop/Identify "Safe Harbor" Areas |

**Lake Pillsbury Community-Identified Priority Projects**

| Priority # | Project Description |
|---|---|
| 3 | Fix the M8 Road (Logging Road) |
| 2 | Rice Fork Hazardous Fuel Reduction (HFR) |
| 2 | Prescribed Fire Area |
| 1 | Increase Revenue for Lake Pillsbury Volunteer Fire Dept. |
| | Lake Pillsbury Volunteer Fire Dept. Training Program |
| | Hazardous Fuel Reduction Chipper Program |
| | Rebuild and Staff Hull Mountain Fire Lookout (USFS) |
| 4 | Siren Warning System (Communication Link) |
| 4 | Radio Repeater on Hull Mountain (Lake Pillsbury Volunteer Fire Dept.) |
| 5 | Retain More Water in Lake Pillsbury During the Summer |

## A.2. Scotts Valley, Lakeport

*Scotts Valley Women's Clubhouse, October 23, 2008*

Community Attendees

- Pamela Capito
- James Dawson
- Janine L. Grothe
- Jared Hendricks
- Linda Juntunen
- Bob Kelly
- Patty Patten
- Greg Scott
- Cornelia Sieber
- Greg Stolesen
- Kenneth Wells
- Lydia Wells

10 residents. Some with fire experience. Even those without fire experience seem aware of fire/environmental issues.

Chief Kenneth Wells, Lakeport Fire—Local Fire Protection Update

Rivieras CC&Rs (covenants) very proactive and fire safe. Lakeport Fire Dept.—4 firefighters on duty 24 hours a day. Don't have the resources to protect every house. Specialty is to protect the structures, not the wildland.
In case of a large fire event, homes will be evaluated according to likelihood of saving them, and safety of fire fighters. Know that best set-up is tanks up high to allow for gravity flow, rather than static flow, which is slower. Also have connectors compatible with local fire engines. If relying on generator, make sure the power is compatible with pump's needs. If using domestic system, know your pressure will be affected with extreme use. Water tenders are valuable asset.
Problem: narrow road, traffic jams. Power outages: be careful. Downed power lines likely and could be live. Cell phone towers will be gone—do not rely solely on cell phones.
Evacuations: very challenging. Rock slides. Evacuation plans and evacuation centers must be part of any local plan. 911 will not be able to help. City Watch: Reverse 911, used to notify groups of people. Emergency Alerting System: we do have this in Lake County, can be activated by Sheriff, BOS and anyone going through OES. We need to add webpage-alerting application to the system. Inter Agency Tactical Communication Plan—but some agencies are not able to be reached directly, costs time to go through dispatch. They are currently working on this.

Local Fire History Remembered

Fires in this area, both recent and distant past. Lots of fuel between Blue Lakes and here. Cow Mountain Fire in 1981.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 9 | Old Cow Mountain to Hopland Mountain—Prescribed Burn |
| 2 | 7 | Water Tender for Lakeport Fire—2 Type-3 with Staffing |
| 2 | 7 | City Watch Reverse 911 Apparatus Moved to Dispatch Facility |
| 3 | 6 | Ongoing Mosaic Burning |
| 3 | 6 | Maintenance/Expansion of Cow Mountain Fuelbreak |
| 3 | 6 | Active Fire Safe Council with Private Landowner Support |
| 4 | 5 | Chipping Program |
| 4 | 5 | Weed Abatement Ordinance—Code Enforcement by County |
| 4 | 5 | Increased funding and staffing for Lakeport Fire Department |
| 5 | 1 | Scotts Valley Hydrant Water System—every 1500 feet |
| 5 | 1 | Appropriate Fire Safe Plant & Landscaping List Distributed by Community Development/Planning Department |
| 5 | 1 | Fuel Reduction on Brewery Hill |
| 0 | 0 | Neighborhood Fuel Reduction |
| 0 | 0 | North Lakeport Fuelbreak |
| 0 | 0 | Defensible Space Clearance—All Structures |
| 0 | 0 | Active/Aggressive Support—CAL FIRE Vegetation Mgmt Program (VMP) |
| 0 | 0 | Tax Lien for Weed Abatement Crew |

## A.3. Nice, Lucerne

*Lucerne Senior Center, October 24, 2008*

Community Attendees

- Bill Becker
- Donna Christopher
- Elizabeth Larson
- Gary Saylor
- James Crabtree
- Jim Bridges
- Jim Robbins
- Louise Talley
- Mace Bailey
- Robert H. Vollmer
- Stephanie Rick

Chief Jim Robbins, Northshore Fire Protection District, Local Fire Protection Update
History of formation of Northshore Fire Protection District, 350 square miles. 70 volunteers, 15 paid staff. Needs: more paid staff, because it's harder to get volunteers who are around. Good cooperation with each other.
This past fire season: resources stretched to the max. We travel to help out via mutual aid too.

Local Fire History Remembered

- Forks Fire
- Mendenhall Fire
- Walker Fire
- Many small fires in the area
- Bird strike fires
- Fireworks fires.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 8 | Upgrade all Senior Centers Around the Lake to Disaster Centers |
| 1 | 8 | Additional Staffing for Northshore Fire |
| 2 | 7 | Chipper program for Northshore |
| 2 | 7 | Communication Upgrades: Computerized Communication and Repeaters. |
| 3 | 5 | Enforcement of Weed & Brush Abatement Ordinance. Hire Weed Abatement Officer |
| 4 | 4 | Task Force to Create Defensible Space for Vulnerable Populations, e.g. Seniors, Disabled |
| 5 | 3 | Hogback Ridge: Fuelbreak and Prescribed Burn Northeast |
| 5 | 3 | More Medical Equipment, Ambulances and Asst. Emergency |
| 6 | 2 | Examine Weed Management Areas for Invasive Species and High Fuel Hazards |
| 7 | 1 | Reflectors on Hydrants |
| 7 | 1 | Address Signage Program and Enforcement |
| 7 | 1 | Use School and 4H Programs for Emergency Planning, Fire Safety Education |
| 0 | 0 | Educational Outreach on Fire Safety to Tourism Community |
| 0 | 0 | Educational Outreach on Fire Safety to Local Adult Population |

## A.4. Spring Valley, Double Eagle

*Spring Valley Clubhouse, October 26, 2008*

Community Attendees

- Evelyn Balsley
- Virgil Blake
- Linda J. Burton
- Alex Carraraga
- Win Cary
- Don Fiora
- Joe G. Welz
- Brian Hanson
- Doyle Head
- Crystal Kinder
- Flo Kinder
- James Kinder
- Cassandra Madero
- Linda Mann
- John Raffaelli
- Gil Roux
- Andrea Salas
- Gene Throg
- Severin Umstrom
- Cameron Waggoner

Chief Robbins, Northshore Fire, Local Fire Protection Update

We have a partnership with USFS and CAL FIRE to cover 350 square miles.
Weeds: The weed abatement program is coming. He is working on the ordinance regarding the residential areas. We need to make sure absentee landowners are taking care of these residential areas. This ordinance should be in place before next summer. Attendee concern about absentee owners and county not clearing ground.

Local Fire History Remembered

- Fork Fire
- Spring Fire—'72
- 1987–750 acre burn on Double Eagle
- Long Fire—2004—roadside ignition
- On Hwy. 20 last year

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 10 | Bridge on Old Long Valley Road and Grade the Road |
| 2 | 7 | Spring Valley Fire Station Staffing |
| 2 | 7 | Double Eagle—Fire Safety Education and Outreach |
| 3 | 6 | Grant for a Chipper |
| 3 | 6 | Wolf Ridge Burn |
| 4 | 5 | Garner-High Valley Extension—Make a Passable Evacuation Route |
| 4 | 5 | Quartz Canyon Burn |
| 5 | 4 | Fire Inspector/Code Enforcement North Shore Fire |
| 5 | 4 | Double Eagle—Community Resource Assessment |
| 6 | 3 | Double Eagle—Road Improvement |
| 6 | 3 | Cougar Road/Benmore Canyon Road Extension |
| 6 | 3 | Wolf Creek to Bartlett Springs road—Evacuation Route |
| 6 | 3 | Spring Valley CERT—Volunteers and Resources |
| 6 | 3 | Double Eagle Phone Tree |
| 7 | 2 | Double Eagle Fuelbreak along Road |
| 7 | 2 | Walker Ridge Firebreak Maintenance |
| 7 | 2 | Double Eagle Defensible Space—Brush Clearing Assistance |
| 8 | 1 | Regular Brush Maintenance Evaluation and Schedule |
| 8 | 1 | Defensible Space Education and Outreach |
| 0 | 0 | Extend Hwy. 53 to New Long Valley Road |
| 0 | 0 | Double Eagle Siren System |

## A.5. Glenhaven, Clearlake Oaks, Paradise Valley, Kono Tayee

*Clearlake Oaks Senior Center, October 28, 2008*

Community Attendees

- Gayle Atkisson
- Clelia Baur
- Jim Baur
- Dianna Brooks
- Pat Graham
- Ben Lawson
- Susan G. Martin

Jeff Tunnell, BLM: Remembered the group of juvenile arsonists, starting grass fires within the town limits of Clearlake Oaks. Much work to do in this community, both in the hills and within the town.

Pat Brown, Battalion Chief Northshore Fire Protection District, Local Fire Protection Update
24-hour staffing at 3 stations, 8 hours at Upper Lake. Brand new attack engine, and one new heavy rescue, both operated by volunteers. All activity is a team effort with CAL FIRE.
Remembered the worst fire of his career on Widgeon Way.
Plans now to include all areas in Northshore District. Using plans/weed abatement policy from Santa Clara County. Do not hesitate to call if there is a need.
Sup. Rushing: illusion that folks in town are not at risk. He agreed. Fires spread house to house quickly. There are examples where the weed abatement has and has not worked. If you have a problem with weeds, or a neighbor with a problem, call the district.

Local Fire History Remembered

- Arson: Widgeon Way, Clearlake Park, Elem Colony, local school.
- This area noted for suspicious fires.
- Meth labs, no explosions for a while.
- Hwy. 20 and 53 fire last year—welder working at the house—50 acres
- Mainly west to east movement of fires, prevailing wind off the lake.
- 2 yrs ago in the plaza, up the canyon.
- High Valley Road and Cerrito—roadside fire
- Forks Fire
- Borax Fire
- Sulphur bank has lots of fires.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 13 | Bridge over Narrows |
| 1 | 13 | Northshore Fire Protection District—Additional Staffing |
| 2 | 10 | Reverse 911 |
| 2 | 10 | Education and Outreach—Defensible Space |
| 2 | 10 | Free Public Dumping—Monthly |
| 3 | 9 | Evacuation Plan |
| 4 | 7 | More Fire Boats |
| 5 | 5 | Weed Abatement Program |
| 6 | 4 | Chipping Program |
| 7 | 3 | Disaster Prep/Emergency Response Drill |
| 8 | 2 | Disallow Trucks on Highway |
| 8 | 2 | Ferry Service |

| Priority # | # Votes | Project Description |
|---|---|---|
| 8 | 2 | Permanent HazMat Site |
| 8 | 2 | Enforcement of Fireworks Ban |
| 9 | 1 | Widgeon Way—one-way road system |
| 9 | 1 | Enhanced Code Enforcement/Assistance with Compliance |
| 9 | 1 | Develop Communication Plan with Alternate Communication Methods |
| 9 | 1 | Increase Road Signage, Property Addressing |
| 9 | 1 | OHV Enforcement |
| 0 | 0 | Shaded Fuelbreaks on WUIs |
| 0 | 0 | Water System Improvement—Avenues & Widgeon Way |

## A.6. Soda Bay, Rivieras, Buckingham

*Riviera Elementary School, October 29, 2008*

Community Attendees

- Carolyn Beach
- Julie Berry
- Cecil Dixon
- Diana Dixon
- Denise Frane
- John Herring
- Cheri Kendrick
- Norm Longoria
- Mary Manning
- Sandy Moura
- Peggy O'Day
- Nora Star
- Linda Tellardin
- Steve Tellardin
- Don Timme
- David Whett
- Walter Zuercher

Local issues: Shake roof on Peninsula

Brian Burnham, Kelseyville Fire, Local Fire Protection Update

Water systems, defendable homes would be great. It all comes down to taking care of our homes and encouraging others to do so, even the absentee owners. His office sends notices to people who may only have bought the property as an investment; they do not maintain it. That's why they keep working on these lots. He could use more enforcement on the CC&Rs, where it states the property *shall* be maintained and cleared annually. We need volunteers to assist with these programs. It's a lot of work. Definitions of what our abatement process should be should be clarified. It's better now than it was 7 years ago.

Add Sierra Club and Water Quality on the Fire Safe Council to be able to hash out obstacles ahead of time.

Local Fire History Remembered

- Mt. Konocti fire—1951, kids playing with matches.
- Glasgow Grade—Mining Flat Fire, roadside.
- Wind comes off the lake and goes up. Northwest prevailing winds, coming down the mtns. Variable. The winds turn at 3pm.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 8 | Fire Safety Regulations During Real Estate Transactions with Enforcement |
| 2 | 6 | Expanding Hours and Coverage of Clearlake Riviera Fire Station |
| 2 | 6 | Extend Fairway Drive to 29 for Evacuation Route |
| 2 | 6 | Alternate Evacuation Route out of Clearlake Riviera Subdivision |
| 3 | 5 | Improve Point Lakeview Road as Evacuation Route |

| Priority # | # Votes | Project Description |
|---|---|---|
| 3 | 5 | Fuelbreak Behind Clearlake Riviera |
| 4 | 4 | 5000-gal. Pumper Boats |
| 4 | 4 | Clearance along Soda Bay Road |
| 4 | 4 | Expanding Hours/Coverage for Riviera Heights Fire Station |
| 5 | 3 | Brush Masticator |
| 5 | 3 | Free Chipper Program |
| 5 | 3 | Weed Abatement Ordinance with Enforcement |
| 5 | 3 | New and Improved Fire Hydrants throughout Region |
| 5 | 3 | Fuel Reduction at Wheeler Point |
| 5 | 3 | Expand CAL FIRE Compound (Conservation Camp) |
| 6 | 2 | Evacuation Siren |
| 7 | 1 | Video Camera at Radio Tower for Firefighters |
| 0 | 0 | New Evacuation Route—Riviera West Subdivision |
| 0 | 0 | Improved helicopter pad—off Golf Course |
| 0 | 0 | New Water System—Buckingham |
| 0 | 0 | Fuel reduction—Little Borax Lake Road |
| 0 | 0 | No Smoking in Cars |

## A.7. Jago Bay, Lower Lake, Clearlake

*Brick Hall, October 27, 2008*

Community Attendees

- Angie Siegel
- Bill Perkins
- Charlotte Griswold
- Dan Desmond
- Frank Meisenbach
- Kathee Toy
- Lois Meisenbach
- Scott Davidson
- Shirley A. Struempf
- Victoria Brandon
- Marty Englander
- Ben Lawson
- Ricky Junker

Morgan Valley recent fires; can't get insurance

Charlie Diener, Battalion Chief, Lake County Fire District, Local Fire Protection Update

Offices are always open—will try to help with neighbor problems and get them to change their ways. Ingress and egress problems in area—Point Lakeview. Getting together in own communities to discuss evacuation for each other. Charlie will come to public meetings to visit and talk about issues. Go out into structure protection mode. Certain things that they look for. Want to be able to save every home; look at homes. Too much vegetation, trashy decks, junipers, vs. proper clearance; if they can get an engine in there, they will make every effort. Have to make tough decisions out there. Help us help you. They have rules they have to live by in order to live. If you know anybody they need volunteers—volunteerism was big; over time, training rules have changed, times have changed. A lot more training required now; more time is involved now. They still have room for volunteers. Must be 18; everyone goes through fire academy; physical, medical clearance. Train twice a month in evenings. They have to be committed. Cadet/explorer program cancelled because of liability insurance issues. Agreement between Lake County Fire District and CAL FIRE. Smoke detectors! Carbon dioxide detector in your home.

Local Fire History Remembered

- Three fires on Dam Road South.
- Electrical fire; abandoned structure.
- Fire just the other day in sleep hollow = suspicious fire. Individual using bird scarer where they shouldn't have been using them.
- Hwy. 29 north of Twin Lakes. Pulled over into tall grass with car. Put embers up in Perini Road. Couple miles from original fire.

- Clearlake Park house burned the other night.
- Fire from blown transformer on Hwy. 29.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 7 | Evacuation Plan and Publicity |
| 2 | 6 | Chapman Tract Fuel Reduction |
| 3 | 5 | Rocky Creek Road Fuel Reduction |
| 3 | 5 | Small Animal Evacuation Planning and Preparation—Education |
| 4 | 4 | Defensible Space Billboard Campaign |
| 4 | 4 | Develop Livestock Evacuation—Butte Rock Ranch |
| 4 | 4 | Twin Lakes Wildlands Fuel Reduction |
| 4 | 4 | Replace Perini Creek Culvert Bridge |
| 5 | 3 | Organize Neighbors for Fuel Reduction—Murphy Springs/Perini Hill/Road |
| 6 | 2 | More Volunteers—Pt. Lakeview Station/Anderson Rd. |
| 6 | 2 | Clear Lake Park Fuel Reduction |
| 6 | 2 | Sulphur Bank/Borax Lake Fuel Reduction |
| 6 | 2 | Hwy. 53-Hwy. 20 Corridor Fuel Reduction |
| 6 | 2 | Repair Sulphur Bank Slide |
| 6 | 2 | Widen Bridges on Burns Valley Creek |
| 7 | 1 | Repair San Joaquin Slide |
| 0 | 0 | K-12 Fire Education Program |

## A.8. Finley, Kelseyville

*American Legion Hall, October 30, 2008*

Community Attendees

- Blaine Baker
- Brian Burnham
- Judy Cardinale
- Susan Feiler
- Kevin Ingram
- John McGann
- Susan McGann
- Catherine Quistgard
- Carolyn Ruttan
- Chris Ruttan
- Roland Shaul

Brian Burnham, Kelseyville Fire, Local Fire Protection Update

We have town limits, large agricultural areas, and outskirt high fuel areas. In town: we have a quick response, 3-5 minutes since we are so close.

On agricultural land, farm equipment and chemicals frequently involved, hay-barn fires (long and hard to extinguish). In the WUI, where the ranches meet the high fuel areas, this is where the critical fires can start.

Great cooperation with CAL FIRE, very thankful for them.

Finley: grasses, vacant orchards, fuel loads are not too heavy. Separated by dirt roads, lots of green. Pumphouses carry voltage—a hazard to firefighters.

Fires in the creek areas—high vegetation and fences are obstacles. Or a power line falls onto a fence going into a fire, can't touch the fence until the power is turned off. Fences a local problem. Old buildings with roofs built on top of older roofs, problem when fighting fires there.

Local Fire History Remembered

- Highland Springs fires, 100 acres, 1-2 years ago, at entrance to park.
- Soda Bay Road, by state park, jumped road and burned Green Acres.
- 95—burned through Saddleback toward state park.
- Hopland grade last year, possibly vehicle start.
- Fire on 29 toward Middletown, caused by chain holding boat, rubbing the road.
- Soda Bay road, catalytic converter or break embers.
- Highland Springs Road, 3-4 weeks ago, dropped power line, fell to the grass.
- Red Fire, Beaner, and Hwy. 29—dropped power line.
- Many power lines are getting old and are dropping.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 7 | Fuel Hazard Reduction on Upper Kelsey Creek—Burn and Mechanical |
| 2 | 6 | Highland Springs Recreation Area, Firebreak Maintenance |
| 2 | 6 | Assistance with Community Fuel Reduction |
| 2 | 6 | Repair and Staff Mt. Konocti Lookout |
| 3 | 4 | Fire Safety Education |
| 4 | 3 | Fuel Reduction on Mt. Konocti |
| 4 | 3 | Prescribed Burn on BLM lands, Highland Springs to Sheldon Creek |
| 5 | 2 | Assistance with Community Discing/Tilling for Weed Abatement |
| 5 | 2 | Fire Plan Development for Public Lands on Mt. Konocti |
| 5 | 2 | Community Chipper |
| 5 | 2 | Fuel Hazard Reduction—Adobe Creek |
| 6 | 1 | Shaded Fuelbreak along Hwy. 29 |
| 6 | 1 | Shaded Fuelbreak along Bottle Rock Road |
| 0 | 0 | Tule Fuel Reduction (as Ecologically Appropriate) |
| 0 | 0 | Shaded Fuelbreak on Soda Bay Road |

## A.9. Cobb Mountain

*Cobb Mountain Lions Club, October 25, 2008*

Community Attendees

- Bruce Anderson
- Mike Boyce
- Keith Fricker
- David Henderson
- Madelyn Martinelli
- Pat Meyer
- Scott Parady
- Tom Slaight
- Robert Stark

*Meeting filmed by Hiram Dukes.*

Frustration expressed regarding the enforcement of clearing and weed abatement ordinances, between Dave Henderson and CAL FIRE.
Signage program with South Lake Fire Safe Council—applicant says it has been a year since her first of three requests. Dave Henderson says they are working on it. Signage needs to be improved on Bottle Rock Road (only signed from one direction)—make sure this is listed on the priorities.

Linda Green, CAL FIRE—Local Fire Protection Update
Two stations nearby. Middletown station will stay staffed through the winter, as will Cobb thanks to mutual aid with other counties.

Bruce Anderson, South Lake Fire Safe Council (SLFSC)—Presentation and Update
Just got three new members.
Chipping program. Next time will be the end of the month (October). The chipping has been decreasing, people will not get the material ready to chip. Bruce says they will have to compile a list of vendors able to prep properties for chipping.
Get their money from Title 3, county funds. Organization is all volunteer.
Reflective Address program: in the process, slowly, of getting an address for the streets, non-County roads, that are unmarked. Hoping to get an address for these streets, using the same signs as the County roads.
Education Program: They will come and speak at any meeting to which they are invited.
Firebreak Program: now have one around ¾ of Loch Lomond. (Attendee lives in the uncleared part, has done extensive clearing on his own and is interested in working with them.) Now they need the folks wanting a firebreak to help the SLFSC to create it.

Local Fires Remembered
- Geysers 2003/4—Road by Unit 13, electrical connection from CalPine, burned south into Sonoma County
- Anderson Springs—50's
- Cobb Mtn.—60's
- Witter Creek—'64

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | 10 | Weed Abatement, Brush and Hazard Reduction. Abatement Ordinance, including Staffing and Enforcement, through South Lake County Fire Department |
| 2 | 7 or 8 | Expand Water Systems to Accommodate Fire Needs |
| 3 | 5 | Controlled Burns on BLM Land |
| 3 | 5 | Shaded Fuelbreak—Whispering Pines |
| 3 | 5 | SLFSC Shaded Fuelbreak—Gifford Springs |
| 4 | 3 | Fire Water Pond |
| 4 | 3 | Controlled Burning Education Program |
| 4 | 3 | SLFSC Shaded Fuelbreak—Anderson Springs |
| 5 | 2 | Mass-mailing to Residents to Educate about Fire-Safety Issues. CalPine has Mitigation Fund that would be Appropriate Funding Source. |
| 5 | 2 | SLFSC Shaded Fuelbreak—Seigler Springs (on Cooper and Water Co. Properties) |
| 6 | 1 | Controlled Burn on Parady Property |
| 6 | 1 | SLFSC Shaded Fuelbreak—Seigler Canyon |
| 6 | 1 | Shaded Fuelbreak—Shenendoah |
| 0 | 0 | Shaded Fuelbreak—Bonanza Springs |
| 0 | 0 | Shaded Fuelbreak—Siegler Springs North |

## A.10. Hidden Valley, Middletown

*Calpine Visitors Center, October 21, 2008*

Community Attendees
- Ronnie Boyd
- Bill Franklin
- Doug Gearhart
- Ken Gonzales
- Dwight Holford
- David Lansdowne
- Christalene Loren
- Sajja Mahmud
- Monica Rosenthal

Dave Miinch, South Lake Fire, Local Fire Protection Update

Wildfire environment not the threat but what we've put into it. Have to be good stewards of the wildland if we're moving into it. Activity is picking up fires getting bigger because more people moving into area. Owners aren't taking the proper procedures to care of properties.

Recent codes have finally gotten serious important changes. News codes are a good start. Fire resistant materials on buildings. Must be "class A" roof now. Must close off eaves now. Fire brands under eaves go into attic. Once fire is in attic you're going to have loss. Windows. One pane must be tempered now. As you can afford it; change siding; spark arrester on fire place. Have to stay on top of grass, limb up trees. Protect your house; offer to help neighbor. Support neighbors. Take it upon self to do it yourself, working together as a community. Better to work together. District has changes in last 7 years. Staffing in Hidden Valley, Cobb Mountain; adding additional engine for Cobb area. 24/7 CAL FIRE augments staffing for South Lake Fire, Amador contract. Can hire additional personnel. Extensive use of grant funding. New ambulance and additional water tender, new wildland engine. Updating equipment, communications, working with neighbors. Same pager as CAL FIRE. Works closely with CAL FIRE. Do vegetation management program (VMP) burns. Prescribed burning to protect communities. South Lake Fire Safe Council (SLFSC): firebreaks, shaded fuelbreaks. In Loch Lomond and Cobb. Large district: 289 square feet. Looking at Anderson Springs box Canyon one way in and out. Fuelbreaks, and reducing fuel loading. Jerusalem Valley—more development. Make sure chipper program is offered in that area and making community more aware. Addressing program. Evacuation plan from SLFSC.

Resident wants to know if there's someone to enforce codes. Hidden Valley is proactive. If property owner doesn't clean it up South Lake Fire can go to CAL FIRE; cheaper to just pay fine. County Community Development has enforcement division. 4291 inspection. Community peer pressure.

Local Fire History Remembered

None noted.

**Community-Identified Priority Projects**

| Priority # | # Votes | Project Description |
|---|---|---|
| 1 | | Road Side Masticator |
| 1 | | Water Tanks for Jerusalem Grade |
| 2 | 4 | Another Chipper for South Lake Fire District with South Lake Fire Safe Council |
| 2 | 4 | Extend Fire Hydrant System in Middletown |
| 2 | 4 | Fuelbreak and Improved Access along Ridge Road |
| 2 | 4 | Brush Clearing on Dry Creek Road |
| 2 | 4 | Fire Education in Schools |
| 2 | 4 | Secondary Egress on Jerusalem Grade |
| 3 | 3 | Local Website with Updated Fire Info |
| 3 | 3 | Water Tanks for Hidden Valley/Ranchos |
| 3 | 3 | Improve Roads and Signage on Jerusalem Grade |
| 4 | 2 | Brush Clearing on Harbin Springs Road |
| 5 | 1 | Shaded Fuelbreak North of Harbin Hot Springs |
| 5 | 1 | Open Hidden Valley Gates to Ranchos |
| 5 | 1 | Shaded Fuelbreak Harbin Hot Springs |

## Appendix B1: Community Meeting Data and Results

The following tables are the risks and hazards, priority projects, and evacuation sites as identified through the community meetings held for this CWPP in October 2008. Values at risk and other data collected at the meetings is shown on the community maps in Appendix B2.

### B1.1. Community Identified Risks and Hazards

There are numerous wildfire hazards and risks within Lake County. The following tables show the hazards and risks identified throughout the ten planning areas, plus Lake Pillsbury. They are shown graphically on the maps in Appendix B2 as "Risks/Hazards".

***Figure 1. Identified Risks and Hazards: Transportation System Issues***

Many of the risks and hazards associated with roads and bridges are in regards to road and bridge quality, gates, and road blockages. These are shown on the maps in Appendix B2 as "Transportation System Issue".

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Van Dorn Reservoir Bridge, Diamond Dust Trail, Ettawa Springs, Rainbow Dr., Rockies Rd., Loch Lomond Rd./N. Seigler, Glenbrook |
| Clearlake, Lower Lake | Perini Creek Culvert, Rocky Creek, Pamela, Sulphur Bank Rd., San Joaquin Rd., Morgan Valley |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | Widgeon Way Rds., Sulphur Bank Rd., Pingree, Bridge at Clarks Island, Cattle Ramps on Round Mountain Rd., Glenhaven Dr., Garden Ct. |
| Kelseyville, Finley | Merritt Crossing/Adobe Creek, Bell Hill/Adobe Creek, Wildcat Bridge, Highland Springs Toll Rd., Diamond Dust, Konocti Rd. |
| Lakeport, Scotts Valley | Hendricks Bridge, Pool Creek Bridge, Entrance to Scotts Valley from Hwy 20, Private Bridges – East Scotts Valley, Mathews Bridge |
| Lucerne, Nice | Fulton Tri, Pyle Rd. |
| Lake Pillsbury | Ranch Main Gate, PGE Campground Gate, Scott Dam Gate, USFS Road M-8, Narrow Bridge Booth Crossing |
| Middletown, Hidden Valley | Hildeband Bridge, Ettawa Bride (2 Crossings), Big Canyon Rd., Dry Creek Crossing, Dry Creek, Wardlow, Jerusalem Grade |
| Rivieras, Buckingham, Soda Bay | Konocti Lookout Gate, Harbor Rd., South Lake Annex, Hillside Ct., Palace Ct., Konocti Vista Rd. |
| Spring Valley, Double Eagle | Old Long Valley Rd., North and South Wolf Creek Bridges, Doe Trail, Chalk Bluff Rd., New Long Valley Rd., Garner Bridge, Nursery Bridge |
| Upper Lake, Blue Lakes | USFS M-8 Rd., "The Slides", Witter Springs, Bachelor Valley Rd., Diversion Bridge, Pitney Lane Bridge, White Rock Canyon Bridge |

***Figure 2. Identified Risks and Hazards: Hazardous Fuels***

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Big Canyon, Anderson Springs, Rosa Trail, Rolling Hills Parking Lot, Gifford Springs |
| Clearlake, Lower Lake | Provensalia to Dump, Nobel Ranch, Twin Lake Subdivision |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | Wigeon Way and Lakeview, Cerrito Way, Bruner Dt. Glenhaven Interface, Lakeview Interface, Nylander Property, Morine Rd., Catholic Church Rd. |
| Kelseyville, Finley | Mt. Konocti, Adobe Creek, Kelsey Creek, Kelsey/Cobb, Highland Springs, Tule's along Clear Lake Shoreline |
| Lakeport, Scotts Valley | Brewery Rd., Scott Creek Watershed |
| Lucerne, Nice | Lucerne Park (Morehead), Foothill Area – Paper Parcels, Gardner Valley |
| Lake Pillsbury | Smokehouse Hazard Fuel Area (HFA), West Shore HFA, Rice Fork HFA (Around Homes), Erickson Ridge HFA |

| | |
|---|---|
| Middletown, Hidden Valley | None Identified |
| Rivieras, Buckingham, Soda Bay | Thurstan Creek Drainage, Soda Bay Interface, Horseshoe Bay, Buckingham Golf Course, Black Forest |
| Spring Valley, Double Eagle | Wolf Ridge, Double Eagle Rd., Helen Mitcham Park, Quartz Canyon, Wolf Creek Rd., Double Eagle, Spring Valley Lakebed, Old Long Valley Roadside, Benmore Canyon, Salt Canyon, Wilson Glade, New Long Valley Rd. |
| Upper Lake, Blue Lakes | White Rock Canyon Rd. |

***Figure 3. Identified Risks and Hazards: Hazardous Fuels Along Roads***

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Anderson Springs, Rainbow Dr., Sulphur Creek Rd., Fisheries Spring Rd., Circle Rd., Ettawa Springs Rd., Alpine Meadows Subdivision Rd., Casale Rd., Ridge Rd. |
| Clearlake, Lower Lake | Anderson Rd. |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | Joseph Trail, Sulphur Bank |
| Kelseyville, Finley | Highway 29, Gaddy Dr., Clark Dr., Bottle Rock Rd., Gas Hill, Sand Hill |
| Lakeport, Scotts Valley | Highway 29, Laurel Dell Rd., Blue Lakes Rd. |
| Lucerne, Nice | None Identified |
| Lake Pillsbury | None Identified |
| Middletown, Hidden Valley | Jerusalem Grade, Sandy Rd., Sheveland Rd. |
| Rivieras, Buckingham, Soda Bay | Soda Bay Rd., Highway 29, Bass Rd. |
| Spring Valley, Double Eagle | Highway 20 |
| Upper Lake, Blue Lakes | Pitney Ln., Clover Valley Rd., Highway 20, Hunter Point Rd., Elk Mountain Rd., Van Ranch Rd. |

***Figure 4. Identified Risks and Hazards: Transmission Lines, Petroleum, and Propane***

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Power Lines |
| Clearlake, Lower Lake | Card Lock Fuel |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | High Tension Power Lines, Gas Stations |
| Kelseyville, Finley | Helms Fuel Storage, Airport Fuel Storage |
| Lakeport, Scotts Valley | Helms Petroleum |
| Lucerne, Nice | High Tension Power Lines, Blue Star Propane, Gas Stations, Sentry Market, |
| Lake Pillsbury | None Identified |
| Middletown, Hidden Valley | Amerigas |
| Rivieras, Buckingham, Soda Bay | Transmission Lines, Gas Stations, Konocti Transmission Tower |
| Spring Valley, Double Eagle | High Tension Power Lines |
| Upper Lake, Blue Lakes | Blue Star Gas, Power Lines Across Highway 20, High Voltage Power Lines Through Wildland Areas |

***Figure 5. Identified Risks and Hazards: Populated/Wildland Urban Interface Areas***

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Pine Grove #1, Seigler Springs, Whispering Pines, Mt. Hannah Subdivision |
| Clearlake, Lower Lake | Chapman Tract, Gobbi Desert Subdivision, Twin Lakes, Bell Circle Housing, Cache Creek Mobile Homes |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | Trailer Park, Elem Colony |
| Kelseyville, Finley | None Identified |
| Lakeport, Scotts Valley | Rancheria, Blue Lake Narrows, The Narrows RV/Campground, North Lakeport |
| Lucerne, Nice | Nice WUI and Lucerne WUI |
| Lake Pillsbury | None Identified |
| Middletown, Hidden Valley | Mobile Home Park, Hidden Valley Ranchos |
| Rivieras, Buckingham, Soda Bay | Braito Property, Clear Lake Riviera Marina, Mt Konocti WUI, Riviera Heights, Boren Vega, Innisfree |
| Spring Valley, Double Eagle | None Identified |
| Upper Lake, Blue Lakes | Mobile Home Park |

***Figure 6. Identified Risks and Hazards: Natural Areas***

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Ettawa Springs, Mt. Hannah |
| Clearlake, Lower Lake | Sulphur Bank Ridge, BLM Lands and Morgan Valley, Bald Mountain, Murphy's Springs |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | None Identified |
| Kelseyville, Finley | Clearlake State Park Campgrounds |
| Lake Pillsbury | Eel River Corridor Day Use and Camping Area |
| Lakeport, Scotts Valley | Spyder Mountain (Cristallago) Entrance to South Cow Mountain |
| Lucerne, Nice | None Identified |
| Middletown, Hidden Valley | Dry Creek |
| Rivieras, Buckingham, Soda Bay | Thurstan Creek Drainage |
| Spring Valley, Double Eagle | None Identified |
| Upper Lake, Blue Lakes | Eucalyptus Plantation, Walnut Orchard, Forks Fire Regeneration Area, Upper Cache Creek Watershed, Eel River Watershed |

***Figure 7. Identified Risks and Hazards: Industrial Sites***

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Reynolds Industries |
| Clearlake, Lower Lake | The Dump |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | None Identified |

| | |
|---|---|
| Kelseyville, Finley | Wildhurst Winery, Steele Winery, Kendall Jackson Winery, Dusinberre Winery, Chemical Storage, Riley's Feed Store |
| Lake Pillsbury | None Identified |
| Lakeport, Scotts Valley | None Identified |
| Lucerne, Nice | None Identified |
| Middletown,<br>Hidden Valley | None Identified |
| Rivieras, Buckingham, Soda Bay | None Identified |
| Spring Valley, Double Eagle | None Identified |
| Upper Lake, Blue Lakes | "Last Mile" Auto Salvage Yard, Piviniska's, Dave's Haybarn |

***Figure 8. Identified Risks and Hazards: Miscellaneous***

| Communities | Identified Risks |
|---|---|
| Cobb Mountain | Anderson Springs Recreation Center, Swartz, Foothill, Hilltop |
| Clearlake, Lower Lake | Sunrise Shores, Modern RRV, Brown's RRV |
| Clearlake Oaks, Glenhaven,<br>Paradise Valley, Kono Tayee | Flagship Marine, Soderling |
| Kelseyville, Finley | Bottle Rock |
| Lake Pillsbury | Gravelly Strip Shooting Site, Boat In Camping Area Around Horse Pasture Ridge |
| Lakeport, Scotts Valley | Abandoned Structures, Pest Control Business |
| Lucerne, Nice | Pyle Rd. – Off-Highway Vehicle and Off-Road Vehicle; Second Canyon – Off-Highway Vehicle |
| Middletown,<br>Hidden Valley | Motocross, Levee |
| Rivieras, Buckingham, Soda Bay | None Identified |
| Spring Valley, Double Eagle | None Identified |
| Upper Lake, Blue Lakes | None Identified |

## B1.2. Community-Identified Potential Projects[1]

As discussed in Chapter 2, a series of meetings were held throughout the county where community members were given the opportunity to identify their top priority fire-safety projects. Residents were asked to brainstorm and think "outside the box," beyond issues of ownerships or regulations. This was done so community members would not restrict their thinking to what they thought was possible, which could be quite subjective. Some of these prioritized projects may not be realistic given today's political and regulatory climate. However, they are important to review in terms of community priorities given the opportunity to put everything on the table and "think big." The following table identifies the top-ranking priorities for each community. All identified potential projects are shown on the maps in Appendix B2 as "Proposed Actions".

