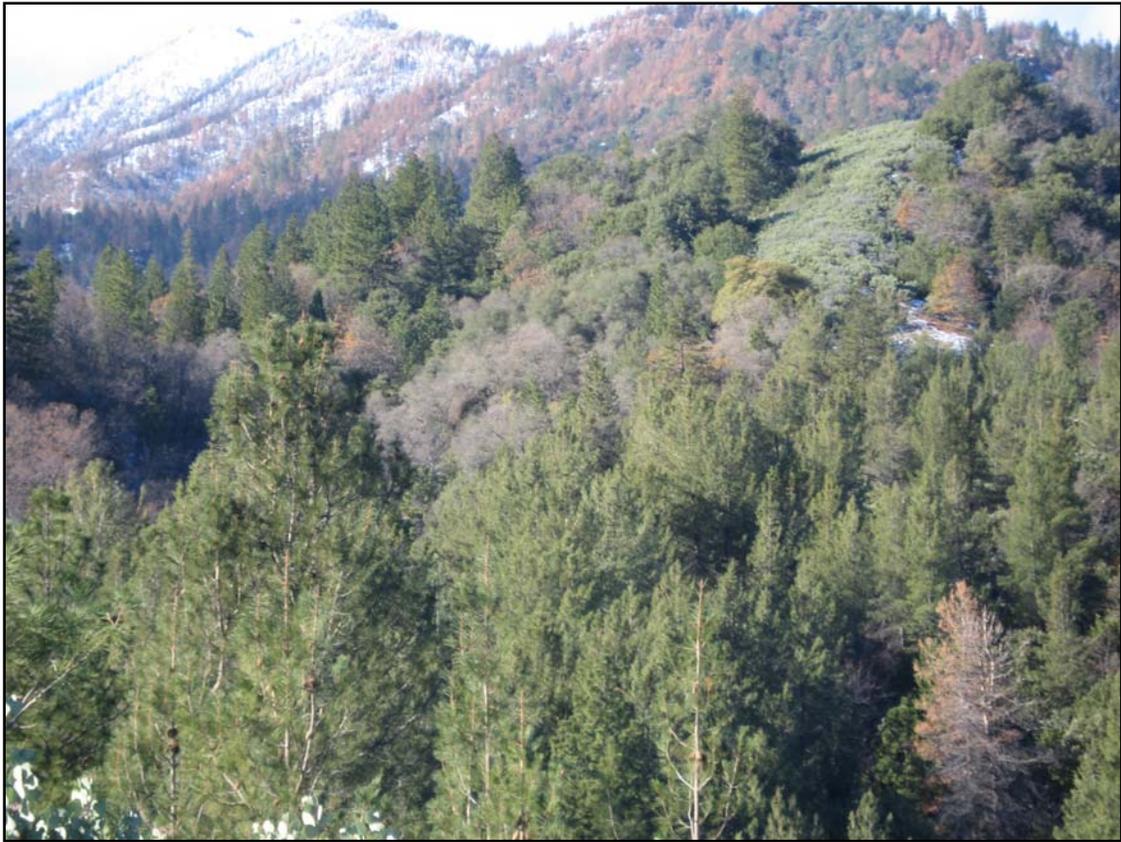


LOWER CLEAR CREEK AREA STRATEGIC FUELS REDUCTION PLAN UPDATE 2010



This project was funded through a grant from the
Shasta County Title III Secure Rural Schools Program



This project was funded through a grant from the Shasta County Title III Secure Rural Schools Program and updated by the Western Shasta Resource Conservation District,
6270 Parallel Road, Anderson CA 96007

Phone: 530 365-7332

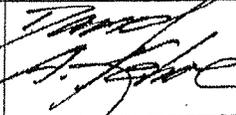
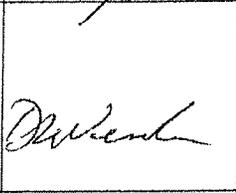
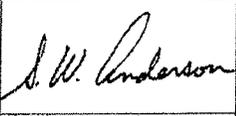
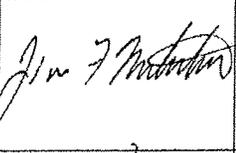
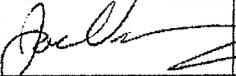
Fax: 530 365-7332

Email: wsrcd@westernshastarc.org

Website: www.westernshastarc.org

**LOWER CLEAR CREEK AREA STRATEGIC
FUELS REDUCTION PLAN UPDATE 2010**

SIGNATURE BLOCK

NAME	SIGNATURE	ORGANIZATION	DATE
David A. Kehoe		Chairman, Shasta County Board of Supervisors	JUN 15 2010
Doug Wenham		Unit Chief , CAL FIRE, Shasta-Trinity Unit and County Fire Warden, Shasta County Fire Department	6/4/10
Steve Anderson		Field Manager, Bureau of Land Management, Redding Field Office	2 June 10
Jim Milestone		Superintendent, National Park Service, Whiskeytown National Recreation Area	June 1, 2010
Joe Vasquez		Chief, Happy Valley Fire Protection District	6-3-10

**LOWER CLEAR CREEK AREA
STRATEGIC FUELS REDUCTION
PLAN UPDATE (2010)**

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LOWER CLEAR CREEK STRATEGIC FUELS REDUCTION PLAN UPDATE (2010)

I. INTRODUCTION

A. THE PLAN

In 2009, Shasta County entered into a consulting services agreement with Western Shasta Resource Conservation District (WSRCD) to update all of the existing strategic fuel management plans in western Shasta County including the *Lower Clear Creek Strategic Fuels Reduction Plan, 2000* (Plan). The purpose of the update was to meet with the local Fire Safe Council, watershed groups, landowners, and agencies to review the existing project list and priorities, move completed projects to a category of maintenance projects, add new projects, identify wildland urban interface areas, conduct risk assessments, and establish a revised list of priority projects.

The Plan update addresses values at risk, landowner objectives, the types of fuel treatments, the road system, potential funding sources, and fuelbreak locations, which together developed the updated fuels reduction plan. The recommendations include locating shaded fuelbreaks along key roadways and ridge lines, increasing publicity for the updated fire and community evacuation plan, and post the Plan on the WSRCD website. Background information from the original Plan was included as well as revisions based on new information.

The 31,256-acre Lower Clear Creek Watershed lies southwest of Redding. The largest concentration of residences is in the southeastern portion of the planning area with scattered residences throughout the rest of the area. With the presence of Whiskeytown National Recreation Area (WNRA), establishment of the Horsetown Clear Creek Preserve, and the development of a trail system and overlook on BLM land, recreational use of the watershed has increased dramatically.

Mining has occurred in the watershed for over 150 years. Gold and gravel were mined throughout the main stem of Clear Creek resulting in extensive damage to the waterway and associated fish habitat. However, over the past decade, Lower Clear Creek Watershed has had extensive work to successfully restore spawning habitat for salmon and steelhead.

Topography of the area varies from relatively flat in the eastern reaches to very steep in the western reaches. Elevations vary from 450 feet in the Sacramento River valley floor to 6,200 feet on Shasta Bally Mountain on the WNRA. Generally, the climate of the watershed is characterized by warm, dry summers and cool, wet winters. Average temperature and precipitation vary greatly within the watershed due largely to changes in elevation. Climatic data from Redding is representative of the lower portion of the watershed. Average annual precipitation for Redding is 38.7 inches ranging from 14.9 inches to 67.8 inches. Average annual temperature is 63.2 degrees F, but often exceeds 100 degrees F in summer. Snow is not uncommon, but rarely persists in lower elevations. Summer winds are generally from the south while north winds are common in late summer and fall.

B. BACKGROUND

Wildfire plays a natural part in the evolution of vegetation in the planning area. Much of the vegetation has evolved and co-existed with fire for many years and is either dependent on fire or has adapted to the fire regime now associated with the area. The forest ecosystems and the chaparral on the canyon slopes within the planning area evolved with frequent, low intensity fire over thousands of years.

Low intensity fires reduced fuel loads, thinned dense pockets of young trees and created small openings in the forest to allow species with less tolerance for shade, such as Douglas-fir, sugar pine and ponderosa pine, to dominate the forested landscape. Native Americans did not simply use the resources of the forest as they found them. There is growing evidence that they actively managed the land using fire to encourage certain plant and animal species and to create and maintain desirable landscapes. The open stands of trees and diversity of ecosystems encountered by the first Europeans were largely the result of human resource management through the use of fire and frequent accidental and lightning fires. The Native Americans were apparently the most important influence on the timing and location of fires, and, therefore, contributed to the maintenance of the fire dependent ecosystem.

Successful fire suppression activities for over eighty years in the western United States and in the planning area in particular, have significantly increased the volume and type of fuels across the landscape. The result is a recommended Very High Fire Hazard Zone Rating throughout the planning area by CAL FIRE (Map 2). The planning area experiences extreme fire weather conditions, especially from May through September, when high temperatures are frequently above 110 degrees F for sustained periods. Frequent strong zonal north winds occur throughout the summer; dry lightning storms occur most years; and dry winds are common in the late summer and throughout the fall.

II. GOALS AND OBJECTIVES

A. ORIGINAL GOALS AND OBJECTIVES (2000)

- Provide for human safety and minimize private property loss.
- Minimize the potential of wildfire burning into or out of the watershed.
- Develop and maintain effective fire safe standards and practices around Structures.
- Develop a priority list of recommendations on fuel reduction or fire safe Projects.
- Identify assets at risk.
- Foster and maintain multi-agency and landowner roles and responsibilities in the implementation and maintenance of the *Lower Clear Creek Watershed Strategic Fuels Reduction Plan*.
- Encourage effective, community-based fire safe practices around structures.

- Identify and map new fuel reduction projects that will provide for human safety, minimize private property loss, minimize the potential of a wildfire burning into the community, and increase fire fighter safety.

B. ADDITIONAL GOALS AND OBJECTIVES (2010)

- Review existing fuel reduction project list to determine what has been completed and if any should be modified or dropped.
- Prioritize and map all fuel reduction projects that will provide for human safety, minimize private property loss, minimize the potential of a wildfire burning into the community, and increase fire fighter safety.

III. METHODOLOGY

The activities necessary for the update of the Plan include:

Activity	Action
Meet with Lower Clear Creek Technical Advisory Committee (TAC), landowners, and representatives from local agencies about the scope of the plan.	Met with the Lower Clear Creek TAC on December 8, 2009, presented an update and received input to prioritization of proposed projects. Met with the Horsetown-Clear Creek Preserve Committee on January 25, 2010. Received community input at a meeting on April 13, 2010. Incorporated TAC and community input.
Present information to CAL FIRE, Shasta County Fire Department, and local landowners for review and assistance in assessment of risk, identification of WUI's, and prioritization of fuel reduction projects.	Met with westside TAC on 12/8/09 and 4/27/10.
Evaluate values at risk, such as structures and natural resources.	Received input for evaluation at the 12/08/09 TAC meeting and 02/10/10 Horsetown-Clear Creek Preserve Committee meeting. .
Coordinate with agencies on their management objectives in the watershed.	Confirmed existing agency management objectives with agency representatives to carry forward in this plan update.
Identify long term maintenance options for fuelbreaks.	Completed projects are included in the Project Maintenance Priority section.
Identify mechanical treatments and possible uses of excess fuels.	Reviewed the mechanical treatment options in the 2004 Plan and carried options forward into the Plan update.
Develop a priority list of recommendations and potential funding sources.	Reviewed the priority list of recommendations with the LCC TAC and Horsetown-Clear Creek Preserve

Activity	Action
	Committee and carried forward the amended potential funding sources into the Plan update.
Complete a draft fuel management plan for review by the TAC.	The draft was posted on line for the TAC and community review on 4/20/10.
Present a draft fire safe plan to the community, incorporating recommendations into the final plan.	Draft posted online 4/17/10 for public comment. Comment incorporated 5/28/10

IV. RECOMMENDED ACTIONS

The following factors were considered in developing this list:

- Public comment/suggestions from community meetings
- Fire history for the area, both lightning caused and human caused fires
- Heavy fuel loading conditions with closed canopies
- Major roads overgrown with vegetation
- Major topographical features important to fire management, especially ridge tops with an east-west orientation
- Fire history and weather patterns for the Lower Clear Creek area show fires in the watershed tend to grow in a north or south direction
- Road access for fire crews
- Willing landowners

A. MANAGEMENT ACTIONS

1. Seek funding to develop a variety of typical neighborhood-scale landscape designs that demonstrate fire safety, increase forest health, and reduce impacts from wind-driven fires while preserving or improving aesthetics and providing for security, privacy, and other values. Link the larger scale projects to individual fuelbreaks. Community members can reduce structural ignitability throughout the planning area by implementing defensible space/Firewise Programs to include the following:
 - a. Assess risk/structure ignitability.
 - b. Upgrade existing structures to fire safe building codes.
 - c. Replace wood roofs with approved fire safe roofing.
 - d. Consider fire resistant exterior siding.
 - e. Maintain a minimum 100-foot defensible space around structures.
 - f. Clean roofs and gutters annually.
 - g. Develop a community phone tree in case of a fire emergency.
 - h. Develop agreements with the county to use the reverse 911 system.
 - i. Remove ladder fuels.
 - j. Clean and screen chimnies.
 - k. Maintain green grass and fire resistant plants within 30 feet of structures.

- l. Move all flammable material at least 30 feet from homes.
 - m. Remove dead, dying, or diseased shrubs, trees, dried grass, fallen branches and dried leaves 100 feet around structures.
 - n. Attach a long hose to a waterline that can reach to all parts of the structures.
2. Identify, prioritize and map new fuel reduction projects.
 3. Enter the completed update on the Western Shasta RCD and SWIM websites.

B. PROPOSED PROJECTS

**Table 1
Lower Clear Creek Fuel Reduction Projects**

PROPOSED PROJECT	MAP NUMBER	CATEGORY	OVERALL PRIORITY
Clear Creek South FB	1	High	1
Water Tank FB	2	High	2
Happy Valley Road FB	3	High	3
Horsetown Clear Creek Preserve FB	4	High	4
Clear Creek North FB	5	High	5
Diggins Way FB	6	High	6

#1 Concern: Dense continuous fuels and northerly winds present wildland fire threat to residences located south of Lower Clear Creek and north of Cloverdale Road and Hawthorne Avenue.

Proposed Solution: Beginning at the existing Friendly Hills fuel break, construct a shaded fuelbreak along the south rim of Lower Clear Creek Canyon to the WAPA powerline easement north of Happy Valley Road. 2.8 miles long x 300 feet wide = 102 acres.

Ownership = 100% private land
 Number of dwellings = 851
 Value of dwellings = \$175,067,720
 Number of people = 2213

Dense fuels along the south rim of Clear Creek Canyon



#2 Concern: Dense fuels along the westside of the development that lies between Clear Creek and Canyon Road and west of Highway 273.

Proposed Solution: Construct a shaded fuel break south from Clear Creek to the City of Redding water tank and then to Canyon Road. This fuelbreak will help prevent a westerly wind driven wildland fire from entering a developed area. 0.74 miles long x 300 feet wide = 27 acres.

Ownership = 100% private land
Number of dwellings = 173
Value of dwellings = \$35,589,560
Number of people = 450

North end of proposed fuelbreak
looking southwest



#3 Concern: Dense fuels along the eastside of Happy Valley Road from the WAPA powerline easement to White Oak Drive.

Proposed Solution: Construct a fuelbreak along the eastside of Happy Valley Road to reduce the possibility of a fire start being blown into the Majestic View Mobile Home Park. 0.48 miles long x 100 feet wide = 6 acres.

Ownership = 100% private land
Number of dwellings = 99
Value of dwellings = \$20,364,498
Number of people = 258

Dense fuels between Happy
Valley Road and mobile
homes



#4 Concern: Continuity of hazardous fuel plus dead fuel buildup in the southeastern corner of Horsetown-Clear Creek Preserve. Several years ago, a heavy snow storm blanketed Shasta County. Thousands of trees were toppled over or limbs were broken off. Numerous trees were affected in the southeastern corner of the Horsetown Clear Creek Preserve. Removal of the dead fuel and construction of a fuelbreak along the property boundary will help to prevent a fire from spreading from the Preserve onto adjoining BLM and private lands.

Proposed Solution: Construct a shaded fuelbreak along the southeastern property boundary and remove the dead fuel within the fuelbreak. 0.52 miles long x 300 feet wide = 19 acres.

