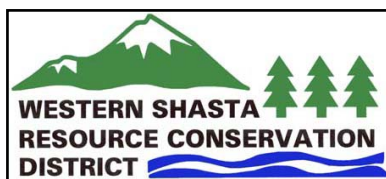


COW CREEK STRATEGIC FUELS REDUCTION PLAN UPDATE 2010



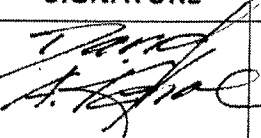

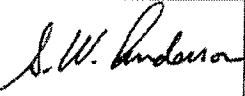
This project was funded through a grant from the
Shasta County Title III Secure Rural Schools Program



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,
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Website: www.westernshastarc.org

**COW CREEK 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

**COW CREEK STRATEGIC
FUELS REDUCTION PLAN UPDATE (2010)**

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**UPDATE TO
THE COW CREEK WATERSHED
STRATEGIC FUEL REDUCTION PLAN and the
BACKBONE RIDGE DEFENSIBLE FUEL PROFILE ZONE PLAN
(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 *Cow Creek Fuels Reduction Plan (July 2003)* and the *Backbone Ridge Defensible Fuel Profile Zone (DFPZ) (December 2002)* (Plans). The DFPZ was written specifically for Backbone Ridge that is the north rim of the Cow Creek Watershed between Highway 299 and Lake Shasta. The Cow Creek Plan covers the remainder of the Cow Creek Watershed. These Plans will be combined into a single document (Plan) through the update. The purpose of the update was to meet with the local Fire Safe Council, watershed group, 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 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 fire safe plan. The recommendations include locating shaded fuelbreaks along key roadways and ridge lines, increasing publicity for the updated fire and community evacuation plan, post the updated Plan on the WSRCD website, and continue annual neighborhood-based fuel reduction work. Background information from the original Plan was included as well as revisions based on new information.

The planning area includes the communities of Palo Cedro, Bella Vista, Whitmore, Oak Run, Round Mountain, and Montgomery Creek. Land ownership is predominately private lands with approximately 98% in private ownership and 2% managed by public agencies. The Latour State Forest is the largest block of public lands in the watershed and is managed by CAL FIRE for multiple uses including sustained yields of timber harvest, recreation, and wildlife management. Population is concentrated in the five major tributaries; Little Cow, Oak Run, Clover, Old Cow and South Cow Creeks. Palo Cedro is largest community.

The Cow Creek Watershed encompasses approximately 275,000 acres and is located in Shasta County on the eastern side of the Sacramento River (**MAP 1**). The topography of the Cow Creek Watershed varies significantly from the flat valley areas around the main stem to mountainous upper reaches. Elevation of the watershed varies from 340 feet above sea level at the valley floor to over 7300 feet at the upper reaches of the watershed. This steep elevational gradient results in a diverse mix of ecotypes throughout the watershed. The summers are hot and dry and winters are cool with moderate rainfall and snow above the 4,000 feet. Annual precipitation ranges from

about 25 inches in the valley to about 65 inches in the northeastern portion of the watershed. Most of the precipitation falls in the winter between November 1 and April 30.

B. BACKGROUND

Fire has played a natural part in the evolution of vegetation within the 127,916 acre planning 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. 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 well 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 number and size of devastating wildfires impacting the western United States over the past ten years resulted in the creation of a National Fire Plan for the U.S. Departments of Interior and Agriculture. The result is that CAL FIRE has recommended a Very High Fire Hazard Severity Rating throughout the planning area (**MAP 2**). Funding has been available through the National Fire Plan, California Fire Plan, and other agencies to assist local communities and watershed groups in identifying, planning, and implementing fuel reduction projects.