***Figure 9. Priority Projects Identified at Community Meetings***

| Communities | Mtg. Priority Ranking | Project Description | Project Category |
|---|---|---|---|
| Clearlake, Lower Lake | 1 | Evacuation Plan and Publicity | Evacuation/Education |
| Clearlake, Lower Lake | 2 | Chapman Tract Fuel Reduction | Fuel Reduction |
| Clearlake, Lower Lake | 3 | Small Animal Evacuation Planning and Preparation – Education | Evacuation/Education |
| Clearlake, Lower Lake | 3 | Rocky Creek Rd. Fuel Reduction | Fuel Reduction |
| Clearlake, Lower Lake | 4 | Defensible Space Billboard Campaign | Education |
| Clearlake, Lower Lake | 4 | Develop Livestock Evacuation for Butte Rock Ranch | Evacuation/Education |
| Clearlake, Lower Lake | 4 | Replace Perini Creek Culvert Bridge | Fire Protection |
| Clearlake, Lower Lake | 4 | Twin Lakes Wildlands Fuel Reduction | Fuel Reduction |
| Cobb Mountain Area | 1 | Weed/Brush/Hazard Reduction Abatement Ordinance with Staff/Enforcement | Policy |
| Cobb Mountain Area | 2 | Expand Water Systems to Accommodate Fire Needs | Water/Fire Protection |
| Cobb Mountain Area | 3 | Shaded Fuel Break – Whispering Pines | Fuel Reduction |
| Cobb Mountain Area | 3 | Shaded Fuel Break – Gifford Springs | Fuel Reduction |
| Cobb Mountain Area | 3 | Controlled Burn on BLM Lands | Prescribed Fire |
| Cobb Mountain Area | 4 | Controlled Burning Education Program | Education |
| Cobb Mountain Area | 4 | Shaded Fuel Break on Anderson Springs | Fuel Reduction |
| Cobb Mountain Area | 4 | Develop Fire Water Pond near Loch Lomond | Water/Fire Protection |
| Middletown, Hidden Valley | 1 | Road Side Masticator | Fuel Reduction/Equipment |
| Middletown, Hidden Valley | 1 | Water Tanks for Jerusalem Grade | Water/Fire Protection |
| Middletown, Hidden Valley | 2 | Fire Education in Schools | Education |
| Middletown, Hidden Valley | 2 | Secondary Egress on Jerusalem Grade | Fire Protection |
| Middletown, Hidden Valley | 2 | Brush Clearing on Dry Creek Rd. | Fuel Reduction |
| Middletown, Hidden Valley | 2 | Fuel Break and Improved Access along Ridge Road Northwest of Harbin Springs Rd. | Fuel Reduction |

[1] These projects (and others identified at community meetings) are suggestions made by meeting participants. By listing them here we do not take a position on the statement. They are listed here to demonstrate community concerns.

| Communities | Mtg. Priority Ranking | Project Description | Project Category |
|---|---|---|---|
| Middletown, Hidden Valley | 2 | Chipper for Fire District with South Lake Fire Safe Council | Fuel Reduction/Equipment |
| Middletown, Hidden Valley | 2 | Extend Fire Hydrant System in Middletown | Water/Fire Protection |
| Kelseyville, Finley | 1 | Fuel Hazard Reduction on Upper Kelsey Creek | Fuel Reduction |
| Kelseyville, Finley | 2 | Repair and Staff Mt. Konocti Lookout | Fire Protection |
| Kelseyville, Finley | 2 | Fire Break Maintenance on Highland Springs Recreational Area | Fuel Reduction |
| Kelseyville, Finley | 2 | Assistance with Community Fuel Reduction | Fuel Reduction |
| Kelseyville, Finley | 3 | Fire Safety Education | Education |
| Kelseyville, Finley | 4 | Fuel Reduction on Mount Konocti | Fuel Reduction |
| Kelseyville, Finley | 4 | Prescribed Burning at Highland Springs and Sheldon Creek | Prescribed Fire |
| Lakeport, Scotts Valley | 1 | Prescribed Fire, Old Cow Mountain to Hopland Mountain | Prescribed Fire |
| Lakeport, Scotts Valley | 2 | CityWatch Apparatus moved to Dispatch Facility | Fire Protection |
| Lakeport, Scotts Valley | 2 | 2 Type 3 Water Tenders with Staffing (Especially for Scotts Valley) | Water/Fire Protection |
| Lakeport, Scotts Valley | 3 | Active Fire Safe Council with Private Landowner Support | Education |
| Lakeport, Scotts Valley | 3 | Cow Mountain Fuel Break – Maintenance and Expansion | Fuel Reduction |
| Lakeport, Scotts Valley | 3 | Ongoing Mosaic Burning | Prescribed Fire |
| Lake Pillsbury | 1 | Increase Revenue for Lake Pillsbury Volunteer Fire Department | Fire Protection |
| Lake Pillsbury | 2 | Rice Fork Fuel Reduction | Fuel Reduction |
| Lake Pillsbury | 2 | Smokehouse Creek Prescribed Fire Area | Prescribed Fire |
| Lake Pillsbury | 3 | Fix the M-8 Logging Road for Evacuation and Fire Protection | Evacuation |
| Lake Pillsbury | 4 | Siren Warning System (Communication Link) | Fire Protection/Equipment |
| Lake Pillsbury | 4 | Radio Repeater on Hull Mountain | Fire Protection/Equipment |
| Lucerne, Nice | 1 | Upgrade Senior Center to Disaster Center Readiness | Fire Protection |
| Lucerne, Nice | 1 | Additional Staff for Northshore Fire Protection District | Fire Protection |
| Lucerne, Nice | 2 | Upgrades – Communications – Computerized Communication Repeaters | Fire Protection/Equipment |
| Lucerne, Nice | 2 | Chipper Program | Fuel Reduction/Equipment |
| Lucerne, Nice | 3 | Enforcement of Weed/Brush Abatement Ordinance, with Enforcement Officer | Policy |
| Lucerne, Nice | 4 | Task Force To Create Defensible Space For Vulnerable Populations | Fuel Reduction |
| Lucerne, Nice | 5 | Additional Medical Equipment – Ambulances, Etc | Fire Protection/Equipment |

| Communities | Mtg. Priority Ranking | Project Description | Project Category |
|---|---|---|---|
| Lucerne, Nice | 5 | Hogback Ridge Fuel Break and Prescribed Burn | Prescribed Fire |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee | 1 | Bridge over Narrows | Fire Protection |
| C.lake Oaks, G.haven, P. Vlly., K. Tayee | 1 | Additional staffing for Northshore Fire Protection District | Fire Protection |
| C.lake Oaks, G.haven, P. Vlly., K. Tayee | 2 | Education and Outreach on Defensible Space | Education |
| C.lake Oaks, G.haven, P. Vlly., K. Tayee | 2 | Reverse 911 System | Fire Protection |
| C.lake Oaks, G.haven, P. Vlly., K. Tayee | 2 | Free Public Dumping – Monthly | Fuel Reduction |
| C.lake Oaks, G.haven, P. Vlly., K. Tayee | 3 | Evacuation Plan | Evacuation |
| Rivieras, Buckingham, Soda Bay | 1 | Fire Safety Regulations during Real Estate Transactions with Enforcement | Policy |
| Rivieras, Buckingham, Soda Bay | 2 | Extend Fairway Dr. to Hwy. 29 for Evacuation Route | Evacuation |
| Rivieras, Buckingham, Soda Bay | 2 | Alternate Evacuation Route out of Clear Lake Riviera Subdivision | Evacuation |
| Rivieras, Buckingham, Soda Bay | 2 | Expanding Hours/Coverage – Clear Lake Riviera Fire Station | Fire Protection |
| Rivieras, Buckingham, Soda Bay | 3 | Improve Point Lakeview Rd. as Evacuation Route | Evacuation |
| Rivieras, Buckingham, Soda Bay | 3 | Fuel Break behind Clear Lake Riviera | Fuel Reduction |
| Spring Valley, Double Eagle | 1 | Build Bridge on Old Long Valley Rd. and Grade the Road | Fire Protection |
| Spring Valley, Double Eagle | 2 | Double Eagle – Fire Safety Education and Outreach | Education |
| Spring Valley, Double Eagle | 2 | Spring Valley Fire Station Staffing | Fire Protection |
| Spring Valley, Double Eagle | 3 | Grant for a Chipper | Fire Protection/Equipment |
| Spring Valley, Double Eagle | 3 | Wolf Ridge Burn | Prescribed Fire |
| Spring Valley, Double Eagle | 4 | Extend Garner/High Valley Rd. to Make Passable Evacuation Route | Evacuation |
| Spring Valley, Double Eagle | 4 | Quartz Canyon Controlled Burn | Prescribed Fire |
| Upper Lake, Blue Lakes | 1 | Prescribed/Controlled Burning in National Forest | Prescribed Fire |
| Upper Lake, Blue Lakes | 2 | Ongoing Fuel Break Maintenance | Fuel Reduction |
| Upper Lake, Blue Lakes | 3 | Education and Outreach – Defensible Space | Education |
| Upper Lake, Blue Lakes | 4 | Program to Assist Residents with Defensible Space | Fuel Reduction |

| Communities | Mtg. Priority Ranking | Project Description | Project Category |
|---|---|---|---|
| Upper Lake, Blue Lakes | 4 | New Water Tender for Upper Lake | Water/Fire Protection |
| Upper Lake, Blue Lakes | 5 | Weed Abatement Program | Policy |

## B1.2.1. Summary of Community-Identified Priority Projects

From the information generated and discussed above, the following actions have been identified as community priorities through the public process.

***Figure 10. Community-Identified Priority Projects***

| Communities | Project Description |
|---|---|
| **Evacuation** | |
| Clearlake Oaks, Glenhaven, P Vlly, K Tayee; Clearlake, Lower Lake; Spring Valley, Double Eagle; Upper Lake, Blue Lakes | Develop Evacuation Plans, Routes, and Sites. Publicize through Community Education |
| Rivieras, Buckingham, Soda Bay | Alternate Evacuation Routes: Clear Lake Riviera, Rivieras West, Extend Fairway Dr., Improve Point Lakeview Rd. |
| Lake Pillsbury | Fix the M-8 Logging Road for Evacuation and Fire Protection |
| Spring Valley, Double Eagle | Explore Alternate Evacuation Routes: Extend Garner/High Valley Rd.; Wolf Creek to Bartlett Springs; Cougar Rd. to Benmore Canyon; Hwy 53 to New Long Valley Rd. |
| Middletown, Hidden Valley | Open Hidden Valley Gates to Ranchos for Evacuation |
| Clearlake, Lower Lake | Small Animal and Livestock Evacuation Planning and Preparation |
| Rivieras, Buckingham, Soda Bay; Lake Pillsbury; Spring Valley, Double Eagle | Evacuation Sirens |
| Spring Valley, Double Eagle | Enhance Spring Valley CERT Team; Double Eagle Community Assessment and Phone Tree |
| Lake Pillsbury | Fire Department Training Program |
| Clearlake Oaks, Glenhaven, P Vlly, K Tayee; Rivieras, Buckingham, Soda Bay | Explore Potential Ferry Service, Boats as Evacuation on the Lake, More Fire Boats |
| **Fire Protection/Emergency Response** | |
| Lakeport, Scotts Valley; Clearlake Oaks, Glenhaven, Paradise Vlly, Kono Tayee | CityWatch Apparatus moved to Dispatch Facility |
| Lucerne, Nice | Upgrade Senior Centers to Disaster Centers |
| Lucerne, Nice; Clearlake Oaks, Glenhaven, P Vlly, K Tayee; Upper Lake, Blue Lakes | Addressing and Signage Programs |
| Lucerne, Nice; Clearlake Oaks, Glenhaven, P Vlly, K Tayee; Rivieras, Buckingham, Soda Bay; Upper Lake, Blue Lakes | Additional Staff/Volunteers for Northshore Fire Protection District in general, Spring Valley Fire Station, Upper Lake; Riviera Heights and Clear Lake Rivieras Stations, Point Lakeview |
| Middletown, Hidden Valley | Secondary Egress on Jerusalem Grade |
| Spring Valley, Double Eagle | Build Bridge on Old Long Valley Rd. and Grade the Road; Improve Double Eagle Road System |
| Clearlake Oaks, Glenhaven, P Vlly, K Tayee | Improve Widgeon Way |

| Communities | Project Description |
|---|---|
| Clearlake, Lower Lake | Replace Perini Creek Culvert Bridge, Sulphur Bank Slide, Widen Bridges on Burns Valley Creak, Repair San Joaquin Slide |
| Kelseyville, Finley; Lake Pillsbury | Repair and Staff Mt. Konocti Lookout, Hull Mountain Lookout |
| Lucerne, Nice; Lake Pillsbury | Communication Upgrades: Computerized Communication Repeaters, Radio Repeater on Hull Mountain |
| Lucerne, Nice | Additional Medical Equipment – Ambulances, Etc. |
| Lake Pillsbury; Lakeport, Scotts Valley | Increase Funding for Fire Districts: Lake Pillsbury, Lakeport, |
| **Education** | |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee; Clearlake, Lower Lake; Cobb Mtn. Area; Kelseyville, Finley; Lakeport, Scotts Valley; Middletown, Hidden Valley; Lucerne, Nice; Spring Valley, Double Eagle; Upper Lake, Blue Lakes | Defensible Space Education<br><br>(in Schools, to Children and Adult Populations, Billboards, Mailings, 4-H, to Tourism Community) |
| **Policy** | |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee; Cobb Mtn. Area; Lakeport, Scotts Valley; Lucerne, Nice; Rivieras, Buckingham, Soda Bay; Spring Valley, Double Eagle; Upper Lakes, Blue Lake | Effective Weed Abatement Ordinance with Staffing and Enforcement |
| Rivieras, Buckingham, Soda Bay | Fire Safety Regulations during Real Estate Transactions with Enforcement |
| Lakeport, Scotts Valley | Firesafe Plant Landscaping List Distributed by County |
| Kelseyville, Finley | Develop Fire Plan for Mount Konocti Public Lands |
| **Water** | |
| Cobb Mountain Area | Expand Water Systems to Accommodate Fire Needs |
| Middletown, Hidden Valley | Water Tanks for Jerusalem Grade, Hidden Valley/Ranchos |
| Lakeport, Scotts Valley; Upper Lake, Blue Lakes | New Water Tenders with Staffing |
| Middletown, Hidden Valley; Lakeport, Scotts Valley; Rivieras, Buckingham, Soda Bay | Hydrants: Extend System in Middletown, Scotts Valley; Improve in Rivieras |
| Cobb Mountain Area | Develop Pond for Fire Water in Loch Lomond |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee; Rivieras, Buckingham, Soda Bay; Upper Lake, Blue Lakes | Improve Water Systems: Avenues and Widgeon Way; Buckingham; Upper Lake |
| **Fuel Reduction** | |
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee; Kelseyville, Finley; Middletown, Hidden Valley; Lake Pillsbury; Lakeport, Scotts Valley; Lucerne, Nice; Rivieras, Buckingham, Soda Bay; Spring Valley, Double Eagle; Upper Lake, Blue Lakes | Community Chipper Program |

| Communities | Project Description |
|---|---|
| Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee; Lakeport, Scotts Valley; Spring Valley, Double Eagle | Neighborhood Fuel Reduction, Defensible Space |
| Clearlake, Lower Lake | Chapman Tract Fuel Reduction and Defensible Space |
| Clearlake, Lower Lake | Rocky Creek Rd. Fuel Reduction |
| Clearlake, Lower Lake | Twin Lakes Wildlands Fuel Reduction |
| Clearlake, Lower Lake | Murphy Springs/Perini Hill – Organize Neighbors for Fuel Reduction |
| Clearlake, Lower Lake | Clear Lake Park Fuel Reduction |
| Clearlake, Lower Lake | Sulphur Bank/Borax Lake Fuel Reduction |
| Clearlake, Lower Lake | Hwy 53/Hwy 20 Corridor Fuel Reduction |
| Cobb Mountain Area | Shaded Fuel Break – Anderson Springs |
| Cobb Mountain Area | Shaded Fuel Break – Whispering Pines |
| Cobb Mountain Area | Shaded Fuel Break – Gifford Springs |
| Cobb Mountain Area | Shaded Fuel Break – Cooper and Water Co. Properties |
| Cobb Mountain Area | Siegler Canyon Fuel Break |
| Cobb Mountain Area | Shaded Fuel Break – Shenandoah |
| Cobb Mountain Area | Shaded Fuel Break – Seigler Springs North |
| Cobb Mountain Area | Shaded Fuel Break – Bonanza Springs |
| Kelseyville, Finley | Fuel Hazard Reduction – Upper Kelsey Creek |
| Kelseyville, Finley | Fire Break Maintenance – Highland Springs Recreational Area |
| Kelseyville, Finley | Fuel Reduction – Mount Konocti |
| Kelseyville, Finley | Fuel Hazard Reduction – Adobe Creek |
| Kelseyville, Finley | Shaded Fuel Break – Highway 29 |
| Kelseyville, Finley | Shaded Fuel Break – Bottle Rock Rd. |
| Kelseyville, Finley | Ecologically Appropriate Tule Fuel Reduction |
| Kelseyville, Finley | Fuel Reduction – Mount Konocti |
| Kelseyville, Finley; Lucerne, Nice; Upper Lake, Blue Lakes | Assistance with Community Fuel Reduction, Especially Vulnerable Populations |
| Kelseyville, Finley; Rivieras, Buckingham, Soda Bay | Clearance/Fuel Break – Soda Bay Rd. |
| Lake Pillsbury | Rice Fork Fuel Reduction, South of Scott Dam |
| Lakeport, Scotts Valley | Fuel Hazard Reduction – Brewery Hill |
| Lakeport, Scotts Valley | North Lakeport Fuel Break |
| Lakeport, Scotts Valley; Upper Lake, Blue Lakes | Cow Mountain Fuel Break – Maintenance and Expansion |
| Lucerne, Nice | Hogback Ridge Fuel Break and Prescribed Burn |
| Lucerne, Nice | Fuel break behind Lucerne |
| Middletown, Hidden Valley | Brush Clearing – Dry Creek Rd. |
| Middletown, Hidden Valley | Fuel Break and Improved Access along Ridge Road Northwest of Harbin Springs Rd. |
| Middletown, Hidden Valley | Brush Clearing – Harbin Springs Rd. |
| Middletown, Hidden Valley | Shaded Fuel Break North of Harbin |
| Middletown, Hidden Valley | Shaded Fuel Break Harbin Hot Springs |
| Middletown, Hidden Valley; Rivieras, Buckingham, Soda Bay | Road Side Masticator |

| Communities | Project Description |
|---|---|
| Rivieras, Buckingham, Soda Bay | Fuel Break behind Clear Lake Riviera |
| Rivieras, Buckingham, Soda Bay | Fuel Reduction – Wheeler Point |
| Rivieras, Buckingham, Soda Bay | Fuel Reduction – Little Borax Lake Rd. |
| Spring Valley, Double Eagle | Create and Maintain Fuel Break along Double Eagle Rd. |
| Spring Valley, Double Eagle | Walker Ridge Fuel Break Maintenance |
| Upper Lake, Blue Lakes | Hogback Ridge Fuel Break |
| Upper Lake, Blue Lakes | Fuel Break East Side of Rancheria |
| Upper Lake, Blue Lakes | Ongoing Fuel Break Maintenance |
| **Prescribed Fire/Controlled Burning** | |
| Upper Lake, Blue Lakes; Lake Pillsbury; Cobb Mountain Area; Lakeport, Scotts Valley; Spring Valley, Double Eagle | Prescribed/Controlled Burning on National Forest and BLM Lands |
| Lucerne, Nice | Hogback Ridge Fuel Break and Prescribed Burn |
| Lakeport, Scotts Valley | Old Cow Mountain to Hopland Mountain, Prescribed Fire |
| Spring Valley, Double Eagle | Wolf Ridge Burn |
| Kelseyville, Finley | Prescribed Burning at Highland Springs and Sheldon Creek |
| Spring Valley, Double Eagle | Quartz Canyon Controlled Burn |
| Lakeport, Scotts Valley | Ongoing Mosaic Burning |
| Lake Pillsbury | Smokehouse Creek Prescribed Fire Area |
| Upper Lake, Blue Lakes | Prescribed Fire North of Blue Lakes |

## B1.3. Community-Identified Evacuation Sites

The following locations were identified as potential evacuation sites. Addresses were added based on location in County GIS database. These are shown on the maps in Appendix B2 as "Evacuation Site".

| Evacuation Site Name | Address # | Address Street | City |
|---|---|---|---|
| Walmart Lot | 15960 | Dam Rd | Clearlake |
| Austin Park | 14135 | Olympic Dr | Clearlake |
| Vacant Field | 13950 | E State Hwy 20 | Clearlake |
| Gravel Pit | 14550 | E State Hwy 20 | Clearlake Oaks |
| The Oasis Restaurant | 24848 | E State Hwy 20 | Clearlake Oaks |
| Conference Center | 11650 | High Valley Rd | Clearlake Oaks |
| Old Marina | 13505 | Jensen Rd | Clearlake Oaks |
| Keys HOA Club | 12980 | Lakeland St | Clearlake Oaks |
| Moose Lodge | 15910 | Moose Lodge Ln | Clearlake Oaks |
| Spring Valley Store | 1578 | New Long Valley Rd | Clearlake Oaks |
| Garner Ranch | 4881 | New Long Valley Rd | Clearlake Oaks |
| Long Valley Ranch | 3105 | New Long Valley Rd | Clearlake Oaks |
| Open Field | 13598 | Road No. 2 | Clearlake Oaks |
| CalFire Station | 140 | Spring Rd | Clearlake Oaks |
| Spring Valley Fire Station | 3178 | Tamarack Wy | Clearlake Oaks |
| Spring Valley Community Center | 2975 | Wolf Creek Rd | Clearlake Oaks |
| Hidden Valley Equine Center | 20749 | Yankee Valley Rd | Hidden Valley |
| Braito's Marina | 1549 | Eastlake Dr | Kelseyville |
| Riviera Country Club | 10200 | Fairway Dr | Kelseyville |
| Riviera Elementary School | 10505 | Fairway Dr | Kelseyville |
| Mountain Vista Middle School | 5081 | Konocti Rd | Kelseyville |
| Borax Lake | 8275 | Little Borax Lake Rd | Kelseyville |
| Grace Evangelical Free Church | 6716 | Live Oak Dr | Kelseyville |
| Lakeside County Park | 1985 | Park Dr | Kelseyville |
| Kits Corner | 7990 | S State Hwy 29 | Kelseyville |
| Konocti Harbor Inn and Resort | 8710 | Soda Bay Rd | Kelseyville |
| Ferndale Resort | 6190 | Soda Bay Rd | Kelseyville |
| Clearlake State Park | 5460 | Soda Bay Rd | Kelseyville |
| CalFire | 8948 | State Hwy 175 | Kelseyville |
| National Guard Armory | 1431 | Hoyt Ave | Lakeport |
| Lakeport Schoolgrounds | 250 | Lange St | Lakeport |
| Fairgrounds | 401 | Martin St | Lakeport |
| Big Valley Casino | 2755 | Mission Rancheria Rd | Lakeport |
| Estrem | 3352 | Scotts Valley Rd | Lakeport |
| Scully Packing | 2180 | Scotts Valley Rd | Lakeport |
| Lampson Field | 600 | Sky Park Dr | Lakeport |
| Anderson Rd. Walnut Orchard | 13751 | Anderson Rd | Lower Lake |
| Konocti Conservation Camp | 8275 | S State Hwy 29 | Lower Lake |
| Pillsbury Lake safety zone | | (Lake Pillsbury) | Lake Pillsbury |
| Gravelly airstrip safety zone | 28836 | 20 N 01 Rd | Lake Pillsbury |
| Oak Flat safety zone | 28836 | 20 N 01 Rd | Lake Pillsbury |
| Squaw Creek picnic area safety zone | 29166 | 20 N 01 Rd | Lake Pillsbury |
| Fuller Grove safety zone | 28272 | 20 N 01 Rd | Lake Pillsbury |
| Sunset Point safety zone | 29050 | 20 N 02 Rd | Lake Pillsbury |
| Gravel Bar safety zone | 26018 | Elk Mountain Rd | Lake Pillsbury |
| Little Squaw Creek safety zone | 25027 | Elk Mountain Rd | Lake Pillsbury |

| Evacuation Site Name | Address # | Address Street | City |
|---|---|---|---|
| Polo field safety zone | 30751 | Polo Field Rd | Lake Pillsbury |
| Rice Fork safety zone | 2257 | Rice Fork Rd | Lake Pillsbury |
| Lucerne Alpine Senior Center | 3985 | Country Club Dr | Lucerne |
| Lucerne Elementary School | 3351 | Country Club Dr | Lucerne |
| Paradise Valley Field | 8300 | E State Hwy 20 | Lucerne |
| Tulip Hill Winery/ Ceago Winery | 5115 | E State Hwy 20 | Lucerne |
| Harbor Park & Alpine | 5965 | E State Hwy 20 | Lucerne |
| Harbor Park & Alpine | 6215 | E State Hwy 20 | Lucerne |
| Clubhouse Park | 6325 | E State Hwy 20 | Lucerne |
| Coyote Valley Elementary | 18950 | Coyote Valley Rd | Middletown |
| Cattle Ranch/Arabian Lane | 18196 | S State Hwy 29 | Middletown |
| Riding Arena | 18200 | Spruce Rd Ext | Middletown |
| Tulip Hill Winery/ Ceago Winery | 4900 | Bartlett Springs Rd | Nice |
| Sons of Italy/ Church | 2817 | E State Hwy 20 | Nice |
| Keeling Park | 3000 | Lakeshore Blvd | Nice |
| Le Trianon | 6155 | Blue Lakes Rd | Upper Lake |
| Robinson Rancheria Casino | 1494 | E State Hwy 20 | Upper Lake |
| Kelly's Campground | 8220 | Scotts Valley Rd | Upper Lake |

## Community Values At Risk

- Community Values At Risk
- Community Values At Risk
- Community Values At Risk

## Wildfires Causes, Risks and Hazards

- Risks/Hazards
- Risks/Hazards
- Risks/Hazards
- Transportation System Issue
- Transportation System Issue
- Transportation System Issue

## Existing Fuel Reduction

- Existing Fuel Reduction
- Existing Fuel Reduction
- Existing Fuel Reduction

## Proposed Actions

- Evacuation/Fire Protection
- Evacuation/Fire Protection
- Evacuation/Fire Protection
- Water/Fire Protection
- Water/Fire Protection
- Water/Fire Protection
- Fuel Reduction
- Fuel Reduction
- Fuel Reduction
- Prescribed Fire
- Prescribed Fire
- Evacuation
- Evacuation
- Evacuation/Education
- Fire Protection
- Fire Protection
- Fire Protection/Equipment