Ownership = 100 % private land
Number of dwellings = 130
Value of dwellings = \$26,743,600
Number of people = 338

Dense continuous fuels
along southern boundary
of Horsetown Clear Creek
Preserve property



#5 Concern: Dense fuels and southerly winds present wildland fire threat to residences located north of Lower Clear Creek and south of Placer Road.

Proposed Solution: Beginning at the existing Texas Springs Road fuel break, construct a shaded fuelbreak along the south sides of the developments to the Diggins Way/Placer Road intersection: 3.8 miles long x 300 feet wide = 138 acres.

Ownership = 100% private land
Number of dwellings = 941
Value of dwellings = \$193,582,520
Number of people = 2447

#6 Concern: Poor fire access and escape along Diggins Way.

Proposed Solution: Construct a shaded fuelbreak along Diggins Way approximately .46 miles long and then southwest to the Clear Creek Canyon rim.

This will provide safer fire ingress and egress. 0.87 miles long x 200 feet wide = 22 acres.

Ownership = 100% private land
 Number of dwellings = 51
 Value of dwellings = \$10,491,720
 Number of people = 133

C. OVERALL COMMUNITY WILDFIRE RISK ASSESSMENT (High, Medium, Low and Prioritization 1,2,3, etc)

BASIC ASSUMPTIONS	
People	2.6 per dwelling
Dwellings	2257
Property Value (\$205,720 per dwelling)	\$464,310,040
Power line – 10.26 miles @ \$250,000/mile	\$25,650,000

COMMUNITY, STRUCTURE OR AREA AT RISK	FUEL HAZARD	RISK OF WILDFIRE OCCURRENCE	STRUCTURAL IGNITABILITY	PREPAREDNESS AND FIRE FIGHTING CAPABILITY	OVERALL RISK	FIRE HAZARD SEVERITY ZONE RATING
Clear Creek South FB	High	High	High	Low/high	High	Very High
Water Tank	High	High	High	Low/high	High	Very High
Happy Valley Road	High	High	High	Low/high	High	Very High
Horsetown Clear Creek Preserve FB	High	High	High	Low/high	High	Very High
Clear Creek North FB	High	High	High	Low/high	High	Very High
Diggins Way FB	High	High	High	Low/high	High	Very High

D. OVERALL COMMUNITY HAZARD REDUCTION PRIORITIES

COMMUNITY, STRUCTURE OR AREA AT RISK	MAP NUMBER	OVERALL RISK	STRUCTURES AT RISK	CULTURAL VALUE	TYPE OF TREATMENT	METHOD OF TREATMENT	OVERALL PRIORITY
Clear Creek South FB	1	High	283	Low	Hand Labor	Brush and tree removal, pruning	1
Water Tank	2	High	173	Low	Hand Labor	Brush and tree removal, pruning	2

COMMUNITY, STRUCTURE OR AREA AT RISK	MAP NUMBER	OVER ALL RISK	STRUCTURES AT RISK	CULTURAL VALUE	TYPE OF TREATMENT	METHOD OF TREATMENT	OVER ALL PRIORITY
Happy Valley Road	3	High	128	Low	Hand Labor	Brush and tree removal, pruning	3
Horsetown Clear Creek Preserve FB	4	High	130	Low	Hand Labor	Brush and tree removal, pruning	4
Clear Creek North FB	5	High	941	Low	Hand Labor	Brush and tree removal, pruning	5
Diggins Way FB	6	High	51	Low	Hand Labor	Brush and tree removal, pruning	6

E. ESTIMATED COSTS

PROJECT NAME	MAP NUMBER	FUNDING NEEDS (\$)	COMMUNITY PRIORITY RECOMMENDATION
Clear Creek South FB	1	\$241,300	1
Water Tank FB	2	\$88,500	2
Happy Valley Road	3	\$38,718	3
Horsetown Clear Creek Preserve FB	4	\$67,500	4
Clear Creek North FB	5	\$318,300	5
Diggins Way FB	6	\$101,600	6

* Projected costs for planning only. More precise costs will be determined when grant applications are prepared.

F. PROJECT MAINTENANCE PRIORITY

PROJECT	MAP NUMBER	COMPLETED	MAINTENANCE PRIORITY
Bridge-to-Bridge Fuelbreak*	7	1999	6
Mule Mountain Fuelbreak	8	1999	3
Bridge-to-Centerville Fuelbreak	9	2000	4
Friendly Hills to Placer Bridge Fuelbreak	10	2001/2004	2
Texas Springs Road Fuelbreak	11	2002/2003	1
Zogg Mine Road Fuelbreak	12	2008	5
Muletown Road Fuelbreak	13	?	7
Archer Road Fuelbreak	14	2010	8

*Also known as Igo Fuels Project

#1 Maintenance concern: Regrowth of flammable vegetation in the Bridge-to-Bridge Shaded Fuelbreak.

Ownership = 26% private land, 40% BLM, %, 34% Shasta County
Number of dwellings = 335
Value of dwellings = \$68,916,200
Number of people = 871

#2 Maintenance concern: Regrowth of flammable vegetation in the Mule Mountain Shaded Fuelbreak.

Ownership = 45% private land, 55% BLM
Number of dwellings = 385
Value of dwellings = \$79,202,200
Number of people = 1001

#3 Maintenance concern: Regrowth of flammable vegetation in the Bridge to Centerville Shaded Fuelbreak.

Ownership = 100 % private land
Number of dwellings = 943
Value of dwellings = \$193,993,960
Number of people = 2452

#4 Maintenance concern: Regrowth of flammable vegetation in the Friendly Hills Shaded Fuelbreak.

Ownership = 100% private land
Number of dwellings = 162
Value of dwellings = \$33,326,640
Number of people = 422

#5 Maintenance concern: Regrowth of flammable vegetation in the Texas Springs Shaded Fuelbreak.

Ownership = 100 private land
Number of dwellings = 40
Value of dwellings = \$82,288,000
Number of people = 2.6

#6 Maintenance concern: Regrowth of flammable vegetation in the Zogg Mine Shaded Fuelbreak.

Ownership = 100 % private land
Number of dwellings = 53

Value of dwellings = \$10,903,160
 Number of people = 138

#7 Maintenance concern: Regrowth of flammable vegetation in the Archer Road Section 1 Shaded Fuelbreak.

Ownership = 100% private land
 Number of dwellings = 12
 Value of dwellings = \$2,468,640
 Number of people = 32

V. PLAN UPDATES

The Fire Agencies of the Lower Clear Creek planning area intend to assess progress annually and invite agencies and landowners to submit additional projects that provide community protection. Additional (new) projects will be displayed in an update appendix to this plan.

VI. VALUES AT RISK

A. RESIDENCES AND MAJOR STRUCTURES

Industry is concentrated in the lower reaches of the LCC watershed and is primarily associated with gravel mining. The majority of the residences are located in the southern portion of the watershed along Canyon Road and China Gulch Drive in the Friendly Hills area.

B. WILDLIFE AND VEGETATION (MAPS 3 & 4)

The Lower Clear Creek Watershed is composed of California mixed chaparral in the lower portions, with conifers increasing in presence at the higher elevations. The following table depicts the vegetative species found in the planning area:

LOWER CLEAR CREEK WATERSHED VEGETATIVE SPECIES

COMMON NAME	SCIENTIFIC NAME
annual ryegrass	<i>Lolium multiflorum</i>
bigleaf maple	<i>Acer macrophyllum</i>
black locust	<i>Robinia pseudoacacia</i>
blue oak	<i>Quercus douglasii</i>
brome grasses	<i>Bromus spp</i>
California black oak	<i>Quercus kelloggii</i>
California buckthorn, coffeeberry	<i>Rhamnus californica</i>
canyon live oak	<i>Quercus chrysoepris</i>
Ceanothus	<i>Ceanothus spp</i>
chinquapin	<i>Castanopsis sempervirens</i>
Douglas-fir	<i>Pseudotsuga menziesii</i>

fescue grasses	<i>Festuca spp.</i>
green-leaf manzanita	<i>Arctostaphylos patula</i>
gray (Digger) pine	<i>Pinus sabiniana</i>
himalayaberry	<i>Rubus procerus</i>
incense-cedar	<i>Calocedrus decurrens</i>
interior live oak	<i>Quercus wislizenii</i>
knobcone pine	<i>Pinus attenuata</i>
leather oak	<i>Quercus durata</i>
manzanita	<i>Arctostaphylos spp.</i>
medusahead	<i>Taeniatherum asperum</i>
mountain mahogany	<i>Cercocarpus betuloides</i>
native black berries	<i>Rubus spp</i>
needle grasses	<i>Stipa (Nassella) spp</i>
Oregon white oak	<i>Quercus garryana</i>
pacific madrone	<i>Arbutus menziesii</i>
pine mat manzanita	<i>Arctostaphylos nevadensis</i>
poison oak	<i>Toxicodendron diversilobum</i>
ponderosa pine	<i>Pinus ponderosa</i>
scrub oak	<i>Quercus dumosa</i>
soft chess	<i>Bromus mollis</i>
squaw carpet	<i>Ceanothus prostratus</i>
sugar pine	<i>Pinus lambertiana</i>
tan oak	<i>Lithocarpus densiflora</i>
tree of heaven	<i>Ailanthus altissima</i>
wedge-leaf ceanothus	<i>Ceanothus cuneatus</i>
white fir	<i>Abies concolor</i>
white-leaf manzanita	<i>Arctostaphylos viscida</i>
wild ryes	<i>Elymus (leymus) spp</i>
wild oats	<i>Avenafatua</i>
yellow star thistle	<i>Centaurea solstitialis</i>

Fish and wildlife habitat in the Lower Clear Creek Watershed has undergone dramatic changes since the beginning of non-native settlement. Gold mining, logging, gravel mining, development, and fire suppression have had major impacts since the mid-1800's. However, as can be seen, the Lower Clear Creek planning area still contains a large diversity of habitats, ranging from coniferous forests, to chaparral, to farmland and urban communities. Consequently, there is a wide range of wildlife and plant species present. Lower Clear Creek has also undergone extensive in-stream rehabilitation since the early 1990's to restore threatened and endangered Chinook salmon and steelhead spawning habitat. As a result, the Lower Clear Creek drainage has sustained some of the higher spawning numbers in spite of the declining Chinook salmon fall run throughout the Sacramento River watershed since 2007.

Some species present in the area are rare and have some form of either State of California or Federal protection (Special Status Species). The following table shows the Special Status Species known to occur within the area. These species sighting locations are also shown on MAP 4.

The information shown on Table 2 and MAP 4 was acquired from the California Natural Diversity Database (CNDDDB). This database manages sightings of uncommon species that biologists make throughout the state. There are undoubtedly other special status species present in the project area, other than those shown on MAP 4 and Table 2, however, they have not been reported to the CNDDDB. Likewise, there are certainly other locations within the project area that have the species shown on Table 2. Regardless of these potential errors, the CNDDDB gives a relatively good sense of what special status species may exist within the study area.

Table 2
Special Status Species Known to be Present Within the Lower Clear Creek Study Area

Scientific Name	Common Name	Legal Status ¹
<i>Actinemys marmorata</i>	western pond turtle	CSC
<i>Antrozous pallidus</i>	Pallid bat	CSC
<i>Haliaeetus leucocephalus</i>	bald eagle	Fed. Delisted.
<i>Lasiurus blossevillii</i>	Western red bat	CSC
<i>Martes pennanti (pacifica) DPS</i>	Pacific fisher	Fed. Cand.; CA Cand.; CSC
<i>Oncorhynchus tshawytscha</i> <i>spring-run</i>	Chinook spring-run	CSC
<i>Rana boylei</i>	foothill yellow-legged frog	CSC

¹Note: CSC=California Species of Concern; Fed. Endang. = Federally Endangered; Fed. Threat. = Federally Threatened; Fed. Delist. = Delisted from Federal protection; CA Endang. = California Endangered; CA Threat. = California Threatened; CNPS-1B= Rare in CA and elsewhere; CNPS-2= Rare in CA but more common elsewhere.

C. SOILS (MAP 5)

The soils in the Lower Clear Creek Watershed are grouped into five associations. These associations are based primarily on physiography and differences in parent material. The associations are Mountain Soils, Foothill Soils, High Terrace Soils, Lower Terrace Soils, and Bottomland Alluvium. In addition to the five soil associations, there are six miscellaneous land types that occur in the watershed. These include: tailings, gravel pits, rock lands, colluvial land, riverwash, and cobble land (WSRCD, 1996)

Fuels management activities located on unstable soils or on slopes greater than 40 percent can stimulate erosion processes or exacerbate existing erosion problems; therefore, prior to any fuels management activities, all soil types within any future project area should be identified and evaluated to determine the erosion hazard. Projects should be designed to prevent or minimize erosion by reducing soil disturbance, maintaining vegetation where appropriate, avoiding steep and unstable slopes if possible, and incorporating the use of grass seed or fire resistant vegetation as a means to provide soil stabilization. Detailed soil mapping information should be examined once project boundaries have been established.

High intensity wildfires can also damage soil by incinerating roots and the humus layer (organic portion of soils) that holds soils together and provides energy dissipation. In addition, the loss of large areas of vegetation can reduce evapotranspiration and increase peak flow, which can result in augmented erosion potential, adversely affecting watershed resources. Many life forms, including invertebrates of phylum Arthropoda that are essential for cycling plant material and fixing atmospheric gases, are unknowingly destroyed. These invertebrates eventually re-establish their populations, but time is lost in maintaining and building up the soils. Over time, continual burning will result in soil depletion, much the same as continual plowing and crop harvesting will deplete the soil of mineral nutrients and negatively affect the soil structure. Fortunately in this area of California, there exist relatively young volcanic soils in the mountains and recent alluvial soils in the valleys that can tolerate fire without immediately showing negative effects. Continued burning though can have long-term negative effects (National Park Service, 2002).

Low intensity prescribed fires in light-to-medium fuels seldom produce enough heat to significantly damage soil or increase the erosion potential within a given watershed. The chemical and physical properties of soil change dramatically after a high intensity fire. Loss of organic matter causes the soil structure to deteriorate, and both the water-storing and transmitting properties of soils are reduced. The living tissues of microorganisms and plants can be damaged by fire if the temperatures are above 1200 degrees F (DeBano 1970).

VII. SUPPORTING PLANS, ORGANIZATIONS AND AGENCIES

A. NATIONAL FIRE PLAN

In 2001, the Chief of the USDA Forest Service published a *National Fire Plan* (U.S. Department of Interior and U.S. Department of Agriculture, 2001), which is a cohesive strategy for improving the resilience and sustainability of forests and grasslands at risk, for conserving priority watersheds, species and biodiversity, reducing wildland fire costs, losses and damages, and to better ensure public and firefighter safety. To achieve these goals, work began to improve firefighting readiness, prevention through education, rehabilitation of watershed functions, hazardous fuel reduction, restoration, collaborative stewardship, monitoring jobs, and applied research and technology transfer.

The objective of the *National Fire Plan* is to describe actions that could restore healthy, diverse, and resilient ecological systems to minimize the potential for uncharacteristically intense fires on a priority basis. Methods include removal of excessive vegetation and dead fuels through thinning, prescribed fire and other treatment methods. The focus of the strategy is on restoring ecosystems that evolved with frequently occurring, low intensity fires. These fires typically occurred at intervals of between 1-35 years and served to reduce the growth of brush and other understory vegetation while generally leaving larger, older trees intact. The report is based on the premise that sustainable resources depend on healthy, properly functioning, resilient ecosystems. The first priority for restoration is the millions of acres of already roaded and managed landscapes that are in close proximity to communities. More information about the *National Fire Plan* is available on the Internet at www.fireplan.gov.

B. THE CALIFORNIA FIRE PLAN

The *California Fire Plan* has five strategic objectives:

- Create wildfire protection zones that reduce risks to citizens and firefighters.
- Assess all wildlands (not just the state responsibility areas) to identify high risk, high-value areas and develop information and determine who is responsible, who is responding, and who is paying for wildland fire emergencies.
- Identify and analyze key policy issues and develop recommendations for changes in public policy.
- Develop a strong fiscal policy focus and monitor wildland fire protection in fiscal terms.
- Translate the analyses into public policies.