II. GOALS AND OBJECTIVES

A. ORIGINAL GOALS AND OBJECTIVES (2002)

- Cow Creek Watershed Strategic Fuel Reduction Plan:
 1. Provide a network of fuelbreaks and large fuel treatment areas at strategic locations in the watershed, helping to reduce or eliminate the spread of wildfire in the watershed.
 2. Allow local and state fire agencies to utilize the fuel reduction areas in their pre-fire planning assessments.
 3. Serve as a catalyst for independent fuels treatment, management and maintenance by private parties in the area.
 4. Develop community support for fuels modification and future maintenance of fuelbreaks.
 5. Spawn new ideas for using excess vegetation as biomass and/or wood products.

- Backbone Ridge DFPZ (2002)
 1. Reduce understory vegetation and eliminate fuel ladders along the ridgetop, thereby reducing the threat and spread of wildfire in the Shasta Trinity National Recreation Area and communities in the Cow Creek Watershed;
 2. Develop a strategic fuel reduction zone that can be incorporated into future fire management plans;
 3. Provide in-place control lines that provide a tactical location for fire suppression forces who could use the area to initiate fire fighting activities;
 4. Be used as safety zones by fire suppression personnel.
 5. Develop community support for fuels modification and future maintenance of fuelbreaks;
 6. Serve as a catalyst for independent fuels treatment by private parties in the fuelbreak area
 7. Spawn other ideas for using excess vegetation as biomass and/or wood products.

B. ADDITIONAL GOALS AND OBJECTIVES (2010)

- Review existing fuel reduction project list to determine what has been completed and if any projects should be modified or dropped.
- Identify new projects.
- Identify assets at risk.
- 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.
- Enter the completed update on the Western Shasta Resource Conservation District’ and Sacramento Watershed Information Model websites.

III. METHODOLOGY

The activities necessary for and the actions taken for the update of the *Plans* are:

ACTIVITY	ACTION
Meet with Cow Creek Board, landowners (residential, farm, ranch, timber), and representatives from local agencies about the scope of the update.	Met with the Cow Creek FSC on July 9, 2009 to brief them on the update and explain the need for input to the categorization and prioritization of the proposed projects.
Present information to the Fire Safe Council, 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.	Made a presentation on the update and requested input at the Cow Creek community meeting on December 2, 2009. Recommendations were incorporated into this update.
Evaluate values at risk, such as structures and natural resources.	Evaluation was accomplished at the 12/10/09 Cow Creek Board/FSC meeting.

ACTIVITY	ACTION
Coordinate with agencies on their management objectives in the watershed.	Confirmed existing agency management objectives with agency representatives and carried them forward to this plan update.
Identify long term maintenance options for fuelbreaks.	Reviewed discussion of options in the 2002 plan with the Cow Creek Board and carried them forward to this plan update.
Identify mechanical treatments and possible uses of excess fuels.	Reviewed the mechanical treatment options in the 2002 Plan with the Cow Creek Board and carried options forward to this Plan update.
Develop a priority list of recommendations and potential funding sources.	Reviewed and amended the potential funding sources from the existing plan
Complete a draft fuel management plan for review by the Cow Creek FSC.	The draft was posted on line for TAC review on 4/19/10.
Present a draft fire reduction plan update to the community, and incorporate recommendations into the final plan update.	Draft Plan was posted online 4/19/10 for public comment. Comment incorporated 5/17/10.

IV. RECOMMENDED ACTIONS

Older fuel reductions efforts within the planning area were focused on prescribed burning through the California Vegetation Management Program administered by CAL FIRE, limited fuelbreaks along roads on private lands and the fuelbreak along Backbone Ridge. All past proposed and completed projects, and new projects have been reviewed and prioritized by the Cow Creek FSC with input from the community. All action items are considered an integral part of any plan to manage the fuels in the planning area. Factors considered in reviewing and developing this list for the update include:

- Fire history for the area, both lightning caused and human caused fires
- Heavy fuel loading conditions with closed canopies
- Assets at risk
- Common wind directions and speed
- Roadsides overgrown with vegetation
- Major topographical features important to fire control and weather patterns which influence fire behavior
- Road access for fire fighters