### Base Layers

- Highways
- City/County Roads
- Other Roads
- Towns
- Creeks
- Water Bodies

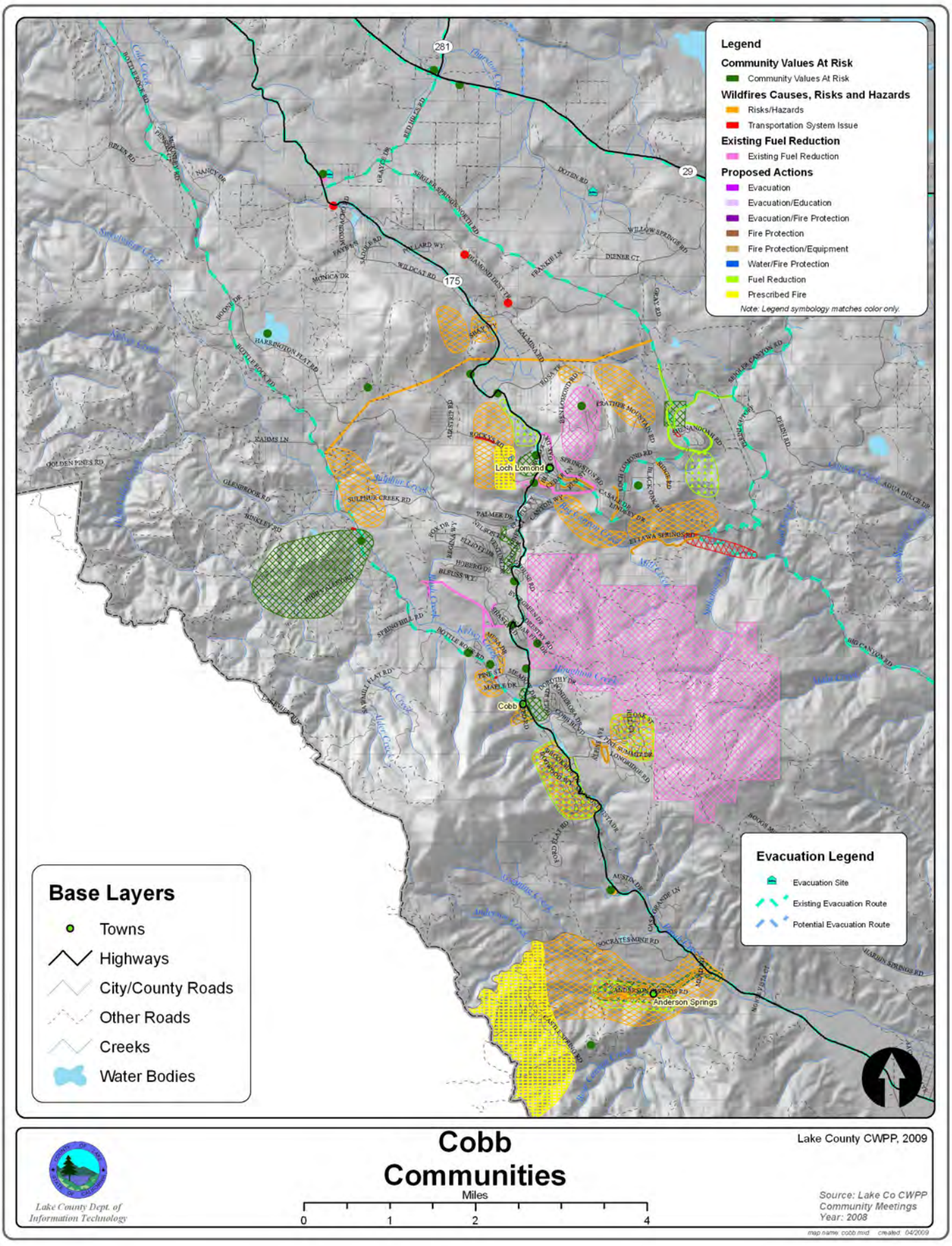
### Evacuation Legend

- Evacuation Site
- Existing Evacuation Route
- Potential Evacuation Route

Lake County Dept of Information Technology

# Community Maps Legend

Lake County CWPP, 2009




# Cobb Communities

Lake County CWPP, 2009

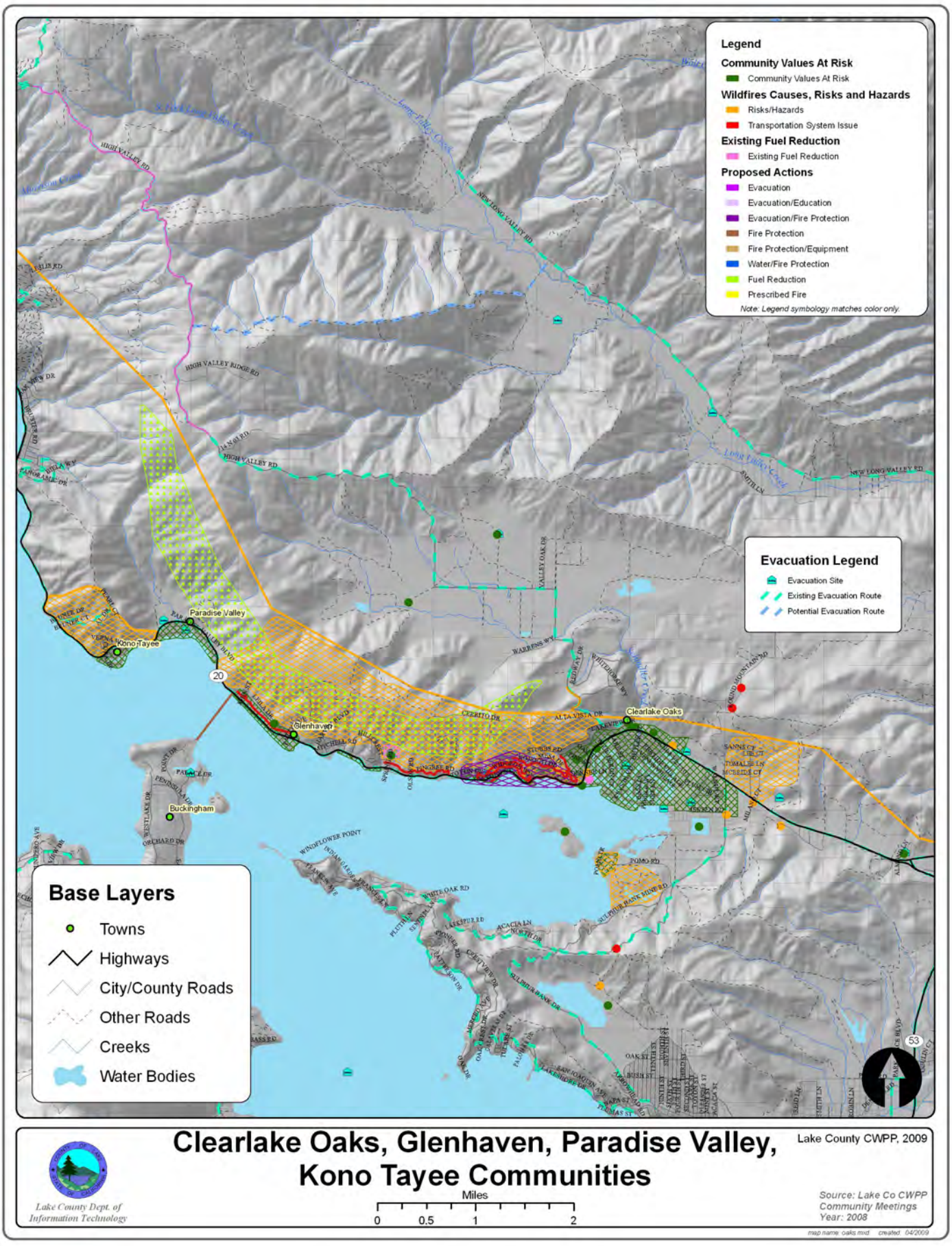
Lake County Dept. of Information Technology

Miles

0 1 2 4

Source: Lake Co CWPP Community Meetings Year: 2008

map name: cobb.mxd created: 04/2009




# Clearlake Oaks, Glenhaven, Paradise Valley, Kono Tayee Communities

Lake County CWPP, 2009

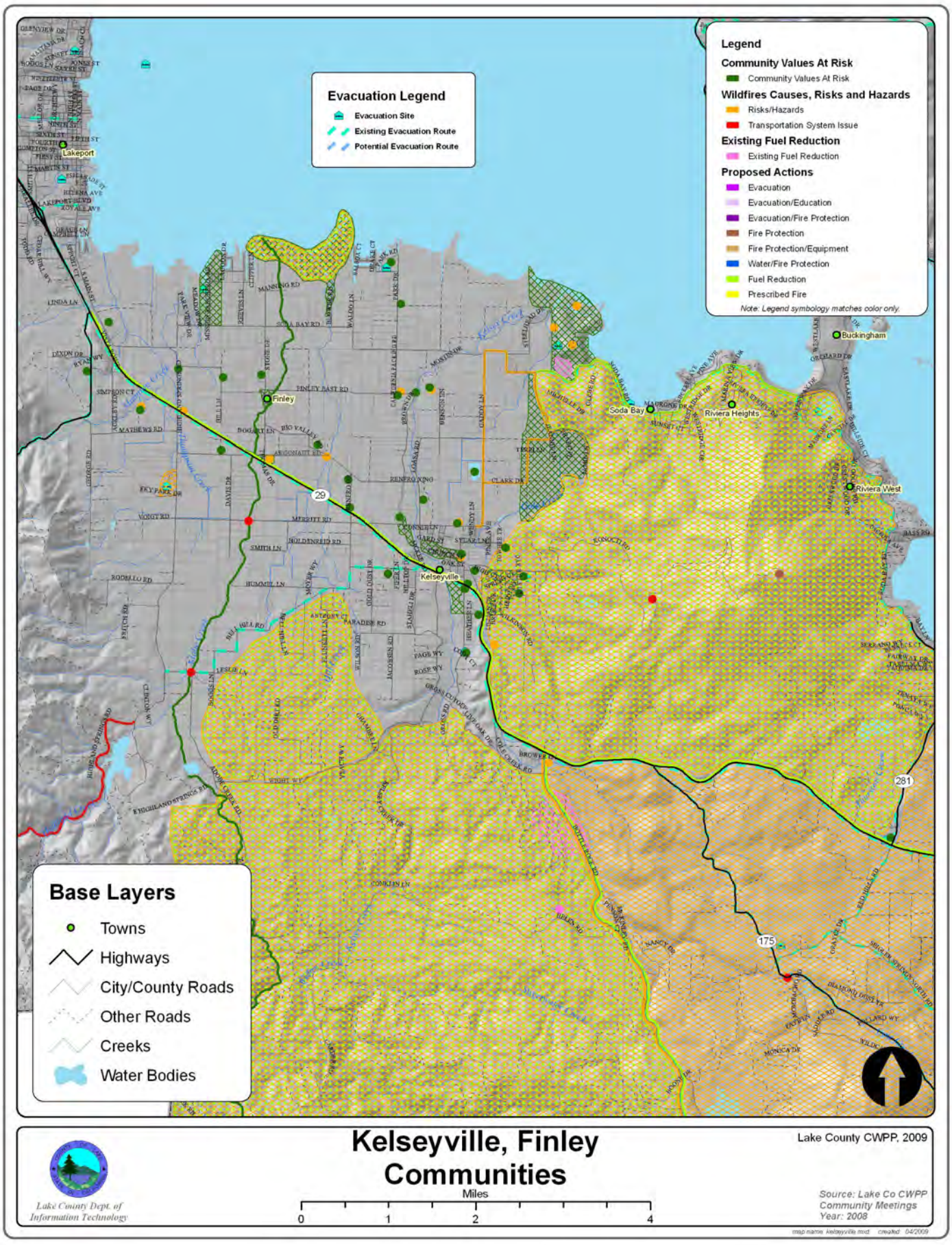
Lake County Dept. of Information Technology

Miles

0 0.5 1 2

Source: Lake Co CWPP Community Meetings Year: 2008

map name: oaks.mxd created: 04/2009




# Kelseyville, Finley Communities

Lake County CWPP, 2009

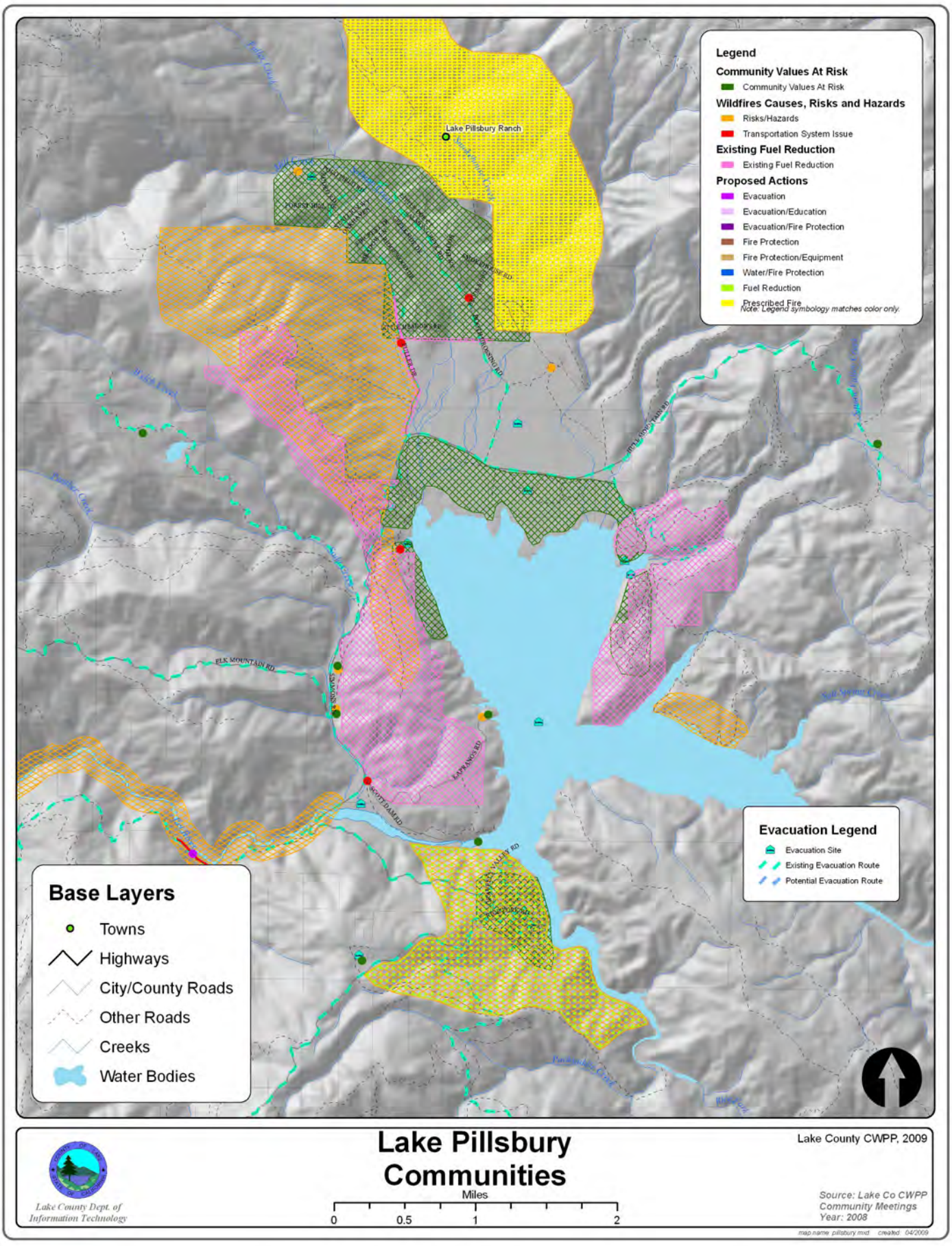
Miles

0 1 2 4

Lake County Dept. of Information Technology

Source: Lake Co CWPP Community Meetings Year: 2008

map name: kelseyville.mxd created: 04/2009




# Lake Pillsbury Communities

Lake County CWPP, 2009

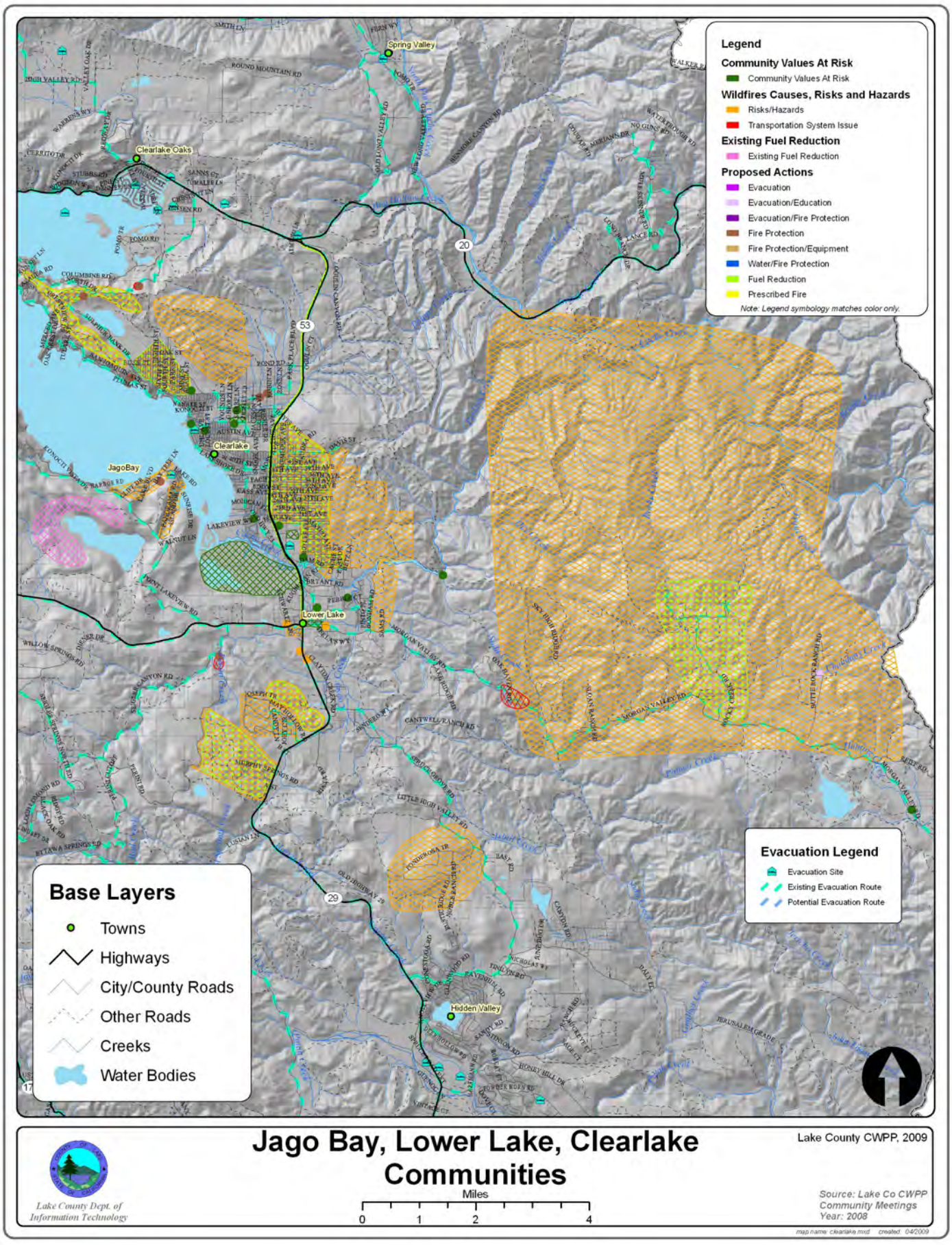
Miles

0 0.5 1 2

Lake County Dept. of Information Technology

Source: Lake Co CWPP Community Meetings Year: 2008

map name: pillsbury.mxd created: 04/2009




# Jago Bay, Lower Lake, Clearlake Communities

Lake County CWPP, 2009

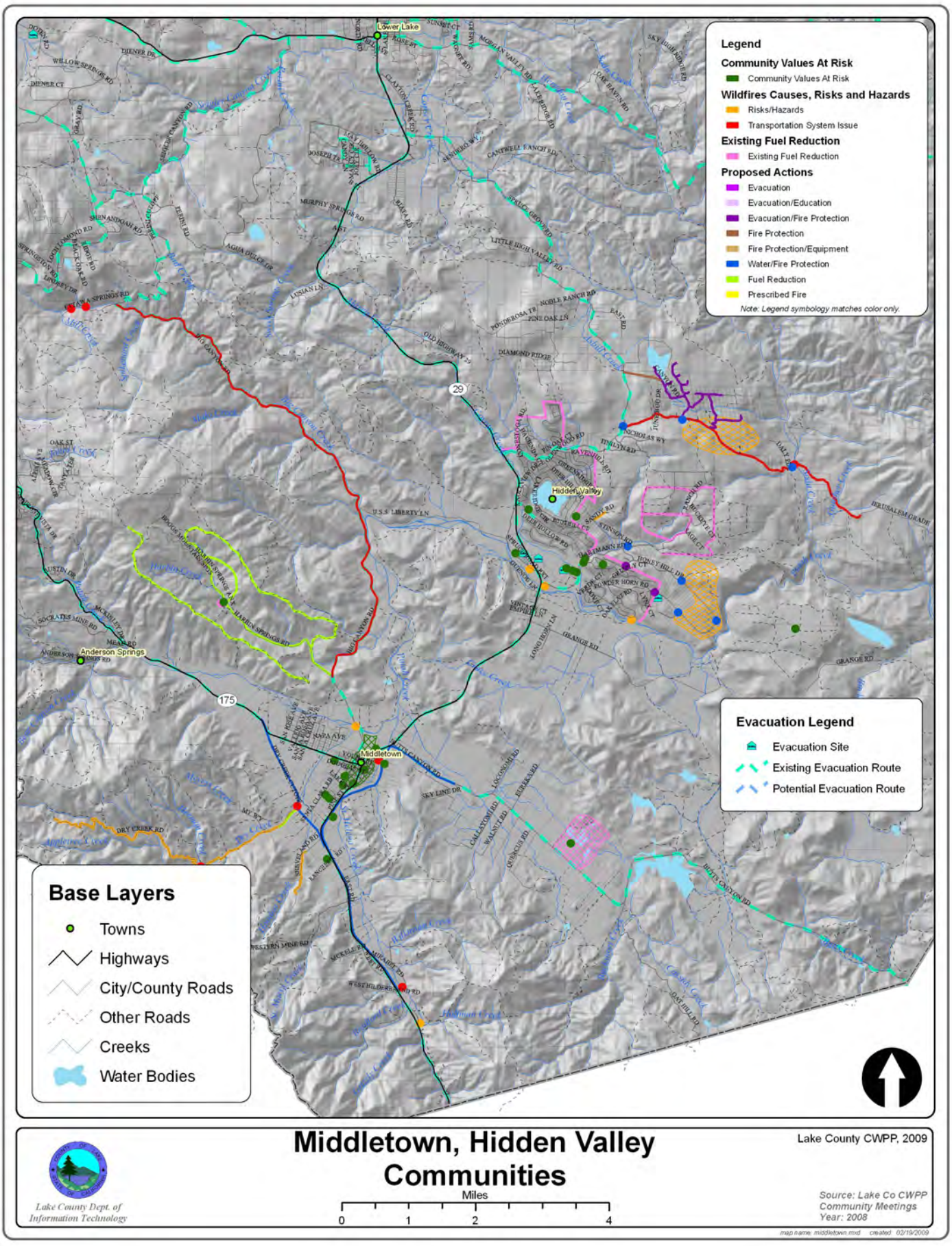
Miles

0 1 2 4

*Lake County Dept. of Information Technology*

*Source: Lake Co CWPP Community Meetings Year: 2008*

*map name: clearlake.mxd created: 04/2009*




# Middletown, Hidden Valley Communities

Lake County CWPP, 2009

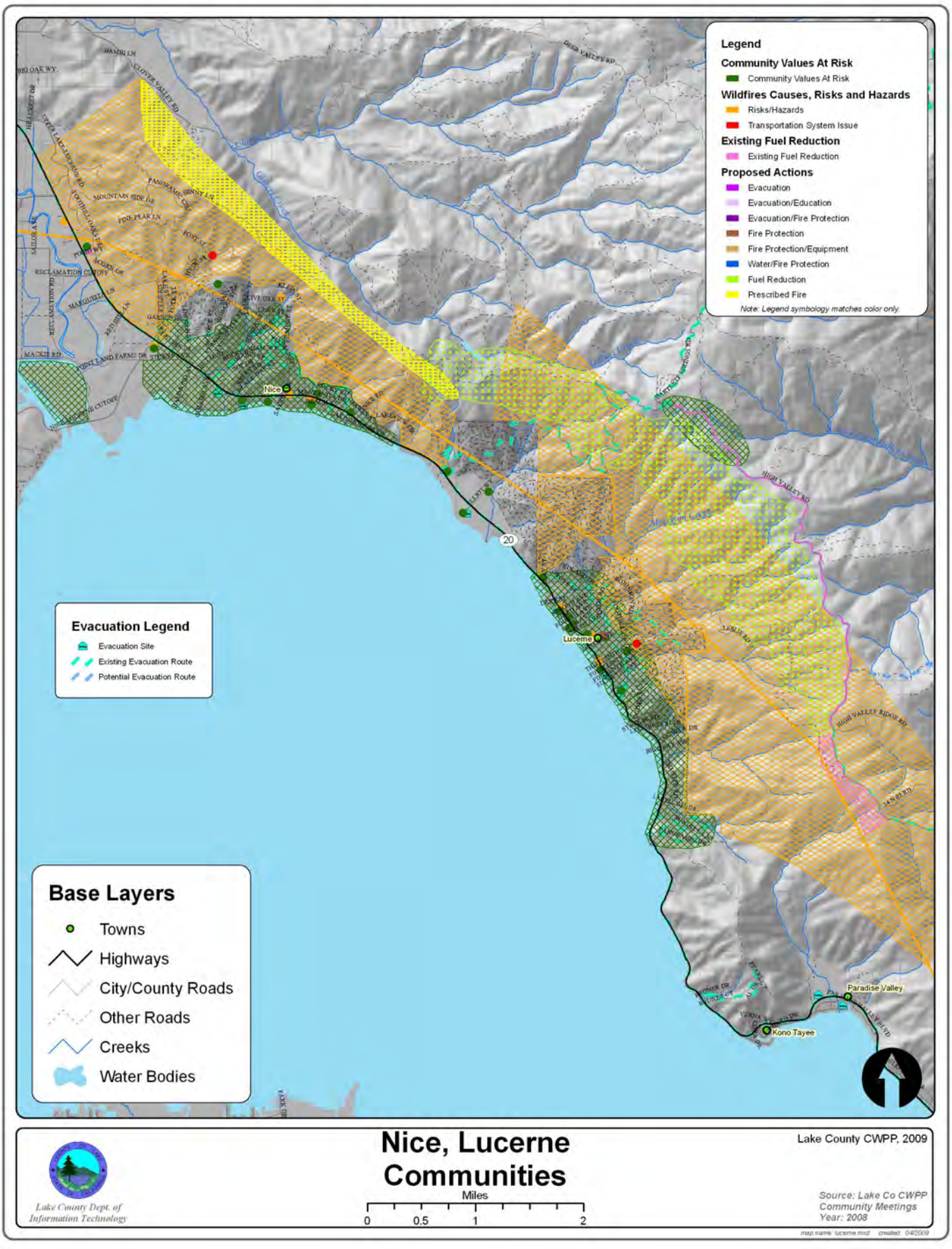
Miles

0 1 2 4

Lake County Dept. of Information Technology

Source: Lake Co CWPP Community Meetings Year: 2008

map name: middletown.mxd created: 02/19/2009




# Nice, Lucerne Communities

Lake County CWPP, 2009

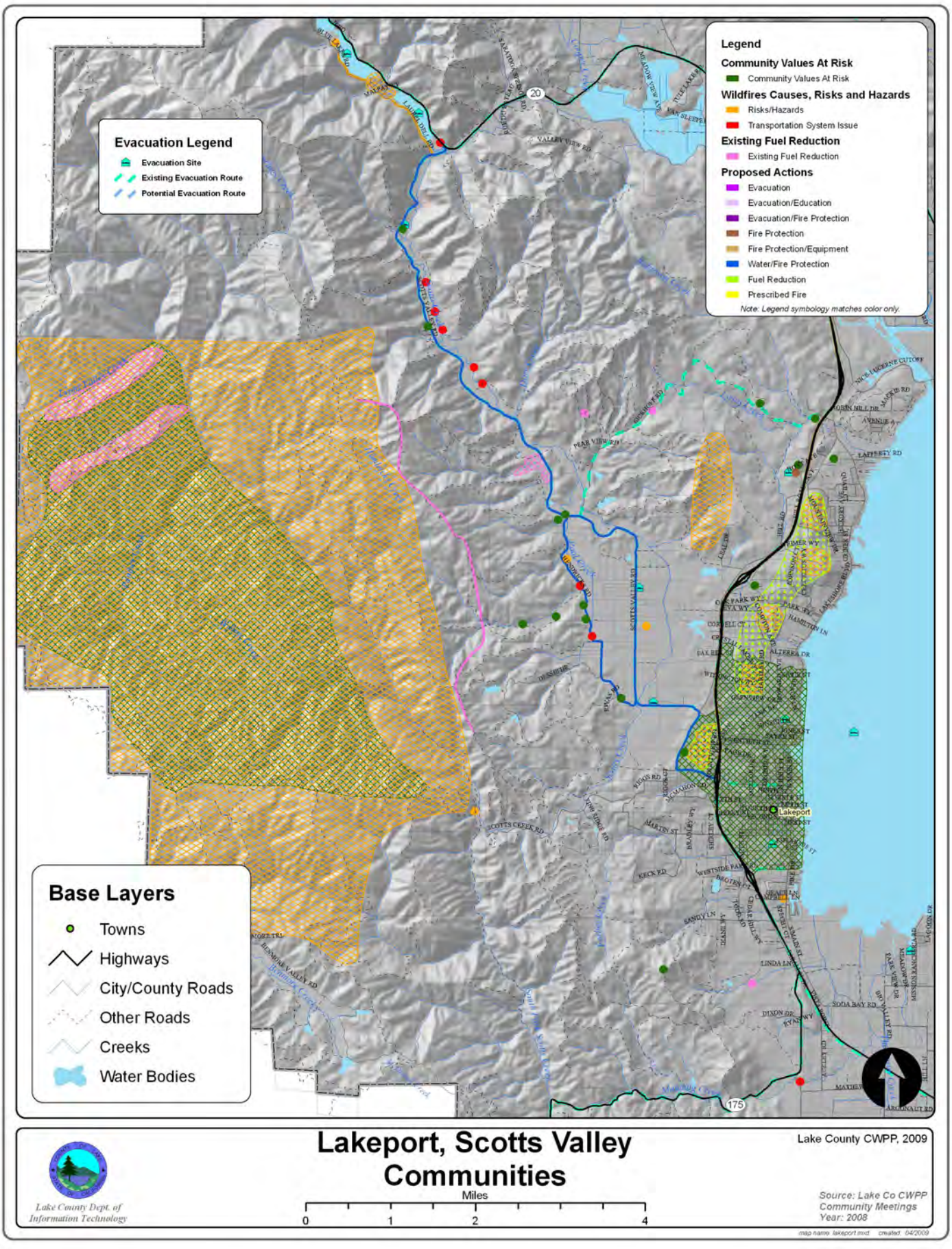
Lake County Dept. of Information Technology

Miles

0 0.5 1 2

Source: Lake Co CWPP Community Meetings Year: 2008

map name: lucerne.mxd created: 04/2009




# Lakeport, Scotts Valley Communities

Lake County CWPP, 2009

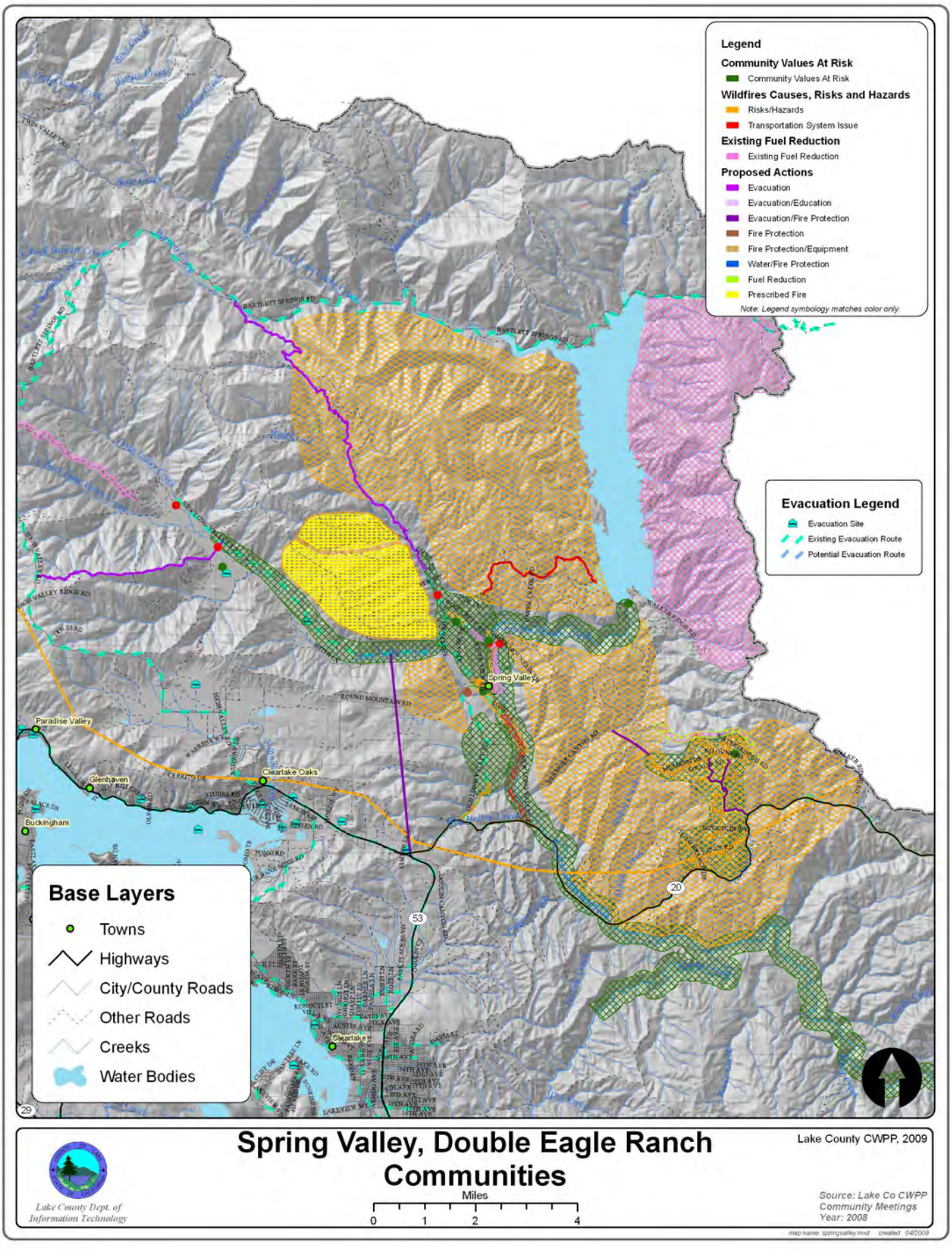
Lake County Dept. of Information Technology