A key product of the *California Fire Plan* is the identification and development of wildfire safety zones to reduce citizen and firefighter risks from future large wildfires. Initial attack success is measured by the percentage of fires that are successfully controlled before unacceptable costs are incurred. Assets at risk are identified and include citizen and firefighter safety, watersheds, water, timber, wildlife, habitat, unique areas, recreation, range structures, and air quality. Air quality is a factor because based on the annual average acres burned by wildfires from 1985-1994; CAL FIRE calculates wildfires emit almost 600,000 tons of air pollutants each year.

The safety and asset assessments in the plan enable fire service managers and stakeholders to set priorities for prefire management project work. Prefire management includes a combination of fuels reduction, ignition management, fire-safe engineering activities, and improvements to forest health to protect public and private assets. CAL FIRE finds there is a direct relationship between reduced expenditures for prefire management and suppression and increased emergency fund expenditures, disaster funding, and private taxpayers' expenditures and losses.

CAL FIRE is responsible for wildland fire protection on all lands within the Lower Clear Creek Watershed except for the Whiskeytown National Recreation area (WNRA). CAL FIRE and the National Park Service have entered into a local agreement for dispatching and resource sharing on all wildland fires occurring in the mutual threat zone near the WNRA. The agreement is in conjunction with the four-party agreement on wildland fire suppression between CAL FIRE, USDA Forest Service, National Park Service, and BLM. The four-party agreement outlines the cooperative sharing of resources for wildland fire suppression because wildfires do not recognize political or ownership boundaries.

In 2000, the State Board of Forestry and CAL FIRE completed a comprehensive update of the *State Fire Plan for Wildland Fire Protection in California*. The overall goal of the plan was to reduce total costs and losses from wildland fire by protecting assets at risk through focused prefire management prescriptions and increasing initial attack success. CAL FIRE's statewide Initial Attack Fire Policy is to aggressively attack all wildfires, with the goal of containing 95% of all fire starts to 10 acres or less.

C. BUREAU OF LAND MANAGEMENT

A large portion of the planning area is composed of public lands managed by the BLM. Fuels management on these lands is guided by the Bureau of Land Management, Redding Field Office, *Fire Management Plan (FMP)* (12/2004). This plan is a general guide that covers all facets of fire management. Specific to fuels management, it sets objectives for focusing work on the Wildland Urban Interface (WUI) and recognized Communities at Risk, and identifies a range of treatment options that could be utilized, consisting of prescribed fire along with non-fire fuels treatments (mechanical, chemical and biological). The FMP identifies six distinct Fire Management Units (FMU), with the Keswick Basin a subsection of the Shasta FMU. BLM lands in the Shasta FMU are about 56,000 acres. Targets are to treat 1/100 to 1/50 of the land base every ten years with prescribed fire and to treat 3/100 to 3/50 of the land base every ten years with a non fire fuels treatment.

D. NATIONAL PARK SERVICE

The upper reaches of the Lower Clear Creek Watershed lie within the Whiskeytown National Recreation Area. The Whiskeytown Fire Management Plan has a specific goal relating to fuels management. The goal is:

- Reduce hazard fuels adjacent to developed areas, urban interface boundaries, and cultural/historical sites.

The Whiskeytown Resource Management Plan provides three management objectives which relate to fire management:

- Protect the diversity of natural ecosystems, which are found within the Whiskeytown Unit;
- Restore and maintain natural processes in areas of Whiskeytown affected by past and present human-caused impacts; and
- Reduce hazardous fuel accumulations throughout Whiskeytown through the use of ecologically sound techniques, and restore fire to the ecosystem through prescribed fire.

The five-year objective is to reduce hazard fuels in developed areas, urban interface boundaries, and cultural/historic zones to a level where at 90th percentile weather conditions, average flame lengths would be four feet or less. The desired outcome is that the fuel conditions in strategic areas adjacent to urban interface boundaries, developed areas, and cultural/historic sites are maintained at a level such that the values-at-risk are adequately protected from wildland fire.

Strategies to attain this are:

- Establish shaded fuelbreaks based on fire risk and maintain existing fuelbreaks as needed.
- Use mechanical treatments to reduce hazard fuels in areas directly adjacent to Whiskeytown facilities and inholdings.

- Use prescribed fire and mechanized hazard fuel reduction in strategic urban interface boundary areas to reduce the threat of wildland fire spreading outside the boundaries of Whiskeytown.
- Apply mechanical hazard fuel reduction adjacent to targeted significant cultural and historic sites to protect from fire damage.
- Monitor the effects of prescribed fire and mechanical fuel reduction treatments so that their effectiveness and resource impacts are identified and incorporated into future planning.

E. SHASTA COUNTY FIRE SAFE COUNCIL

The Shasta County Fire Safe Council (SCFSC) was formed in May 2002 as part of a statewide effort that began in 1993 to form area Fire Safe Councils across the state to educate and encourage Californians to prepare for wildfires before they occur. (See 5 for more information.) The mission of the SCFSC is to be a framework for coordination, communication and support to decrease catastrophic wildfire throughout Shasta County. The group meets quarterly to discuss projects, share information, schedule speaking engagements, develop educational opportunities, and update maps showing fuels reduction projects and maintenance throughout the county. SCFSC has a mobile education trailer used for public outreach. The trailer is available to fire safe councils throughout the county for use at schools, fairs, and other civic gatherings. For more information, check out SCFSC on the web at www.shastacountyfiresafecouncil.org.

F. TIMBER PRODUCTION ZONES

About 2,407 acres of the planning area are owned by private forest landowners who manage the lands as Timber Production Zones (TPZs), which are restricted to timber production and certain compatible uses. Sierra Pacific Industries is the primary commercial forest landowner in the watershed.

Typically, all contractors and employees permitted on private forestland are required to make every effort and take all precautions necessary to prevent fires. A sufficient supply of hand tools is maintained on a job site at all times for fire fighting purposes only. Tools include shovels, axes, saws, backpack pumps, and scraping tools. Each forest worker, employee, or person permitted on private forestland is required to take immediate action to suppress and report any fire on or near the property.

On all fires, a sufficient number of people stay on a fire until it is known that adequate action has been taken by the agency with primary responsibility for putting out the fire. All people and equipment remain until released by the agency in charge, or for a longer period, if considered necessary by the land manager.

During fire season, most companies conduct daily aerial patrols covering their forest operations and pay special attention to those areas where work is underway, even hours after workers have left the area.

Specific treatments are required for limbs and other woody debris (often called slash) created by harvest operations in order to minimize fire hazards in areas of public access. This includes piling and burning slash no later than April 1 of the year following its creation, or within a specified period of time after fire season, or as written in the associated Timber Harvest Plan. Within 100 feet of the edge of the traveled surface of public roads, and within 50 feet of the edge of the traveled surface of permanent private roads open for public use where permission to pass is not required, slash and any trees knocked down by road construction or timber operations are typically lopped for fire hazard reduction, then piled and burned, chipped, buried or removed from the area. Lopping is defined as severing and spreading slash so that no part of it remains more than 30” above the ground. All woody debris created by harvest operations greater than one inch (1”) and less than eight inches (8”) in diameter within 100 feet of permanently located structures maintained for human habitation are removed or piled and burned. All slash created between 100-200 feet of permanently located structures maintained for human habitation are usually lopped (cut) for fire hazard reduction, removed, chipped or piled and burned. Lopping may be required between 200-500 feet from a structure if an unusual fire risk or hazard has been determined.

G. PRIVATE LAND – OTHER

Other private land use includes residences and businesses. In the eastern portion of the watershed, the structures are concentrated along Highway 273, Clear Creek Road, Canyon Road, China Gulch Drive, Texas Springs Road, and Honey Bee Road. In the western section, the residences are primarily located along Placer Road and Mule Town Road. The small town of Igo is located just outside of the watershed on Placer Road.

VIII. ANALYSIS OF FUEL INVENTORY AND CONDITIONS

A. WILDLAND FIRE ENVIRONMENT

The three major components of the wildland fire environment are fuels, weather, and topography (National Wildland Coordination Group, 1994). Weather is a major factor and local weather conditions are important in predicting how a fire will behave. Fuels are made up of the various components of vegetation, living and dead that occur on a given site. Fuels have been classified into four groups – grasses, brush, timber, and slash. The differences in fire behavior among these groups are related to the fuel load and its distribution among the fuel diameter-size classes. In summary, with heavy fuel loading, hot temperatures, critically low humidity, and strong north winds, a major wildfire potential exists in the planning area.

Within the lower elevations of the Sacramento River Canyon the wind blows from the north during the early part of the summer and from the south during the latter part of the summer; and in the western foothills, the wind trends up the canyons on the hillsides east to west. In the valley the wind patterns push wildfire in a northerly or southerly direction and westerly direction in the foothills. From a strategic standpoint, fire spread in lower elevations can most likely be decreased by an east-west oriented fuelbreak or area to set up control lines. To hold valley fires from being pulled up through ‘chimneys’ in the canyons of the foothills, strategically placed fuelbreaks near the foothills oriented in a north-south direction can help.

Topography can affect the direction and the rate of fire spread. Topographic factors important to fire behavior are elevation, aspect, steepness and shape of the slope. When fire crews are considering fire suppression methods, the topography is always critical in determining the safest and most effective plan of attack. When accessible, ridge lines are very important features from which to conduct fire suppression activities and can be a strategic area from which to conduct fuels management activities.

Fuel factors that influence fire behavior are: fuel moisture, fuel loading, size, compactness, horizontal continuity, vertical continuity, and chemical content. (National Wildfire Coordinating Group 1994). Factors include:

- Fuel moisture - the amount of water in a fuel, expressed as a percentage of the oven-dry weight of that fuel. For example, a fuel sample can be found to have 20- 60% moisture content. Moisture content can range from as low as 5 % to a high of 260+%.
- Fuel loading - defined as the oven-dry weight of fuels in a given area, usually expressed as bone dry tons. For example, an area can be calculated to have 20 bone dry tons per acre of fuel. A bone dry ton is 2,000 pounds of vegetation when rated at 0% moisture content.
- Size - the dimension of fuels, and compactness refers to the spacing between fuel particles.
- Continuity - the proximity of fuels to each other, vertically or horizontally, that governs the fire's capability to spread and sustain itself.
- Chemical content - this either retards or increases the rate of combustion.

All of these factors will influence the quantity of heat delivered, the duration, flame length and rate of spread of any given fire, and should be considered prior to considering pre-fire projects or initiating fire suppression activities.

B. AGENCY LARGE FIRE DATABASES

CAL FIRE and USDA Forest Service maintain databases with GIS layers on large fires and fire starts within and around their Forest Protection Zones (FPZ). The CAL FIRE database also includes fires recorded within the National Park Service Fire Protection Zone. Both databases include the year of fire start, large fires, and total fire acreage.

**TABLE 3
Incidence of Fires in the Lower Clear Creek Watershed
(CAL FIRE 2009)**

Year	Acres
1945	411
1946	25993
1950 (2)	7488
1954	2069
1960	512
1984	20

Year	Acres
1985	15
1990	2901
1999	2580
2007	177
Total	42,166

C. FUEL INVENTORY

In the summer of 1997, the Western Shasta Resource Conservation District, Bureau of Reclamation, Bureau of Land Management, and CAL FIRE conducted a fuel inventory of the planning area. The goal of the inventory was to identify high fuel loading areas and collect data that could be used as a tool to develop the original fuels reduction plan. The Lower Clear Creek fuel inventory used the 13 Fuel Models described by Anderson, 1982. An additional fuel model, fuel model 14, was derived from CAL FIRE *Fire Plan Hazard Assessment Methods* (Sapsis, 1987). Fuel model 14 was used for residential neighborhoods and industrial areas. Fuel models are simply tools to help the user realistically estimate fire behavior. The criteria for choosing a fuel model includes the assumption that fire burns in the fuel stratum best conditioned to support the fire. This means that situations will occur where one fuel model will represent the rate of spread most accurately, while another best depicts fire intensity. In other situations, two different fuel conditions may exist, so the spread of fire across the area must be weighed by the fraction of the area occupied by each fuel type. In addition, the inventory ascribes additional ladder and crown fuel rankings to the 13 fuel models. These rankings contribute to understanding the probability that torching and crown fire would occur if the stand were subjected to a wildfire under adverse environmental conditions.

D. RESULTS OF THE FUEL INVENTORY

Eight different fuel-model types are identified in the watershed. Fuel model 2 is the most common and is predominately found in the lower part of the watershed, from the Sacramento River up to the Placer Road Bridge area. Fuel model 9 is located in the upper portion of the watershed from the Placer Road Bridge area and up. Fuel model 6 is located in the lower and middle portions of the watershed. Table 4 shows the 8 different fuel models in the watershed and their acreage:

**TABLE 4
FUEL MODELS**

FUEL MODEL	TOTAL ACRES
2	10,063
5	873
6	5,747
8	2,840
9	8,419

FUEL MODEL	TOTAL ACRES
10	1,359
11	124
14	482
Bare Ground	1,308

IX. FUEL TREATMENTS

A. INTRODUCTION

Reducing fuel loads is one of the most effective elements of any fire prevention and protection program. Although fire is an integral component of the planning area ecosystem, managing fire by managing fuel loading is critical to maintaining communities, ranches, forest land, grazing lands, riparian areas, and the overall health and function of the watershed. The ability to implement fuel reduction projects typically comes down to the source of funds available, the cost of labor, the permitting process to implement the project, and landowner cooperation.

B. SHADED FUELBREAKS

Shaded fuelbreaks are constructed to create defensible space where firefighters can conduct relatively safe fire suppression activities. Shaded fuelbreaks may also slow a wildfire's progress enough to allow supplemental attack by firefighters. The main idea behind shaded fuelbreak construction is to break up fuel continuity to prevent a fire from reaching the treetops, thus forcing the fire to stay on the ground where it can be more easily and safely extinguished. Shaded fuelbreaks may also be utilized to replace flammable vegetation with less flammable vegetation that burns less intensely. A well-designed shaded fuelbreak also provides an aesthetic setting for people and a desirable habitat for wildlife, in addition to fuels reduction. The California Board of Forestry has addressed the needs to strengthen community fire defense systems, improve forest health and provide environmental protection. The Board rules allow a Registered Professional Forester (RPF) to use a special silviculture prescription when constructing or maintaining a community fuelbreak, exempts community fuelbreaks from an assessment of maximum sustained production requirements and allows defensible space prescriptions to be used around structures.

The WSRCD, through consultation with its agency partners, has developed the following Shaded Fuelbreak Standards:

- The typical minimum width of a shaded fuelbreak is 100 feet, but can be up to 300 feet wide. The appropriate width is highly dependent on the slope, fuel density, fuel type, fuel arrangement, and landowner cooperation.
- Fuelbreaks should be easily accessible by fire crews and equipment at several points. Rapid response and the ability to staff a fire line is very important for quick containment of a wildfire.

- The edges of a fuelbreak are varied to create a mosaic or natural look. Where possible, fuelbreaks should compliment natural or man-made barriers such as meadows, rock outcroppings, and roadways.
- A maintenance plan should be developed before construction of a fuelbreak. Although a fuelbreak can be constructed in a matter of a few weeks, maintenance must be conducted periodically to keep the fuelbreak functioning properly.
- The establishment of a shaded fuelbreak can lead to erosion if not properly constructed. Short ground cover, such as grass, should be maintained throughout the fuelbreak to protect the soil from erosion.

Demonstration Fuelbreak



A properly treated area should consist of well-spaced vegetation with little or no ground fuels and no understory brush. Tree crowns should be approximately 10-15 feet apart. The area should be characterized by an abundance of open space and have a ‘park like look’ after treatment.

In areas where privacy is a concern, islands of brush may be left in strategic positions. CAL FIRE recommends that brush left in place be limited to islands having a diameter two times the height of the brush, and a distance three times the height of the brush between the islands. If the islands of brush are strategically placed, a homeowner can achieve a reasonable amount of defensible space, and retain the privacy most people are seeking when they move to the wildland urban interface (WUI).

The Pile and Burn method is most commonly utilized when constructing fuelbreaks. Material is cut and piled in open areas to be burned. Burning takes place under permit on appropriate burn days. Burn rings can be raked out after cooling as a means to decrease their visual effect. In dealing with chaparral, a relatively new technique called “crush and burn” combines mechanical fuels treatment with burning. It is more effective in eliminating chaparral than a low-intensity prescribed burn, which has difficulty competing with the high moisture content of live chaparral. In this method, the chaparral is mechanically crushed, then piled and burned. It is a good technique for areas adjacent to communities and to encourage chaparral regeneration in riparian zones.

C. MECHANICAL TREATMENT

Using mechanized equipment for reducing fuels loads on suitable topography and in certain fuel types can be very effective. Depending on the use of the equipment, it may require

environmental review and documentation. Using equipment to remove excess vegetation may enable the landowner to process the debris to a level where it can be marketed as a product for use in power generation. The debris then becomes labeled as “biomass” or “biofuels” and is further explained in Section IX of this report.

Mechanical methods to remove fuels include, but are not limited to, the utilization of bulldozers with or without brush rakes, excavators, chainsaws or mechanized falling machines, masticators, chippers, and grinders. Mechanical treatments are typically conducted on chaparral landscapes with some type of masticator, which grinds standing brush and reduces it to chips, which are typically left on the ground. Brush may also be mechanically removed and fed into a grinder for biomass production. Mechanical treatments are also utilized on industrial and non-industrial timberlands in which trees are thinned by mechanized tree cutting or falling machines. In most cases, stands of trees are thinned from below as a means to eliminate the fuels that can take a fire higher in the forest into the tree canopy (ladder fuels). However, stands of trees may also be thinned from above to eliminate crown continuity.

Mechanical treatments can be used successfully on stable ground up to 50% slope, but should only be conducted during dry periods when soils are not saturated to minimize erosion and compaction. However, mechanical treatments should not be conducted on hot, dry, wind, low relative humidity days. The drastic visual impacts should be considered when planning projects so that all parties are aware of how the area will look when the project is completed. Initial planning should address mitigation for erosion potential, using measures such as waterbars, ditching, and mulching in critical areas. Furthermore, the impacts on wildlife and archaeological resources must be addressed.

Due to air quality concerns, the mechanical treatment method is becoming a more acceptable method of fuel reduction in WUI areas despite its greater cost. Compared to prescribed fire, mechanical treatment involves less risk, produces less air pollutants, is more aesthetically pleasing, and allows landowners to leave desirable vegetation.

Mechanical treatment will usually necessitate a cultural resource survey, CEQA/NEPA documentation, a Natural Diversity Database search, and the preparation of Water Quality documents. The cost of these safeguards must be figured into the budget for any projects using mechanical methods.

D. BIOMASS ANALYSIS

For thousands of years, people have been taking advantage of the earth’s vegetation, also called biomass, to meet their energy needs (www.epa.gov, 2002). Technologies for using biomass continue to improve and today biomass fuels can be converted into alternative fuels (biofuels), such as ethanol, methanol, biodiesel, and as boiler fuel for use in industrial heating and power generation.

When used for generating electricity, biomass is typically burned to transform water into steam, which is used to drive a turbine and attached generator (www.epa.gov, 2002). Although most of the biomass market is associated with energy production, biomass offers a wide variety of uses

such as fiber-reinforced composites, fiber-filled thermoplastics, high performance fiberboard, cement board, mulch for landscaping and soil amenities, smoke chips for curing and flavoring meat and bio-oils which are used as asphalt additives or adhesives. Potential markets continue to be explored and developed by the private sector, and the federal government has also demonstrated interest in the biomass industry by the release of Executive Order 13134. On August 12, 1999, President Clinton released Executive Order 13134, designed to stimulate the creation and early adoption of technologies needed to make biobased products and bioenergy cost-competitive in the large national and international markets (www.bioproducts-bioenergy.gov, 1999).

The utilization and development of biomass technology offers many economic and socioeconomic benefits. However, one of the most widely acknowledged benefits is the development and utilization of biofuels as a means to reduce the world's dependency on non-renewable fossil fuels. Presently, burning fossil fuels such as coal, natural gas, and oil generates most of the electricity in the U.S. At the local level, the development of biotechnology also offers both economic and socioeconomic benefits. The planning area contains thousands of acres of forestland, which produce a substantial amount of renewable biomass each year. The biomass market associated with wood product production has long been developed, and biomass harvesting for fuel reduction is a common practice within managed forestlands in northern California. Biomass production not only provides economic support at the local, state, and federal levels, but also reduces the nation's dependency of fossil fuels. The watershed also contains thousands of acres of brushland, which produce a significant amount of renewable biomass, although only a small portion of the biomass produced from chaparral landscapes is utilized for biofuels.

The potential for biomass production within the planning area is good given that the watershed contains a substantial amount of raw material (brushland and forest land species). The closest wood-fired power plant is approximately 50 road miles away in Anderson, California. This is a 50-megawatt wood-fired power plant, Wheelabrator Shasta Energy, which utilizes one hundred semi truckloads (~1,400 bone dry tons) of biomass each day, seven days/week, to produce electricity (Jolley 2002). There are other wood-fired power plants in Shasta County, but this facility is the closest to the Lower Clear Creek Watershed.

The feasibility of any biomass operation depends on the market price of biomass, (also commonly called hogged fuel or hog fuel if it is processed through a hammer hog) the density or amount of fuel on the ground, and transportation costs. Processing can include harvesting and chipping or hogging and costs are directly correlated with the species, age, size and density of the vegetation being processed as well as the topography of the area. The transportation cost from the project area to the nearest wood fired power plant is directly related to the size of the vehicle, time needed for loading biomass, the road bed system and distance to the plant.

The price a power plant is willing to pay for a ton of biomass vs. the processing and transportation costs determines the economic feasibility of an operation. However, the value of fuel reduction to the landowner should be included in this calculation to determine the true feasibility of a biomass operation.

Harvesting is usually accomplished with an excavator and/or a bulldozer tractor, which is utilized to remove and pile the brush. Processing can be accomplished with a hammer hog, tub grinder, drum chipper or some other type of industrial type chipper fed by the excavator or other mechanical means.

Pursuant to the California Forest Practice Rules, if biomass operations involve the harvest of commercial species, the project requires a permit issued by CAL FIRE. Biomass operations not involving the harvest of commercial species are not subject to the California Forest Practice Rules, but are subject to Water Quality jurisdiction, and may require county permits or other agency review depending on the physical characteristics of the project area. A Registered Professional Forester should be involved prior to commencement of any biomass operation in order to determine what permits might be required and to estimate the cost and timing of obtaining the permits.

Biomass Collection in Action. Tub grinder on right, conveyor moves biomass into the van.



Although the biofuels industry is the most developed biomass market in northern California, other markets are currently in the developmental stage and may become a commercially viable option for biomass products in the future. These markets are far from becoming a significant force in the market place, but may provide alternative utilization methods and future marketing opportunities.

E. MAINTENANCE TREATMENT

Maintenance plans for all existing shaded fuelbreaks, as well as a maintenance strategy for all planned shaded fuelbreaks need to be formulated as soon as funding can be made available. A maintenance section needs to be added to all planned shaded fuelbreaks. Scrub oak re-sprouts and manzanita seedlings on disturbed areas are typical of the vegetation needing control. Control can take many forms including chemical control, mechanical control, or grazing by livestock (namely goats).

The time frame for maintenance is typically two years, five years and ten years after initial construction of the shaded fuelbreak. Treatment with livestock would need to be repeated more frequently (See #2 below). Periodic maintenance of a fuelbreak sustains its effectiveness. Seeding the fuelbreak with annual grass cover immediately following its construction will help

reduce brush and conifer invasion, but only depending on grass cover will not eliminate invading plants for an extended period of time. The species of grass must be selected with care. A mature stand of tall grass presents a flashy fuel hazard that may be almost bad as the re-sprouts.

Shade is another method for controlling the re-growth of vegetation. The shade in shaded fuelbreaks is a two-fold benefit. Not only does it make the fuelbreak more aesthetically palatable, the shade also limits the re-growth of shade intolerant species like manzanita and toyon.

Following are several methods to maintain fuelbreaks:

1. Herbicides

The use of herbicides is a very effective and inexpensive method of eliminating unwanted vegetation, but there are many restrictions. Some herbicides are species specific, which means they can be used to eliminate brush species and will not harm grass species. Manual treatment is also a very effective means to eliminate invading vegetation, but is very labor intensive. The cost of fuelbreak maintenance must be balanced with its degree of effectiveness.

2. Herbivores

Herbivore (goat) grazing may be used as a means of maintaining fuelbreaks, since goats will eat brush and weeds. Browse makes up about 60% of a goat's diet, but only about 10-15% of a cow's diet.

Goats used for fuel load reduction are managed to remove dense understory, including brush, shrubs, forbs, and lower branches to remove ladder fuels. It may require giving goats supplements of protein or energy, depending on the class of goats used and the time of year. The choice must be balanced on the type of soil, vegetation and livestock analysis. Monitoring of the herbivore grazing is critical since over-grazing can lead to erosion.

Herbivores Used In Fuel Reduction



As goats work through an area they also work on the understory, old pine needles and leaves, break lower branches, and split apart old downed branch material. Once an area has been “brushed” by goats, it can be maintained as a living green belt. Fire control or

containment with goats takes coordination of the stockowner, land steward, local fire patrol, professional fire abatement teams, CAL FIRE, DFG, and others.

According to a report published by the North Carolina Cooperative Extension Service, grazing goats have been observed to select grass over clover, prefer browsing over grazing pastures, prefer foraging on rough and steep land than over flat, smooth land, graze along fence lines before grazing the center of a pasture, and graze the top of the pasture canopy fairly uniformly before grazing close to the soil level.

Herbivore grazing has been done in the Sierra Foothills by Goats Unlimited, Rickerby, CA. They report the vegetation in the Sierra Foothills grazing area consists of woody plants, shrubs, forbs and grasses. Before entering a new area, the herder develops a landscape goal, completes a vegetative survey and identifies toxic plants. They identify the growth habit and adaptation of each plant species, especially those that are toxic. The objective is to control the invasion of unwanted species and encourage perennial grasses to return. In a report published by Langston University, goats improve the cycling of plant nutrients sequestered in brush and weeds, enabling the reestablishment of grassy species. Portable electric fencing with solar energizers is used to control the goats' foraging area.

3. Converting Brush Land to Forest Land

Brush land frequently occurs on soils that are best suited for growing brush. The exception to this are forest soils that have been burned, and have come back to brush. Brushland soils are sloping to very steep loams and are gravelly, stony, or rocky. These soils are usually shallow to bedrock, and available water capacity is low or very low. Vegetation is generally chaparral, which includes such species as chamise, Lemmon ceanothus, buckbrush, toyon, poison-oak, whiteleaf manzanita, and western mountain mahogany. There are few trees occurring on the sites, such as interior live oak and gray pine. At least 80 percent of the surface cover is woody vegetation.

Conversion from brushland to forestland will entail a thorough investigation of the site. Soil depth, type, aspect, and exposure determine the success or failure of an attempted conversion. With few exceptions, most of the brushy sites are naturally occurring, and represent the native vegetative community.

Natural regeneration of coniferous species after a burn is very difficult to accomplish. A conversion from brush to forestland should begin with a thorough investigation of the capability of the site to support coniferous trees. The second, or next step, should be to secure a reliable source of climatically adapted seedlings; and the third step should be to develop a planting plan. A realistic cost estimate should be the fourth step. All this should be accomplished before the existing brush cover is removed.

X. ROADS FOR ACCESS

Roads are an essential part of any fire and fuels management plan, providing the principal access to the communities, homes, and WNRA in the watershed. Importantly, roads may offer a

defensible space from which firefighters can conduct direct attack on wildfires and provide strategic locations for roadside fuelbreaks. Roadside fuelbreaks provide not only defensible space for firefighters, but also a safer escape route for residents in the event of a wildfire.

The Lower Clear Creek Watershed has many roads that are well traveled on a daily basis. The following is a brief list of some of the more traveled roads in the area that support the various communities included in or closely bordering the Lower Clear Creek Watershed.

Road features that are important for rapid response of fire resources are:

- The road is wide enough for safe use for homeowners and fire resources.
- Passing lanes, turnouts, and turn arounds are essential.
- Roadside hazard reduction is an important consideration for homeowners and fire fighting resources.
- The road is suitable for fire fighting access and resident escape during emergencies.

Following is a list of the main access roads in the planning area.

A. NORTH-SOUTH ROADS

- Lower Muletown Road
- Zogg Mine Road
- Canyon Road

B. EAST-WEST ROADS

- Clear Creek Road
- Placer Road
- China Gulch Drive

C. OTHER ROADS

- Cloverdale Road

XI. POTENTIAL COST-SHARE FUNDING SOURCES

The following table is a list of cost share programs.

**TABLE 5
FUNDING SOURCES AND COST SHARE PROGRAMS**

Program	Goals	Services	Will Fund	Agency	Who	Limitations
Emergency Watershed Protection	Helps safeguard people and property following natural disasters.	Technical and financial assistance	Up to 75%	NRCS	Public agencies, non-profits, community groups	25% cost share. Must obtain necessary permits
Environmental Quality Incentives Program	To address significant natural resource needs and objectives	Cost sharing, technical and educational assistance	Up to 75% set by local working group	NRCS, FSA	Agricultural producers having significant natural resource needs	Approved practices up to \$10,000 per producer per year. Must have Conservation Plan approved by NRCS.
Forest Stewardship Program	Assist California communities to more actively manage their watershed resources, to keep forests and associated resources productive and healthy	Technical, educational and financial assistance	Cost share up to \$50,000. 100% match is required.	CAL FIRE	RCDs, RC&Ds, special districts, Indian tribes, and community non-profit organizations.	Projects that involves activities that may lead to changes in the environment are required to comply with CEQA. Projects must be on NIPF land & address one of the major categories: pre-fire fuels mgmt, forest

Program	Goals	Services	Will Fund	Agency	Who	Limitations
						& woodland health, water quality, or wildlife & fisheries habitat.
Hazard Mitigation Grant Program	Hazard mitigation to reduce risk from future disasters	Cost share	Up to 75%	FEMA	Agencies, governments, non-profits, tribes	Federal Disaster Areas
Vegetation Management Program	To provide incentives for using fire as a tool to control unwanted brush, and other vegetation, which creates wildfire hazards.	Covers liability, conducts prescribed burn	Up to 90% cost share	CAL FIRE	Landowners, individual or group	Agreement to sign, plan required
California Forest Improvement Program	Forestry, watershed and riparian protection and enhancement	Reforestation, site prep, land conservation, and fish & wildlife habitat improvements	75% up to \$30,000 per contract, rehab after natural disaster up to 90%	CAL FIRE	Landowners	Plan (can be cost shared) required, 20-50,000 acres of forestland

Additional funding sources include:

- California Department of Conservation, RCD Assistance Program
- USDA Forest Service State Fire Assistance (SFA)
- Shasta County Regional Advisory Committee, Title II Funds, Secure Rural Schools and Community Self-Determination Act of 2000
- Bureau of Land Management (BLM) Community Assistance
- National Park Service (NPS) Community Assistance/WUI
- U.S. Fish and Wildlife Service (USFWS) Wildland-Urban Interface Grant Program

- California State Fire Safe Council Clearinghouse, Fuel reduction project grant funding

XII. FUNDING FUELBREAK MAINTENANCE

Since grant funds are often obtained just to construct the fuelbreak, maintenance efforts are often left to the landowner. Unfortunately, some landowners do not have the physical or financial means to do maintenance. If a fuelbreak is not properly maintained in its entirety, it will not provide adequate fire protection in the long run. Therefore, in some situations it is often best for watershed groups and other conservation organizations to seek funding for maintenance as a means to better ensure fire protection for a given area. The Community Protection Plan was developed as a result of the USFS National Fire Plan. This plan provides grant funding for fuel reduction projects on private lands. In addition, many of the programs listed in Table 5 above also provide funding opportunities for fuels reduction and maintenance.

Information on private sector funding can be found at the following Internet sites:

- www.fdncenter.org
- www.ceres.ca.gov/foreststeward/funding.html
- www.ice.ucdavis.edu/
- www.teleport.com/~rivernet/general.htm
- www.tpl.org/tpl/about/
- www.ufe.calpoly.edu/data/news/grants.html

Funding programs can assist in the development of shaded fuelbreaks, defensible space around structures, roadside fuel reduction, and community fire safe projects.

XIII. GRANT FUNDING OPPORTUNITIES

Funding sources are as varied as the projects listed above. WSRCD has the mechanism in-place to seek funding for any projects generated through this plan. There are several sources of funding available through the agencies in the area. Historically, funding sources have been CalFed, BLM, CAL FIRE, National Park Service (NPS), USFS, U. S. Fish and Wildlife Service (USFWS), and California Department of Conservation (DOC).