Miles

0 1 2 4

Source: Lake Co CWPP Community Meetings Year: 2008

map name: lakeport.mxd created: 04/2009




# Spring Valley, Double Eagle Ranch Communities

Lake County CWPP, 2009

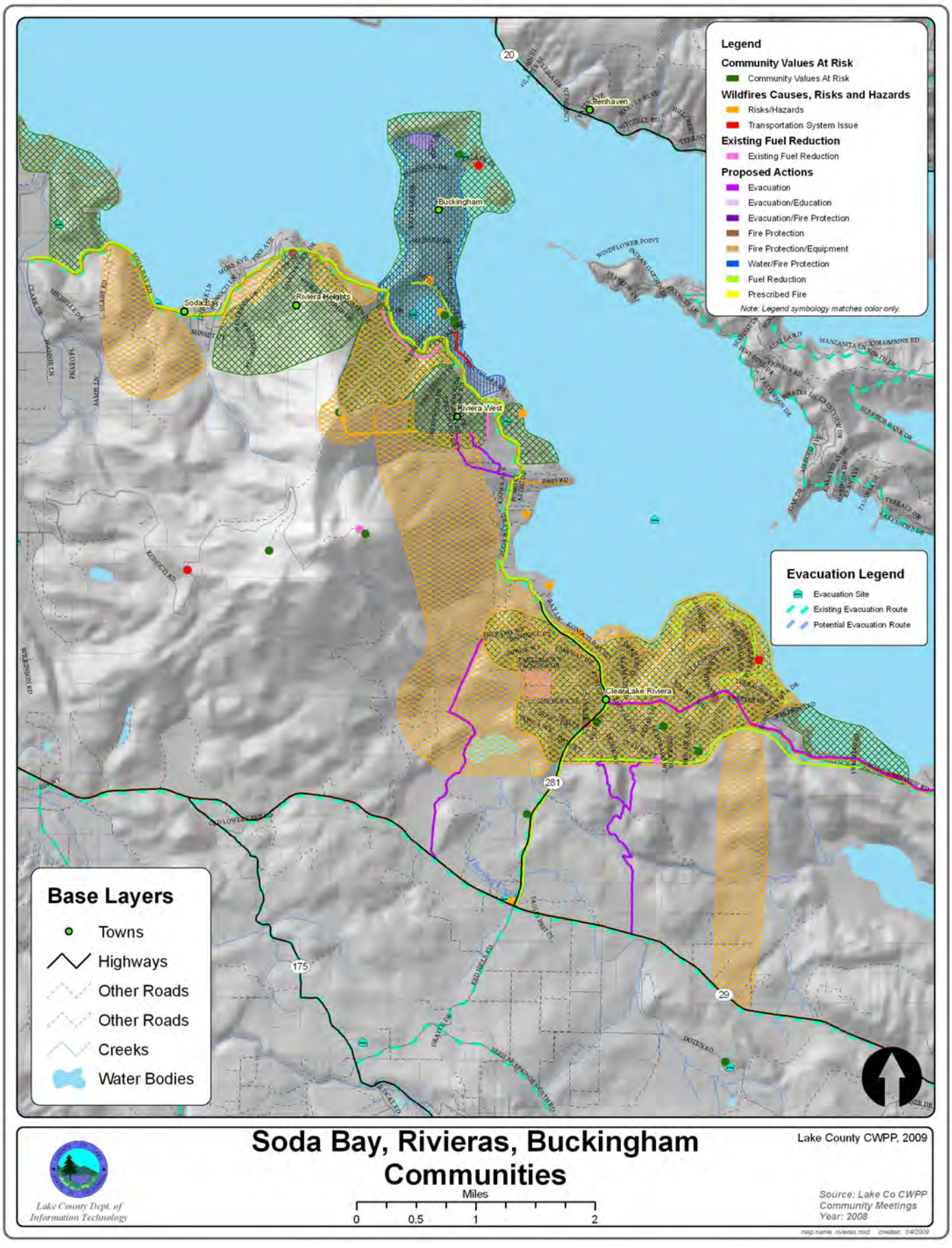
Lake County Dept. of Information Technology

Miles

0 1 2 4

Source: Lake Co CWPP Community Meetings Year: 2008

map name: springvalley.mxd created: 04/2009




# Soda Bay, Rivieras, Buckingham Communities

Lake County CWPP, 2009

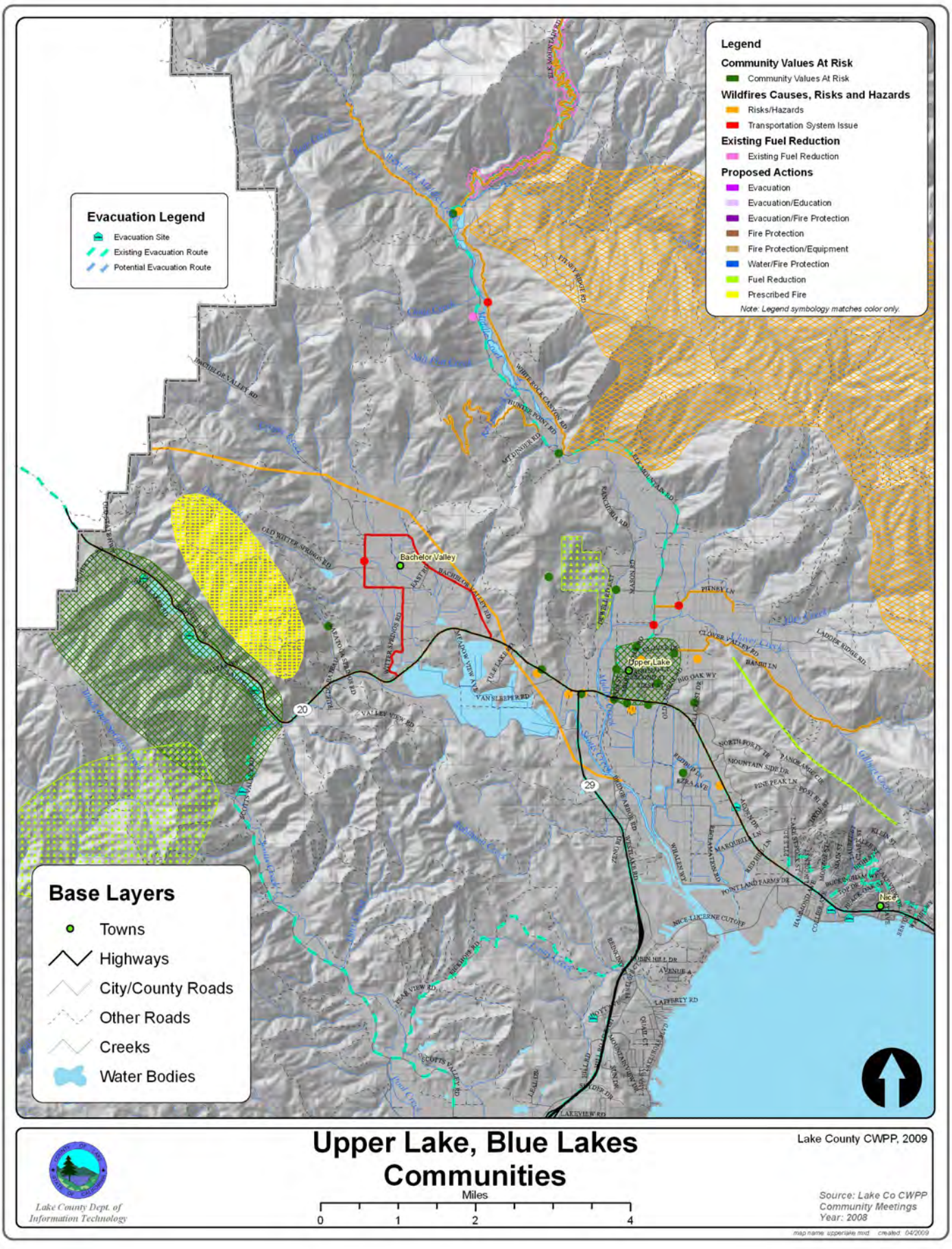
Lake County Dept. of Information Technology

Miles

0 0.5 1 2

Source: Lake Co CWPP Community Meetings Year: 2008

map name: rivieras.mxd created: 04/2009


Legend
Community Values At Risk
Community Values At Risk
Wildfires Causes, Risks and Hazards
Risks/Hazards
Transportation System Issue
Existing Fuel Reduction
Existing Fuel Reduction
Proposed Actions
Evacuation
Evacuation/Education
Evacuation/Fire Protection
Fire Protection
Fire Protection/Equipment
Water/Fire Protection
Fuel Reduction
Prescribed Fire
Note: Legend symbology matches color only.
Evacuation Legend
Evacuation Site
Existing Evacuation Route
Potential Evacuation Route
Base Layers
Towns
Highways
City/County Roads
Other Roads
Creeks
Water Bodies
Bachelor Valley
Upper Lake
Nice
20
29
Upper Lake, Blue Lakes Communities
Miles
0
1
2
4
Lake County CWPP, 2009
Lake County Dept. of Information Technology
Source: Lake Co CWPP Community Meetings Year: 2008
map name: upperlake.mxd created: 04/2009

## 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.

[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.

## D. Wildland Fuel-Hazard Reduction[1]

There are a myriad of fuel-reduction methods available to land managers. This document explains many of these methods, to allow land owners and managers to knowledgably choose the most appropriate practices for their particular site within Lake County. It is written inform and empower Lake County landowners (large or small) to cooperate on fuel management toward a fire-safe community, and a healthier wildland environment. This document differs from *Appendix C: Wildfire Safety at Home,* in that it focuses on the Wildland Fuel Reduction Zone, which is the area one hundred feet or more from structures. This zone is where innovative, ecologically savvy fuel-reduction treatments can be accomplished, in an effort to begin the restoration process for previously impacted and degraded landscapes.

The landscape seen today in Lake County is the result of past glacial periods ending nearly 10,000 years ago. Mud core samples taken from Clear Lake show that the vegetation now present has been in place and stable for a very long time. However, the current vegetation is also a result of plant succession, the progressive change of the plant and animal life in response to environmental conditions. The last century of human practices (fire suppression, road building, logging, the introduction of non-native plants, and vegetation conversion for agriculture and livestock) has created the "natural" landscape today.

These human practices have left an ecological legacy on the landscape. In some cases, forests and woodlands are choked due to tightly growing trees. This leads to low-level growth or vigor. This comes with an increased susceptibility to *pathogens*, as well as increases in *fuel load conditions*, and changed *species composition* and *habitat conditions* of all vegetation types (forestlands, woodlands, shrublands, and grasslands). Some of these changes have increased local fire hazards by 1) increasing fuels, 2) increasing acreages of susceptible fire-prone plant communities, and 3) increasing overall risk of catastrophic fire given that today a larger area of the county is wildland-rural-urban interface.

To remedy this landscape imbalance, *modify fire behavior,* and reduce the potential for crown fire, local land management agencies and private landowners are taking a proactive approach to reducing fuels.

When guided by conservation-based principles, fuel-hazard reduction will facilitate long-term positive environmental outcomes, and assist in the process of restoring health to the forestlands, woodlands, shrublands, and grasslands of Lake County. Incorporating ecological considerations into planning and implementing these fuel-reduction treatments can be an innovative and exciting task for landowners and land managers, with positive improvements for neighborhoods, and the surrounding ecosystem.

In this document, you will find explanations of the concepts of fuel management, and pros-and-cons on each of the techniques available, all presented in what is intended to be a clear and user-friendly manner. Some of the most common fuel-reduction methods include controlled burning, thinning, brush clearing, mastication, and grazing; all are intended to restore and maintain vegetative communities to a more fire-resilient condition. Although vegetation types vary greatly in Lake County, and site-specific treatments will need to be developed to take into account this variation, certain silvicultural and other land management practices are applicable throughout all the different vegetation types. *See Reference I: Glossary for definitions of terms found here.*

*For examples of treatment prescriptions for the wildland zone, see the Fuel Modification descriptions for each vegetation type in Chapter 4.*

### D.1. Ecologically Based Fuel Reduction

Ecological fuel reduction seeks to reduce surface fuels, ladder fuels, and *crown density* while implementing treatments that work to enhance plant community health and biodiversity. Ecologically based fuel-reduction techniques assist degraded ecosystems in becoming more stable, resilient, and *productive.*

Treatments are designed to be site-specific; they take into consideration vegetation, soil types, slope, aspect, ecosystem health needs, and individual landowner objectives. Fuel-reduction objectives are most successfully accomplished when combined with an emphasis on ecological treatments. In the forest, these include *forest stand*

[1] Parts of this document were written by Marko Bey of Lomakatsi Ecological Services: www.lomakatsi.org.

*enhancement* and restoration techniques such as thinning and controlled burning. The implementation of ecologically restorative fuel-reduction treatments is guided by the Conservation Principles in Chapter 1.

Methods for ecological fuel reduction seek to strike a balance among the following:

**Goals**

- To make all vegetative communities less susceptible to crown fire.
- To reduce wildfire intensity through activities that separate surface and ladder fuel continuity and volume.
- To manage and modify fuels and configurations of trees and plants.
- To reintroduce low-intensity (cool-burning) fire.
- To positively contribute to the ecological processes and functions of local forest and plant communities.
- To improve the health of vegetation most suited to the site.
- To emulate a plant regime similar to what occurred with natural fire.
- To maintain and enhance native species diversity.
- To maintain and enhance wildlife habitat.
- To control problematic, invasive, non-native species.
- To provide erosion control where appropriate, in conjunction with fuel-reduction activities.
- To make fire-suppression efforts safer and more effective as a result of reduced fuel loads in the vicinity of roads, homes, and other important areas.
- To utilize byproducts of fuel-reduction activities where ecologically appropriate and economically feasible, to help offset costs.

**Methods**

This document proposes methods that emulate lightning and other *anthropogenic* low-intensity fires that have helped shape the landscape for thousands of years. These methods include:

- Selectively thinning portions of the forest or shrub understory.
- Selectively thinning or burning dense vegetative communities such as chaparral.
- Favoring and retaining the largest, most fire-resilient, and healthiest trees adapted to the location.
- Favoring and retaining native vegetation.
- Burning, chipping, and/or masticating the smaller fuel loads.
- Mowing or grazing grasses and small woody plants.

## D.1.1. Introduction to Treatment Prescriptions

A treatment prescription as it relates to fuel-hazard reduction is a sequence of steps to bring a plant community to a more stable state. These efforts will ideally increase the area's resiliency to fire as a natural disturbance without resulting in catastrophic impacts.

Prior to beginning any fuel reduction work, the first step is an assessment of the property, including fuel hazards and health conditions. This is called an *initial site assessment,* where you walk the property and take a closer look to gather information about present conditions. Using the answers to a series of questions outlined below, you will gather the data that will enable you to plan your fuel-hazard reduction treatments.

When planning fuel-reduction prescriptions, remember that you are attempting to manage a natural, living system. Whatever you do, nature will respond either favorably (with lower intensity fires) or negatively (by increasing fire hazards). Three important concepts to consider and/or research in planning your prescription are *1) Present Condition, 2) Historic Natural Condition,* and *3) Future Desired Condition.* To reduce fuel hazards without creating additional environmental problems, use these three concepts when planning a treatment prescription.

### Site Assessment—Present Condition

Present Condition describes what conditions occur on your property now. It will enable you to outline your activities based on today's starting condition. It will also facilitate gathering your initial assessment data for planning your treatments.

The following is a list of questions that will help you plan a prescription for an ecologically based fuel-hazard reduction project. *(Definitions that may help you prepare your plan are in Reference I: Glossary).* When answering each question be sure to collect and organize information into a written document (or "plan"). This document can be as simple or detailed as you want; what matters is that it meets your needs.

**Site Evaluation Information and Questions**

1) What is the elevation of the treatment area? List the variety of elevations from low to high.
2) What are the aspects of the treatment area? What direction does your property face? Explain in detail.
3) Give a brief synopsis of the topography of the site. Highlight *draws,* ravines, rock outcroppings, and special landscape features.
4) What are the vegetation types and plant associations of the site?
5) What are the dominant and *codominant* species on the property?
6) What are the estimated *age classes* of the plant communities on the site? What is the variability (and range) of sizes of the trees? What are the trees' diameters at breast height (DBH)?
7) Explain the fuel load conditions on the site. Describe the density of vegetation and the variety of fuel types *(see Chapter 3 for an introduction to fuel models).* Assess the *ground fuels,* surface fuels, ladder fuels, snags, widow-makers (large trees with lots of dead limbs), etc.
8) Give an estimate of the number of snags per acre on the site. What species of snags are present? What is the DBH of these snags? Which snag classes are present? Snags are categorized into three structural classes[2]—characterized by the amount of bark and branches, condition of the treetop, and condition of the wood—these features determine wildlife use. Document snag height. What may be causing tree mortality? Is there beetle activity present?

8) Describe fuel loads in relationship to home-site, driveway, and other access/exit routes on the property.

9) List and explain any details about this site that should be considered for fuel mitigation and vegetation-enhancement treatments. Include information about sensitive zones for plants, wildlife, *slope stability,* etc.

## Historic Natural Condition

The Historic Natural Condition will give you the baseline data regarding how the ecosystem functioned prior to previous activities such as fire suppression, or industrial activities that may have occurred. Questions include:

- What trees and plants were dominant on the property and historically present?
- How frequently did fire occur?
- What plant communities were present prior to European settlement that are now gone?

Some of these questions can be answered from the vegetation type descriptions in Chapter 4. You can also acquire this information from old or historic photos of your property, old settler's journals, the traditional oral descriptions of Native American elders who may be living in your area, or by visiting neighboring lands in your watershed that have not been greatly altered. You can also talk to an ecosystem restoration professional.

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[2] Structural Class 1 represents those trees that have died recently and retain most of their bark and most of their branches; the top is intact. Very little decay has occurred in the wood, unless the tree had "heart-rot" decay when living. Heart-rot refers to fungus-caused decay of a tree's interior wood. Class 1 snags are typically used primarily for foraging by woodpeckers on bark beetles in and under the bark. Once the bark loosens, bats can roost under the bark.

Structural Class 2 represents those snags that have been dead for several years and have lost some branches and bark; tops are often broken; there is some evidence of decay. Woodpeckers use these for nesting, foraging in the bark, and foraging in the interior for carpenter ants.

Structural Class 3 represents those snags that have been dead a long time and lack branches and bark. Tops are broken off and the sapwood and heartwood are extensively decayed. The primary use of these trees is by woodpeckers foraging on carpenter ants and wood-boring beetle larvae. Most of these trees are too decayed for woodpeckers to excavate a cavity in them, although secondary nesters may use existing cavities.

The site-specific information for your property will create a closer-to-home level that will help in planning your treatment prescription. "Site-specific" is a key concept that means tailoring your treatment prescription to your property, using general guidelines as a basis, while taking into consideration detailed site conditions. It describes the unique place and its conditions, and should be considered in the overall plan.

**Future Desired Condition**

Future Desired Condition outlines both the short-term and long-term goals you wish to accomplish. The Future Desired Condition for fuel-mitigation efforts along a driveway might be described as follows:

"Will be an area with little-to-no surface fuels, no ladder fuels, and fire-resistant, shade-casting trees without low-hanging branches. There will be larger, well-spaced trees with wide spreading crowns. Any shrub or brush patches will be small and isolated. The grasses on the site will be converted over time, from tall, annual grasses that carry longer flame lengths to shorter, native grasses with shorter, flashier flame spread."

You can create your future desired condition concepts with help from the Conservation Principles *(see Chapter 1)* and other information in this CWPP.

### D.1.2. Know Your Vegetation

Lake County includes diverse vegetation types that can be categorized generally as forest, woodlands, shrubland, or grassland. Within each of these general categories are many distinct vegetation communities. *These are each described in more detail in Chapter 4.*

Forests within the county consist of trees such as ponderosa pine (*Pinus ponderosa)*, knobcone pine (*P. attenuate)*, incense cedar (*Calocedrus decurrens)*, Douglas fir (*Pseudotsuga menziesii)*, California black oak (*Quercus kelloggii*), and canyon live oak (*Q. chrysolepis),* intermixed with a variety of shrub species such as manzanita (*Arctostaphylus spp.)*, buck brush (*Ceanothus cuneatus*), and poison oak (*Toxicodenron diversilobum)*. Forest communities can vary greatly throughout the county from pure stands of knobcone pine to stands of ponderosa pine intermixed with Douglas fir, incense cedar, and a variety of understory shrub species. Crown fires can occur in forested areas that have very dense canopies and are characteristic of species such as knobcone pine.

Woodlands can vary from pure stands of valley oaks (*Q. lobata*) in deep, fertile soils to pure stands of blue oaks (*Q. douglassii*) on drier sites. In most cases these deciduous species can be intermixed with interior live oak (*Q.wislizenii*), gray pine (*P. sabiniana*), or at upper elevations canyon live oak (*Q. chrysolepis*). On upper elevation sites, pure stands of scrub oak (*Q. berberidfolia*) can dominate an area with associates of knobcone pine, chaparral pea (*Pickeringia montana*), toyon (*Heteromeles arbutifolia*), manzanita, coyote bush (*Baccharis pilularis)*, and *Ceanothus spp.*

Shrublands within the county consist of species such as chamise *(Adenostoma fasciculatum*), manzanita*, Baccharis spp*., and *Ceanothus spp.* It can be very diverse or dominated by a single species. These vegetation types can be composed of pure stands of chamise that can cover thousands of acres or dense stands of manzanita with a scattered gray pine overstory and/or a variety of oak trees. Fires in these shrub-dominated communities can be very intense.

Grasslands are important vegetation type within Lake County, sometimes associated with vernal pool habitats. Grasslands within the county are dominated by non-native invasive annual grasses and plants such as yellow star thistle (*Centaurea solstitialis*). Grasslands can be intermixed with both forest and scrubland vegetation types, forming mosaic landscapes. Grasslands fires tend to burn very rapidly, although with relatively low intensity due to their highly volatile fuels.

*See Chapter 4 for a more specific description of the vegetation types found in Lake County.*

### D.1.3. Fuel-Reduction Treatment Methods

Fuelbreaks—where fuel volumes have been intentionally reduced to slow down a fire and reduce its flame length and intensity—are one of the most well known types of fuel-reduction methods. Firebreaks on the other hand, are where all fuels are removed to bare mineral soil for fire suppression. Fuelbreaks can be created in several different ecologically sound ways that mimic naturally occurring fires, and will vary within each vegetation type found in the county.

## Shrubland Fuelbreak

Historically, the preferred method to managing fuels in shrublands was to use controlled fire on a 5-10 year cycle, limiting the amount of accumulating fuel by repeatedly burning the "brush." Today, it is common to observe large, cleared pathways meandering through these communities serving as a fuelbreak, such as in the Cow Mountain area. Removal of surface and ladder fuels, and reduction of horizontal continuity of fuels, are the major objectives in reducing fire intensity and rate of spread within shrublands.

On residential properties vegetation can be removed in clumps or thinned throughout a selected area. When creating clumps be sure to separate them by a distance of approximately three times the height of the plant. For example a clump that is three feet tall should be separated by at least nine feet from the next clump. Identify clumps throughout the area that will be left as wildlife habitat. When thinning in clumps or over entire areas, focus on removing dead plants, trees, and branches before cutting live vegetation. Where present, identify hardwood and/or conifer snags that will be retained as wildlife habitat. If trees are present they should be pruned to reduce the ladder fuels that could carry fire into their canopy. *For more information on pruning, see below: Pruning Individual Trees and* Figure D-1. Proper Pruning Techniques.

When thinning in shrubland areas that are far away from roads, it may be best to deal with slash created during thinning operations by either "lopping and scattering" (see below) or by creating burn piles. Burn piles should be created in small openings and gaps created during thinning operations in order to reduce the risk of escaped fires during burning. Both the Air Quality Management District and the local Fire Protection Districts have jurisdiction over burning for both fire safety and air quality. All burning must comply with all rules and regulations, and a permit or Smoke Management Plan is always required. *(See Burning section D.2.1 below for an explanation on how to properly burn piles)*.

When thinning next to a road much of the thinned material can either be chipped back onto the site or loaded into a chip truck for removal. When chipping material back onto a site, be sure the chips do not exceed more than several inches in depth *(see D.2.3 Chipping below)*. Some of the thinned material can also be lopped and scattered back onto the site for soil stabilization and wildlife habitat *(see D.2.4 Lop and Scatter below)*.

## Grassland Fuelbreak

The purpose of treating grassland fuels is to lower the flame length and fire intensity in desired locations as well as to restore damaged landscapes. A grassland fuelbreak consists of mowing, burning, or grazing a desired area. Areas adjacent to roads or ecotone edges are treated to lower grass height. Grasses can be treated approximately 50-100 feet on each side of roads to create a sufficient fuelbreak. Prior to initiating any fuel reduction within grassland areas it is important to identify native grasses to be retained as future seed sources. Grazing and fire are two potential approaches to treating grassland areas *(see D.2.1 Burning and D.2.2 Grazing sections below)*. When using fire as a management tool within grasslands, trees and shrubs should be protected by first reducing the amount of vegetative fuels around their base. This helps protect the tree from damage caused by direct flame contact.

Upon completion of grassland fuel treatments it is highly recommended to begin the process of sowing native perennial grasses. Work with local resource and restoration professionals, and/or rangeland managers to create a restoration plan that will convert non-native grasslands into native grasslands over time.

## Forest and Woodland Shaded Fuelbreak

When you remove fuel ladders around your property and leave the top layer of the trees (canopy) in place, you are creating a shaded fuelbreak. This break in fuel continuity—a result of treating both surface and ladder fuels—gives firefighters a chance to slow down and perhaps even stop a fire. Shaded fuelbreaks are effective because they 1) reduce amounts of fuel, 2) modify types of fuel, and 3) improve fuel arrangement. It is called "shaded" because most of the forest canopy is left intact. In some cases, some of the canopy may need to be removed if local conditions are high for a crown fire.

A shaded fuelbreak differs from a firebreak where a bulldozer or other equipment is used to create a bare-ground break with no vegetation. Firebreaks tend to regenerate quickly with flashy fuel and require a lot of maintenance, adding to future costs and fire hazards. By contrast, the shade cast by the canopy helps to reduce

regeneration, thus keeping the amount of fuel low in these fuelbreaks and requiring less maintenance. Shaded fuelbreaks also improve evacuation routes, as they provide a place where a fire might slow down or decrease in intensity, making it safer for you to get out (and firefighters to get in) if and when the time comes.

Shaded fuelbreaks should be strategically located. These include ridges and *benches,* along roads, around communities, and some other areas of flatter terrain. It is important that these efforts be coordinated with multiple landowners to achieve increased community wildfire-safety objectives. Shaded fuelbreaks located mid-way on a slope can be dangerous because fire can preheat an area from below, and burning materials from above can roll downhill and ignite fires.

The exact prescription for a shaded fuelbreak depends on your objectives and local conditions. Some landowners want to create as much cleared space as possible, under their perception of fire safety. Others want to maintain as much privacy as possible, sometimes compromising but almost always still improving fire safety. Many comment after implementing shaded fuelbreaks and other fuel-reduction treatments that the end results are aesthetically pleasing. Treatment prescriptions will vary according to the vegetation type and the aspect in which you are working. Determine your vegetation type and reference its Fuel Modification Prescription in Chapter 4 for site-specific treatments to incorporate into your design.

Within shaded fuelbreaks trees are typically spaced so their crowns no longer touch. Lower branches are pruned. Shrubs and dead and downed material are removed to reduce surface and ladder fuels. Not all small trees need to be removed; care should be taken to create horizontal space between small trees and nearby larger trees. Heavy underbrush and fallen limbs are generally removed, leaving mature trees that are more fire resistant. In ponderosa pine and mixed conifer areas, between sixty and eighty-five percent of the overstory canopy can be left intact, depending on the forest type.[3] Act cautiously within the project area by retaining enough canopy to prevent adverse effects from opening it up too much, too fast. Moving any forest stand toward historic conditions can be achieved in repeated intervals of five- to ten-years. The method of *sequential entries* can be an effective, cautious way both to reduce fire hazard and restore the stand and associated ecological conditions. Monitoring the response of the forest and ecological community will be the guiding influence on what time intervals to use for further thinning entries. Ecological monitoring can be accomplished by a visual assessment of the stand's response, *photo point monitoring,* or by establishing permanent monitoring plots to closely measure ecological benefits or impacts. *See Chapter 9 for more information on monitoring.*

In chaparral, shaded fuel breaks can be created by leaving shrub groupings in well-spaced patches while leaving sufficient shade to prevent the ground from drying out and exotic species from invading.

Varying levels of light on the forest floor will generate different re-sprouting responses; therefore creating shaded fuelbreaks requires the commitment to maintain them. As in all fuel-reduction treatments, regular annual or bi-annual maintenance is often necessary as stump-sprouting plants, invasive species, and/or shrubs begin to colonize the understory (although this is theoretically minimized with the shade provided by the intact canopy). Maintenance can be accomplished either by pruning and cutting back re-growth, or through use of prescribed-burning techniques. Shaded fuelbreaks in appropriate locations provide a good opportunity for the use of fire.

Following thinning and controlled-burning applications, restoring and establishing native grasses and forbs along shaded fuelbreaks is a long-term objective for the prevention of invasive species. In situations where private lands border federal lands or wilderness areas, invasive species can travel into these neighboring public lands and "spread like wildfire;" hence it is critical that long-term stewardship be a priority for maintaining these sites.

**Shaded Fuel Break Basic Prescription for First Entry[4]**

- For the first entry, cut as much of the *1-hour* (0–0.24 inches in diameter) and *10-hour fuel* (0.25–1.0 inch in diameter) as possible, i.e. the finer fuel.

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[3] Salmon River Fire Safe Council. *Fire Planning & Fuels Reduction Program.* www.srrc.org/programs/firefuels.php. And, Dennis Martinez. *Canopy Retention for Fuel Modification Treatment in Douglas Fir Stands.* 2003. Boulder Dumont Late Successional Reserve (LSR) Vegetation Management Project. Tiller Ranger District, Umpqua National Forest.

[4] This prescription is also based on the work of Dave Kahan, Full Circle Forestry, Redway, CA.

- Remove trees that look brushy (versus a more tree-like form), or unhealthy, are lacking in vigor, or are overtopped by larger and/or more vigorous trees that block access to open spaces in the canopy.
- Eliminate dead vegetation of all sizes.
- Shade will inhibit regrowth of sprouting species, so it will not be a major maintenance problem. Prune up all trees left behind as high as you can safely reach, with a chainsaw or pole saw.
- Start low in the area and work gradually uphill. Prioritize the lowest-growing plants and then work up the fuel ladder. This will help keep you from burying your work, and the result will be cleaner and more thorough.
- When implementing shaded fuelbreaks, work in teams with a sawyer and a brush hauler. This can result in a more thorough job with less effort, once safety and logistical issues have been established. The sawyer can make a small to moderate mess in one spot and then move to the next spot while the brush hauler cleans up the mess in the first spot. They then flip-flop and the sawyer returns to the first spot to expand upon what's been done, while the brush hauler cleans up the mess in the second spot. This method requires teamwork and awareness, and it will enable the sawyer to cut with more ease. Meanwhile the brush hauler is cleaning things up but is not in danger from falling trees and limbs because the cutting occurs in a separate area.

**Second Entry, or Advanced First Entry**

- Go to those trees and shrubs that you weren't sure about on the first pass.
- Think about vegetation health and species composition. You will generally want to favor rarer species. The type of vegetation you have on your property will determine what species to leave, and the appropriate percentage of canopy and understory density *(see Chapter 4)*.
- Look at the leader (the new growth at the top of the tree) and the overall health and vigor of the tree in relation to other trees of the same species. The leader reveals the annual growth. How is the tree growing in relation to other trees? Is the leader longer or shorter? Does it look healthy? Leave the healthiest trees. Is there space for them to grow in the upper canopy? If not, can you create that space by removing the less healthy or suppressed trees? If not, the tree is a good candidate for removal regardless of health and vigor. Imagine the same place in ten or twenty years. Will there be room for all the trees you have left? If not, remove some of the unhealthiest and smallest ones, or those in the way of your largest and most dominant trees. Keep in mind that the denser the canopy, the less regeneration (maintenance) you will have to address next year.

**How to Decide which Trees to Leave or Take**

- First look for the vigorous, healthy trees. These are the trees to leave, and to favor in your treatments.
- One way to decide which trees to cut is to look at how much crown is on a tree. Trees with less than twenty-five percent live crown are candidates for removal because they will have a hard time being released.
- Choose trees with healthy crowns to leave. Create space around them by removing less vigorous trees.
- Look for existing space in the canopy. Is there space for the tree to grow into the upper canopy? If so, leave it. If not, consider removing it.
- There may be trees that you will eventually want to remove—often intermediate trees—that are not cost-effective on the initial entry, but could be on a subsequent entry, especially with the addition of a value-added wood products market in the county. *See section D.2.5 Small-Diameter Wood Products below*.

After you've created your shaded fuelbreak, take a final pass through the area. How does it look? Do you need to remove any branches or small fuels that were left behind? Did you miss some trees or shrubs that obviously can be taken out now? Remember, you don't need to remove everything. You can leave clumps of vegetation for wildlife habitat.

## Pruning Individual Trees

- Prune as high as you safely can with a chainsaw or a pole saw, given your available time and financial resources. Remember, the more you prune, the more slash you will have to remove.
- Leave at least one-half of the tree height in live crown. Only remove one-third of the total foliage at one time.

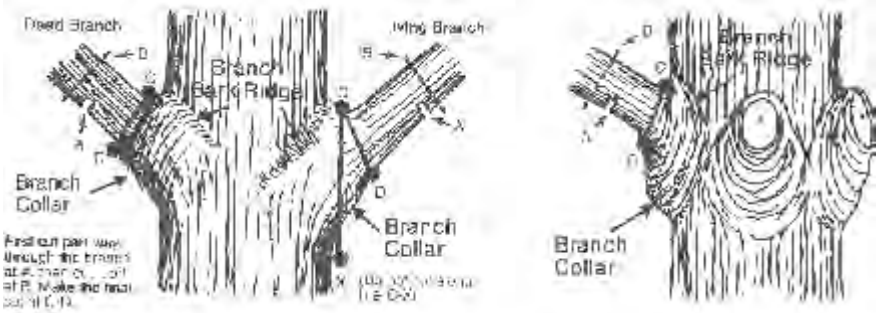
- Don't bother pruning anything that is shorter than you (unless it's in your defensible space zone, then it should probably be removed).
- Be sure to follow proper pruning techniques (see below) so you don't create health problems in your trees.
- Pruning is one of the most difficult skills to master but it is also one of the most important. For tips on proper pruning techniques, see the following table, and the website: "Prune trees for better health and higher value," by the California Forest Stewardship Program.[5]

***Figure D-1. Proper Pruning Techniques[6]***

Prune correctly. The object of the operation is to remove the branches as close to the tree stem as possible without leaving any stubs.