Agencies that have funded or can fund fuelbreak construction and education/outreach efforts include:

- USDA Forest Service
- California Department of Conservation RCD Grant Assistance Program.
- USDI Bureau of Land Management
- USDI Fish and Wildlife Service
- CAL FIRE
- USDI National Park Service
- Shasta County – Secure Rural Schools & Community Self-Determination Act of 2000.
- FEMA

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APPENDICES

A.	GLOSSARY	A1
B.	COMMUNITY FIRE SAFE FUEL REDUCTION GUIDELINES	B1
	MAPS	M1

APPENDIX A.

GLOSSARY

BEHAVE – A computer program used for predicting fire behavior.

Chain – A unit of measurement equal to 66 feet.

Fuel Characteristics – Factors that make up fuels such as compactness, loading, horizontal continuity, vertical arrangement, chemical content, size and shape, and moisture content.

Fuel Chemical Content – Substances in the fuels which can either retard or increase the rate of combustion, such as mineral content, resins, oils, wax or pitch.

Fuel Ladder – Fuels which provide vertical continuity between strata. Fire is able to carry from ground, to surface, to crown.

Fuel Moisture Content – The amount of water in a fuel, expressed as a percentage of the oven-dry weight of that fuel.

Fuels – Any organic material, living or dead, in the ground, on the ground, or in the air, that will ignite and burn. General fuel groups are grass, brush, timber and slash.

Mechanical Treatment – Using mechanized equipment including but not limited to bulldozers with or without brush rakes, rubber tired skidders, mechanized falling machines, chippers and grinders.

Pile and Burn – Material is cut and piled in open areas to be burned. Burning takes place under permitting environmental conditions.

Prescribed Burning – The burning of forest or range fuels on a specific area under predetermined conditions so that the fire is confined to that area to fulfill silvicultural, wildlife management, sanitary or hazard reduction requirements, or otherwise achieve forestry or range objectives.

Rate of Speed – It is expressed as rate of forward spread of the fire front, usually is expressed as chains per hour.

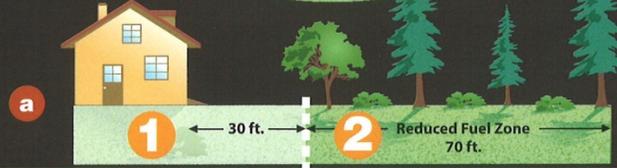
Shaded Fuelbreak – A wide strip or block of land on which the vegetation has been modified by reducing the amount of fuel available, rearranging fuels so that they do not carry fire easily, and replacing particularly flammable fuels with others that ignite less easily and burn less intensely.

Surface Fire – A fire that burns surface litter, debris and small vegetation.

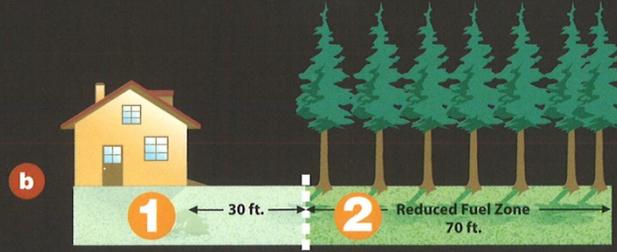
Topography – The configuration of the earth's surface, including its relief and the position of its natural and manmade features.

APPENDIX B
COMMUNITY FIRE SAFE FUEL REDUCTION GUIDELINES

100' DEFENSIBLE SPACE Make Your Home FIRE SAFE



or



Contact your local CDF office, fire department,
 or Fire Safe Council for tips and assistance.

www.fire.ca.gov

Why 100 Feet?

Following these simple steps can dramatically increase the chance of your home surviving a wildfire!

A **Defensible Space** of 100 feet around your home is required by law.¹ The goal is to protect your home while providing a safe area for firefighters.

1 "Lean, Clean and Green Zone."

– Clearing an area of 30 feet immediately surrounding your home is critical. This area requires the greatest reduction in flammable vegetation.

2 "Reduced Fuel Zone."

– The fuel reduction zone in the remaining 70 feet (or to property line) will depend on the steepness of your property and the vegetation.

Spacing between plants improves the chance of stopping a wildfire before it destroys your home. You have two options in this area:

- a** Create horizontal and vertical spacing between plants. The amount of space will depend on how steep the slope is and the size of the plants.
- b** Large trees do not have to be cut and removed as long as all of the plants beneath them are removed. This eliminates a vertical "fire ladder."

When clearing vegetation, use care when operating equipment such as lawnmowers. One small spark may start a fire; a string trimmer is much safer.

Remove all build-up of needles and leaves from your roof and gutters. Keep tree limbs trimmed at least 10 feet from any chimneys and remove dead limbs that hang over your home or garage. The law also requires a screen over your chimney outlet of not more than ½ inch mesh.

¹. These regulations affect most of the grass, brush, and timber-covered private lands in the State. Some fire department jurisdictions may have additional requirements. Some activities may require permits for tree removal. Also, some activities may require special procedures for, 1) threatened and endangered species, 2) avoiding erosion, and 3) protection of water quality. Check with local officials if in doubt. Current regulations allow an insurance company to require additional clearance. The area to be treated does not extend beyond your property. The State Board of Forestry and Fire Protection has approved Guidelines to assist you in complying with the new law. Contact your local CDF office for more details.



April 2006

Here's How to Get Started: Create a Fire Safe Landscape in Seven Steps

Step One

Evaluate the environment around your home. What will catch on fire? Be on the lookout for those "little things" that can burn your home; this can include lounge cushions, papers or anything flammable outside your home. Also consider slope, prevailing winds, vegetation type and density, and exposure to direct sun.

Step Two

Determine what you need to do. Start with the closest Home Ignition Zone and work toward the Defensible Space Zone and through the Wildland Fuel Reduction Zone.

Step Three

Develop a plan for correcting any fire safe problems identified in steps one and two. Consider completing your work prior to June 1 of each year before fuel conditions become too dry. Make sure your power tools have approved spark arresters and, if working in the summer months, complete all work before 10 a.m. Coordinate with adjacent land owners if possible and incorporate existing formal landscape features.

Step Four

Consider codes and regulations related to *defensible space*, burning, work performed near waterways, and tree removal; comply with federal environmental laws and, if necessary, secure permits such as burn permits.

- The Department of Forestry & Fire Protection (CAL FIRE) should be consulted if any wood products from your property are sold, traded or bartered. Types of regulated wood products include sawmill logs, firewood or wood chips.
- The Department of Fish & Game should be notified and consulted if work occurs near a river, stream, lake, or tributaries. Go to: www.dfg.ca.gov/1600/1600.html
- Before cutting down trees, residents should check local association and special district regulations.

Step Five

Implement the plan. Get help and any needed equipment. Begin work in the Home Ignition Zone and work out from there. Remember: It's the little things—such as patio furniture and cushions, leaves, needles, firewood piles, bark, etc.—that can ignite and cause a fire to your home.

Step Six

Remove all slash and debris generated during the fuel modification process by chipping, burning or disposal at your local vegetative waste site. Contact your local fire department for permit requirements. Contact your local Fire Safe Council about their chipping, home consultation and other programs. Find your local Fire Safe Council at www.FireSafeCouncil.org.

Step Seven

Continue to monitor and evaluate the fire safe condition of your home and landscape. Maintain your home's resistance to fire and the *defensible space* in the surrounding property on a routine basis—annually or more frequently, if needed. For new construction, consider fire resistant materials such as concrete panels, stone, brick or other material that doesn't burn easily.

Design and printing: www.FireSafeHelp.com. To order, call: 530/872-0850
Special thanks to the Butte County Fire Safe Council

Is Your Home a Safe Place to Stay?

You live in an area of natural beauty—but it's also prone to wildfire. In fact, it's not a matter of *IF* the timberlands of California will burn, it's a matter of *WHEN* that will happen.

Fortunately, you can take steps today to dramatically improve your odds of survival by making your property "fire safe."

A fire safe property is one where the home and landscape resist the impact of fire. A fire safe landscape is a beautiful landscape that not only protects your home from fire but can also increase the value of your home and impact your home's insurability.

The Fire Environment

Fire behavior is affected by a variety of factors—some of these you can do something about and others are weather-related and beyond your control. Understanding these terms will help you make your home and the surrounding property fire safe.

Fuels: Any flammable materials that will burn. This includes everything from the home itself to plants, dried leaves in the rain gutter, brush, wood shingles, patio furniture and decking material. If it will burn, it's a fuel.

Ignition: The point at which a fire starts as a result of fuel contacting with embers, firebrands (hot, flying embers), direct flame, or superheated air.

Topography: Primarily slope or the steepness of the incline on which your house is situated. Also your home's location on the slope and proximity to canyons or ravines.

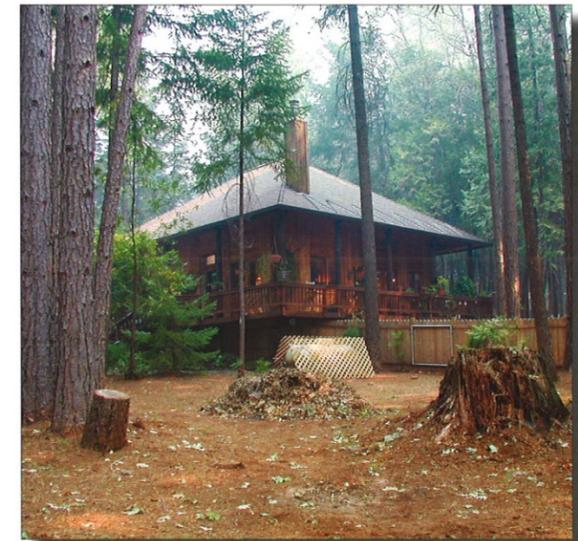
Weather: Primarily wind, but also air temperature and humidity (moisture content of the air).

Extreme X-Factor: A multiplication factor used to increase the *defensible space* around a home due to extreme fire behavior factors such as slope, and/or constant or unusually strong winds. If your home is located **on or near** the top of a slope and/or **receives constant or unusually strong winds** you must increase the *defensible space* in Zones 2 and 3 by a multiplication of 1.5 (X-Factor). For instance, in Zone 2, increase the *defensible space* from 100 feet to 150 feet.



During the summer and fall months, a combination of low humidity, high temperatures and strong winds results in a "red flag" weather warning. During such a condition, the fire danger is very high. The X-Factor explained above helps provide that extra margin of *defensible space* necessary to keep your property fire safe.

A Homeowner's Guide to Fire Safe Landscaping



Timberland

The California Fire Safe Council's mission is to provide leadership and support that mobilizes all Californians to protect their homes, communities and environment from wildfire. We accomplish our mission through broad-

based public/private partnerships that create community-wide change via education and action programs because we believe fire prevention and loss reduction are everyone's business.



www.FireSafeCouncil.org



Funding for this brochure was provided by a grant from State Farm Insurance.



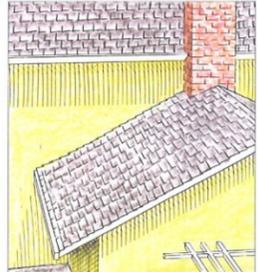
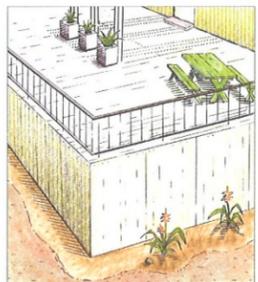
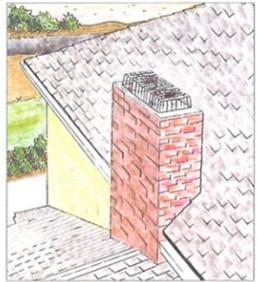
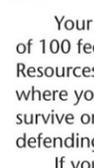
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www.FireSafeCouncil.org

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 California Fire Safe Council

www.fire.ca.gov
 California Department of Forestry & Fire Protection;
 includes forest management information

Home Ignition Zone (The home plus 10 ft distance)

It's the 'little things' that will endanger your home. Just a little ember landing on a little pile of flammable material will burn it. Spend a morning searching out and getting rid of those flammable little things outside and your home will be much safer.

1. Keep your rain gutters and roof clean of all flammable material. 
2. Get rid of dry grass, brush and other flammable materials around your home—and don't forget leaves, pine needles and bark walkways. Replace with well maintained (watered) landscape vegetation, green lawn and landscape rocks. 
3. Clear all flammable materials from your deck. This includes brooms, stacked wood and easily ignitable patio furniture. Also enclose or board up the area under your deck to keep it from becoming a fuel bed for hot embers. 
4. Move woodpiles and garbage cans away from your home. Keep woodpiles away from the home a distance of 2 times the height of the pile—more if lot size allows. 
5. Use fine mesh metal screen (1/4" or less) to cover eaves, roof and foundation vents to prevent windblown embers from entering.
6. Inspect and clean your chimney every year. Trim away branches within 10 feet. Install a spark arrester with 1/2" or smaller mesh screen. 
7. Got a propane tank? Get rid of any flammable materials within 10 feet of it and, if possible, position it at least 30 feet from any structures.
8. Window screens should be metal, not plastic or other flammable or meltable material.
9. If your home has a pet door, check its seal.

Burning embers landing on wood shake roofs are one of the leading risk factors for losing your home to a wildfire. If possible, replace wood shingle roofs with non-flammable (Class-A) roofing materials, such as asphalt shingles, tile or metal roofing.

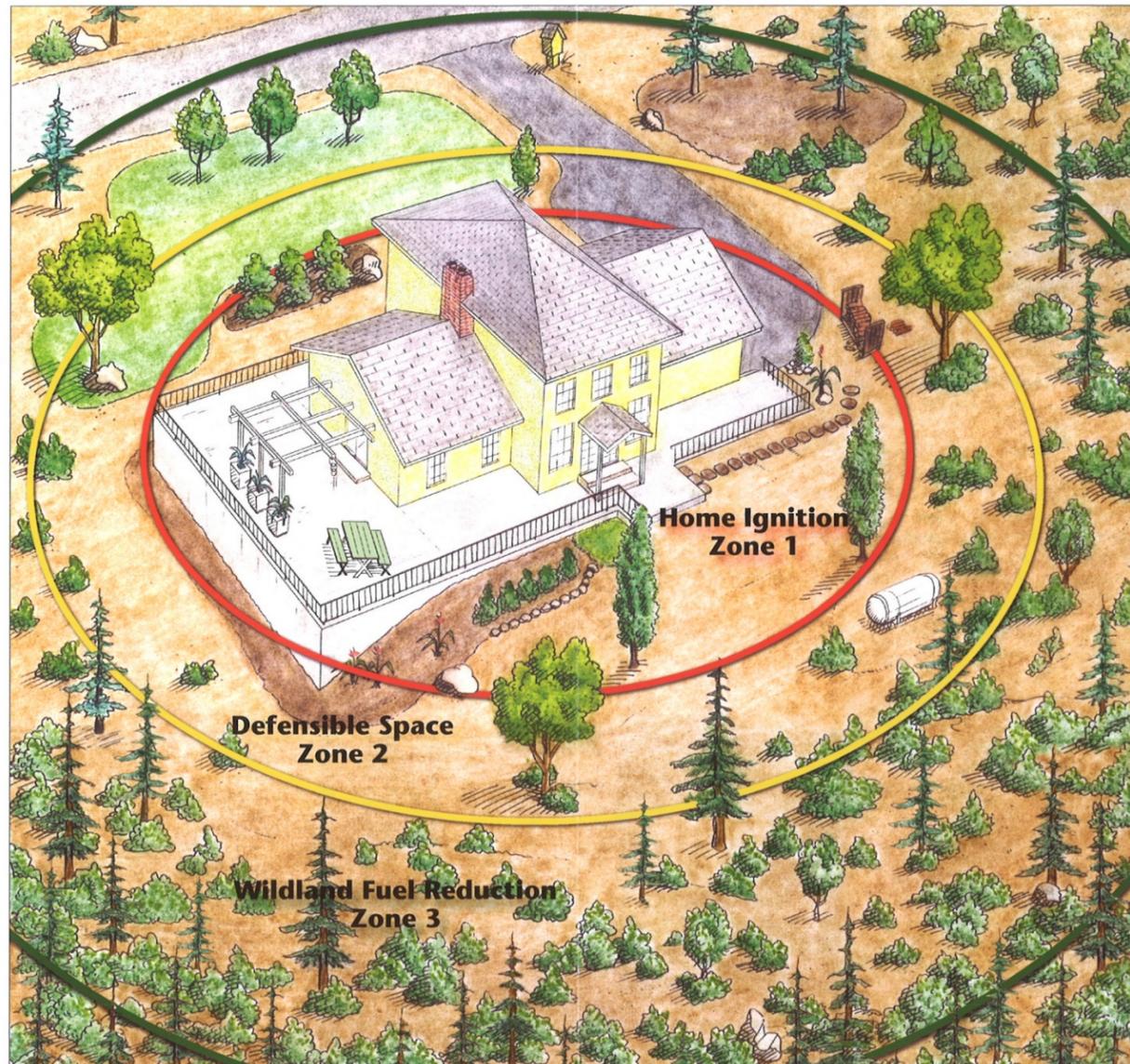
Defensible Space Zone (100 feet or more distance) • Keep this area lean and green!

Your "defensible space" is the area that is a minimum of 100 feet from your home (as required under State Public Resources Code 4291 or other local ordinances). This is the area where you've modified the landscaping to allow your house to survive on its own—greatly improving the odds for firefighters defending your home.

If your home is on a slope or subject to high winds, extend the distance of this zone based upon the "X-Factor." For instance, this zone may increase to 150 feet (1.5 X 100 feet).

Create a Defensible Space Zone by keeping in mind the three R's of defensible space:

- **Remove**—dead and dying grass, shrubs and trees.
- **Reduce**—the density of vegetation (fuel) and ladder fuels, those fuels extending from the ground to the tree canopies.
- **Replace**—hazardous vegetation with less flammable, irrigated landscape vegetation including lawn, or other low growing groundcovers and flowering plants.



Find out more ways to make your home fire safe: www.FireSafeCouncil.org

Wildland Fuel Reduction Zone (Beyond 100 feet distance)

Getting rid of the undergrowth and thinning out densely-crowded smaller trees in this outlying area will reduce fire intensity and slow the spread of a fire moving toward your home. Defensible space increases the odds of your home's survival.

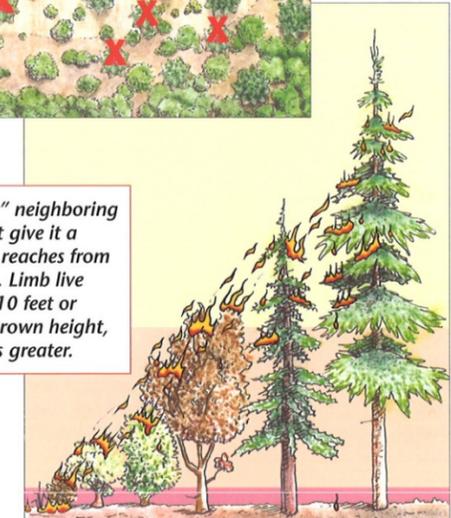
Experts recommend a minimum of 10 feet of spacing between individual trees and shrubs, measured at the crown (widest part) of the tree or shrub. You may need to increase this distance based on your property's X-Factor.

Mature trees should also be limbed up 10 feet, or 1/3 of their live crown height, whichever is greater.

It's possible, depending upon the size of your property, that you will be limited by your property boundary and unable to complete the fire safe measures identified in Zones 2 and 3. If this happens, talk with your neighbors and ask for their cooperation. A safer home means a safer neighborhood for everyone.



Fire "climbs" neighboring trees—don't give it a ladder that reaches from low to high. Limb live trees up to 10 feet or 1/3 of live crown height, whichever is greater.



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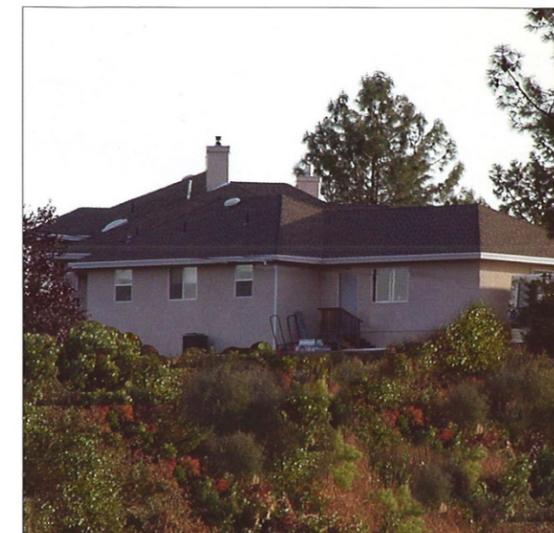
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During the summer and fall months, a combination of low humidity, high temperatures and strong winds results in a "red flag" weather warning. During such a condition, the fire danger is very high. The X-Factor explained above helps provide that extra margin of *defensible space* necessary to keep your property fire safe.

A Homeowner's Guide to Fire Safe Landscaping



Brushland

The California Fire Safe Council's mission is to provide leadership and support that mobilizes all Californians to protect their homes, communities and environment from wildfire. We accomplish our mission through broad-based public/private partnerships that create community-wide change via education and action programs because we believe fire prevention and loss reduction are everyone's business.



www.FireSafeCouncil.org



Funding for this brochure was provided by a grant from State Farm Insurance.



California Fire Safe Council
P.O. Box 2106
Glendora, CA 91740
Phone: 626/335-7426
www.FireSafeCouncil.org

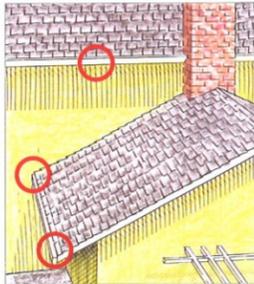
For more information:

- www.FireSafeCouncil.org
California Fire Safe Council
- www.fire.ca.gov
California Department of Forestry & Fire Protection;
includes forest management information

Home Ignition Zone (The home plus 10 ft distance)

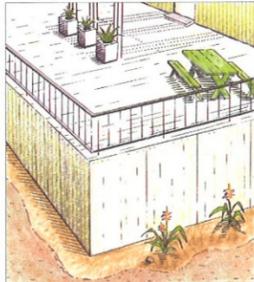
It's the 'little things' that will endanger your home. Just a little ember landing on a little pile of flammable material will burn it. Spend a morning searching out and getting rid of those flammable little things outside and your home will be much safer.

1. Keep your rain gutters and roof clean of all flammable material.



2. Get rid of dry grass, brush and other flammable materials around your home—and don't forget leaves, pine needles and bark walkways. Replace with well maintained (watered) landscape vegetation, green lawn and landscape rocks.

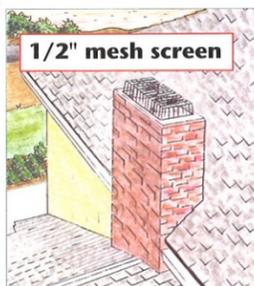
3. Clear all flammable materials from your deck. This includes brooms, stacked wood and easily ignitable patio furniture. Also enclose or board up the area under your deck to keep it from becoming a fuel bed for hot embers.



4. Move woodpiles and garbage cans away from your home. Keep woodpiles away from the home a distance of 2 times the height of the pile—more if lot size allows.

5. Use fine mesh metal screen (1/4" or less) to cover eaves, roof and foundation vents to prevent windblown embers from entering.

6. Inspect and clean your chimney every year. Trim away branches within 10 feet. Install a spark arrester with 1/2" or smaller mesh screen.



7. Got a propane tank? Get rid of any flammable materials within 10 feet of it and, if possible, position it at least 30 feet from any structures.

8. Window screens should be metal, not plastic or other flammable or meltable material.

9. If your home has a pet door, check its seal.

Burning embers landing on wood shake roofs are one of the leading risk factors for losing your home to a wildfire. If possible, replace wood shingle roofs with non-flammable (Class-A) roofing materials, such as asphalt shingles, tile or metal roofing.

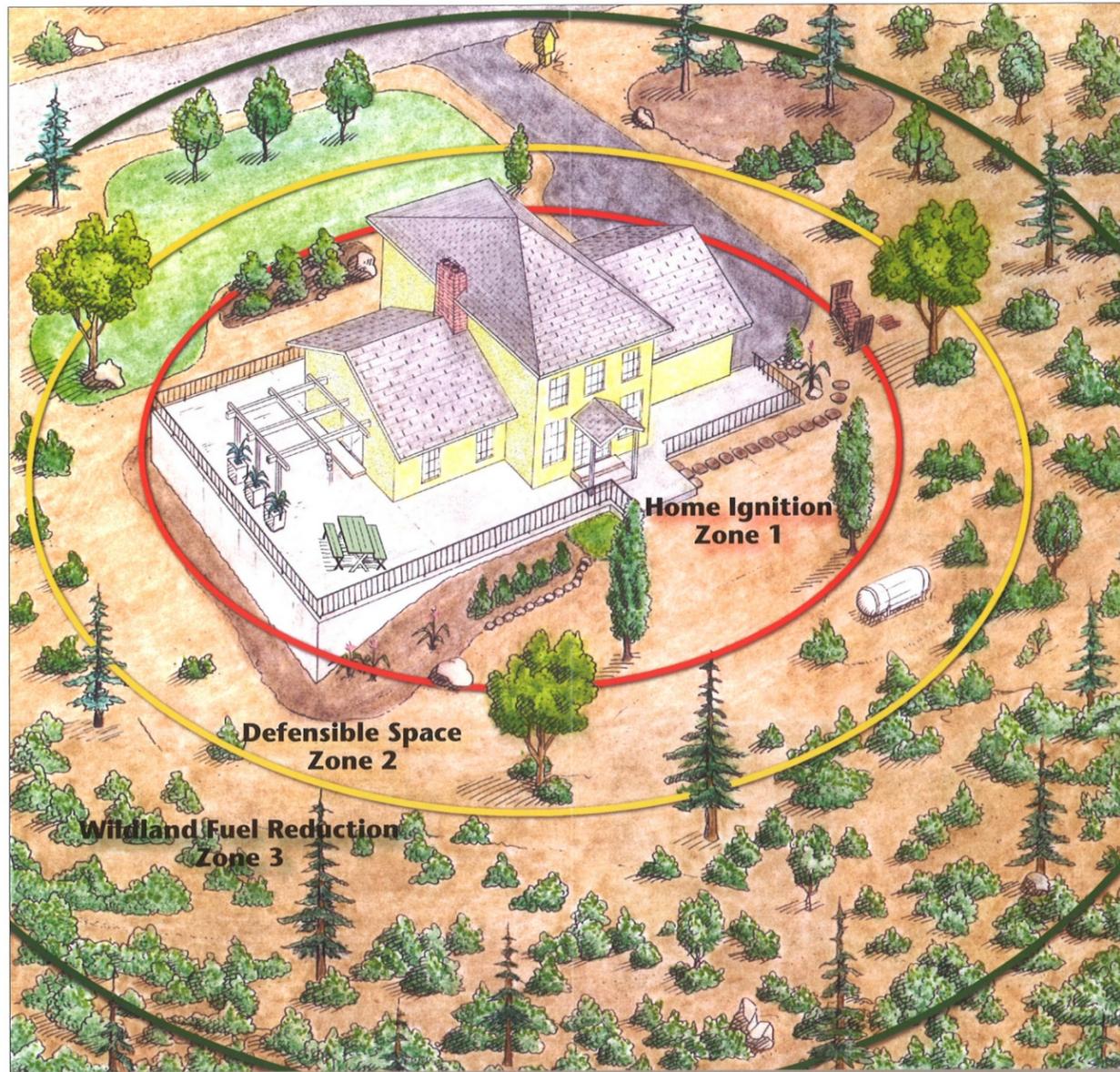
Defensible Space Zone (100 feet or more distance) • Keep this area lean and green!

Your "defensible space" is the area that is a minimum of 100 feet from your home (as required under State Public Resources Code 4291 or other local ordinances). This is the area where you've modified the landscaping to allow your house to survive on its own—greatly improving the odds for firefighters defending your home.

If your home is on a slope or subject to high winds, extend the distance of this zone based upon the "X-Factor." For instance, this zone may increase to 150 feet (1.5 X 100 feet).

Create a Defensible Space Zone by keeping in mind the three R's of defensible space:

- **Remove**—dead and dying grass, shrubs and trees.
- **Reduce**—the density of vegetation (fuel) and ladder fuels, those fuels extending from the ground to the tree canopies.
- **Replace**—hazardous vegetation with less flammable, irrigated landscape vegetation including lawn, or other low growing groundcovers and flowering plants.



Find out more ways to make your home fire safe: www.FireSafeCouncil.org

Wildland Fuel Reduction Zone (Beyond 100 feet distance)

Getting rid of the undergrowth and thinning out densely-crowded smaller trees in this outlying area will reduce fire intensity and slow the spread of a fire moving toward your home. Defensible space increases the odds of your home's survival.

Experts recommend a minimum of 10 feet of spacing between individual trees and shrubs, measured at the crown (widest part) of the tree or shrub. You may need to increase this distance based on your property's X-Factor.

Mature trees should also be limbed up 10 feet, or 1/3 of their live crown height, whichever is greater.

It's possible, depending upon the size of your property, that you will be limited by your property boundary and unable to complete the fire safe measures identified in Zones 2 and 3. If this happens, talk with your neighbors and ask for their cooperation. A safer home means a safer neighborhood for everyone.



Reduce density by giving brush and shrubs more space—ideally they should be about 10 feet apart from one another.

Fire "climbs" neighboring trees—don't give it a ladder that reaches from low to high. Limb live trees up to 10 feet or 1/3 of live crown height, whichever is greater.



Here's How to Get Started: Create a Fire Safe Landscape in Seven Steps

Step One

Evaluate the environment around your home. What will catch on fire? Be on the lookout for those "little things" that can burn your home; this can include lounge cushions, papers or anything flammable outside your home. Also consider slope, prevailing winds, vegetation type and density, and exposure to direct sun.

Step Two

Determine what you need to do. Start with the closest Home Ignition Zone and work toward the Defensible Space Zone and through the Wildland Fuel Reduction Zone.

Step Three

Develop a plan for correcting any fire safe problems identified in steps one and two. Consider completing your work prior to June 1 of each year before fuel conditions become too dry. Make sure your power tools have approved spark arresters and, if working in the summer months, complete all work before 10 a.m. Coordinate with adjacent land owners if possible and incorporate existing formal landscape features.

Step Four

Consider codes and regulations related to *defensible space*, burning, work performed near waterways, and tree removal; if necessary, secure permits such as burn permits.

- The Department of Forestry & Fire Protection (CDF) should be consulted if any wood products from your property are sold, traded or bartered. Types of regulated wood products include sawmill logs, firewood or wood chips. For more information, contact your local CDF unit.
- The Department of Fish & Game should be notified and consulted if work occurs near a river, stream, lake, or tributaries. Go to: www.dfg.ca.gov/1600/1600.html
- Before cutting down trees, residents should check local association and special district regulations.

Step Five

Implement the plan. Get help and any needed equipment. Begin work in the Home Ignition Zone and work out from there. Remember: It's the little things—such as patio furniture and cushions, leaves, needles, bark, etc.—that can ignite and cause a fire to your home.

Step Six

Remove all slash and debris generated during the fuel modification process by chipping, burning or disposal at your local vegetative waste site. Contact your local fire department for permit requirements. Contact your local Fire Safe Council about their chipping, home consultation and other programs. Find your local Fire Safe Council at www.FireSafeCouncil.org.

Step Seven

Continue to monitor and evaluate the fire safe condition of your home and landscape. Maintain your home's resistance to fire and the *defensible space* in the surrounding property on a routine basis—annually or more frequently, if needed. For new construction, consider fire resistant materials such as concrete panels, stone, brick or other material that doesn't burn easily.

Design and printing: www.FireSafeHelp.com. To order, call: 530.872.0850
Special thanks to the Butte County Fire Safe Council

Is Your Home a Safe Place to Stay?

You live in an area of natural beauty—but it's also prone to wildfire. In fact, it's not a matter of *if* the grasslands of California will burn, it's a matter of *when* that will happen.

Fortunately, you can take steps today to dramatically improve your odds of survival by making your property "fire safe."