A. Cut partway through the branch from beneath at a point one or two inches from the trunk.


B. Make a second cut on the top of the branch, at a distance of 1/3 to 1/2 the diameter of the limb from the first cut. This should allow the length of the limb to fall from its own weight and be safely removed.
C. Complete the job by making a final cut next to the trunk, just outside the branch collar, with the lower edge farther away from the trunk than at the top.




Using the illustrations above, final cuts should be made from points C to D. Do not cut along C–X, which is an imaginary vertical line to help you locate C–D. First cut partway through the branch at A, then cut it off at B. Make the final cut at C–D.

## Drip-Line Thinning

The technique of drip-line thinning can be used to reduce ladder fuels and release desired leave trees from competition for nutrients, sunlight, and water by removing the nearby small trees and shrubs.

The drip line is the area at the end of the longest branches of a tree or shrub where water drips vertically to the forest floor. Drip-line thinning is accomplished by clearing away the ladder fuels within the drip-line circumference around the desired leave tree. The best place to begin is by picking out your healthiest, largest, desired leave trees and drip-line thinning around them. You can then reevaluate what vegetation is left and plan how to shape the remaining plants and stands of trees. Trees may be left individually, or standing in groups.

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[5] California Forest Stewardship Program. "Prune Trees for Better Health and Higher Value." *Forestland Steward* Newsletter. Winter 2002. http://ceres.ca.gov/foreststeward/html/prune2.html.

[6] California Forest Stewardship Program. 2002.

## Mosaic Thinning and Adaptive Management

Mosaic thinning is a style of vegetative thinning that creates openings and patches of vegetation to increase the potential variety of habitat types. It can be used to accomplish fuel-reduction objectives and provide ecologically sound treatment results such as enhancing site biodiversity. Mosaic-thinning regimes work to emulate the structural composition created by wildfire. Although thinning will not achieve the same ecological results as a natural fire, the openings and patches of vegetation that are created can increase the potential for a variety of habitat types. For example, in certain portions of a treatment area, thicker vegetation and tree cover may be left to provide *thermal cover* for deer, elk, and other wildlife, while in other locations canopy cover may be reduced to provide sunlight to the forest floor in order to favor struggling native grasses and associated herbaceous understory vegetation. Mosaic thinning includes treatments that reduce the abundance of dense vegetation, thus encouraging herbaceous understory and overstory growth. Such thinning results in a diversity of habitat types beneficial to wildlife by creating islands, corridors, thickets, open understory forest stands, and small grassy openings of random shape, size, and occurrence.

## Variable-Density Thinning

A variable-density treatment means thinning or selectively cutting trees in a manner to restore repeating variability or redundancy in a forest. *Variable-density thinning* regimes are an integrated approach to the management of forest stands and vegetative communities of different sizes and densities. This silvicultural practice can be applied to the diversity of vegetation types throughout the county, with site-specific adjustments made to accommodate the favored species historically suited for each plant community location.

The main goal of variable-density thinning is to restore maximum repeating variability or redundancy to a forested landscape.[7] Since we do not know exactly how much of what kind of habitat to restore or maintain, it is good to vary the treatments and apply them in small areas. This is in line with the Precautionary Principle.

This kind of thinning will help reduce crown fire hazard and can be combined with biomass utilization, surface fuel treatments, and controlled-burning activities. Low- to moderate-severity fire (the kind experienced historically in parts of the county) will then tend to naturally select for fire-resistant species.

> "Variable-density thinning regimes in which thinning intensity and tree marking rules are varied within the stand of interest (Carey and Johnson 1995; Carey and Curtis 1996) are a useful approach to increasing heterogeneity in stand density and canopy cover. Variable-density thinning is sometimes referred to as a 'skips and gaps' approach. In such a prescription, some portions of a stand are left lightly or completely unthinned ('skips'), providing areas with high stem density, heavy shade and freedom from disturbance, while other parts of the stand are heavily harvested ('gaps'), including removal of some dominant trees, providing more light for subdominant trees and understory plants (Carey et al. 1996). Intermediate levels of thinning are also applied in a typical variable-density prescription."[8]

These goals can be accomplished by the following practices:

- Creating and maintaining variable or uneven spacing, with clumps of trees and canopy gaps;
- Maintaining the largest trees of the stand;
- Maintaining "early-seral species" on the landscape, those species which begin growing in natural succession following a disturbance like fire or logging;
- Reducing the density of "ingrowth," trees that grow large enough in a season to be considered a sapling or pole timber; and
- Reducing the fuel loading by removing ladder fuels.

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[7] Lindenmayer, David B.; Franklin, Jerry F. *Conserving Forest Biodiversity: A Comprehensive Multi-Scaled Approach.* 2002. Island Press. Washington, D.C. See in particular the "Risk Spreading" chapter.

[8] Lindenmayer and Franklin. 2002. p. 184.

In addition to providing fire safety, ecological fuel reduction provides many other benefits. Some of these are:

- Improved forest health and productivity. There will be less stress and mortality from reduced competition, and this translates into lower fire intensity. By removing the lower branches of your trees, you will have higher-quality lumber (less knots) should you ever choose to harvest those trees for wood products.
- Improved wildlife habitat. Opening up the lower canopy and forest floor provides habitat for some of the species that prefer to dwell in larger trees or older forests.
- Improved aesthetics. Many landowners comment on how much nicer their view is after doing fire hazard reduction, as they can see out into the forest again.
- Creation of firewood.

*For additional information on fuel-hazard reduction, please see Appendix F: Fire Safety Information.*

## D.2. What to Do with Thinned Materials

As a result of your fire safety efforts, you will likely accumulate a lot of branches and other materials. There are several options for dealing with thinned materials, including: burning, chipping, lop and scatter, grazing, some combination of these, and small-diameter wood products, and/or biomass.

Be aware when working on forested properties. You can only use commercial wood products from forestry operations on your own property. To sell most commercial wood products from a forest operation requires a Timber Harvest Plan (THP) approved by the California Department of Forestry and Fire Protection (CAL FIRE). THPs are generally too cost-prohibitive for fuel-hazard reduction in most young forests nor would they be appropriate or applicable to much of Lake County. However, the Forest Fire Prevention Exemption provides an alternative: *see section C.1.2 on the Board of Forestry in Appendix C, for more information.* The Mattole Restoration Council (MRC) has a great summary and comparison of fire-hazard reduction exemptions you can use for your fire-hazard related forestry operations. Find their "Forest Practice Rules for Thinning Exemptions," at mattole.org/pdf/Exemption_thinning_requirements.pdf, and "Comparison of Thinning Exemptions," at mattole.org/pdf/fire_hzrd_exemption_comparisons.pdf *(also in Appendix F).*

In addition to MRC's summary and explanation of fuel-hazard exemptions, the State Board of Forestry has developed a table of permit options for fuel-hazard reduction on private and state owned lands.[9] *This document is also available in Appendix F.*

Firewood is also a great by-product of fuel-hazard reduction. To sell firewood, you need a firewood exemption permit from CAL FIRE. Additional permits may also be required by the county.

### D.2.1. Burning

Controlled burning (or prescribed fire) is the controlled application of fire to forest, woodland, shrubland, or grassland in either their natural or modified state. All methods of controlled burning need to be undertaken with great care, with a well thought-out plan in place, and must follow all legal requirements. Fire can be an important tool to help restore fire-adapted ecosystems such as those found in Lake County. However, it can be a dangerous tool, and must only be used with the utmost respect, care, and skill. Before initiating any burning with your fuel-reduction efforts, consult with both the Lake County Air Quality Management District (LCAQMD)[10] and your local Fire Protection District (FPD). *See Broadcast Underburning below for more on necessary precautions.*

Controlled burning must be done within site-specific environmental conditions to confine the fire to a predetermined area. The objective is to produce the fire behavior and characteristics required to attain fuel treatment, ecological restoration, and resource-management objectives. (*For more information on how some other communities are using fire, see El Dorado County Fire Safe Council, Prescribed Burning,*

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[9] Board of Forestry (BOF). *Table of Current Fuel Hazard Reduction Permit Options.* September 17, 2008. www.bof.fire.ca.gov/other_board_actions/permit_options_for_fuel_hazard_reduction_on_private_and_state_owned_lands/finaldraftfhrtable.pdf.

[10] Lake County Air Quality Management District: www.lcaqmd.net. General E-mail: lcaqmd@lcaqmd.net. Voice: 707-263-7000. Fax: 707-263-0421. Address: 885 Lakeport Blvd., Lakeport, California 95453.

*www.edcfiresafe.org/prescribed_burning.htm, and Orleans Somes Bar Fire Safe Council Prescribed Burning Program, http://www.mkwc.org/programs/firefuels/prescribedburn.html.)*

Burning, like all slash disposal options, has both advantages and disadvantages.

**Advantages** for burning are:

- Fairly quick to dispose of large amounts of thinned materials.
- Access is generally not a limiting factor.
- May be the most inexpensive ways to remove thinned material.
- Recycling of nutrients into the ecosystem.

**Disadvantages** to burning are:

- Emitted smoke can cause adverse health impacts
- Risk of escaped fires.
- Limited number of burn days.
- Usually requires experienced fire professionals and fire suppression resources.
- Can be significant liability issues, especially with fire escapes.

The following is a list of suggestions for safe burning based on those developed by the California Forest Stewardship Program[11] and adapted for Lake County:

- Only clean, dry vegetation should be burned.
- Arrange the material to be burned to burn hot, fast, and free of dirt, to minimize smoke emissions. Place material of various sizes in the pile for adequate airflow, guarding against excessive smoke when burning.
- Only ignite outdoor fires with ignition devices approved by LCAQMD and CAL FIRE.
- Ignite material to be burned as rapidly as practical within applicable fire control restrictions.
- Curtail, mitigate, or extinguish burning when smoke is drifting into a nearby-populated area or creating a public nuisance. Smoke Management Plans (obtained from LCAQMD) can be utilized to minimize smoke problems and nuisance.
- Don't burn material unless it is free of tires, rubbish, tarpaper, plastic, and construction debris; is reasonably free of dirt, soil, and moisture; and is loosely stacked in such a manner as to promote drying and ensure combustion with a minimum amount of smoke.

In Lake County, the "Burn Ban" goes into affect on May 1st every year. Only "economic exemptions for agricultural operations" may be granted during the fire season; contact your local Fire Protection District or the Air Quality Management District (707-263-7000) for details.[12]

Residential burn piles must be no larger than 4x4 feet, at least 100 feet from the nearest neighbor, at least 30 feet from the nearest structure, and the ground scraped clean for at least 10 feet around the pile. A responsible adult must be present during burning at all times. Keep children far away from all fires and smoke. Residential burning hours in Lake County are 9am–3pm on permissive burn days. Burn permits last from the end of fire season (CAL FIRE determines when fire season is over) to the end of April.

Agriculture burn permits (issued for routine agricultural burning) are also required within the county. Burning hours for this permit are 11am–3pm for leaves, grass, and field crops and 9am–3pm for other material. LCAQMD also offers a parcel or land-development burning permit. This permit is issued for land development and clearing only and typically requires a pre-burn inspection by the local FPD. These permits are not for the use of year-to-year vegetation management.

LCAQMD may require a Smoke Management Plan for burning if:

- Smoke impact potential is high.
- There is a history of burn complaints.

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[11] California Forest Stewardship Program. *How to Burn Piles Properly.* www.ceres.ca.gov/foreststeward/html/burnpiles.html.

[12] Juntunen, Linda. Personal Communication. August 6, 2009.

- There is a high danger that the fire might escape.
- The fire will burn for more than one day, or
- The property includes more than one acre of standing brush, understory, removed whole vines, or trees.

These permits are only issued by the LCAQMD. Note: that there is NO burning within commercial areas in Lake County. Commercial properties include golf courses, apartment complexes, motels, and trailer parks. For more information regarding burning and burn permits please visit www.lcaqmd.net.

## Controlled-Burning Methods and Treatments

Controlled burning (AKA prescribed burning or prescribed fire) methods vary and include swamper burning, *hand pile burning, broadcast underburning,* and *patch burning.* All burning methods can be used to reduce fuel hazards and improve the ecological health of Lake County wildlands. When choosing the right controlled burning activity for your property it is very important to consult fuel management and forestry professionals, especially when considering broadcast underburning. Controlled burning methods are very site-specific, and generally only applicable for larger ownerships. Not all methods are appropriate for every location. Burning prescriptions must be determined on a unit-by-unit or section-by-section basis. The details you will need for burning will develop as on-the-ground work progresses along with your knowledge of site conditions. Whenever burning, dry material properly (this can take several weeks or more). Minimum drying times are available through LCAQMD.

### Swamper Burning

Swamper burning is a controlled burning method in which fuels are gradually and continually added (usually over the course of a day) to a hand or machine pile. Near homes, swamper burning may be a good option. This method is highly recommended within denser vegetation zones, following an initial *first-entry thinning treatment,* where high concentrations of slash will be generated. Swamper burning is a first preparation step prior to broadcast underburning.

This method can be beneficial for the following reasons:

- There is less smoke at any one time when dragging and burning downed slash, rather than lighting many hand piles at once.
- More fuels are consumed as a result of this method. There is little opportunity for piles that are lit to extinguish in the center.
- Swamper burning minimizes scorching of leave trees and sensitive vegetation zones. Slash can be dragged away from leave trees and transported to burning piles in more open locations.
- The danger for crown scorching and the potential for runaway fire is lessened because piles are more manageable in a swamper burn situation than in a larger *touch-off* hand-pile burn.
- The visual appearance of hundreds of hand piles burning at one time can be frightening. In contrast, swamper burning is a good tool to educate landowners about fire, and the fire-adapted landscape in which they live.
- Swamper burning methods are safer and more manageable in both appearance and execution. In light of the prescribed-fire disasters in the Southwest, this is important in terms of developing and maintaining community trust for landowners, contractors, and agencies involved in the application of controlled burning.
- In a swamper-burning situation, materials for special forest products and small-diameter utilization can be sorted by hand crews.

The swamper burn method is site-specific. For controlled burning activities in chaparral, chemise-chaparral, and foothill woodland *(see Chapter 4)* where fuels burn hotter than conifer forests, the swamper burning approach will achieve positive end results, provide a safer burn, and prepare site conditions for the future reintroduction of low-intensity fire.

Swamper Burning Prescription

- Place burn-pile locations at a minimum of ten feet outside the drip zones of the largest overstory leave trees, where they exist.
- Place burn piles in the most open areas to avoid damage to surrounding trees and other vegetation.

- Construct small piles (comprised of mainly smaller fine fuels such as live and dead branches) approximately every 15-25 feet to serve as *pilot ignition piles.* These piles can be constructed roughly three feet high and covered with slash paper. (Check with LCAQMD for approved slash paper materials.) After stacking enough material for the base of the pile, place a sheet over the material then stack about 1/3 more on top to hold down the paper—this will keep things dry for later lighting.
- Leave the remainder of slash on the ground until you burn.
- Swamper burning must be conducted prior to fire season; check with your local FPD, LCAQMD, or CAL FIRE for permitting details.
- Desired sub-merchantable materials can be sorted for special forest products, small-diameter poles, and firewood. *(See section D.2.5 below for more information*.) Yard these products to roadside locations.
- When the burning, ignite pilot piles in smaller sections (ten piles at a time), with the remaining slash dragged to the burning piles in a rotational fashion. Add slash to the piles while keeping reasonable flame lengths. When these piles have become manageable, crew members with hand-carried *drip torches* can move ahead to ignite other piles. At the same time, a mop-up crew will stay behind and clean up the remaining slash and burn out the surrounding slash in the piles.
- Depending on the time of year, a *scratch line* or *scalping* down to *bare mineral soil* may need to be placed around the piles to prevent the fire from burning outside the pile ring.
- After visible flames have burned down, hot embers will remain in the burn ring. Depending on what fuel type you are burning, these hot embers may remain for several days. It is important to inspect the area where you were burning several times throughout the following days until the fires are completely out, more often if there is <u>any</u> wind. Throughout Lake County, fuels on the ground can dry out rapidly even after several days of rain. Pay close attention to this to prevent fire from escaping.

Following burning, a good restoration practice is to sow native grass seed into the mineral-rich ashes of some of the burn locations to help restore native grasses. Native grass can establish itself well in disturbed locations such as burn spots. Check with your local nursery to acquire native grass seed for your specific location. Sow these seeds by hand; experiment with how much seed to sow. Seeding rates will vary; check where you buy seed as to how much to use per location, trying to obtain the freshest seed stock. The best time to sow native grass seeds is November through March, during their dormant time which depends on elevation. Sowing native grasses not only restores herbaceous plant communities to your site, it is a good preventative measure for noxious weeds.

Remember: don't strip the ground of all woody material in your burning operations. Be sure to leave some coarse woody debris (the larger the pieces the better). Don't burn every stick. Decide what to leave on the site based on slope percentage, aspect, and location, (e.g. leave more large materials on steeper slopes).

**Hand Pile and Burn**

Following thinning operations you may consider the method of *hand pile burning*, where slash is gathered into piles in open areas and burned. Slash is piled soon after it is cut, then covered with slash paper to allow the piles to dry out so they can be properly (and legally) burned. Slash piles are usually burned in the fall and winter during moist days. At this time, the piles will be relatively dry while surrounding vegetation will be damp, minimizing the spread of fire beyond the pile. This method differs from swamper burning in that materials are not continually added to the piles once they are ignited.

<u>Hand Piling Specifications</u>

- Pile debris ranging from two to eight inches in diameter, at least two feet or more in length. On slopes greater than 55%, small-diameter (greater than eight inches) coarse woody debris may be left for soil stability. Favorable small-diameter materials may be yarded for special forest product utilization. *See D.2.5 below.*
- Piles should be placed away from old stumps and fallen logs to minimize their ignition. To prevent holdover fire potential (i.e., a fire not burning out completely), make sure piles aren't located on top of old stump holes or decomposing logs. Place piles a sufficient distance from the drip lines of trees to prevent scorch.
- Construct piles up and down slopes; create a secure base to prevent the rolling of materials.
- Use smaller fuels as the initial core for later ignition, with larger fuels placed on tops and sides.

- Size piles in a range from a minimum of three feet high by five feet in diameter to a maximum of five feet by seven feet, except when insufficient slash is available in the area.
- Residential burn piles must be no larger than four by four feet.
- Make piles as compact as possible. Limbing, aligning the material, and placing heavier material on top of the pile will obtain compaction. Do not exceed three inches in cross dimension air space between logs and limbs after piling.
- Cover piles with slash paper so the covering does not go beyond half the length of each side of the piles, as measured from the top (or center/mid-point). The goal is to have the center core of the pile covered (not the entire pile) for successful ignition when lighting the pile later.
- Placing heavy materials on top of slash paper to provide the best protection from rain and snow.

For piles that may cause unavoidable scorch to residual trees upon combustion, burn them during periods of rain or snow to minimize damage. Each pile should be *chunked* at least once during burning operations. Include any creep in the chunk to keep the fire confined to the piled area. Chunk piles after they have had sufficient time to burn down. Check piles daily, and frequently throughout the day in windy conditions. Use extreme caution: escaped burn piles are responsible for numerous wildfires.

**Broadcast Underburning**

Broadcast underburning allows a controlled fire to burn in the understory throughout a designated area within well-defined boundaries. It is done to reduce fuel hazards and/or as a silvicultural restoration treatment. It is generally used only on very large properties, or public lands. Prior to considering broadcast burning, be sure to contact local fire agencies, CAL FIRE, and LCQAMD to obtain all the necessary permits and to conform to all legal requirements. Before burning in forested stands, obtain a Smoke Management Plan from the LCAQMD and approval for specific burning times from LCAQMD and your local FPD.

To effectively and responsibly reintroduce fire—to ensure it will burn on the ground and not in crowns—first thin and brush the site. This reduces stand densities, ladder fuels, and excessive brush and surface fuels.

Preventative measures should be taken to ensure the survival of overstory trees. Often a thick duff or thatch layer will accumulate beneath mature trees. Feeder roots will often grow into the duff layer close to the surface of the ground. The loss of these roots due to extreme heat and/or fire can cause tree mortality. Thus duff should be raked back several feet with a McLeod or other raking device to prevent unwanted impacts. This is important beneath large pines and oaks, which often accumulate thick mounds of debris, colonized by sensitive roots.

Favorable conditions for igniting fires include low winds, moderate humidity, fairly moderate temperatures, and a small amount of soil moisture to protect soils from baking. Aboveground fine fuels should be dry enough to ignite and carry fires. The idea is to reduce fine fuels in the form of duff or grasses without compromising or impacting soils, fungal associates, sensitive tree roots, etc. Burn intensities will vary depending on the vegetation type, the amount of ground and surface fuels, and the restoration objectives on the site.

Flashy underburns are the desired outcome where there are less surface fuels, and grass persists in the understory (e.g. oak woodlands and grasslands). Flashy underburns are best accomplished in the fall, usually on the second dry day following a rain, and enable safer broadcast burning of larger areas. The top several inches of the surface fuels should be dry, with the moisture content sufficiently low to safely carry the fire quickly (flashy), consuming the top layer of the surface fuels while leaving some organic material to protect the soil.

Where surface fuels consist of deep, heavier leaf litter mixed with duff (e.g. ponderosa pine and mixed conifer forests), a slower creeping fire may be more appropriate. During mid-winter periods, an annual window of an extended dry period often occurs following heavier periods of earlier winter rain. This is a good time to accomplish this type of underburning to consume more of the abundant surface fuels. The slow creeping fire will consume more depth of surface and ground fuels. The native people in the region referred to this type of burning as 'cool burning'; fire creeps along and consumes fuels without getting hot and out of control.[13]

[13] Pilgrim, Agnes Baker. Confederated Tribe of Siletz, Takelma Tribe of the Rogue Valley, Southern Oregon. Personal communication.

Broadcast Burn Fire Preparation Example

- Thin and remove ladder fuels and jackpots (pockets of dense fuels where fire could flare up and burn more intensely); prune to head height. Separate ground-to-crown and crown-to-crown live and dead fuels.
- Lop and scatter tree branches and tops; cut to twelve- to eighteen-inch lengths on the ground.
- Pile all other slash three to four feet high, five to six feet at base.
- Use flagging to mark desired leave species like seedlings and native shrubs. Create a *blackline* around these. Slowly burn out from desired leave species to protect them during the main broadcast burn).
- Blackline (backburn) all retained doghair thickets and gulches before broadcast burning.
- Use a McLeod tool to pull back heavy duff from leave trees to prevent root steaming and possible mortality,.
- Leave slash less than two to three inches in diameter on the forest floor.
- Put medium-sized slash in piles or near roads for firewood.
- Leave slash greater than eight inches diameter on the forest floor.

**Patch Burning**

Following initial thinning and slash treatment, patch burning may be used in site-specific locations. Patch burning is done by defining and isolating a small area of fuels that you want to burn, and applying fire only to that area. This method is sometimes used in the management of invasive blackberries where the area around the patch is thinned, a scratch line is created around the thinned area, then the inside patch is ignited.

This method can also be used to burn surface fuels within a variable-density treatment where unthinned areas are retained but you want to achieve the diversity of mosaic burn conditions.

If performed properly, patch burning can be a very effective method for reducing fuels and costs. In the proper conditions it works well in chaparral and chemise-chaparral, as these plant types often have lots of dead fuel, and patches can be isolated and burned.

As with other controlled-burning methods, only perform the activities with the proper permits and by consulting and hiring skilled fire or forestry professionals.

**Considerations for Burning Activities within Riparian Corridors**

Some variation may occur during burning operations due to changes in vegetation, slope, and aspect.

- Burning should be carried out with extreme caution along slopes above riparian draws, especially in *headwalls,* or where loose boulders may be found. Lop and scatter coarse woody debris in these locations to protect the soil and enhance slope stability.
- Burn on stable benches within upland riparian areas. Transport thinned slash by hand crews to these locations.
- Take extra care while burning is being conducted to protect vegetative diversity. Burn slash away from "mesic" (normally moist) vegetation.
- Underburn in a patch-burn fashion.

## D.2.2. Grazing

As explained in Chapter 4, grazing is an option to reduce grassland fuels using livestock (e.g. cows, sheep, goats, and horses). One of the long-term objectives of using grazing as a restoration tool is to convert an area from exotic annuals back to native grasses, as native plants are generally adapted to the local wildfire ecology. This can be done in the fall or spring, and followed by the sowing of native grass seed. Conversion from annuals back to perennials is a very time-consuming task requiring meticulously scheduled seasonal activities, and is more appropriate for highly focused areas due to the intensity of the work.

If grass conversion is not the focus, a very temporary and selective rotation of livestock grazing on an area can mitigate annual grass heights and also clear brush. Goats, sheep, or cows are all options for livestock grazing. Whereas cows and sheep are good for grasslands, goats are a great option for heavily brushed areas, including dense stands of poison oak or Himalayan blackberry. There are several local goatherds available for fuel

reduction. Goats are a good option for areas that are steep, or for smaller tracts. Only one or two goats can effectively clear smaller areas.

With any grazing treatment for fuel reduction, areas that you do not want to be grazed will need to be fenced, or some other method will need to be used to control the animals. Where grazing is desired in a strip pattern, use proper fencing to contain animals in the proper location. Grazing animals can quickly denude an area of all plant life if left unmonitored.

**Advantages** to grazing are:

- Can be inexpensive.
- Only fuel costs are in transport.
- Can quickly clear an area.
- Provides nitrogen-rich fertilizer.

**Disadvantages** to grazing are:

- Can quickly denude an area.
- Can spread exotic species through manure.
- Need to be controlled by fencing or other means to protect areas not to be treated.
- Need access to water.
- May need protection from wildlife.

### D.2.3. Chipping

Chipping is the use of machinery to reduce branches and other small materials to small chips, or wood chips. It is another method for treating thinned materials, and like all options it has both advantages and disadvantages.

**Advantages** to chipping are:

- You can work on most days when other options may not be feasible.
- The chips created can be used for landscaping, such as on paths around your homesite (but not within your five-foot fire-free zone).
- Chips spread along roadsides will suppress the growth of vegetation, thereby keeping down fire hazards.
- There is a no chance for escaped fires or smoke.
- Free or reduced-cost chipping is available for smaller projects through the local Fire Safe Councils.

**Disadvantages** to chipping are:

- Chipping can be expensive if you are doing it on your own.
- Chippers break down and need to be serviced.
- Production levels for slash disposal can be slow, especially with large materials and a small chipper.
- Chippers are limited to where they can be staged; they generally need to be close to roads.
- Chippers are noisy.

If you don't have access to a chipper, the Lake County Fire Safe Council (707-263-4180, ext. 16) and the South Lake Fire Safe Council (Bruce Anderson 707-928-5232 or Allen Clay at 707-987-0243) are part of a community-chipping program in cooperation with the Resource Conservation Districts (RCD, Dave Mostin 707-279-2968). Contact any of them for more information. They can likely help you chip your residential slash.

The Lake County community chipping program began in 2002 with a chipper purchased by Lake County Air Quality Management District (LCAQMD) and leased to the Lake County Fire Safe Council (LCFSC). The LCFSC helped develop the program; the foreman and crew work for West Lake RCD.

The program is supported by minimal fees, private donations, and the County of Lake and LCAQMD. Once the program was established, the chipper was donated to the program by the LCAQMD, with an MOU that the chipper would be available for public benefit projects upon request. Lake County Special Districts also donated a used dump truck. LCAQMD provided funding to convert the truck from diesel to propane for emissions reductions. The chipper is now owned and maintained by West Lake RCD It continues to be a successful method of fuel reduction for the county's residents.

The South Lake Fire Safe Council began its own chipping program in 2002. It utilized grants to hire a chipping contractor at no charge to residents. This program today however utilizes the chipper managed by the West Lake RCD. It is still offered at no cost by the SLFCS to the communities that they serve.

The Hidden Valley Lakes Association purchased a chipper in 2002 to service their residents. Dues provides by association members pay for this chipping program.

For specific instructions regarding how to prepare your materials for use with the community chipping programs, please visit: http://southlakefiresafecouncil.org/chipping.htm, and www.recycling.co.lake.ca.us/news/ChippingProgram.pdf.

If one of these programs is not available to you, you can hire a forestry contractor who has a chipper, or rent one. If you rent one, it should be able to process material up to ten inches in diameter. Even if the material you are chipping is six inches, having a ten-inch chipper will make things go faster because sometimes you will want to put three branches (each three inches in diameter) in the chipper simultaneously. With a chipper that takes larger-diameter material you will prevent the potential problem of jamming the machine. It is very important that you get a good chipper, since it can be frustrating to rent a chipper that does not serve your needs.

Chippers are best suited for use close to roads, landings, or where access to your thinning slash is convenient, although tracked chippers are available that can drive through the forest on minimal slopes. The best materials to chip are softwood conifer species. Chippers can be used on hardwood and chaparral, but you will need to pre-process these materials before putting them into the chipper. Broad, branchy fuels like chaparral (e.g. manzanita or buck brush) can cause a chipper to jam if you do not first limb the branches with a chainsaw. These fuel types are time-consuming but workable. Limit dirt from getting into the chipper, as this will quickly dull the blades. Remember to stack all your branches in the same direction so you can easily feed the chipper.

Use extreme caution when operating a chipper; always wear safety glasses and ear protection. Pay special attention to the feed control; watch that your clothes (especially shirtsleeves) are not caught on branches as they are pulled into the chipper. Keep children far away from all chipping operations.

Finally, another form of chipped or processed materials can be achieved in conjunction with the county green waste program. There is free curbside pickup for green waste for county residents with refuse pickup. The local composting facility uses wood processing equipment to produce landscape materials and compost for residential and commercial use, from materials from the green waste and chipping programs. More facilities such as this, and/or composting facilities could be developed in Lake County for processing of removed fuels, benefitting the local economy and creating local jobs.

### D.2.4. Lop and Scatter

Lop and scatter is a method whereby thinned materials are spread about to rot on the forest floor—taking care not to form large piles of slash (jackpots). Lop and scatter can be very cost-effective; it is definitely a site-specific treatment.[14] This is the best method for improving site soil fertility and hence the ecosystem's long-term productivity. By removing the ladder fuels and scattering them low to the ground, you are improving the chances of your forest or wildland surviving a wildfire. However, because of short-term increased hazard this is not a method to do near structures within the Defensible Space Zone.I It is more appropriate in the Wildland Fuel Reduction Zone *(see Appendix C for more information on the various zones).*

**Advantages** to lop and scatter are:

- Do not have to pay for additional disposal treatment such as burning or chipping.
- Material is left on site and produces wildlife habitat and future soil.
- Access is generally not a limiting factor.

**Disadvantages** to lop and scatter are:

- It is very time consuming to cut material into short lengths.
- Fuels are not removed, so there is still a surface fire hazard for up to three years or more.

[14] Jones, Tim. Fire Management Officer, Bureau of Land Management. Arcata, CA. Personal Communication. July 12, 2004.

Material should be cut down to an ideal height of one foot above the ground. However, lopping to less than or equal to twelve inches above ground is likely beyond the skills of most, so eighteen inches is sufficient goal. Remove all large pieces of wood; use this for firewood). Dedicate some larger, heavier pieces to sit on top of the slash and weigh it down. Conifer slash "lies down" much easier with much less lopping than most hardwood slash due to its growth habit. Green slash of all species lies down easier than dry slash (if you're thinking of coming back later to lop). Make sure none of your material on the ground is touching the base of any trees or shrubs you have left standing (your leave trees). Think about this in terms of creating defensible space around leave trees just as you would around structures.

The biggest risk with the lop and scatter method is that fire may occur within your treated area before the fine fuel falls to the ground and decomposes. Even so, lop and scatter does reduce your fuel hazard because the fuel is no longer part of the fuel ladder, and there is vertical clearance between the surface fuel and the bottom branches of the trees (ideally a minimum of eight feet of space). Nevertheless, your surface fuel hazard may increase in the short term—from three to ten years—depending on your forest types and decomposition times.

### D.2.5. Small-Diameter Wood Products

Much effort has been made in California and throughout the Pacific Northwest to develop markets for small-diameter, or value-added wood products, especially for hardwoods. Small-diameter wood products are furniture and other materials developed from generally small, suppressed trees, or large limbs.[15] (Not to be confused with smaller branches and other materials from fuel-reduction projects that can be used as mulch or for landscaping.)

**Advantages** to small-diameter wood products are:

- Creation of local jobs.
- Creation of valuable wood products to sell.
- Helps to offset the cost of fuel-reduction projects.

**Disadvantages** to small-diameter wood products are:

- Can be expensive to remove these materials.
- Limited availability of infrastructure currently to can handle this material.

It is possible to use these materials commercially. They often produce beautiful lumber. Small, suppressed Douglas fir—a softwood—often has a tight grain that makes for attractive trim and tongue-and-groove flooring. Local hardwoods such as tanoak and madrone can be used by local woodworkers to create stunning furniture, cabinets, and floors. To be merchantable, the logs need to be straight and between six to ten inches in diameter. Two great Northern California sources for more information are the Institute for Sustainable Forestry (www.sustainablehardwoods.net) and the Watershed Center (www.thewatershedcenter.com).

There are many issues limiting the use of small-diameter and non-conventional forest products in Lake County. The main issues are the lack of both infrastructure and a constant supply of small-diameter wood products. There are portable sawmills in Mendocino County. However, hauling costs could limit the feasibility of adding value to small-diameter materials generated during fuel-reduction projects. Lake County could be a central location for a small-diameter log mill that could service areas of eastern Mendocino County, Napa County, and Colusa County. A small-diameter log mill can create local jobs as well as add value to material cut during fuel-reduction projects. The added value of these wood products can help offset the cost of fuel-reduction efforts.