A fire safe property is one where the home and landscape resist the impact of fire. A fire safe landscape is a beautiful landscape that not only protects your home from fire but can also increase the value of your home.

The Fire Environment

Fire behavior is affected by a variety of factors—some of these you can do something about and others are weather-related and beyond your control. Understanding these terms will help you make your home and the surrounding property fire safe.

Fuels: Any flammable materials that will burn. This includes everything from the home itself to plants, dried leaves in the rain gutter, brush, wood shingles, patio furniture and decking material. If it will burn, it's a fuel.

Ignition: The point at which a fire starts as a result of fuel contacting with embers, firebrands (hot, flying embers), direct flame, or superheated air.

Topography: Primarily slope or the steepness of the incline on which your house is situated. Also your home's location on the slope and proximity to canyons or ravines.

Weather: Primarily wind, but also air temperature and humidity (moisture content of the air).

eXtreme X-Factor: A multiplication factor used to increase the *defensible space* around a home due to eXtreme fire behavior factors such as slope, and/or constant or unusually strong winds. If your home is located **on or near** the top of a slope and/or **receives constant or unusually strong winds** you must increase the *defensible space* in Zones 2 and 3 by a multiplication of 1.5 (X-Factor). For instance, in Zone 2, increase the *defensible space* from 100 feet to 150 feet.



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A Homeowner's Guide to Fire Safe Landscaping



Grassland

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www.FireSafeCouncil.org

April 2005

Allstate
You're in good hands.
This brochure made possible by a grant from the Allstate Foundation.

For more information:

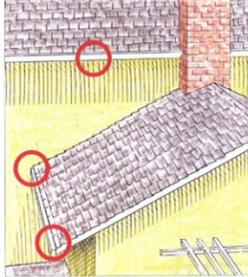
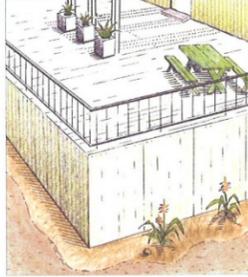
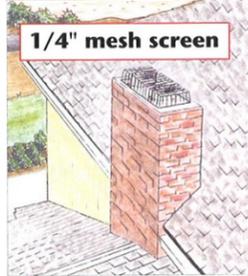
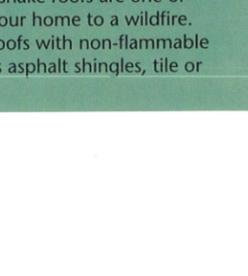
- www.FireSafeCouncil.org
California Fire Safe Council
- www.firewise.org
National Wildland/Urban Interface Fire Program
- www.fire.ca.gov
California Department of Forestry & Fire Protection;
includes forest management information
- www.allstate.com
Allstate Insurance

California Fire Safe Council
P.O. Box 2106
Glendora, CA 91740
Phone: 626/335-7426
www.FireSafeCouncil.org

Fire Safe COUNCIL

Home Ignition Zone (The home plus 10 ft distance)

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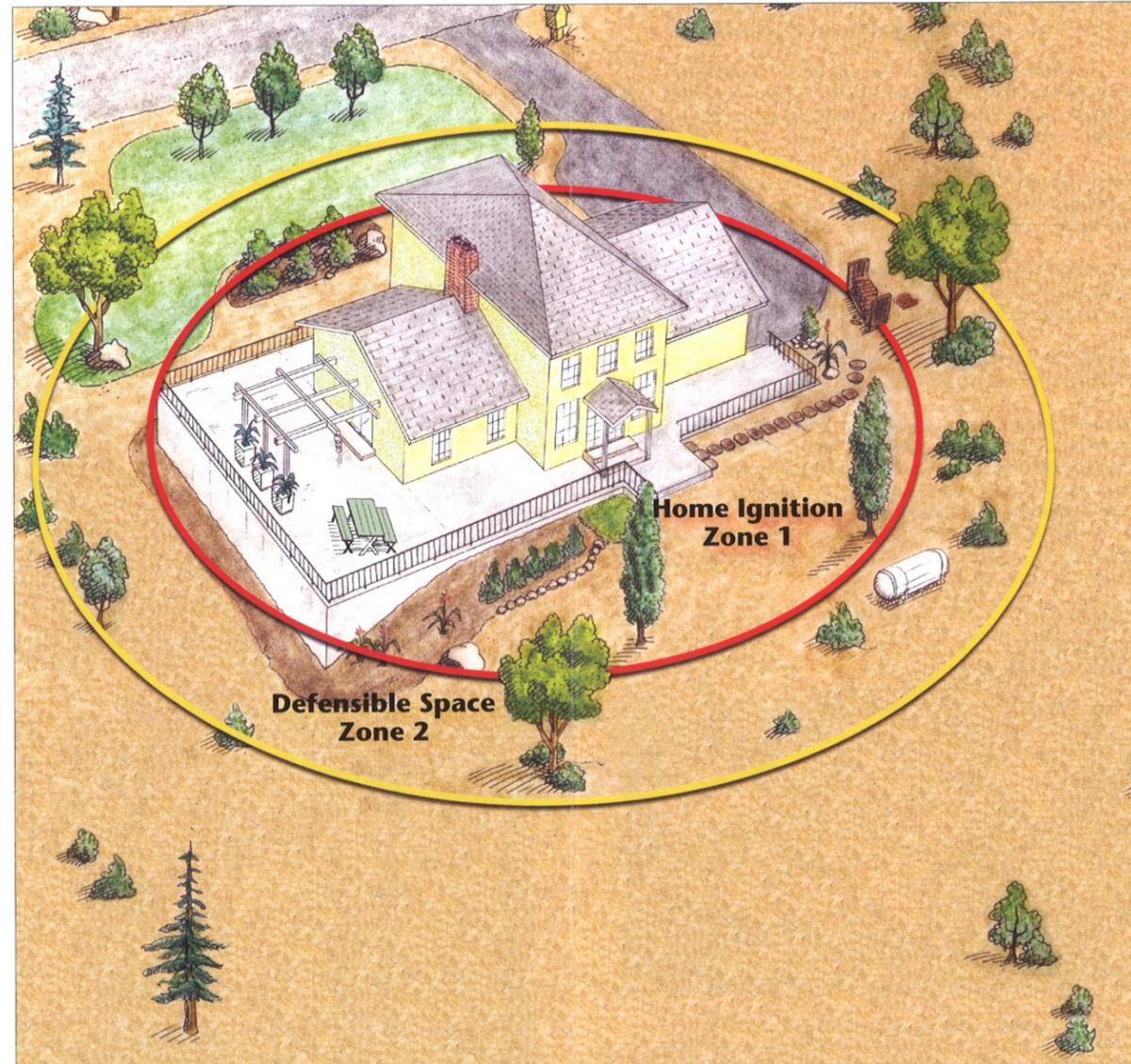
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Find out more ways to make your home fire safe: www.FireSafeCouncil.org

Are you doing the right thing—the wrong way?

Getting rid of the hazards around your home is a good idea—but you need to do it properly or you could accidentally start a wildland fire.

Each year fire departments respond to thousands of fires started by people using equipment the wrong way. Whether working to create defensible space around your home, just mowing dry grass, or pulling your dirt bike over to the side of the road, if you live in a wildland area you need to use all equipment responsibly.

Lawnmowers, weedeaters, chainsaws, grinders, welders, tractors and trimmers can all spark a wildland fire. Do your part, the right way, to keep your community fire safe.



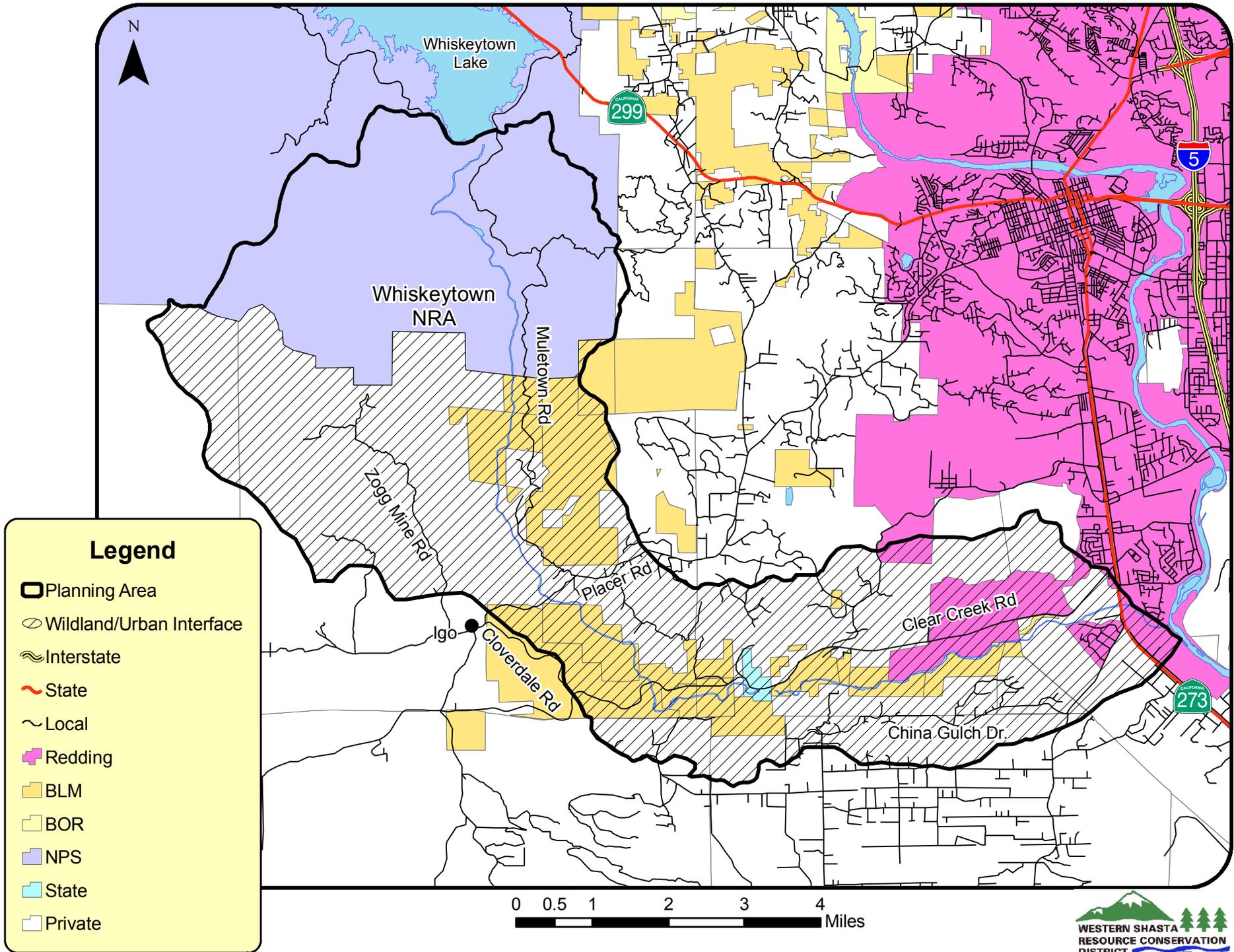
Here's how to do it the RIGHT WAY:

- Mow before 10 a.m. If it's too hot for you, it's too hot to mow. **REMEMBER, DON'T MOW DURING THE HEAT OF THE DAY OR WHEN THE WIND IS BLOWING!**
- **Beware**—Lawn mowers are designed to mow lawns, not dry grass, weeds or rocks! A grass-hidden rock is enough to start a fire when struck by a metal blade. Remove rocks from the area before you begin mowing.
- **In wildland areas**, spark arresters are required on all portable gasoline powered equipment. This includes tractors, harvesters, chainsaws, weedeaters and mowers.
- Keep the exhaust system, spark arresters and mower in proper working order and free of carbon buildup. Use the recommended grade of fuel and don't top off.
- **In wildland areas**, grinding and welding operations require a permit plus 10 feet of clearance, a 46-inch round point shovel, and a backpack watertype fire extinguisher—all ready to use.
- Hot exhaust pipes and mufflers can start fires you won't even see—until it's too late! Don't drive your vehicle onto dry grass or brush.
- Keep a cell phone nearby and call 911 **immediately** in case of fire.

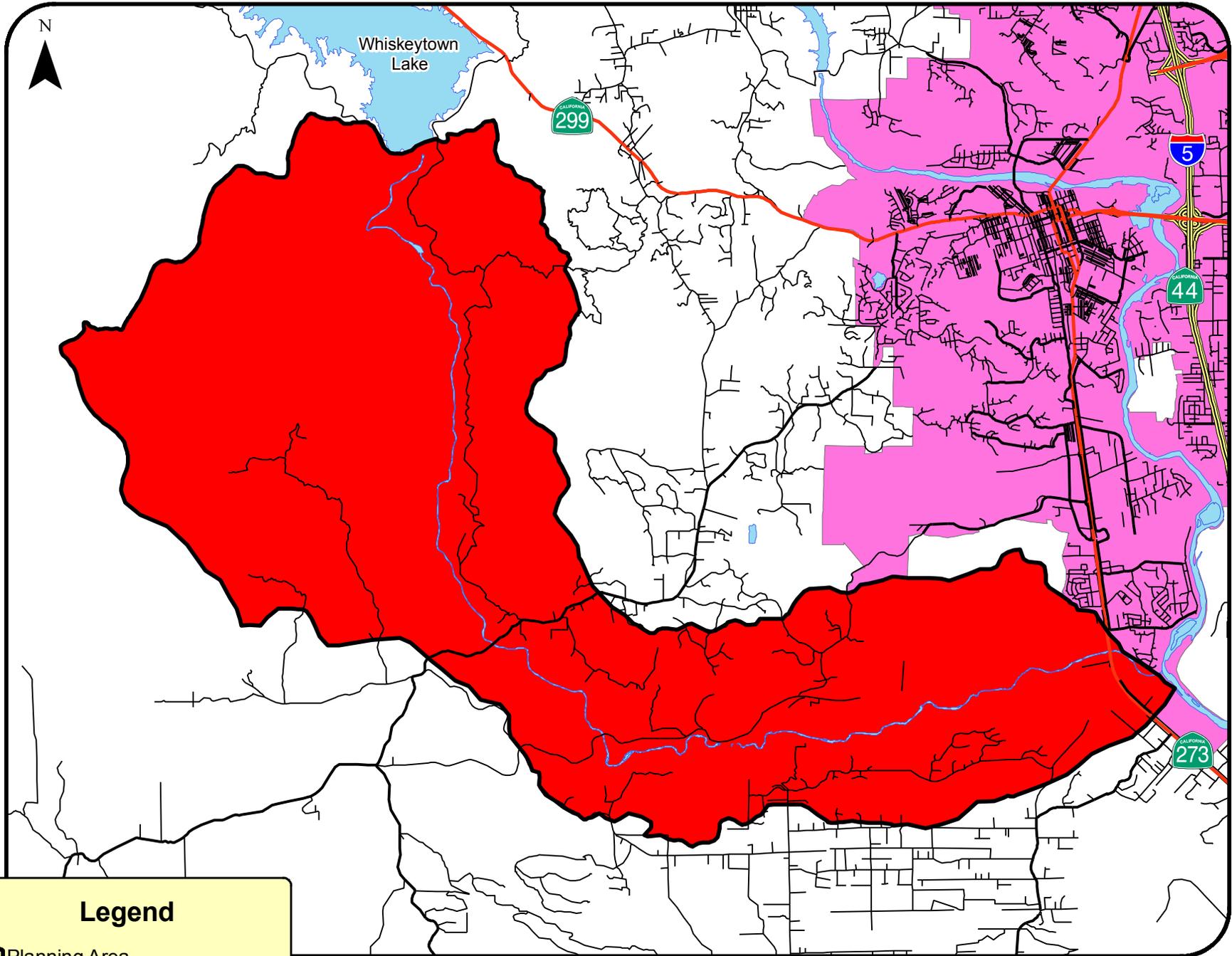
MAPS

- 1. PLAN AREA**
- 2. FIRE SEVERITY ZONE RATING**
- 3. VEGETATION**
- 4. SPECIAL STATUS WILDLIFE AND PLANTS**
- 5. FIRE HISTORY**
- 6. PROJECT MAP**