In addition to milling small-diameter material for conventional wood products, vegetation cut during fuel-reduction projects can also be used for a variety of other purposes. Manzanita, for example, is very beautiful and can be used for decorative purposes in its round form. Small-diameter conifer and hardwood material removed during fuel-reduction projects can be used to create rustic furniture. The ability to sort this type of material at a scale that is economically feasible (wood sort yard) will be the major limiting factor in creating a value-added facility in Lake County. A local sort yard could help supply the public with specialty wood products that have been cut during fuel-reduction activities. The Watershed Center in Trinity County has a functioning sort yard that

[15] For more information on small diameter wood products and biomass, see: Rural Voices for Conservation Coalition. *Woody Biomass Terms.* April 2008. www.forestguild.org/biomass/resources/definitions_rvcc.pdf.

could be a model for a similar project in Lake County. These projects can help reduce fire danger, limit the amount of burning, and create local jobs.

### D.2.6. Biomass

As stated throughout this CWPP, the vegetative communities of Lake County have accumulated high amounts of biomass over the past decades.

> "Biomass refers to organic material from living things such as trees, shrubs, grasses and other plants. The temperate forests of the Pacific Northwest contain the highest amounts of biomass per acre of any forests in the world, far exceeding tropical forests. Biomass is commonly used as lumber, firewood, and paper. Biomass can also be used for energy production."[16]

California's biomass resource is large and diverse. The statewide gross annual resource in 2005 was estimated at over 86 million *bone dry tons* (BDT). Of this, 34 million BDT/yr are potentially available for sustainable use. This is a preliminary estimate based on technical and ecosystem limitations in resource acquisition and does not strictly define the fraction of biomass that is economically feasible to use. Of the gross annual statewide resource, 25% is from agriculture, 31% from forestry, and 44% from municipal solid wastes.[17]

Within Lake County the amount of estimated[18] biomass in 2005 varied within these categories (agriculture, forestry and municipal solid waste). Estimated agricultural biomass—orchard and vineyard clippings—was approximately 14,548 BDT/yr. Estimated forest biomass was 429,018 BDT/yr. Of this figure, logging slash comprised 119,806 BDT/yr, forest thinning 118,929 BDT/yr, mill residue 64,392 BDT/yr, and shrublands 125,891 BDT/yr.[19] This biomass has the ability to create energy or be used for a variety of other uses.

In its simplest form, biomass is used as firewood to create heat. One of the most efficient ways is through a process called gasification. This technology is being used in schools in rural areas *(see www.fuelsforschools.org)*. Gasification uses woody materials as a source of energy to produce methane and hydrogen gases. These gases are then used to create heat or as fuel to power an engine for electricity. Biomass can even be used to replace our dependence on fossil fuel. It can be better for the environment, assuming the production and collection of the original biomass is done in an ecologically appropriate and sustainable manner.

One of the noteworthy challenges associated with biomass as a source of energy is transportation cost. In order for biomass utilization to be economically feasible, the distance for the biomass to travel should not exceed 25-50 miles. However, alternatives are being developed as biomass is being emphasized as a federal mandate for public land management agencies. One alternative is to bring the biomass plant to the woods. Portable biomass facilities are being developed but are not yet commercially viable. Community-scale biomass alternatives that distribute the benefits and the risks (such as over-exploitation of forests and air pollution), while reducing transportation costs and limiting large-scale impacts are most desirable and advantageous for Lake County.

Finally, a resource for developing biomass in Lake County is the California Forest Biomass Working Group (CFBWG). This group includes numerous agencies, consultants, and conservation organizations, and has developed the following mission statement:

> "Every forest community in California has the capacity to address and utilize the excess biomass in their area that is appropriately scaled to be economically and ecologically sustainable so that local jobs are created that help restore the environment and reduce fire risk."

Learn more about CFBWG by contacting Bruce Goines of US Forest Service Region 5: 707-562-8910.

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[16] Institute for Sustainable Forestry. *Safeguarding Rural Communities: Fire Hazard Reduction and Fuels Utilization, Final Report.* September 2001 to December 2002. p. 23.

[17] Department of Biological and Agricultural Engineering, University of California Davis. California Biomass Collaborative. *Biomass Resource Assessment in California.* 2005. p.54.

[18] Department of Biological and Agricultural Engineering. 2005.

[19] Department of Biological and Agricultural Engineering. 2005. Pp. 5–16.

## Appendix E: GIS Data

| Description | File/Dataset Name | Source | Link | Contact |
|---|---|---|---|---|
| BLM | owncablm | Bureau Of Land Management | | |
| Census | census_blocks | Us Census Bureau | | |
| City Limits | city_poly | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Community Growth Boundaries | community growth boundaries | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Condition Class | cafrcc03_2 | CDF Fire And Resource Assessment Program | http://frap.cdf.ca.gov/data/frapgisdata/select.asp | |
| County | county | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Creeks | hydro_line | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Elevation | rastcalcclp | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Emergency Response | critical_facilities | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Evacuation Site | protection_point | Lake County Cwwp | | |
| Existing Communities At Risk | comatrisk06_1 | California Fire Alliance Fire Planning And Mapping Tools | http://wildfire.cr.usgs.gov/fire_planning/ | |
| Existing Evacuation Route | protection_line | Lake County Cwwp | | |
| Fire Hazard Severity Zones | fhszall06a1_c17, fhsz106_3.17ns | CDF Fire And Resource Assessment Program | http://frap.cdf.ca.gov/data/frapgisdata/select.asp | |
| Fire History | fire07_1_17 | CDF Fire And Resource Assessment Program | http://frap.cdf.ca.gov/data/frapgisdata/select.asp | |
| Fire Protection Districts | FPD | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Fire Regime | cafrcc03_2 | CDF Fire And Resource Assessment Program | http://frap.cdf.ca.gov/data/frapgisdata/select.asp | |
| Fire Stations | critical_facilities | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Fire Threat | fthrt05_1 | CDF Fire And Resource Assessment Program | http://frap.cdf.ca.gov/data/frapgisdata/select.asp | |
| Hillshade | nbrmnhsclp | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Major Water Bodies | hydro_poly | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Potential Evacuation Route | priorities_line | Lake County Cwwp | | |
| Private | county | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Proposed Communities At Risk | commatrisk_proposed | Lake County Cwwp | | |
| Rancherias/Tribal | rancherias | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| Responsibility Areas | fhszall06a1_c17 | CDF Fire And Resource Assessment Program | http://frap.cdf.ca.gov/data/frapgisdata/select.asp | |
| Roads/Highways | roads_features | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| State | state | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |
| USFS | mendo_ntl_forest | Lake County | http://gis.co.lake.ca.us | lon_s@co.lake.ca.us |

## Appendix F. Fire-Safety Information

## Fire-Safety Internet Links

The following list of Internet links is provided for additional fire-safety information.

- Board of Forestry, Defensible Space Guidelines:
  www.fire.ca.gov/CDFBOFDB/pdfs/Copyof4291finalguidelines9_29_06.pdf
- Board of Forestry, Forest Fire Prevention Exemption Language:
  www.bof.fire.ca.gov/regulations/proposed_rule_packages/ (see Forest Fire Exemption)
- CAL FIRE, Home Page:
  www.fire.ca.gov
- CAL FIRE, Fire Safety Education:
  www.fire.ca.gov/communications/communications_firesafety.php
- CAL FIRE, Before, During, and After Wildfire:
  www.fire.ca.gov/communications/downloads/fact_sheets/BeforeDuringAfter.pdf
- CAL FIRE, Evacuation Handout:
  www.fire.ca.gov/communications/downloads/fact_sheets/Evacuation.pdf
- CAL FIRE, Why 100 Feet?:
  www.fire.ca.gov/communications/communications_firesafety_100feet.php
- CAL FIRE, Outside the Home:
  www.fire.ca.gov/communications/communications_firesafety_outsidehome.php
- CAL FIRE, Inside the Home:
  www.fire.ca.gov/communications/communications_firesafety_insidehome.php
- California Fire Safe Council (CFSC), Home Page:
  www.firesafecouncil.org
- CFSC, Information for Homeowners:
  www.firesafecouncil.org/homeowner/index.cfm
- CFSC, Landscape Guides:
  Brushland: firesafecouncil.org/education/attachments/landscapingbrushland.pdf
  Grassland: firesafecouncil.org/education/attachments/landscapinggrassland.pdf
  Timberland: firesafecouncil.org/education/attachments/landscapingtimberland.pdf
- Firewise, Resources for the Homeowner:
  www.firewise.org/resources/homeowner.htm
- Homeowner's Wildfire Mitigation Guide:
  groups.ucanr.org/HWMG/index.cfm
- Public Resource Codes 4290 and 4291: www.leginfo.ca.gov
- Office of the State Fire Marshall, Wildland Fire Prevention:
  www.fire.ca.gov/fire_prevention/fire_prevention_wildland.php
- South Lake Fire Safe Council, Fire Resistant Plants:
  www.southlakefiresafecouncil.org/plants.htm
- Summary of California WUI Codes:
  www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php
- The Role of Registered Professional Foresters (RPF), RPF Law:
  www.fire.ca.gov/CDFBOFDB/pdfs/RoleofRPF_2005version.pdf

Evacuation Tips

# Evacuation Tips

Evacuations save lives and allow responding personnel to focus on the emergency at hand. **Please evacuate promptly when requested!**

## The Law

California law authorizes officers to restrict access to any area where a menace to public health or safety exists due to a calamity such as flood, storm, fire, earthquake, explosion, accident or other disaster. Refusal to comply is a misdemeanor. (Penal Code 409.5)

## Evacuation Orders

The terms ***Voluntary*** and ***Mandatory*** are used to describe evacuation orders. However, local jurisdictions may use other terminology such as *Precautionary* and *Immediate Threat*. These terms are used to alert you to the significance of the danger. **All evacuation instructions provided by officials should be followed immediately for your safety.**

## Long Before a Fire Threatens

Prepare an *Evacuation Checklist* and Organize:

- Critical medications.
- Important personal papers, photos.
- Essential valuables.
- Pet and livestock transport, limited amount of pet food.
- Change of clothing, toiletries.
- Cell phone.
- Critical papers and effects in a fire-proof safe.
- An Evacuation Route Map with at least two routes.*
- Drive your planned route of escape before an actual emergency.*

*During an evacuation, law enforcement/ emergency personnel may determine your route.

## If Evacuation is a Possibility

- Locate your *Evacuation Checklist* and place the items in your vehicle.
- Park your vehicle facing outward and carry your car keys with you.
- Locate your pets and keep them nearby.
- Prepare farm animals for transport.
- Place connected garden hoses and buckets full of water around the house.
- Move propane BBQ appliances away from structures.
- Cover-up. Wear long pants, long sleeve shirt, heavy shoes/boots, cap, dry bandanna for face cover, goggles or glasses. 100% cotton is preferable.
- Leave lights on in the house - door unlocked.
- Leave windows closed - air conditioning off.

# Evacuation Tips

## The Evacuation Process

1. Officials will determine the areas to be evacuated and the routes to use depending upon the fire's location, behavior, winds, terrain, etc.
2. Law enforcement agencies are typically responsible for enforcing an evacuation order. **Follow their directions promptly.**
3. You will be advised of potential evacuations as early as possible. You must take the initiative to stay informed and aware. Listen to your radio/TV for announcements from law enforcement and emergency personnel.
4. You may be directed to temporary assembly areas to await transfer to a safe location.

## If You Become Trapped

While in your vehicle:

- Stay calm.
- Park your vehicle in an area clear of vegetation.
- Close all vehicle windows and vents.
- Cover yourself with wool blanket or jacket.
- Lie on vehicle floor.
- Use your cell phone to advise officials – Call 911.

While on foot:

- Stay calm.
- Go to an area clear of vegetation, a ditch or depression if possible.
- Lie face down, cover up.
- Use your cell phone to advise officials - Call 911.

While in your home:

- Stay calm, keep your family together.
- Call 911 and inform authorities of your location.
- Fill sinks and tubs with cold water.
- Keep doors and windows closed, but unlocked.
- Stay inside your house.
- Stay away from outside walls and windows.

** Note – it will get hot in the house, but it is much hotter, and more dangerous outside.*

After the fire passes, and if it is safe, check the following areas for fire:

- The roof and house exterior.
- Under decks and inside your attic.
- Your yard for burning trees, woodpiles, etc.

## Returning Home

Fire officials will determine when it is safe for you to return to your home. This will be done as soon as possible considering safety and accessibility.

When you return home:

- Be alert for downed power lines and other hazards.
- Check propane tanks, regulators, and lines before turning gas on.
- Check your residence carefully for hidden embers or smoldering fires.

www.fire.ca.gov

# OUTSIDE

## 1 Design/Construction

(For new Wildland Urban Interface Construction or Remodels)

- ❑ Use ignition resistant construction (effective January 1, 2008) for roofs/roof assemblies, gutters, vents, desks, exterior walls, exterior windows.
- ❑ Enclose the underside of eaves, balconies and above ground decks with fire resistant materials
- ❑ Show your 100 feet Defensible Space on plot plan
- ❑ Build your home away from ridge tops, canyons and areas between high points of a ridge
- ❑ Consider installing residential sprinklers
- ❑ Make sure that electric service lines, fuse boxes and circuit breaker panels are installed and maintained per code
- ❑ Contact qualified individuals to perform electrical maintenance and repairs

## 2 Access

- ❑ Make sure that your street name sign is visibly posted at each street intersection
- ❑ Post your house address so it is easily visible from the street, especially at night
- ❑ Address numbers should be at least 3 inches tall and on a contrasting background
- ❑ Identify at least two exit routes from your neighborhood
- ❑ Clear flammable vegetation at least 10 feet from roads and five feet from driveways
- ❑ Cut back overhanging tree branches above access roads
- ❑ Construct roads that allow two-way traffic
- ❑ Make sure dead-end roads, and long drive ways have turn-around areas wide enough for emergency vehicles
- ❑ Design bridges to carry heavy emergency vehicles
- ❑ Post clear road signs to show traffic restrictions such as dead-end roads, and weight and height limitations

## 3 Roof

- ❑ Install a fire resistant roof. Contact your local fire department for current roofing requirements
- ❑ Remove dead leaves and needles from your roof and gutters
- ❑ Remove dead branches overhanging your roof and keep branches 10 feet from your chimney
- ❑ Cover your chimney outlet and stovepipe with a nonflammable screen of 1/2 inch or smaller mesh

## 4 Landscape

- ❑ Create a **Defensible Space** of 100 feet around your home. It is required by law
- ❑ Create a **"LEAN, CLEAN and GREEN ZONE"** by removing all flammable vegetation within 30 feet immediately surrounding your home
- ❑ Then create a **"REDUCED FUEL ZONE"** in the remaining 70 feet or to your property line

  You have two options in this area:

  **A. Create horizontal and vertical spacing between plants. The amount of space will depend on how steep your property is and the size of your plants.**

  **B. Large trees do not have to be removed as long as all of the plants beneath them are removed.**
- ❑ Remove lower tree branches at least six feet from the ground
- ❑ Landscape with fire resistant plants
- ❑ Maintain all plants with regular water, and keep dead braches, leaves and needles removed.
- ❑ When clearing vegetation, use care when operating equipment such as lawnmowers. One small spark may start a fire; a string trimmer is much safer

## 5 Yard

- ❑ Stack woodpiles at least 30 feet from all structures and remove vegetation within 10 feet of woodpiles
- ❑ Above ground Liquefied Petroleum Gas (LP-gas) containers (500 or less water gallons) shall be located a minimum of 10 feet with respect to buildings, public ways, and lot lines of adjoining property that can be built upon. - CFC 3804.3
- ❑ Remove all stacks of construction materials, pine needles, leaves and other debris from your yard
- ❑ Contact your local fire department to see if debris burning is allowed in your area; if so, obtain a burning permit and follow all local air quality restrictions

## 6 Emergency Water Supply

- ❑ Maintain an emergency water supply that meets fire department standards through one of the following:
  - a community water/hydrant system
  - a cooperative emergency storage tank with neighbors
  - a minimum storage supply of 2,500 gallon on your property (like a pond or pool)
- ❑ Clearly mark all emergency water sources
- ❑ Create easy firefighter access to your closest emergency water source
- ❑ If your water comes from a well, consider an emergency generator to operate the pump during a power failure

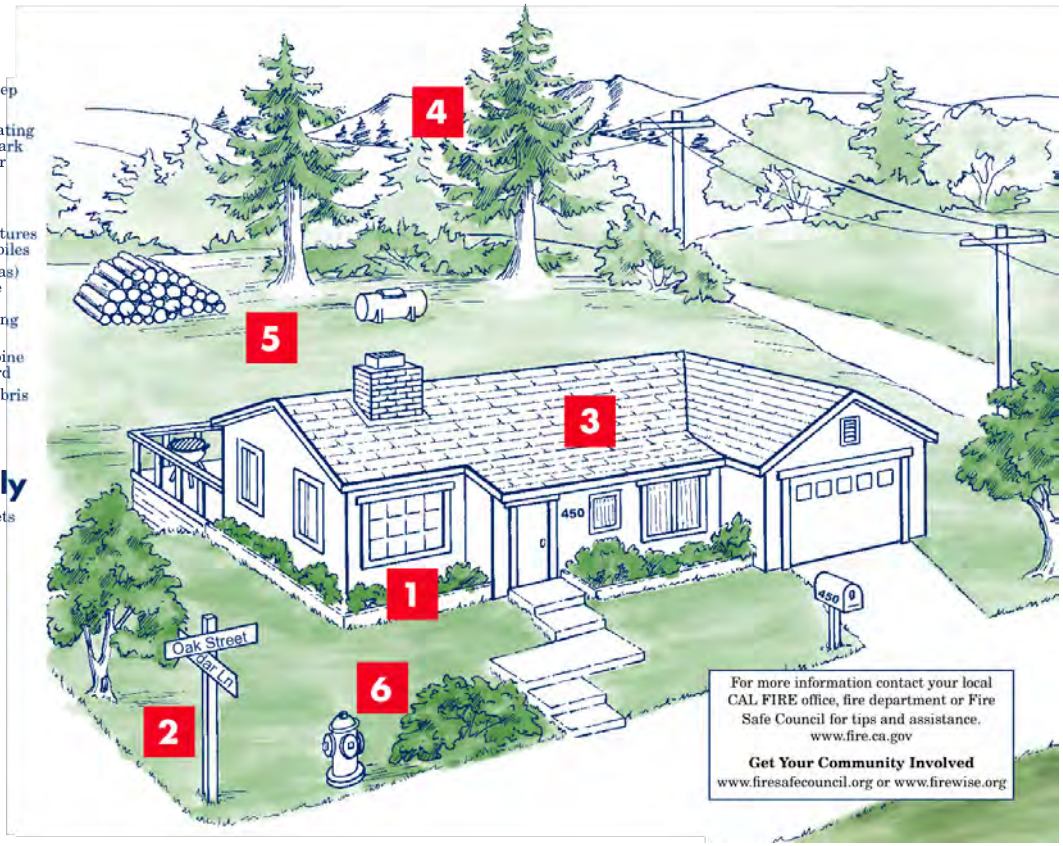
**March 2009**

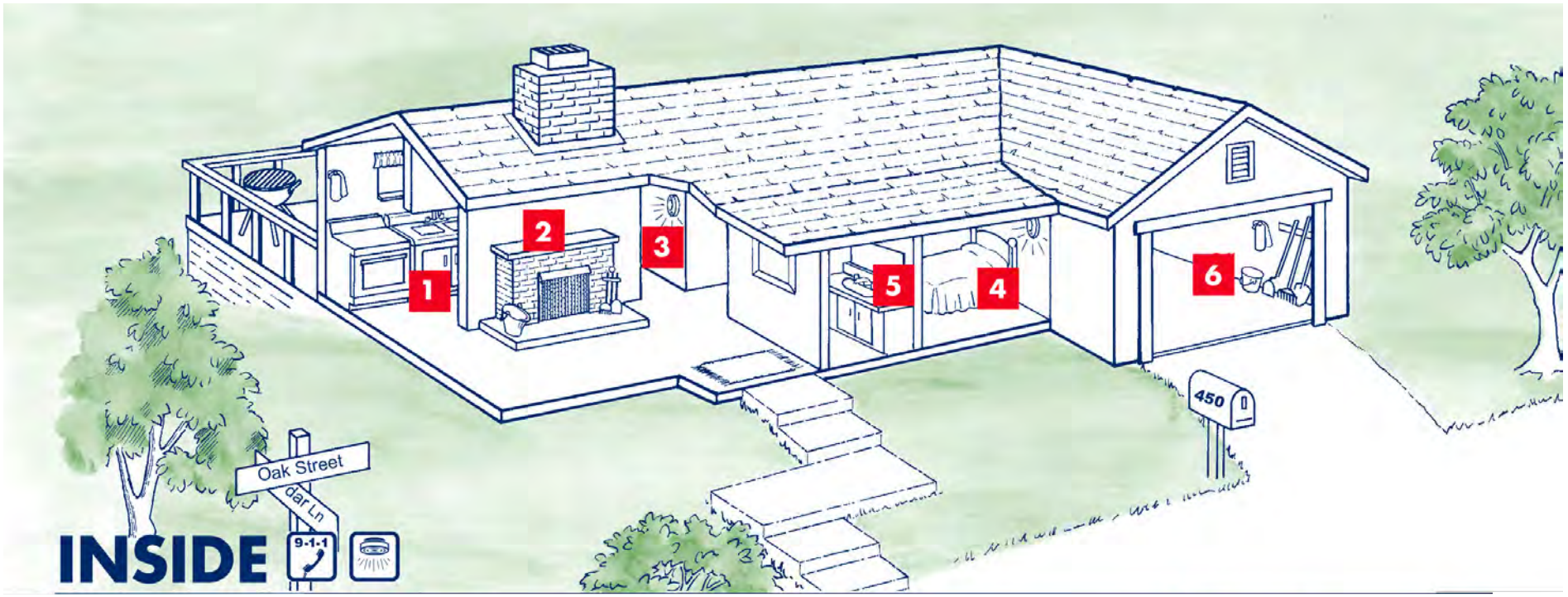
California Department of Forestry and Fire Protection

# Homeowners Checklist

www.fire.ca.gov

## How To Make Your Home Fire Safe






## 1 Kitchen

- ❑ Keep a working fire extinguisher in the kitchen
- ❑ Maintain electric and gas stoves in good operating condition
- ❑ Keep baking soda on hand to extinguish stove-top grease fires
- ❑ Turn the handles of pots and pans away from the front of the stove
- ❑ Install curtains and towel holders away from stoveburners
- ❑ Store matches and lighters out of reach of children
- ❑ Make sure that electrical outlets are designed to handle appliance loads

## 2 Living Room

- ❑ Install a screen in front of fireplace or wood stove
- ❑ Store the ashes from your fireplace (and barbecue) in a metal container and dispose of only when cold
- ❑ Clean fireplace chimneys and flues at least once a year

## 3 Hallway

- ❑ Install smoke detectors between living and sleeping areas
- ❑ Test smoke detectors monthly and replace batteries twice a year, when clocks are changed in the spring and fall
- ❑ Replace electrical cords that do not work properly, have loose connections, or are frayed

## 4 Bedroom

- ❑ If you sleep with the door closed, install a smoke detector in the bedroom
- ❑ Turn off electric blankets and other electrical appliances when not in use
- ❑ Do not smoke in bed
- ❑ If you have security bars on your windows or doors, be sure they have an approved quick release mechanism so you and your family can get out in the event of a fire

## 5 Bathroom

- ❑ Disconnect appliances such as curling irons and hair dryers when done; store in a safe location until cool
- ❑ Keep items such as towels away from wall and floor heaters

## 6 Garage

- ❑ Mount a working fire extinguisher in the garage
- ❑ Have tools such as a shovel, hoe, rake and bucket available for use in a wildfire emergency
- ❑ Install a solid door with self-closing hinges between living areas and the garage
- ❑ Dispose of oily rags in Ⓤ Underwriters Laboratories approved metal containers
- ❑ Store all combustibles away from ignition sources such as water heaters
- ❑ Disconnect electrical tools and appliances when not in use
- ❑ Allow hot tools such as glue guns and soldering irons to cool before storing
- ❑ Properly store flammable liquids in approved containers and away from ignition sources such as pilot lights

## *Disaster Preparedness

- ❑ Maintain at least a three-day supply of drinking water, and food that does not require refrigeration and generally does not need cooking
- ❑ Maintain a portable radio, flashlight, emergency cooking equipment, lanterns and batteries
- ❑ Outdoor cooking appliances such as barbecues should never be taken indoors for use as heaters
- ❑ Maintain first aid supplies to treat the injured until help arrives
- ❑ Keep a list of valuables to take with you in an emergency; if possible, store these valuables together
- ❑ For safety, securely attach all water heaters and furniture such as cabinets and bookshelves to walls
- ❑ Have a contingency plan to enable family members to contact each other. Establish a family/friend phone tree
- ❑ Designate an emergency meeting place outside your home
- ❑ Practice emergency exit drills in the house (EDITH) regularly
- ❑ Make sure that all family members understand how to STOP, DROP AND ROLL if their clothes should catch fire

**COMMUNITY DEVELOPMENT DEPARTMENT**
**Code Enforcement Division**
**Office: 6110 A East. Hwy 20, Lucerne**
**Mailing:** 255 N. Forbes Street Lakeport, California 95453
Telephone 707/274-8923 email compliance@co.lake.ca.us

# WEED AND BRUSH CLEARING

Each year from May 15 to November 1 there is an increased fire danger in Lake County and over Northern California. Excessive weeds and brush can be a threat to people, structures, and animals. Lake County Code Enforcement, local Fire Departments, and community groups provide information to educate the public about responsibilities to keep properties safe and in compliance with Lake County Codes.

The Lake County Board of Supervisors has declared weeds and rubbish to be a public nuisance. If you own, lease, or have control of any real property within Lake County that property must have a thirty foot firebreak around those structures. If your neighbor has excessive weeds, complaints should be phoned to your local Fire District or Lake County Code Enforcement. A site visit is made to the property and once confirmed, notification is mailed. If weeds are not removed, or there are properties with continuing weed problems, the weeds will be cut and charges made to the property owner. It is important that owners act promptly to inspect and determine if their property is in compliance. For the wording of the specific code, see http://municipalcodes.lexisnexis.com/codes/lakeco/

**The following guidelines are ways to keep your residence and structures Fire Safe:**

Trim trees and shrubs away from buildings and chimneys;

Remove dead leaves, branches and needles from roofs and rain gutters;

Keep your property free of combustibles, such as dried vegetation and prunings;

Keep access roads and driveways trimmed to allow for Fire Department access;

Make sure your address is clearly visible from the roadway. Additional helpful information may be found at: http://www.southlakefiresafecouncil.org/ and "Fire Safe Landscaping": http://www.firesafecouncil.org/education/landscaping/

**WEED ABATEMENT RECOMENDATIONS**

1. Any person that owns, leases, or controls any real property that has structures shall maintain a firebreak that is within thirty feet of all structures on said real property.
2. All parcels which are less than 5 acres in size must have all combustible growth in excess of 4" in height cut and removed.
3. Vines within 20 feet of any combustible building or fence shall be cut and removed.
4. Disking is not an option on land with slopes. However, it may be an acceptable method of abatement on flat ground. In general, cutting will often maintain the property in a satisfactory manner for the remainder of the dry season. However, the property owner may be required to cut the property multiple times if growth becomes excessive during the season.
5. Regardless of the abatement method used by the property owner, all properties may be subject to inspections throughout the dry season, as well as notification and abatement proceedings if the property is not

maintained in compliance with County requirements. Properties must be maintained throughout the entire dry season.
6. Rubbish left, deposited or abandoned on property must be removed. Any dead vegetation and prunings must also be removed.
7. Sidewalks, planter strips, alleys and ditches adjacent to a parcel are the responsibility of the property owner, and must be maintained by the property owner to be in compliance.
8. To abate any parcel which is 5 acres or larger in size, firebreaks may be considered as an alternative to clearing the entire parcel. All combustible growth must be cut and removed from within a minimum of 30 feet from all structures and all access roads on the property. All combustible growth must also be removed from any sidewalks, planter strips, alleys or ditches which are adjacent to the parcel. Additional 30 foot wide "cross cut" firebreaks must be constructed throughout the remainder of the parcel in order to divide the remaining combustible material into separate sections, no more than 2.5 acres in size.

10. Any hillside or otherwise steep property with natural obstructions or terrain features must still be abated, often requiring handwork. If the conditions of the property are such as to also prohibit safe handwork, the use of an approved fire trail or firebreak may be acceptable.
Develop a plan of what to do in the event of a fire on or near your property. This plan should include a predetermined meeting place safely away from the property for family members to gather, and for different available routes of travel from the property.

*Lake County Code: Chapter 5 Article I Sec.5-6E.2*
*(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 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 and prevent erosion.*

LAKE COUNTY

# CHIPPING PROGRAMS

TO ASSIST IN FIRE PREVENTION

by helping homeowners create a defensible space and reduce fuel loads in their neighborhood.

## SOUTH LAKE FIRE SAFE COUNCIL

P.O. Box 2, Cobb, CA 95426

Contact: Bruce Anderson at (707) 928-5232
or James Ott (707) 987-9869

Serving the communities of Middletown, Hidden Valley, Coyote Valley, Anderson Spring and Cobb.

**FREE** service available the last week of March, May, July September and November.

APPOINTMENT REQUIRED.

for information and application, go to http://www.southlakefiresafecouncil.org

## WEST LAKE RESOURCE CONSERVATION DISTRICT

889 Lakeport Blvd, Lakeport, CA 95453

Contact: Dave Mostin
(707) 279-2968

Serving the communities of Kelseyville, North Lakeport, Scotts Valley, Upper Lake, Nice, Lucerne, and Clearlake Oaks.

First 30 minutes **FREE:** **FEES**: $60/hour after the first 30 minutes.

APPOINTMENT REQUIRED.

Call for application.

## HOW TO PREPARE MATERIAL FOR CHIPPING

### DO…

- Remove brush 10 feet back from the road;
- Stack brush perpendicular to the road;
- Stack with cut ends toward the road;
- Keep mud off the brush;
- Have posted address;
- Use eye and ear protection while in the vicinity of the chipper.

### DON'T…

- Stack brush over 4 feet high;
- Pile brush with a bulldozer;
- Place poison oak, blackberry vines or scotch broom in chipper pile;
- Place roots, rocks, metal or other foreign materials in pile.
- Drag brush through mud (dirt and gravel may damage chipper blades.

# SOUTH LAKE FIRE SAFE COUNCIL, LAKE COUNTY, CALIFORNIA

Online Resources: CHIPPING REQUEST & PERMISSION TO ENTER FORM | EVACUATION MAP | CALENDAR

**Free wood chipping** and information on community fire breaks are provided by Council members for the communities of Loch Lomond, Cobb, Anderson Springs, Middletown, and Hidden Valley Lake.

To participate in our chipping program, please complete, sign, and submit a Request for Chipping and Right of Entry Permit form to your neighborhood coordinator, or mail it directly to the South Lake Fire Safe Council, P.O. Box 1773, Middletown, CA 95461. Forms will be provided at our Community Education Meetings, or upon request by contacting the Fire Safe Council.

For information on Chipper Days within your area, contact the Fire Safe Council at (707) 987-2857 or by E-mail.

## DON'T

- Stack brush over standing vegetation or roadway
- Stack brush over 6 feet high
- Drag brush through mud (dirt and gravel may damage chipper blades)
- Bulldozed or machine-stacked piles cannot be processed.
- Place poison oak or scotch broom in chipper pile (this will cause new invasions)
- Stand near the chipper outflow
- Piles cross-stacked or stacked so dense and compacted that the material cannot be pulled free to run through the chipper will not be processed.
- Do not submit this form until the material is stacked and ready for inspection.

## DO

- Remove brush 10 feet back from the road, if possible
- The material must be stacked adjacent to roads and accessible to our contractor's equipment without having to be moved.
- The material must be free of rocks, dirt, berry vines, poison oak, tree stumps or construction material of any type.
- Brush, tree limbs, and trees smaller than six inches (6") must be stacked neatly and evenly with the butt ends all facing the road. Piles cannot exceed five feet (5') in height.
- Keep mud off brush (be careful when the ground is wet)
- Use material larger than three inches in diameter for firewood
- Material must be cut to manageable twelve foot (12') lengths maximum.
- Let the chipper crew know if you want the chips broadcast or pile for later use
- Use eye and ear protection while in the vicinity of the chipper

**Mattole Restoration Council: www.mattole.org**

# Clear Lake Riviera Community Association
## Fire Safety Policy and Procedures

The Board of Directors will appoint a Fire Safe Committee each year at the October meeting.

It will be the Committee's responsibility to canvass the area and grade each empty lot on a scale from 3-5, with 5 being the most dense property and three being a cleared lot. One being a conforming house site and two will be a homesite needing clearing. Photos will be supplied, along with guidance from Kelseyville Fire Protection District as to grading scale.

Fire Safe Committee yearly duties will include:

a. Yearly inspection and grading of lots, lesser to higher in November.
b. Mapping of lots with appropriate fire grade.
c. Compilation and update of a list of qualified, licensed companies available to homeowners.
d. Compilation of a list of lots in violation. Assist office in sending letters to all lots in violation.

Office Staff Fire Safety duties to include:

a. Send initial letter to all property owners not in compliance within 30 days of inspection.
    1. Advise owner of inspection grade and need for prompt action
    2. Request owner to contact office to set time limit for compliance
    3. Include with letter a list of lot clearing contractors and a photo of a lot in compliance for guidance.
b. 30-day Follow Up
    If no response within 30 days, CLRCA contacts reputable company to bid on clearing the worst of the properties. (year one- highest hazard, working down to least).
    1. Send letter to owner along a bid from one of the companies. Owner will be notified that they can accept the bid and send a check to the CLRCA office to be held until the work is done and inspected. They will also be advised that they may send a check to the office if they hire another company. We will inspect the property when cleared and release the check at that time.
c. 60-day Follow Up
    If lot is not cleared, inspection will be made by a representative of Kelseyville Fire District and a letter will be sent to the owner by registered mail letting them know their property is considered an a hazard by an expert, and if the property is cleared by the Association, which is the next step, a lien will be filed against their property for payment.

d. Code Enforcement and the County are working together to be able to collect for the HOA's after a lien is filed by placing the amount on the tax rolls.

e. Thank you letters will be sent to property owners as lots are cleared.

**Prepared in cooperation with KFPD, approved by legal counsel and approved by the BOD at their 12/18/08 meeting.**

**Public Resources Code 4290 and 4291**

**4290**. (a) The board shall adopt regulations implementing minimum fire safety standards related to defensible space which are applicable to state responsibility area lands under the authority of the department. These regulations apply to the perimeters and access to all residential, commercial, and industrial building construction within state responsibility areas approved after January 1, 1991. The board may not adopt building standards, as defined in Section 18909 of the Health and Safety Code, under the authority of this section. As an integral part of fire safety standards, the State Fire Marshal has the authority to adopt regulations for roof coverings and openings into the attic areas of buildings specified in Section 13108.5 of the Health and Safety Code. The regulations apply to the placement of mobile homes as defined by National Fire Protection Association standards. These regulations do not apply where an application for a building permit was filed prior to January 1, 1991, or to parcel or tentative maps or other developments approved prior to January 1, 1991, if the final map for the tentative map is approved within the time prescribed by the local ordinance. The regulations shall include all of the following:
(1) Road standards for fire equipment access.
(2) Standards for signs identifying streets, roads, and buildings.
(3) Minimum private water supply reserves for emergency fire use.
(4) Fuel breaks and greenbelts.
(b) These regulations do not supersede local regulations which equal or exceed minimum regulations adopted by the state.

**4291**. (a) A person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining a mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or land that is covered with flammable material, shall at all times do all of the following:
(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 o 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.

(4) Remove that portion of any tree that extends within 10 feet of the outlet of a chimney or stovepipe.

(5) Maintain any tree, shrub, or other plant adjacent to or overhanging a building free of dead or dying wood.

(6) Maintain the roof of a structure free of leaves, needles, or other vegetative materials.

(7) (a) Prior to constructing a new building or structure or rebuilding a building or structure damaged by a fire in an area subject to this section, the construction or rebuilding of which requires a building permit, the owner shall obtain a certification from the local building official that the dwelling or structure, as proposed to be built, complies with all applicable state and local building standards, including those described in subdivision (b) of Section 51189 of the Government Code, and shall provide a copy of the certification, upon request, to the insurer providing course of construction insurance coverage for the building or structure. Upon completion of the construction or rebuilding, the owner shall obtain from the local building official, a copy of the final inspection report that demonstrates that the dwelling or structure was constructed in compliance with all applicable state and local building standards, including those described in subdivision (b) of Section 51189 of the Government Code, and shall provide a copy of the report, upon request, to the property insurance carrier that insures the dwelling or structure.

(b) A person is not required under this section to manage fuels on land if that person does not have the legal right to manage fuels, nor is a person required to enter upon or to alter property that is owned by any other person without the consent of the owner of the property.

(c) (1) Except as provided in Section 18930 of the Health and Safety Code, the director may adopt regulations exempting a structure with an exterior constructed entirely of nonflammable materials, or, conditioned upon the contents and composition of the structure, the director may vary the requirements respecting the removing or clearing away of flammable vegetation or other combustible growth with respect to the area surrounding those structures.

(2) An exemption or variance under paragraph (1) shall not apply unless and until the occupant of the structure, or if there is not an occupant, the owner of the structure, files with the department, in a form as the director shall prescribe, a written consent to the inspection of the interior and contents of the structure to ascertain whether this section and the regulations adopted under this section are complied with at all times.

(d) The director may authorize the removal of vegetation that is not consistent with the standards of this section. The director may prescribe a procedure for the removal of that vegetation and make the expense a lien upon the building, structure, or grounds, in the same manner that is applicable to a legislative body under Section 51186 of the Government Code.

(e) The Department of Forestry and Fire Protection shall develop, periodically update, and post on its Internet Web site a guidance document on fuels management pursuant to this chapter. Guidance shall include, but not be limited to, regionally appropriate vegetation management suggestions that preserve and restore native species, minimize erosion, minimize water consumption, and permit trees near homes for shade, aesthetics, and habitat; and suggestions to minimize or eliminate the risk of flammability of nonvegetative sources of combustion such as woodpiles, propane tanks, wood decks, and outdoor lawn furniture.

(f) As used in this section, "person" means a private individual, organization, partnership, limited liability company, or corporation.

4291.1. (a) Notwithstanding Section 4021, a violation of Section 4291 is an infraction punishable by a fine of not less than one hundred dollars ($100), nor more than five hundred dollars ($500). If a person is convicted of a second violation of Section 4291 within five years, that person shall be punished by a fine of not less than two hundred fifty dollars ($250), nor more than five hundred dollars ($500). If a person is convicted of a third violation of Section 4291 within five years, that person is guilty of a misdemeanor and shall be punished by a fine of not less than five hundred dollars ($500). If a person is convicted of a third violation of Section 4291 within five years, the department may perform or contract

for the performance of work necessary to comply with Section 4291 and may bill the person convicted for the costs incurred, in which case the person convicted, upon payment of those costs, shall not be required to pay the fine. If a person convicted of a violation of Section 4291 is granted probation, the court shall impose as a term or condition of probation, in addition to any other term or condition of probation, that the person pay at least the minimum fine prescribed in this section.

(b) If a person convicted of a violation of Section 4291 produces in court verification prior to imposition of a fine by the court, that the condition resulting in the citation no longer exists, the court may reduce the fine imposed for the violation of Section 4291 to fifty dollars ($50).

4291.3. Subject to any other applicable provision of law, a state or local fire official, at his or her discretion, may authorize an owner of property, or his or her agent, to construct a firebreak, or implement appropriate vegetation management techniques, to ensure that defensible space is adequate for the protection of a hospital, adult residential care facility, school, aboveground storage tank, hazardous materials facility, or similar facility on the property. The firebreak may be for a radius of up to 300 feet from the facility, or to the property line, whichever distance is shorter.

**BOARD OF FORESTRY TECHNICAL RULE ADDENDUM NO. 3**
**BROOD MATERIAL**

**A. Hazard Determination -**

- Tree mortality and top killing result when Ips beetle populations reproduce and increase in pine brood material 1/ and then leave this material and attack pines in the residual stand. Hazard increases with the amount of pine brood material present.
- Any suitable breeding material, including pine logs from recently felled trees, represents a hazard as long as it remains on site long enough for the beetles to complete a life cycle in it. During suitable weather, the life cycle may be as short as five weeks. Piling of brood material is more hazardous than leaving it spread-out on the ground.
- Timing of brood material production may influence hazard. Hazard is presumed to be highest when pine brood material is produced from February through June and moderate when produced at other times of the year. At no time is hazard presumed to be low. In some parts of the Southern Forest District, hazard is presumed to be high year round, regardless of when the brood material was produced.
- Age, size, and species of residual trees influence hazard. Young pole size stands of pine are most susceptible to damage. Tree species other than pine are not damaged by insects that breed in pine brood material. Brood material from tree species other than pine generally does not contribute to the build-up of damaging beetle populations.
- Low vigor residual trees are at greatest risk. Historically, drought stressed, suppressed, and overstocked stands have been identified as high risk. Off-site, diseased, damaged, and overmature trees are also at risk.
- If damaging insect populations are high, hazard will be greater. High beetle populations have the potential to damage more than just low vigor trees. Chronic pine mortality in the area should be evaluated to determine if high beetle populations are present. An established Zone of Infestation for pine bark beetles implies that conditions are appropriate for the build-up of beetle populations.
- Potential for the spread of damaging insects to adjacent ownerships should be considered. The closer the ownership, the greater the risk. Generally, ownerships beyond one quarter of a mile will have little or no risk.
- Value of residual trees should be considered. How much loss to residuals is acceptable?

**B. Hazard Reduction Treatment Alternatives -**

Any treatment to reduce hazard should apply to the entire area where a hazard has been determined to exist, including the area where lopping for fire hazard reduction has been used. Treatment alternatives include modification of the brood material so that it is less suitable as a breeding site for beetles or methods to reduce beetle populations that have developed. Specific Treatment Alternatives applied to pine brood material are as follows:

**(1)** The following treatments are acceptable provided they are completed before insect broods emerge from infested material. During weather that is suitable for brood development, a five week window is the maximum time that should elapse between creation of brood material and its treatment by one of the following methods: brood material can be removed from the site for processing or disposal; if left on-site, it can be piled and burned, chipped, debarked, treated with an appropriate pesticide, or piled and covered with clear plastic. If brood material is piled and covered, the plastic used must be a minimum of 6 mil thick; piles must be completely sealed by the plastic so that there are no openings to the outside and remain covered for 6 months (or 4 months if at least 2 summer months are included).

**(2)** The following treatment is acceptable, provided it is completed as soon after brood material creation as is practical, but not later than one week. Lop all branches from the sides and tops of those portions of main stems which are 3" or more in diameter. Branches shall be scattered so that stems have maximum exposure to solar radiation. Do not pile brood material. Lopped stems could also be cut into short segments to decrease drying time and further reduce hazard.

**(3)** Burying brood material will prevent it from being colonized by beetles, but may not prevent emergence of the beetles. Therefore, it must be buried before becoming infested. During suitable weather, brood material must be buried concurrent with its creation. "Suitable" weather depends upon location. In areas that receive snowfall, suitable weather generally exists from April 15-October 15. In other areas, suitable weather exists from March 1-November 30.

## Appendix G: Lake County Fire History Data

| Year | Fire Name | Agency | Acreage | Ignition Source |
|---|---|---|---|---|
| 1920 | Knee Cap | USFS | 1,425 | Lightning |
| 1922 | Boardman Ridge | USFS | 1,812 | Miscellaneous |
| 1923 | Streeter Ridge | USFS | 14,996 | Miscellaneous |
| 1923 | Alley | USFS | 1,596 | Unknown/Unidentified |
| 1923 | Bartlett Mtn | USFS | 9,915 | Miscellaneous |
| 1928 | Kibby Peak | USFS | 3,288 | Equipment Use |
| 1928 | Spanish Ranch | USFS | 1,395 | Miscellaneous |
| 1928 | Kibby Peak | USFS | 2,955 | Miscellaneous |
| 1929 | Nell Green | USFS | 2,088 | Miscellaneous |
| 1929 | Mccullough Cabin | USFS | 1,516 | Miscellaneous |
| 1929 | Garrett Mtn | USFS | 1,115 | Miscellaneous |
| 1931 | Dow #2 | USFS | 1,230 | Miscellaneous |
| 1931 | Dashiell | USFS | 1,297 | Miscellaneous |
| 1932 | Long Valley | USFS | 6,910 | Miscellaneous |
| 1932 | Pine Ntn | USFS | 1,741 | Unknown/Unidentified |
| 1932 | Big Rock | USFS | 1,876 | Miscellaneous |
| 1933 | Dan Pitney | USFS | 8,053 | Unknown/Unidentified |
| 1934 | Bartlett Springs | USFS | 3,978 | Miscellaneous |
| 1937 | High Valley | USFS | 2,796 | Miscellaneous |
| 1939 | Enterprise | USFS | 804 | Unknown/Unidentified |
| 1939 | Enterprise | USFS | 675 | Unknown/Unidentified |
| 1939 | Elk Mtn | USFS | 1,929 | Miscellaneous |
| 1939 | Alley Creek | USFS | 1,023 | Miscellaneous |
| 1939 | Digger Pine Camp | USFS | 3,982 | Miscellaneous |
| 1939 | Salmon Creek | USFS | 8,049 | Debris |
| 1944 | Boardman | USFS | 19,510 | Equipment Use |
| 1944 | Jordan Flat | USFS | 11,797 | Equipment Use |
| 1944 | Bevins Flat | USFS | 3,144 | Equipment Use |
| 1944 | John Alley Ridge | USFS | 1,050 | Equipment Use |
| 1946 | N/A | CDF | 1,283 | Unknown/Unidentified |
| 1947 | N/A | CDF | 3,357 | Unknown/Unidentified |
| 1947 | N/A | CDF | 8,462 | Unknown/Unidentified |
| 1947 | N/A | CDF | 3,867 | Unknown/Unidentified |
| 1947 | N/A | CDF | 6,399 | Unknown/Unidentified |
| 1947 | N/A | CDF | 914 | Unknown/Unidentified |
| 1948 | N/A | CDF | 1,396 | Unknown/Unidentified |
| 1948 | N/A | CDF | 2,507 | Unknown/Unidentified |
| 1948 | N/A | CDF | 2,154 | Unknown/Unidentified |
| 1949 | N/A | CDF | 913 | Unknown/Unidentified |
| 1949 | N/A | CDF | 760 | Unknown/Unidentified |
| 1949 | N/A | CDF | 5,665 | Unknown/Unidentified |
| 1950 | Public Domain #1 | CDF | 618 | Unknown/Unidentified |
| 1950 | Public Domain #2 | CDF | 4,616 | Unknown/Unidentified |
| 1950 | Edna Jone | CDF | 1,124 | Unknown/Unidentified |
| 1950 | Little Stoney Fire | CDF | 17,367 | Unknown/Unidentified |
| 1950 | N/A | CDF | 5,165 | Unknown/Unidentified |
| 1950 | N/A | CDF | 1,330 | Unknown/Unidentified |
| 1950 | Seigler Canyon | CDF | 7,242 | Unknown/Unidentified |
| 1951 | Howes Camp | USFS | 4,845 | Unknown/Unidentified |
| 1951 | Richard A. Kant | CDF | 6,202 | Unknown/Unidentified |
| 1951 | Ruppert Ridge | CDF | 418 | Unknown/Unidentified |
| 1951 | Boardman Ridge | CDF | 6,676 | Miscellaneous |
| 1951 | Trout Creek | CDF | 351 | Unknown/Unidentified |

| Year | Fire Name | Agency | Acreage | Ignition Source |
|---|---|---|---|---|
| 1951 | Wolf Ridge | CDF | 880 | Unknown/Unidentified |
| 1951 | Whispering Pine | CDF | 1,612 | Unknown/Unidentified |
| 1951 | Geo. Snyder | CDF | 629 | Unknown/Unidentified |
| 1951 | Indian Beach | CDF | 405 | Unknown/Unidentified |
| 1951 | M.R. Ghiselin | CDF | 615 | Unknown/Unidentified |
| 1951 | Mary Bowcher | CDF | 3,447 | Unknown/Unidentified |
| 1951 | N/A | CDF | 1,009 | Unknown/Unidentified |
| 1951 | N/A | CDF | 370 | Unknown/Unidentified |
| 1951 | Scott Creek | CDF | 1,704 | Unknown/Unidentified |
| 1952 | Charles Reid | CDF | 395 | Unknown/Unidentified |
| 1952 | D.L. Macfarlane #2 | CDF | 879 | Unknown/Unidentified |
| 1952 | Dorn State Park | CDF | 348 | Unknown/Unidentified |
| 1952 | H.C. Kimball | CDF | 214 | Unknown/Unidentified |
| 1952 | Highland Springs Gun | CDF | 361 | Unknown/Unidentified |
| 1952 | Oat Hill Mine | CDF | 2,667 | Unknown/Unidentified |
| 1952 | Saratoga Springs #3 | CDF | 1,545 | Unknown/Unidentified |
| 1952 | Mirabel Springs | CDF | 731 | Unknown/Unidentified |
| 1952 | N. Brookins | CDF | 444 | Unknown/Unidentified |
| 1952 | N/A | CDF | 8,645 | Unknown/Unidentified |
| 1952 | N/A | CDF | 1,370 | Unknown/Unidentified |
| 1952 | N/A | CDF | 1,288 | Unknown/Unidentified |
| 1952 | Dx Hunting Club | CDF | 3,450 | Unknown/Unidentified |
| 1953 | W.M Alderson #2 | CDF | 2,920 | Unknown/Unidentified |
| 1954 | Marcelino | CDF | 2,187 | Unknown/Unidentified |
| 1954 | County Roadside #4 | CDF | 1,562 | Unknown/Unidentified |
| 1954 | Nice | CDF | 716 | Unknown/Unidentified |
| 1954 | Ukiah Pine | CDF | 319 | Unknown/Unidentified |
| 1954 | N/A | CDF | 1,625 | Unknown/Unidentified |
| 1955 | C. Dow | CDF | 578 | Unknown/Unidentified |
| 1955 | E. Payne | CDF | 551 | Unknown/Unidentified |
| 1955 | Harbin Springs #2 | CDF | 409 | Unknown/Unidentified |
| 1955 | Allison | CDF | 749 | Unknown/Unidentified |
| 1956 | Buck Mountain #2 | CDF | 448 | Unknown/Unidentified |
| 1957 | Konocti | CDF | 439 | Unknown/Unidentified |
| 1957 | E. Ford R.I. Escape | CDF | 2,307 | Unknown/Unidentified |
| 1957 | Highway 20 #10 | CDF | 299 | Unknown/Unidentified |
| 1959 | Manning Flat | CDF | 1,496 | Unknown/Unidentified |
| 1959 | Roadside #12 | CDF | 824 | Unknown/Unidentified |
| 1959 | Roadside #26 | CDF | 11,150 | Unknown/Unidentified |
| 1960 | Bear Springs | CDF | 1,324 | Unknown/Unidentified |
| 1960 | Chalk Mountain | CDF | 1,441 | Unknown/Unidentified |
| 1960 | Creager | CDF | 723 | Unknown/Unidentified |
| 1960 | Grizzly Creek | CDF | 412 | Unknown/Unidentified |
| 1961 | Mt. Konocti Series | CDF | 4,000 | Unknown/Unidentified |
| 1961 | Roadside #13 | CDF | 154 | Unknown/Unidentified |
| 1961 | B.L.M. #1 | CDF | 634 | Unknown/Unidentified |
| 1961 | Dump #2 (Highlands) | CDF | 608 | Unknown/Unidentified |
| 1962 | J. Davis | CDF | 296 | Unknown/Unidentified |
| 1962 | Widow Creek | CDF | 10,327 | Unknown/Unidentified |
| 1962 | Cache Creek | CDF | 702 | Unknown/Unidentified |
| 1962 | Cow Mountain | CDF | 187 | Unknown/Unidentified |
| 1963 | Foley Farm Ri Escape | CDF | 383 | Unknown/Unidentified |
| 1964 | P.G.& E. | CDF | 1,896 | Unknown/Unidentified |
| 1964 | Crabtree | CDF | 2,267 | Unknown/Unidentified |
| 1966 | Round | USFS | 20,864 | Campfire |

| Year | Fire Name | Agency | Acreage | Ignition Source |
|---|---|---|---|---|
| 1966 | Howard | CDF | 755 | Unknown/Unidentified |
| 1966 | Jericho | CDF | 2,677 | Unknown/Unidentified |
| 1967 | 39th Street | CDF | 3,399 | Unknown/Unidentified |
| 1967 | Hopland Grade | CDF | 2,185 | Unknown/Unidentified |
| 1967 | Jim Dollar Mountain | CDF | 628 | Unknown/Unidentified |
| 1968 | Jim Dollar | CDF | 502 | Unknown/Unidentified |
| 1970 | Indian Creek | CDF | 487 | Unknown/Unidentified |
| 1971 | Pitney | USFS | 771 | Arson |
| 1971 | Benmore | USFS | 375 | Campfire |
| 1972 | Paradise Canyon | CDF | 1,020 | Unknown/Unidentified |
| 1972 | Spring Valley | CDF | 424 | Unknown/Unidentified |
| 1973 | Barkerville | USFS | 26,428 | Miscellaneous |
| 1973 | Gravely | USFS | 83 | Arson |
| 1975 | Highland Springs | CDF | 391 | Unknown/Unidentified |
| 1975 | Keithly #2 | CDF | 844 | Unknown/Unidentified |
| 1975 | Open | USFS | 97 | Arson |
| 1976 | Yankee Valley | CDF | 1,588 | Unknown/Unidentified |
| 1977 | N/A | USFS | 114 | Miscellaneous |
| 1977 | N/A | USFS | 98 | Miscellaneous |
| 1979 | Seigler | CDF | 1,225 | Unknown/Unidentified |
| 1980 | N/A | USFS | 20 | Miscellaneous |
| 1980 | Highland Springs | CDF | 650 | Unknown/Unidentified |
| 1980 | Benmore | CDF | 905 | Unknown/Unidentified |
| 1981 | Schoolteacher Hill | CDF | 551 | Arson |
| 1981 | Sulphur Bank | CDF | 4,568 | Arson |
| 1981 | Cow Mtn. | CDF | 25,664 | Arson |
| 1981 | Grizzly | CDF | 4,811 | Arson |
| 1981 | Langes Peak | CDF | 14,449 | Arson |
| 1981 | Hunter | CDF | 1,397 | Miscellaneous |
| 1983 | Morgan Valley | CDF | 471 | Arson |
| 1984 | Nice | CDF | 478 | Miscellaneous |
| 1985 | Hidden Valley | CDF | 1,032 | Unknown/Unidentified |
| 1985 | Magic | CDF | 227 | Unknown/Unidentified |
| 1986 | N/A | USFS | 369 | Debris |
| 1987 | Lauder | CDF | 612 | Miscellaneous |
| 1987 | Mendenhall | CDF | 65,468 | Unknown/Unidentified |
| 1987 | Fouts | USFS | 16,363 | Lightning |
| 1987 | Tyler | CDF | 426 | Arson |
| 1988 | Westside | USFS | 6 | Lightning |
| 1988 | N/A | USFS | 4,309 | Miscellaneous |
| 1988 | N/A | USFS | 79 | Smoking |
| 1988 | Letts | USFS | 3,312 | Miscellaneous |
| 1989 | Valley | USFS | 557 | Campfire |
| 1990 | Eagle | CDF | 1,922 | Unknown/Unidentified |
| 1990 | Jones | USFS | 19 | Debris |
| 1990 | N/A | USFS | 93 | Debris |
| 1991 | Bartlett | USFS | 45 | Debris |
| 1991 | Turkey Run | CDF | 516 | Unknown/Unidentified |
| 1991 | N/A | USFS | 1,009 | Debris |
| 1991 | Indian | USFS | 49 | Debris |
| 1991 | Snow | USFS | 38 | Miscellaneous |
| 1992 | Borax Fire | CDF | 1,867 | Unknown/Unidentified |
| 1992 | Nye | USFS | 15 | Campfire |
| 1996 | Guenoc | CDF | 649 | Unknown/Unidentified |
| 1996 | Fork | USFS | 83,057 | Arson |

| Year | Fire Name | Agency | Acreage | Ignition Source |
|---|---|---|---|---|
| 1998 | Soda Ii | USFS | 55 | Arson |
| 1998 | San Hedrin | USFS | 5 | Arson |
| 1998 | Haul | USFS | 164 | Arson |
| 1999 | Sixteen | CDF | 37,894 | Arson |
| 2000 | Morgan | CDF | 3,316 | Equipment Use |
| 2000 | Hidden | CDF | 3,960 | Equipment Use |
| 2000 | Cabbage | USFS | 1,358 | Campfire |
| 2001 | Hough | CDF | 156 | Debris |
| 2001 | Trough | USFS | 24,928 | Miscellaneous |
| 2003 | Bear | USFS | 403 | Lightning |
| 2003 | Happy Camp | USFS | 1,482 | Lightning |
| 2003 | Deafy | USFS | 4,782 | Lightning |
| 2003 | Horse (Hull) | USFS | 102 | Lightning |
| 2003 | Anderson | USFS | 291 | Lightning |
| 2003 | Ericson | USFS | 2 | Lightning |
| 2003 | West Crockett | USFS | 132 | Lightning |
| 2003 | Crockett 2 | USFS | 33 | Lightning |
| 2003 | Streeter | USFS | 1 | Lightning |
| 2003 | Young | USFS | 0 | Lightning |
| 2003 | Boardman | USFS | 511 | Lightning |
| 2003 | Gravelly | USFS | 0 | Lightning |
| 2003 | Smokehouse | USFS | 21 | Lightning |
| 2003 | Garrett | USFS | 0 | Lightning |
| 2003 | Calpine | CDF | 86 | Powerline |
| 2003 | Morgan | CDF | 144 | Lightning |
| 2003 | Brushy | CDF | 199 | Lightning |
| 2003 | Scotts | CDF | 23 | Arson |
| 2004 | Long | CDF | 271 | Arson |
| 2004 | Geysers | CDF | 12,244 | Equipment Use |
| 2005 | Clover | CDF | 772 | Unknown/Unidentified |
| 2005 | Spruce | CDF | 154 | Equipment Use |
| 2005 | Rumsey | CDF | 62 | Miscellaneous |
| 2005 | Deer | USFS | 1,720 | Equipment Use |
| 2006 | Homestake 2 | CDF | 124 | Unknown/Unidentified |
| 2006 | Murphy | CDF | 125 | Vehicle |
| 2006 | Highland | CDF | 198 | Unknown/Unidentified |
| 2006 | Grade | CDF | 105 | Unknown/Unidentified |
| 2006 | 29 | CDF | 344 | Vehicle |
| 2007 | Spruce | CDF | 129 | Powerline |
| 2007 | Robinson | CDF | 122 | Arson |
| 2007 | Bartlett 2 | USFS | 36 | Miscellaneous |
| 2007 | Slides | USFS | 12 | Miscellaneous |
| 2007 | Vann | USFS | 56 | Miscellaneous |
| 2008 | Walker | CDF | 11,173 | Vehicle |
| 2008 | Back | USFS | 1,566 | Lightning |
| 2008 | Mill | USFS | 3,042 | Lightning |

## Reference I–Glossary

**1-Hour Fuel:** Fuels that are less than ¼ inch in diameter. These fuels will only take about an hour to lose or gain two-thirds of the equilibrium moisture content of their environment.

**10-Hour Fuel:** Fuels that range in diameter from ¼ inch to 1 inch, and take about ten hours to lose or gain two-thirds of the equilibrium moisture content of their environment.

**100-Hour Fuel:** Fuels that range from 1 inch to 3 inches and take about 100 hours to lose or gain two-thirds of the equilibrium moisture content of their environment.

**1,000-Hour Fuel:** Fuels from 3 inches to 8 inches and take about 1,000 hours to lose or gain two-thirds of the equilibrium moisture content of their environment.

**10,000-Hour Fuel:** Fuels which are greater than 8 inches in diameter. Obviously, the 1,000- and 10,000-hour fuels do not burn easily. However, if they do burn, these fuels will generate extreme heat, often causing extreme fire behavior conditions. *From: National Weather Service. Fire Weather Definitions. Dead and Live Fuel Moisture. www.crh.noaa.gov/fsd/firedef.htm.*

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

**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.

**Age Classes:** A way of classifying the age range of trees or forests, usually divided into 20-year units or classes, e.g. 0–20 years.

**Aloft Winds:** Upper winds that occur in the atmosphere above the surface level, generally 2,000 feet and higher.

**Anchor Point:** The point at which firefighters begin fireline construction, usually blocked from the spreading fire to protect firefighters from harm.

**Anthropogenic:** The result of human activities or the influence of humans on nature.

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

**Backburn:** *See Blackline.*

**Backfire:** A technique used in certain locations to direct fire spread against the wind while doing prescribed burns.

**Bare Mineral Soil:** The layer of inorganic earth below the litter and duff layer that is composed of sand, silt, and clay and has little to no combustible materials.

**Benches:** Flat landscape areas that occur along foothill and mountainous slopes. They can be the result of natural land formations through slope movement and sloughing, or land alteration by previous resource-extraction activities such as logging.

**Biodiversity:** The abundant variety of plant, fungi, and animal species found in an ecosystem including the diversity of genetics, species, and ecological type.

**Biomass:** The total weight of living matter in a given ecosystem. May also be defined as the total weight of plant debris that can be burned as a fuel.

**Bioregional/Bioregion:** The characteristic features of an area (bioregion) constituting a natural ecological community of contiguous geographic terrain, delineated by natural rather than artificial borders: the region's climate, local aspects of seasons, particular landforms, watersheds, soils, native plants, and animals. Humans are also an integral aspect of a bioregion's life.

**Blackline:** Preburning, or backburning, of fuels adjacent to a control line before igniting a prescribed burn (controlled burn).

**Bone Dry Ton (BDT):** A standard industry designation for a ton of material at nominal zero moisture content.

**Broadcast Burning:** A controlled burn, where the fire is intentionally ignited and allowed to proceed over a designated area within well-defined boundaries for the reduction of fuel hazard after logging, for site preparation before planting, and/or for ecosystem restoration.

**Broadcast Patch Burning:** A controlled burn, where the fire is intentionally ignited and allowed to proceed over a designated smaller area for site-specific management of fuels or plant community enhancement for certain groupings of vegetation or patches.

**Broadcast Underburning:** A method of burning where a prescribed fire is allowed to burn in the understory of a designated area to reduce fuel hazards and/or as a silvicultural treatment.

**Brush:** To control and/or clear small woody debris.

**Brushing:** The act of removing brush such as dead materials, shrubbery, and branches.

**BTU:** British Thermal Units (heat)/feet/second.

**Burn Plan:** Detailed document with specific information on prescribed burns. Used by the burn boss for implementing specific prescribed-burn (controlled-burn) projects.

**Burn-Out Time:** The length of time in which flaming and smoldering phases occur in a given area or for the whole fire.

**Cambium:** The growing layer of a tree, located between the bark and wood of the stem.

**Canopy:** The top layer of a forest or tree, which is formed by leaves, needles, and branches creating a continuous cover.

**Cavities:** Holes or openings, usually in a decayed area of a tree, where birds and animals may live.

**Chunk: To** complete the pile burning process by turning in or placing the unburned woody material ends into the fire ring.

**Climax Species:** The terminal community in ecological succession capable of self-replacement under the prevailing climatic, edaphic, physiographic, biotic, and pyric conditions.

**Closed Canopy:** Occurs when the canopies of trees touch and blend together enough so that light does not reach the floor of the forest.

**Codominant:** Species that share dominance or are of equal importance. For example, a codominant fir-pine forest would be dominated by both firs and pines.

**Colonize:** The act of establishing populations in new sites, such as burned areas, by seed.

**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.

**Composition:** The percentage of each species that comprise a given area.

**Condition Class:** Condition class is based on a relative measure describing the degree of departure from the historical natural fire regime. Fire regime describes the characteristic patterns of fire in a given ecosystem and can include fire behavior, distribution, frequency, size, and season.

**Conks:** Shelf-like mushrooms that grow on trees, stumps, and downed wood. They are known for their wood decaying characteristics. *See Heart-Rot Decay.*

**Conservative Species:** Referring to species which are non-generalist. Conservative, sensitive species require very specific habitat niches and are generally uncommon, rare, or threatened.

**Containment:** The process of completely surrounding a fire with natural or man-made fuel breaks.

**Contour Falling:** Cutting and placing trees along the slope contour. This is a treatment that utilizes positioned logs to control erosion from water flow. Logs are offset on the slope contour to slow water by creating a meandering travel path.

**Control:** The act of managing a fire, which generally entails a completed control line around the fire.

**Controlled Burning (or Prescribed Fire):** A forest management practice that uses fire to improve habitat or reduce hazardous fuels. A plan for the prescribed burn must be written out and approved, and specific requirements must be met before commencing burning.

**Convection Column:** Heat generated from a fire into a column that rises into the air at varying heights, depending on the size of the burn.

**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.

**Crop:** The amount of fruits a group of plant yields in one growing season.

**Crown Density:** A measurement of the thickness or density of the foliage of the tree crown in a stand.

**Crown Fire:** A fire that spreads from treetop to treetop, and is characteristic of hot fires and dry conditions. Crown fires are generally more complex to control than surface fires.

**Crown Scorch:** When a fire or a convection column burns a portion or the entire crown of a tree.

**Crown Structure:** The structure or arrangement of the uppermost branches and foliage of a tree.

**Dappled Light:** When the forest canopy has small openings, where filtered sunrays project through the treetops onto the forest floor.

**DBH:** Diameter at Breast Height, a measurement of a tree's diameter at the level of an adult chest (approximately 4.5 feet above the ground).

**Dead Out:** When a fire has completely burned out or has been entirely extinguished.

**Decay Classes:** Decomposing wood is categorized based on the level of decomposition, broken into five classes.

**Defensible Fuel Profile Zone:** Defensible Fuel Profile Zones: a term used by federal and state land management agencies to describe a larger shaded fuelbreak normally O.25 mile in width. The object of these measures are to reduce the fuel ladder and add space between the tree top canopy in order to keep the fire out of the canopy on the ground.

**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.

**Defensible Space Zone:** The one-hundred-foot zone around the home.

**Discing:** Cultivating or roto-tilling the soil.

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

**Disturbance Factor:** The aspects that influence changes to the environment, both human-caused and natural occurrences, such as agriculture, logging or development, and fire, wind, or floods.

**Disturbance Regime:** The characteristic and usually historical pattern of disruptions to the environment (such as fire or flood or drought) in a given area.

**Diurnal:** Belonging to or active during the day.

**Doghair:** An excessively dense stand of trees. An example is an acre with 35,000 trees, all smaller than seven inches DBH.

**Dominant:** The species that is the most abundant or influential in an ecosystem. For example, a dominant tree is one that stands taller than the rest and receives full sun.