LOWER CLEAR CREEK PLANNING AREA

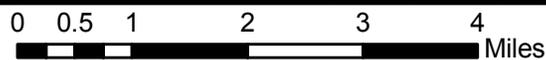


FIRE SEVERITY RATING

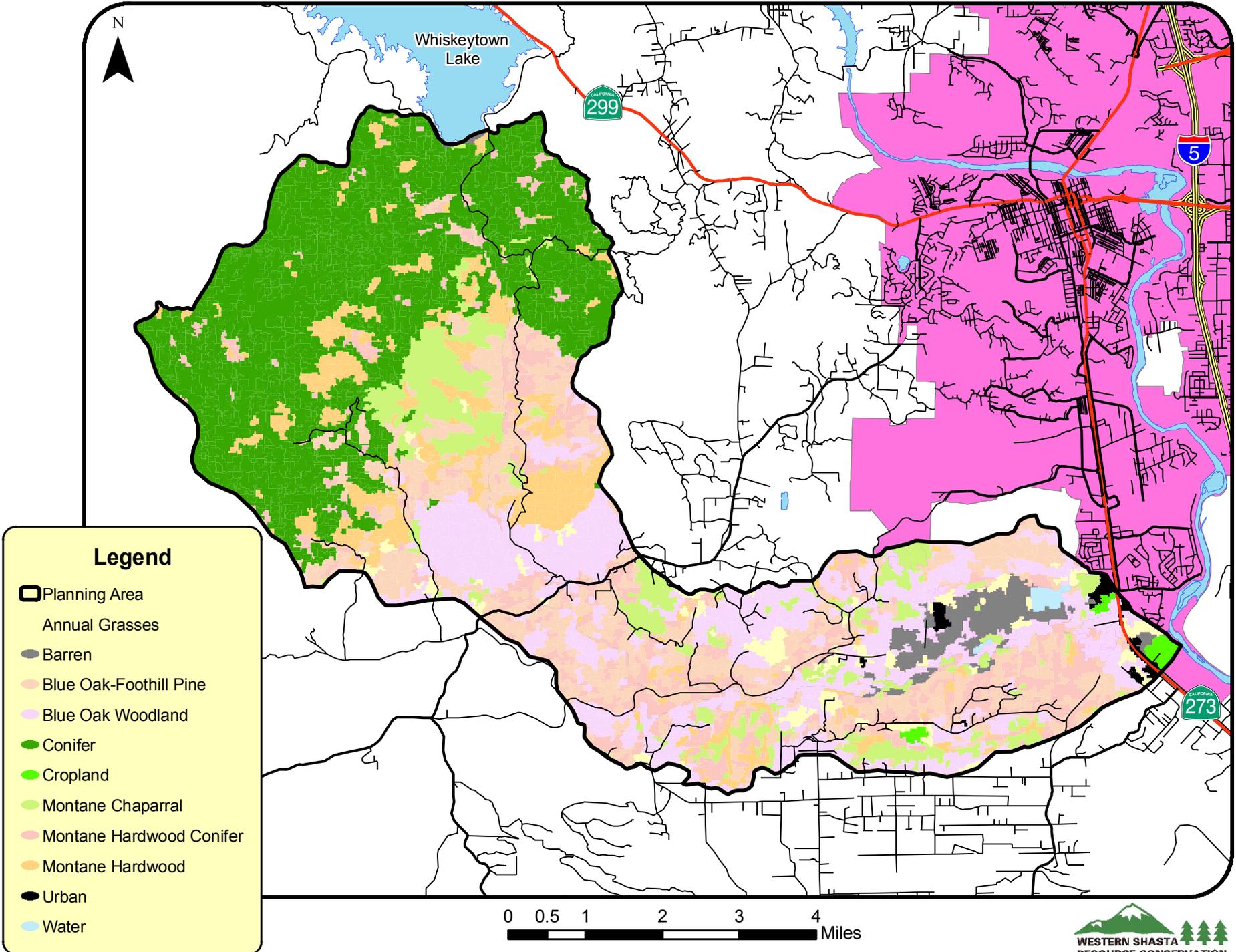


Legend

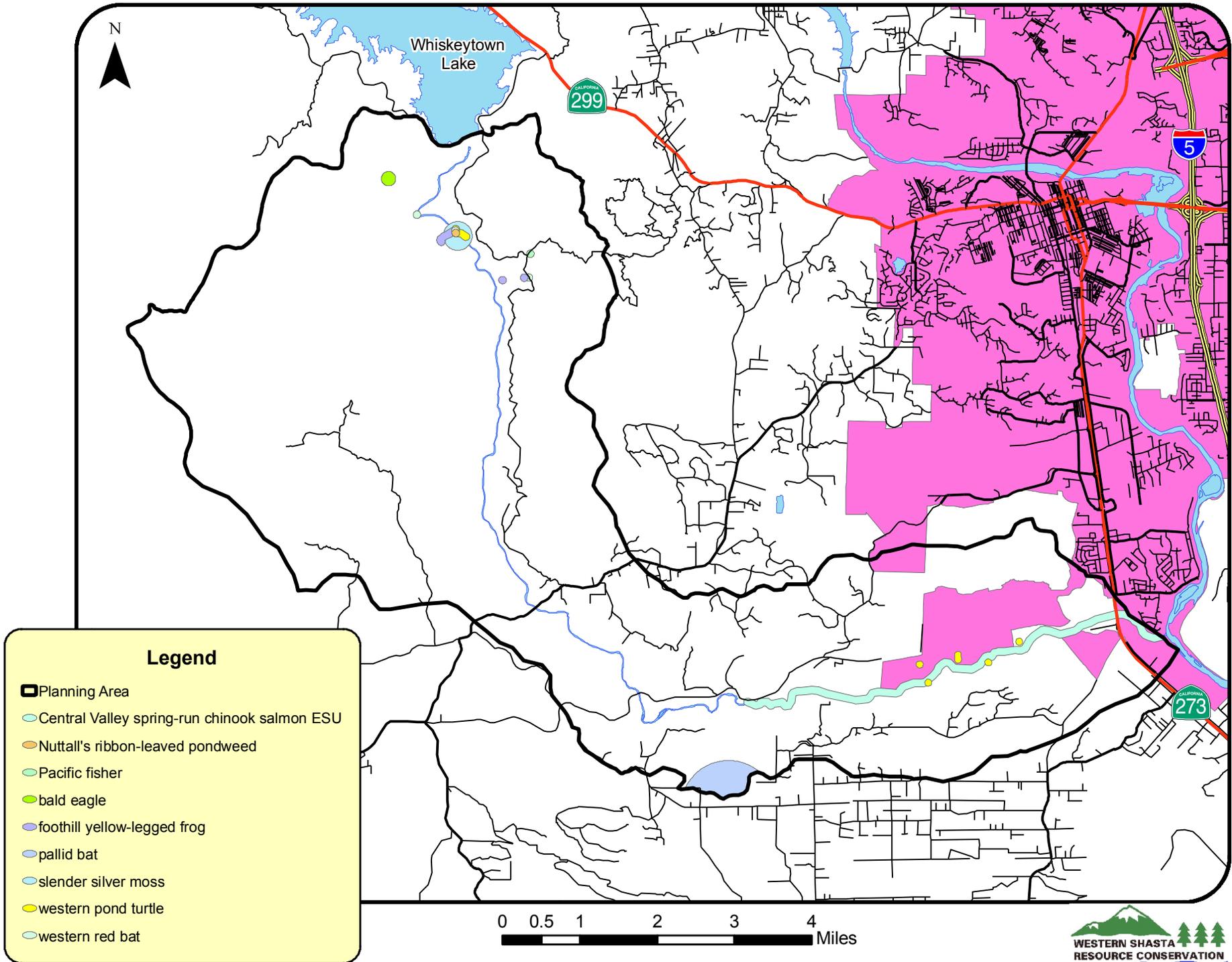
- Planning Area
- Very High Fire Severity Rating



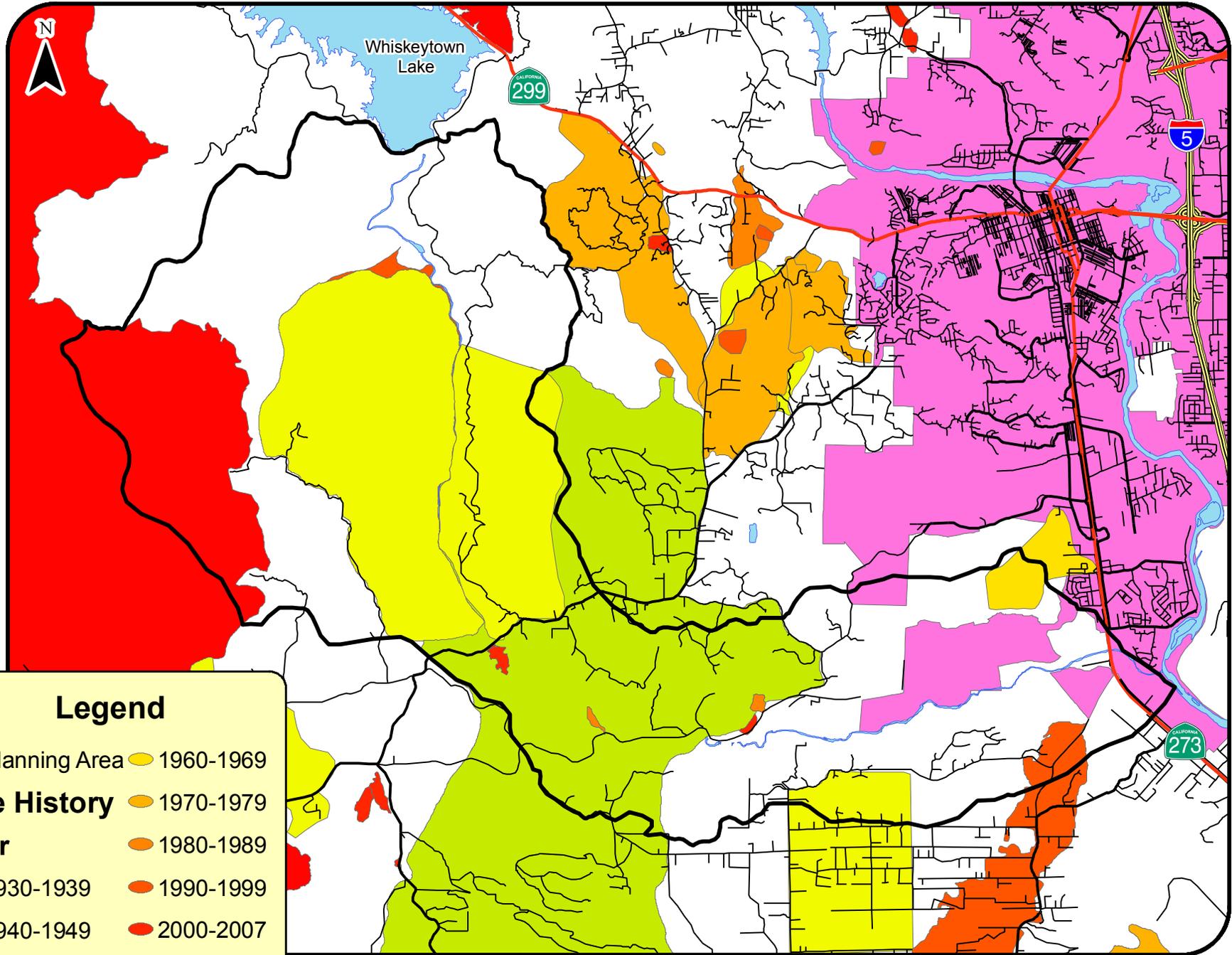
VEGETATION



SPECIAL STATUS WILDLIFE AND PLANT SPECIES

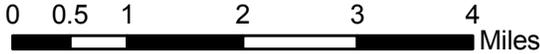


LOWER CLEAR CREEK FIRE HISTORY

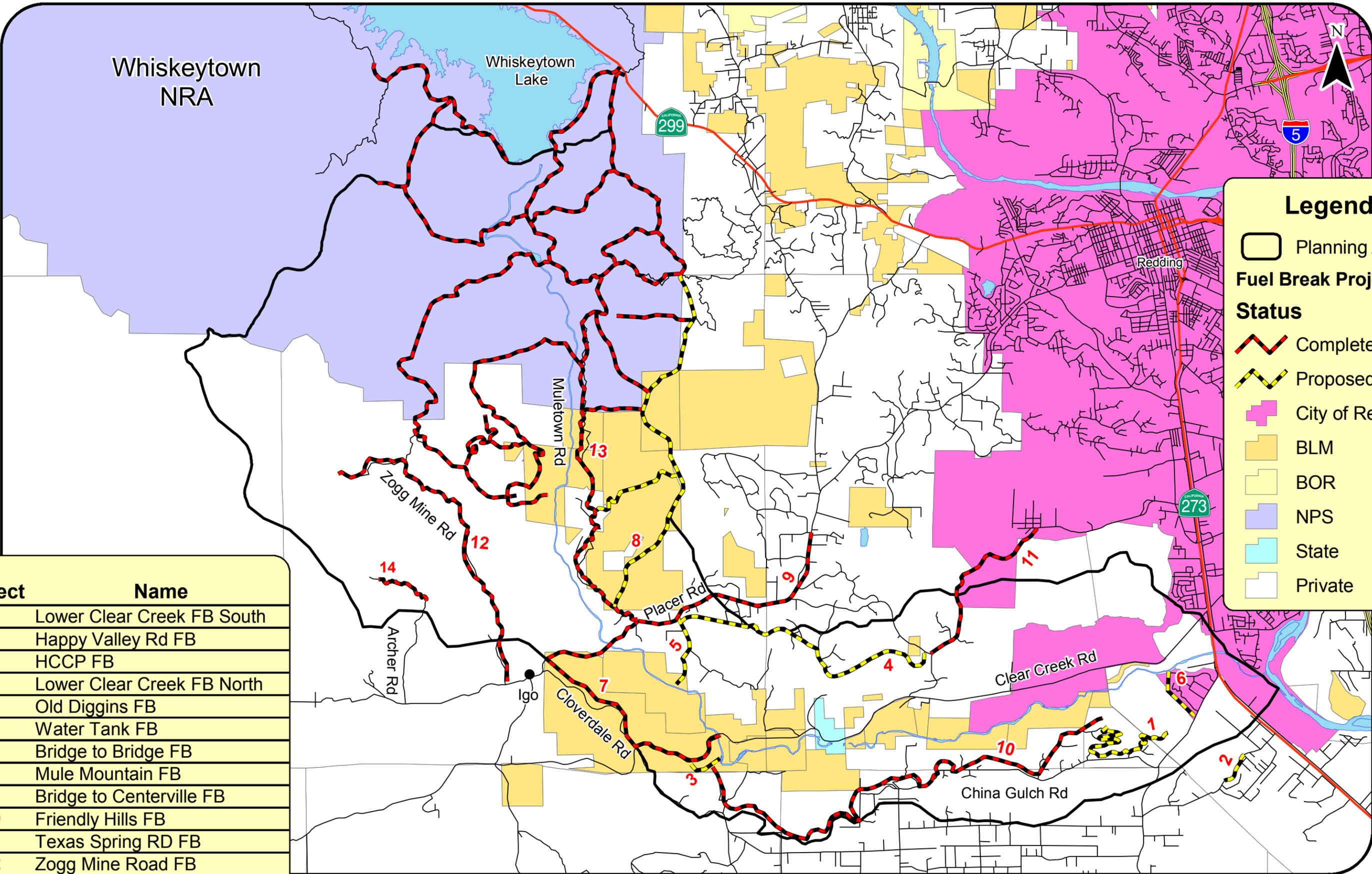


Legend

Planning Area	1960-1969
Fire History	1970-1979
Year	1980-1989
1930-1939	1990-1999
1940-1949	2000-2007
1950-1959	2008-2009



PROJECT MAP



Legend

- Planning Area
- Fuel Break Projects Status**
- Completed
- Proposed
- City of Redding
- BLM
- BOR
- NPS
- State
- Private

Project	Name
1	Lower Clear Creek FB South
2	Happy Valley Rd FB
3	HCCP FB
4	Lower Clear Creek FB North
5	Old Diggins FB
6	Water Tank FB
7	Bridge to Bridge FB
8	Mule Mountain FB
9	Bridge to Centerville FB
10	Friendly Hills FB
11	Texas Spring RD FB
12	Zogg Mine Road FB
13	Muletown Rd FB
14	Archer Rd FB