**Downed Woody Debris:** The remains of dead trees, branches, and various woody brush that sit on the forest floor—generally refers to trunks of trees.

**Draft:** Using the forces of suction to draw water from ponds, swimming pools, or other bodies of water. This technique utilizes a partial vacuum formed by a suction pump and atmospheric pressure. The water is then moved where it is needed.

**Draw:** A topographic channel that is generally shallower than a ravine.

**Drip Torch:** A hand-held device used to ignite fires by dripping flaming liquid fuel on the materials to be burned.

**Drip Line:** The boundary of a tree's canopy, generally estimated by the extent of the tree's outermost limbs and the circular moisture line formed when rainfall drips from the limb tips.

**Drip-Line Thinning:** Clearing ladder fuels under the drip-line circumference of a leave tree. *See Appendix D for more detailed information.*

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

**Early-Seral Species:** Species which start growing in natural succession soon after a disturbance (fire or logging). These can include plantshrubs, such as ceanothus, and hardwoods usually in tree form, such as red alder, bitter cherry and big leaf maple.

**Ecosystem:** A community of organisms (including plants, animals, and fungi and the non-living aspects of the physical environment) that makes up a specific area. Examples of ecosystem types include a pond or a forest.

**Ecotone Edge:** The boundary between two or more ecosystems. The change in ecosystems may be due to elevation, soil type, disturbance, or other factors.

**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.

**Embers:** Small glowing or smoldering pieces of wood or other organic debris, often dispersed ahead of a fire, also known as firebrands.

**Endemic:** A plant that is native to a certain limited area and found nowhere else.

**Ephemeral:** Meaning short duration or life, as in an ephemeral stream that only exists after a rainstorm or during the rainy season.

**Ephemeral Stream:** A stream or watercourse that does not flow all year round, only during rainy season.

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

**Escape Route:** A path or road that has been preplanned to get out of harm's way in a fire situation. The route should be well understood by all participants. If there is any unclear direction, the path should be marked.

**Escapes:** Wildfires that cannot be contained with the first attempts at suppression.

**Excessive Stems:** Stems (tree or shrub main trunks) in high density.

**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/.*

**Extinction Moisture:** The moisture level in fuels when fires tend to stop burning.

**Facultative Sprouter:** A species of plant that can resprout after a fire from the rootstock, although this may not be its usual method of reproduction in the absence of fire. The ability to resprout may be dependent on the intensity of the fire.

**Feathering:** A process that reduces the appearance of change between treated and untreated sites by gradually softening the transition.

**Firebrands:** A piece of wood or a coal that is hot and glowing from fire activity, often dispersed by wind ahead of a fire. Also called embers.

**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. *See Fuelbreak for the difference between the two.*

**Fireshed:** An area or areas with similar fire management, fire history, and risk of wildland fire issues.

**Fire-Adapted:** The ability of organisms or ecosystems to make long-term genetic change for the most advantageous response to fire-prone environments.

**Fire-Adapted Ecosystem:** A local mix of mature natural vegetation (ideally native species but often found in combination with exotic species) that maintains its ability to survive and regenerate, and perhaps even to thrive, with regular disturbance from wildfire. Some species may actually require fire to trigger seed maturation, such as the giant sequoia. Opportunistic species benefit from fire and the openings it can create in a woodland; this is part of their adaptation.

**Fire Behavior:** The combination of fire spread, heat output, flame length intensity, etc. as the fire responds to weather, topography, types of fuels, etc.

**Fire Climax:** The stage of vegetation that is sustained with frequent fire.

**Fire Ecology:** The study of fire and its relationship to the physical, chemical, and biological components of an ecosystem.

**Fire Free Zone:** A five-foot minimum zone around the home that is free of all fuels.

**Fire Hazard:** The amount, conditions, and structure of fuels that will burn if a fire enters an area.

**Fire Ignition:** The act of setting on fire or igniting a fire.

**Fire Intensity:** A measurement of the heat released in an area during a specific amount of time (BTU/ft./sec.). Intensity has a large influence on an ecosystems' recovery from fire.

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

**Fire Regime:** The characteristic patterns of fire in a given ecosystem. May include fire behavior, distribution, frequency, size, and season.

**Fire Resiliency:** The ability of an ecosystem to maintain its native biodiversity, ecological integrity, and natural recovery processes following a wildland fire disturbance.

**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.

**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.

**Fire-Return Interval:** A period of time between fires in a specific region or area.

**Fire Risk:** The combination of vegetation, topography, weather, ignition sources and fire history that lead to fire potential and danger in a given area.

**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.

**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.

**Fire-Sensitive:** A species of tree that is more susceptible to fire damage. Sensitivity may be due to thin bark or easily ignitable foliage.

**Fire Weather:** The various types of weather that affect how a fire ignites, behaves, and is controlled.

**First-Entry Thinning Treatment:** The first stage of tree thinning performed in a fuels reduction treatment.

**Flame Length:** The span of the flame from the tip to the base.

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

**Flanks:** Slope areas on both sides below a ridge top.

**Flashy Fuels:** AKA fine fuels, such as grass, leaves, pine needles, ferns, moss and some kinds of slash, which ignite readily and are consumed rapidly when dry.

**Foehn Events:** A wind that blows warm, dry, and generally strong, creating extremely dry fuel and dangerous fire potential.

**Forbs:** Herbaceous flowering plants, other than grasses.

**Forest Stand Density:** The amount of trees in a forest per unit area. Can be measured in terms of basal area and crown cover.

**Forest Stand Enhancement:** A combination of both silvicultural thinning practices and other forest restoration activities such as controlled burning, which aim to increase the health, resiliency, and vigor of tree communities within a forest ecosystem.

**Fragment:** Used as a verb, the transformation of forests or vegetation into one or more patches of smaller size than the original area. Can also refer to one of the patches.

**Fragmentation:** The transformation of forests or vegetation into one or more patches of smaller size which can occur by natural means such as fire, disease, etc., or by management practices such as timber harvesting.

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

**Fuelbreak:** A strategic area where fuel volumes have been intentionally reduced to slow down a fire and reduce its flame lengths and intensity; as distinguished from fire breaks where all fuels are removed to bare mineral soil for fire suppression.

**Fuel Bed Height:** A measurement of the height of fuel composition on the forest floor.

**Fuel Complex:** The volume, type, condition, arrangement, and location of fuels.

**Fuel Continuity:** The amount of continuous fuel materials in a fire's path that allows the fire to extend vertically towards the crowns of trees or horizontally into the forest or other fuels.

**Fuel Ladder:** A ladder of vegetation from the forest floor into the canopy (or upper branches) of the trees that allows fire to climb upwards.

**Fuel Load Conditions:** The amount of combustible material (both dead and live fuels). It relates to the site's *fuel model (see definition below and Chapter 3)*, slope, aspect, and the fuel moisture content.

**Fuel Model:** A standardized description of fuels available to a fire based on the amount, distribution, and continuity of vegetation and wood. Fuel models distinguish between vegetation (such as tall and short chaparral, or timber with and without an understory), as well as describe the arrangement and amount of the vegetative fuels. Fire managers use fuel models within the Fire Behavior Prediction System to analyze the wildfire environment. *See Chapter 3 for more information.*

**Fuel Modification:** The management of fuels for fire safety or ecosystem health. Examples include prescribed burns and creation of firebreaks.

**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.

**Fuel Volumes:** The quantity of fuel in a specified area that is susceptible to fire consumption.

**Future Desired Condition:** The short-term and long-term goals desired from management activities on a property/area. It is important to keep the Conservation Principles in mind (*see Chapter 1*) when designing these.

**Generalist Species:** A species with the ability to utilize a wide variety of resources and tolerate various environmental situations.

**Girdling:** A technique used to kill trees by cutting through the cambium and sapwood layer around the circumference of the tree. The flow of water and nutrients is broken and the tree eventually dies.

**GIS (Geographic Information System):** A system for storing and manipulating geographical information on a computer.

**GPS (Global Positioning System):** A hand held navigational device that uses satellites to determine positions on the earth.

**Green Islands:** Patches of live tree and plant communities retained within a mosaic thinning prescription.

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

**Ground Fuels:** The layer of combustible materials that exists below the layer of surface litter. This layer includes plant roots, duff, etc. These materials can combust and burn without contact with a flame, when embers drop from above.

**Growth or Vigor:** The ability of plants to exhibit healthy natural growth and survival.

**Habitat Conditions:** The conditions needed by local wildlife to survive, including food, water, cover, and nesting.

**Hammerhead Turnout:** A "T" shaped roadway that allows for large emergency vehicles to turnaround. This space allows for a three-point turnaround and should be as wide as other surrounding roads.

**Hand Pile Burning:** Hazardous fuels piled by hand for burning in a manner that will not damage surrounding trees or soil.

**Headwall:** Steep upper sides of a drainage where fire can move quickly.

**Heart-Rot Decay:** Fungus-caused decay of a tree's heartwood (interior wood). Trees are infected when fungal spores enter tree wounds or dead branch stubs, and encounter conditions favorable for spore germination. *See Conks.*

**Heat Output:** The total amount of heat a fire released in a specific area during the passing of the flaming front.

**Heat Per Unit Area:** The amount of heat produced by burning fuels in a given unit area through the entire duration of the fire.

**Herbaceous Overstory Vegetation:** The vegetation layer that forms the uppermost canopy layer and is partly composed of non-woody plants that die back in the winter.

**Herbaceous Understory Vegetation:** The layer of vegetation under the forest canopy that is composed of non-woody plants that die back in the winter.

**Heterogeneity:** An object or system consisting of multiple items having a large number of structural variations.

**High Pruning:** Cutting of both dead and live branches ten to fifteen feet from the base of the tree (height to live crown). This is done on larger trees to separate the fuel connectivity from the ground to the crown of a tree.

**Historic Natural Condition:** The natural condition of a property/area that occurred in the past, before fire suppression and industrial activities. Old photos, settlers' journals, elders' oral history, and clues on the property (such as old stumps) may be helpful in identifying the historical natural condition of an area.

**Home Ignition Zones:** Includes the home and a 100 to 200 foot area around the home.

**Hydrology:** A science that deals with the waters of the Earth including movement, distribution, seasonal patterns, and conservation.

**Hydrophobic:** Literally meaning "water-fearing," as in a substance such as oil, which does not mix well with water. Also refers to a soil that will no longer absorb water.

**Ignition Specialist:** A trained professional who specializes in ignition and prescribed fire techniques and management. Ignition specialists are certified through the National Wildfire Coordinating Group and have years of experience in wildland fire suppression and prescribed fire use. They have met all necessary requirements to perform firing applications.

**Ignition Zones:** The zone where combustion is initiated.

**Ingress-Egress:** Roads and other avenues to enter and leave your property. The act or right to come in or go through, as in entering a property (ingress); the act or right to depart or go out, as in exiting a property (egress).

**Ingrowth:** The trees that grow large enough in a season to be considered a sapling or pole timber.

**Initial Data Assessment:** Information gathered from initial site assessment based on a series of questions.

**Initial Entry:** The first stage of vegetation and tree thinning performed in a fuel-reduction treatment.

**Initial Site Assessment:** The preliminary steps of an evaluation of a piece of property to determine fuel hazards and health conditions. Information is gathered to help plan a fuel hazard reduction treatment.

**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, Arundo, tamarisk, and Scotch broom.

**Jackpots:** Generally, small pockets of dense fuels, which could allow a fire to flare up and burn more intensely.

**Key Ecosystem Component:** An important piece of an ecosystem such as soil, native species, or mature/rare habitats, which are essential to the stability of an ecosystem.

**Ladder Fuel Continuity:** The amount of continuous fuel materials in a fire's path that allows the fire to extend in a vertical direction towards the crowns of trees.

**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.

**Layout:** In this case, defining and designating forest operations for a specific location.

**Leading Edge:** The foremost part of a fire that is guiding the fire in the direction of travel.

**Leave-Trees:** Trees that have been selected to remain standing in an area of thinning or harvesting.

**Leave-Patches:** Swaths or clusters of trees or other vegetation that have been selected to remain standing in an area of fuel treatment.

**Limb Up:** To remove the lower branches from a woody plant to create a defined space between the forest floor and the canopy.

**Limbing:** Removing selected branches of a standing or fallen tree.

**Live Crown Percentages:** The proportion of the height of the tree on which live branches and foliage are present.

**Lop and Scatter:** The act of cutting and evenly spreading branches over the ground to reduce fire hazard and erosion potential, while promoting the decomposition of branches via their close proximity to the ground.

**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.

**Mastication:** The grinding, shredding, chunking, or chopping of vegetation by heavy machinery.

**Meadows and seeps:** More or less dense grasses, sedges, and herbs that thrive, at least seasonally, under moist or saturated conditions. They occur from sea level to treeline and on many different substrates. They may be surrounded by grasslands, forests, or shrublands. A seep is an area where water rises from an underground source to the surface and creates a wet area.

**Merchantable:** Timber that is viable for sale under the current economic situation. This is generally determined by the part of the stem (trunk) that is suitable for timber products.

**Mesic:** The condition of being normally moist, as in vegetation or ecosystems.

**Mixed-Structural Thinning:** Practice of selectively eliminating multi-stemmed species to achieve a variety of densities where either one stem is retained or groupings of stems are retained.

**Modify Fire Behavior:** Using fire-safe practices such as fuel treatments, thinning, creating firebreaks, etc. to change the way a fire will behave, with a goal of slowing it down and/or suppressing it more easily.

**Moisture Content:** The dry weight of a material, such as wood or soil, compared to the wet weight of the same material. It is not unusual for live material to have moisture content greater than 100% because it could contain more water than solid material by weight.

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

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

**Mosaic Thinning:** A style of vegetative thinning that creates openings and patches of vegetation to increase the potential variety of habitat types.

**Mosaic Thinning Regimes:** A system of thinning to create patches and openings that emulate the structural composition created by a wildfire.

**Mulch:** A material (such as decaying leaves, bark, or compost) spread around or over a plant to keep invasive weeds down, to reduce moisture-loss, or to enrich and insulate the soil; as a verb, the application of such material.

**Mycorrhizal:** The mutually beneficial relationship between plant roots and fungi "roots," AKA mycorrhizae, where the fungus receives sugar from the tree while helping the tree with water and nutrient uptake. The majority of plants depend on this relationship.

**Natural Disturbance:** Disturbances, like fire and floods, which occur in the environment without the intervention of humans.

**Natural Place Community:** A simple term describing a specific type of ecosystem.

**Natural Range of Conditions:** The normal assortment of circumstances under which an organism or group can survive.

**Niches:** A species or population's role and/or function within an ecosystem. Includes resource use, interactions, etc.

**Nurse Log:** A tree that has fallen, died, and started to decompose. The decaying log is rich in moisture and nutrients and provides a germination spot for plants, as well as habitat for insects.

**Obligate Seeder:** A plant that reseeds itself after fires as a means of recovery and regeneration.

**Obligate Sprouter:** A plant that resprouts after fires as a means of recovery and regeneration.

**Offshore Flow:** The flow of wind blowing from the land to the water, or in other words wind blowing offshore.

**One-Way Transport Route:** A hauling trail used during tree extraction activities where one entry pass is made.

**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.

**Overstory Trees:** Trees that form the uppermost layer of the canopy in a forest.

**Patch Burning:** A method of prescribed burning where patches are burned to prepare an area for planting or to reduce fuels, forming an obstruction to future fires.

**Patch-Retention Thinning:** A silvicultural thinning practice where patches of trees and vegetation are retained in a given area while other parts of the treatment area are thinned (selectively cut) at intermediate levels.

**Patch Under-Burns:** A designated area, or vegetation patch, where fire is utilized to consume surface fuels but not trees and shrubs.

**Pathogens:** Insects or disease that can affect a site or individual plant.

**Perennial:** In reference to water, a stream that holds water year-round during a typical year. May have some flux in a drought year.

**Perennial Stream:** A stream or watercourse that has water all year round.

**Permeability:** In this case, a condition whereby fire can spread through a community with minimal negative impact.

**Photo-Point Monitoring:** Using a specific, identifiable point on a property from where photos are taken over time using the same view to compare and monitor changes.

**Pilot Ignition Piles:** Small piles of primarily small fine fuels such as branches, dead materials and organic matter.

**Pistol Butts:** Trees within a forest stand that have a crooked sweep beginning at the base of the tree, then growing straight toward the sky. A "pistol butt" tree indicates erosive soil movement on the slopes of a particular area.

**Plant Community:** A group of plants that are interrelated and occupy a given area.

**Plant Succession:** In ecology, progressive change of the plant and animal life of an area in response to environmental conditions.

**Pole-Sized:** Generally younger trees with a trunk diameter between four and eight inches.

**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.

**Prescribed Fire (or Controlled Burn):** A forest management practice that uses fire to improve habitat or reduce hazardous fuels. A plan for the prescribed burn must be written out and approved, and specific requirements must be met before commencing burning.

**Present Condition:** The environmental conditions that occur on a property/area at the present time.

**Productive:** A term used for land or forests that are growing efficiently and in a vigorous manner.

**Pump Chance:** An area where water can be pumped from a pond or creek for fire-suppression purposes.

**Rate of Spread:** The speed of an advancing fire. May be measured by the growth in area or by the speed of the leading edge of the fire.

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

**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/professional_foresters_registration/about_registration/.*

**Relative Humidity:** A measure of moisture in the air. If the humidity is 100%, the air is completely saturated with moisture. If the humidity is less than 20%, the air is very dry. When the air is dry, it absorbs moisture from the fuels in the forest making them more flammable. *(South Carolina Forestry Commission. Wildfire in S.C. 1994. See www.state.sc.us/forest/refwild.htm.)*

**Release:** Using thinning techniques to free a tree or group of trees from competition for nutrients, sunlight, and water by removing the competing small trees and shrubs.

**Repeating Skips and Gaps:** The forest structure throughout a treatment area, following a variable density treatment, where some areas are retained and not thinned (skips) and other portions of the stand are heavily harvested (gaps). The range of size of the skips and gaps are from a few hundred square feet to up to an acre where site conditions dictate.

**Residence Time:** How long the flaming front burns in any one location.

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

**Retention Patch:** A clump of vegetation that has been isolated from contiguous fuels and retained for wildlife habitat and/or native plant species diversity.

**Rhizome:** An underground stem that has the ability to send out roots and shoots. Grasses and irises are two plants that exhibit rhizomes.

**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.

**Salvage Logging:** Logging and removing merchantable trees after a fire to capture economic potential. This is a very controversial subject.

**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.

**Scalping:** The act of removing the surface layer to expose the bare mineral soil.

**Scratch Line:** An incomplete control line in the beginning stages that is constructed as an emergency backup for spreading fires.

**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.

**Seed Bank:** A repository of dormant seeds found buried in the soil.

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

**Sense of Place:** A feeling and understanding of the unique place in which one lives, derived from the mix of natural and cultural features in the landscape and community. Sense of place can also mean rooting and defining oneself in terms of a given piece of land, watershed, or bioregion.

**Sensitive Species:** A plant or animal species that can tolerate a small range of resources and environmental situations. These species raise concerns about population numbers and may be recognized locally as rare.

**Sequential Entries:** Entering a forest stand or other vegetation type several times over the course of years to spread out the impacts of treatments.

**Serotinous:** A condition where seeds are retained within cones that only open and release seeds en mass following fire. The mechanism varies, with some cones sealed by resin and waxes that melt during the fire, allowing the cones to open afterwards, releasing the seed.

**Shade Tolerant:** Attribute of a species that is able to grow and mature normally in and/or prefers shaded areas.

**Shaded:** Blocked from light with shade or shadows.

**Shaded Fuelbreaks:** A fire-suppression technique using fuelbreaks in forested areas. Vegetation is reduced and/or modified to reduce fire risk, but an adequate amount of crown canopy remains intact, thus inhibiting weedy undergrowth.

**Shape:** The act of pruning a tree to a desired form or appearance.

**Sheltered Connectivity:** Contiguous areas within a thinning treatment that are retained for wildlife cover and to support wildlife movement.

**Silvicultural:** The practice of caring for forest trees in a way that meets management objectives. For example, foresters may control the composition and quality of a forest stand for goods such as timber and/or benefits to an ecosystem.

**Site-Specific:** Applicable to a specific piece of land and its associated attributes and conditions (e.g. microclimate, soils, vegetation).

**Size Class:** The division of trees by the size of their diameter, sometimes split into three categories—seedlings, pole, and saw timber—or by diameter in inches.

**Slash:** The wood debris left on the ground after pruning, thinning, or brushing—may include branches, bark, chips, or logs.

**Slash Paper:** Paper used to cover slash piles before ignition with the intention of keeping the slash dry or allowing it to dry. Paper is more environmentally appropriate than plastic.

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

**Slope Stability:** The degree to which a slope is susceptible to erosion and slides, or the measure of its overall stability.

**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.

**Social Capital:** The individual and communal time and energy that is available for such things as community improvement, social networking, civic engagement, personal recreation, and other activities that create social bonds between individuals and groups. *From: CDC Healthy Places Terminology, http://www.cdc.gov/healthyplaces/terminology.htm#p.*

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

**Spatial Distribution:** The manner in which plants are arranged throughout an area.

**Species Composition:** The combination of species found in a particular site.

**Spot Fire:** A smaller fire outside the boundary of the main fire (usually ahead of the direction the fire is traveling), started by airborne sparks or embers.

**Spur:** A road branching off the main road to provide access to a designated area.

**Stacking Functions:** The act of accomplishing several goals with one activity.

**Stand:** A group of trees with similar species composition, age, and condition that makes the group distinguishable from other trees in the area.

**Stand Structure Model:** The spatial arrangement of the forest stand, describing the density and connectivity of the understory, mid-story, and overstory vegetation.

**Steady State Climax:** The stage of vegetation that is self-sustained without disturbance.

**Stem and Poles:** The trunk of a tree or a piece of wood that is long and slender.

**Stemwood:** The wood of the main stem or trunk of a plant

**Stocking Levels:** The density and calculation of tree seedlings, saplings, and poles in a given area.

**Strip Patch:** In prescribed burning, a narrow section or area where the fuel is burnt while the surrounding area is left untreated.

**Structural Protection Zone:** Immediate 30-ft. buffer zone around the home.

**Structure:** The composition of a forest or vegetation, specifically looking at the density, cover, size or diameter, and arrangement.

**Stump Sprout:** The ability of a tree to resprout from its cut stump.

**Submerchantable:** Trees that cannot be sold for timber products due to disease, deformities and/or size.

**Surface Fire:** A fire on the forest floor that consumes debris and smaller plants.

**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.

**Surface or Crown:** The distinguished location that a fire burns. Surface refers to the forest floor while crown refers to fires in the top of trees.

**Suspended Dead Material:** Typically composed of pine needles that are draped on living brush. Made up of dead fuels not in direct contact with the ground, consisting mainly of dead needles, foliage, twigs, branches, stems, bark, vines, moss, and high brush. In general these fuels easily dry out and can carry surface fires into the canopy.

**Swamper Burning:** A method of prescribed fire where fuel is added gradually and continually to a burning pile over the course of a day.

**Thermal Cover:** Vegetation cover that modifies unfavorable affects of weather for animals. For example, elk may move to a fir forest with trees at least forty feet tall and with seventy percent crown closure to protect themselves from harsh weather.

**Thicket:** A thick area of brush containing close-growing plants. Provides habitat to wildlife but may be difficult for humans to pass through.

**Thinning Away Contiguous Fuels:** The practice of cutting back fuel loads from the edge of a desired leave-tree or patch in an effort to separate fuel connectivity.

**Thinning From Below:** Silvicultural practice where smaller understory trees are selectively removed below overstory trees. This method is also called “low thinning.”

**Tillering:** The process by which new aerial shoots emerge from the base of the plant. To send forth shoots from the base of grass, for example.

**Tip-Sprout:** The ability of a shrub to resprout from a cut limb.

**Torching:** A rapid and intense burning of a single or small group of trees/shrubs, causing the upward movement of fire. AKA crown fire initiation or flare-up.

**Touch-Off:** A controlled burning (or prescribed fire) operation performed by a forestry or fire crew, where large quantities of forest treatment slash are arranged in hand piles and ignited with drip torches simultaneously by multiple crew members.

**Treatment:** An action or controlled technique that is applied in a specific process. Refer to “Fuel Treatment” for a more specific definition.

**Underburn:** A prescribed fire method where burning is conducted in the understory of the forest, below the dominant trees.

**Understory:** Generally herbaceous or shrubby vegetation that makes up the layer of forest under the tree canopy layer.

**Uneven-Aged Treatment:** A treatment that deals with three or more age-classes of trees.

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

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

**Variable-Density Thinning:** Thinning or selectively cutting trees in a manner to restore repeating variability or redundancy in a forest. This technique ensures diversity in stand density and canopy cover.

**Variable Density Treatment:** Silvicultural thinning practice where some portions of a stand are left lightly or completely un-thinned ("skips"), providing areas with high stem density, heavy shade, and freedom from disturbance; while other parts of the stand are heavily cut ("gaps"), including removal of some dominant trees to provide more light for subdominant trees and understory plants. Intermediate levels of thinning are also applied in a typical variable-density prescription. This practice is also known as "free thinning."

**Vernal pool:** Seasonal amphibious environments dominated by annual herbs and grasses adapted to germination and early growth under water. Spring desiccation triggers flowering and fruit set, resulting in colorful concentric bands around the drying pools.

**Vertical and Horizontal Structure Diversity:** Describes the configuration of trees within a forest stand that create a variation of structure where trees stand straight up and down (vertical) or grow at an angle (horizontal).

**Vertical Fuels:** Those fuels (brush, small trees, decks, etc.) that provide a continuous layer of fuels from the ground up into the top fuel layers (i.e. tree canopy).

**Viewshed:** The landscape or topography visible from a geographic point, especially that having aesthetic value.

**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.

**Weed-Eater:** A hand-held tool that utilizes a gas or electric motor and a rotating nylon string or metal blade to cut down vegetation.

**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.

**Wildland-Urban Interface (WUI):** The area where wildlands and communities converge, often assumed to be at high risk of wildfire.

**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.

**Windthrow:** Trees that are uprooted by wind events. May occur in logged areas or in stands of shallow-rooted trees such as white pines. Formerly protected stands whose edges are opened up become vulnerable to this effect.

**Yarding:** A technique for moving felled trees, limbs, and brush by hauling them to the road with a cable and tractor.

## Reference II—Internet Links for Further Information

### GENERAL INTEREST WEBSITES

Bureau of Land Management, Ukiah Field Office. www.blm.gov/ca/st/en/fo/ukiah.html

California Department of Forestry and Fire Protection (CAL FIRE). Fire Safety Education. http://fire.ca.gov/education.php

CAL FIRE. Fire and Resource Assessment Program. http://frap.cdf.ca.gov

CAL FIRE. Fire Safety In the Home. www.fire.ca.gov/education_homeowner.php

California Emergency Management Agency, Hazard Mitigation: Fire Hazards. http://hazardmitigation.calema.ca.gov/hazards/natural/fire

California Fire Alliance (CFA) homepage. www.cafirealliance.org

CFA. Community Wildfire Protection Plans (CWPPs). http://cafirealliance.org/cwpp/

California Fire Safe Council homepage. www.firesafecouncil.org

California Fire Safe Council. General Fire Safety. www.firesafecouncil.org/homeowner/index.cfm

County of Lake. www.co.lake.ca.us

County of Lake Geographic Information System. http://gis.co.lake.ca.us/

Firewise homepage. www.firewise.org

Firewise Homeowners Resources. www.firewise.org/resources/homeowner.htm

Healthy Forests and Rangelands. www.forestsandrangelands.gov/communities/index.shtml

Lake County Air Quality Management District. www.lcaqmd.net

Lake County Community Wildfire Protection Plan (CWPP) and Lake County Fire Safe Council. www.co.lake.ca.us/FireSafeCouncil.htm

Lake County Resource Conservation Districts. www.lakecountyrcds.org

Mendocino National Forest. www.fs.fed.us/r5/mendocino/

National Wildfire Programs Database. Provides information about policies and programs that seek to reduce the risk of loss of life and property through the reduction of hazardous fuels on private lands. www.wildfireprograms.usda.gov/

Society of American Foresters. "Preparing a Community Wildfire Protection Plan, A Handbook for Wildland Urban Interface Communities." www.safnet.org/policyandpress/cwpp.cfm

South Lake County Fire Safe Council. http://southlakefiresafecouncil.org/index.htm

Department of Fish and Game. Habitats and Natural Communities. www.dfg.ca.gov/wildlife/nongame/habitats.html

### *INTERNET LINKS AS FOUND IN PLAN CHAPTERS AND APPENDICES (IN ORDER OF APPEARANCE IN EACH DOCUMENT)*

### LIVING WITH WIDFIRE: LAKE COUNTY CWPP OVERVIEW AND SUMMARY

U.S. Census Bureau. State & County Quickfacts. http://quickfacts.census.gov

Lake County Air Quality Management District (LCAQMD). www.lcaqmd.net/

American Lung Association. State of the Air Report 2009. www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf

Lake County Community Wildfire Protection Plan and Lake County Fire Safe Council website. www.co.lake.ca.us/FireSafeCouncil.htm

CFA Simplified CWPP Template. http://cafirealliance.org/cwpp/

## CHAPTERS

### 1. INTRODUCTION

American Lung Association. *State of the Air Report 2009.* www.lungusa2.org/sota/2009/SOTA-2009-Full-Print.pdf

U.S. Census Bureau. *State & County Quickfacts.* http://quickfacts.census.gov

California Fire Alliance. http://cafirealliance.org

California Fire Alliance. *Communities At Risk History.* http://cafirealliance.org/communities_at_risk/communities_at_risk_history

CAL FIRE. *Fire Safety In the Home.* www.fire.ca.gov/education_homeowner.php

California Fire Safe Council. *General Fire Safety.* www.firesafecouncil.org/homeowner/index.cfm

Firewise. *Homeowners Resources.* www.firewise.org/resources/homeowner.htm

ForEverGreen Forestry. *Conservation Principles for Community Wildfire Protection in California's Sierra Nevada.* www.forevergreenforestry.com/SierraConservationCWPP.html

CAL FIRE. *Learning to Live with Fire.* www.fire.ca.gov/communications/downloads/live_w_fire.pdf

CAL FIRE. *Why 100 ft. Defensible Space is the Law.* www.fire.ca.gov/education_100foot.php

California Fire Safe Council. *General Fire Safety.* www.firesafecouncil.org/homeowner/index.cfm

Audubon. *What's Your Ecological Address?* www.audubon.org/bird/at_home/Explore.html.

Ministry of Forests and Range. Protection Branch. Province of British Columbia. *Fire Behavior.* www.bcwildfire.ca/FightingWildfire/behaviour.htm.

Los Angeles County Cooperative Extension. *Fuel Reduction Planning.* http://celosangeles.ucdavis.edu/Natural_Resources/Wildland_Fire.htm

University of California Center for Fire Research and Outreach. *Fire Information Engine Toolkit.* http://firecenter.berkeley.edu/toolkit/homeowners.html

UC Extension's *Homeowner's Wildfire Mitigation Guide.* http://groups.ucanr.org/HWMG/index.cfm

Firewise. *Is Your Home Protected From Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit.* www.firewise.org/resources/files/wildfr2.pdf

CAL FIRE. *Wildland Urban Burning Codes.* www.fire.ca.gov/fire_prevention/fire_prevention_wildland_codes.php

Living with Fire. Access Zone. *Before the Fire.* www.livingwithfire.info/beforethefire/accesszone/index.php

Michigan Department of Natural Resources (MDNR). Landowner's Guide. Evaluating the Land. www.dnr.state.mi.us/publications/pdfs/huntingwildlifehabitat/Landowners_Guide/Habitat_Mgmt/Planning/Evaluating_Land.htm

Science and Environmental Health Network. *The Precautionary Principle.* www.mindfully.org/Precaution/Precautionary-Principle-Common-Sense.htm

California Native Plant Society. *Native Plants.* www.cnps.org/cnps/nativeplants/

California Invasive Plant Council. www.cal-ipc.org

UC Integrated Pest Management Program. www.ipm.ucdavis.edu/PMG/weeds_common.html

Northern Arizona University. Ecological Restoration Institute. www.eri.nau.edu/joomla/content/view/220/200/lang,en/

California Wildlife and Their Habitats. Western Sierra Nevada. www.fs.fed.us/psw/rsl/projects/wild/verner/psw_37.html

Vera Strader. Master Gardener Column. http://cetuolumne.ucdavis.edu/newsletterfiles/Master_Gardener_Articles_20044858.doc

MDNR. *Landowner's Guide. Introduction to Backyard Management.* www.dnr.state.mi.us/publications/pdfs/huntingwildlifehabitat/Landowners_Guide/Habitat_Mgmt/Backyard/Backyard_Intro.htm

PAWS. Kevin Mack. *Sharing Your Property with Breeding Wildlife.* www.paws.org/about/emailnetwork/archive/wildagain/wild_2004_06_02.html

Audubon. *Keeping Wildlife Safe.* www.audubon.org/bird/at_home/SafeMisc.html

National Wildlife Federation. *A Snagging Issue.* www.nwf.org/backyard/snags.cfm

California Deptartment of Fish and Game (DF&G). Nongame Wildlife Program. *Threatened and Endangered Species.* www.dfg.ca.gov/wildlife/nongame/t_e_spp/

US Forest Service. *Ecological Subregions of California.* www.fs.fed.us/r5/projects/ecoregions/m261b.htm

Managing Wholes. *How to Build New Topsoil.* www.managingwholes.com/new-topsoil.htm

Las Pilitas Nursery. *Leaf Burn Times of California Native Plants.* www.laspilitas.com/classes/fire_burn_times.html

Healthy Landscapes. *Basics for a Healthy Landscape.* www.uri.edu/ce/healthylandscapes/tips/6.html

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