A. PROPOSED PROJECTS (MAP 6)

**Table 1
Cow Creek Fuel Reduction Projects**

PROPOSED PROJECT	MAP NUMBER	CATEGORY	OVERALL PRIORITY
Buzzards Roost Road FB	1	High	1
Phillips Road FB	2	High	2
Oak Run to Fern Road FB	3	High	3
Fern Road East Road FB	4	High	4
Oak Run Road FB	5	High	5
Whitmore Road FB	6	High	6
McCandless Gulch Road FB	7	High	7

#1 Concern – Poor Fire Access and Escape along Buzzards Roost Road: The Buzzards Roost Road Fuelbreak is an important project to be implemented because it:

- Provides another link in the fuelbreak system to the Oak Run Road Fuelbreak;
- Provides protection to the areas numerous private residences that are vulnerable to being destroyed by wildfire;
- Ties the eastern end of the project into areas burned under the Fountain Fire; and
- Identifies firefighter safety zones in conjunction with the fuelbreak development to provide fire suppression forces strategic locations for planning fire management and suppression actions.

Proposed Solution:

1. Construct shaded fuelbreaks along Buzzards Roost Road: 4 miles long x 100 feet on each side = 97acres.
2. Encourage residents to develop defensible space/Firewise activities around their homes.

Ownership = 100% private land
 Number of dwellings = 39
 Value of dwellings = \$10,356,060
 Number of people = 102
 Number of outbuildings = 78
 Value of outbuildings = \$3,510,000



Buzzards Roost, Sections 1 and 2: Note dense vegetation up to the edge of the road

#2 Concern – Poor Fire Access and Escape Along Phillips Road: The Phillips Road Fuelbreak is an important project to be implemented because it:

- Provides another north-south fuelbreak in the watershed, predominantly within mixed conifer forests and perpendicular to prevailing winds;
- Provides important access for fire suppression forces in this portion of the watershed; and
- Connects to the proposed fuelbreak on Oak Run to Fern Road, which provides another level of protection to residents and property in this area.

Proposed Solution:

1. Construct shaded fuelbreaks along Phillips Road: 7.3 miles long x 100 feet on each side = 177 acres.
2. Encourage residents to develop defensible space/Firewise activities around their homes.

Ownership = 100% private land
Number of dwellings = 156
Value of dwellings = \$41,424,240
Number of people = 406
Number of outbuildings = 312
Value of outbuildings = \$17,040,000

Phillips Road Fuelbreak: Note dense brush and trees up to edge of the road



#3 Concern – Poor Fire Access and Escape Along Oak Run to Fern Road: The Oak Run to Fern Road Fuelbreak is an important project to be implemented because it:

- Is located in an area that has had little fuel reduction activities implemented in the past;
- Provides a critical first step in providing a strategic fuel reduction project in the area;
- Provides a fuelbreak perpendicular to prevailing winds;
- Helps protect life and property of numerous private residences that are vulnerable to being destroyed by wildfire;
- Identifies firefighter safety zones in conjunction with the fuelbreak development will provide fire suppression forces strategic locations for planning fire management and suppression actions;
- Provides relatively low cost for implementation for about one-half of the project; and
- Enables other areas of dense conifer vegetation to be treated with mechanical methods and commercial harvests (both biomass and timber), which will speed implementation and reduce overall project costs.

Proposed Solution:

1. Construct shaded fuelbreaks along Oak Run to Fern Road: 16.2 miles long x 100 feet on each side = 393 acres.
2. Encourage residents to develop defensible space/Firewise activities around their homes.

Ownership = 100% private land
Number of dwellings = 188
Value of dwellings = \$55,852,920
Number of people = 489
Number of outbuildings = 376
Value of outbuildings = \$16,920,000

Oak Run to Fern Road Fuelbreak: Note dense brush and trees up to the edge of the road



#4 Concern – Poor Fire Access and Escape Along Fern Road East: The Fern Road East Fuelbreak is an important project to be implemented because it:

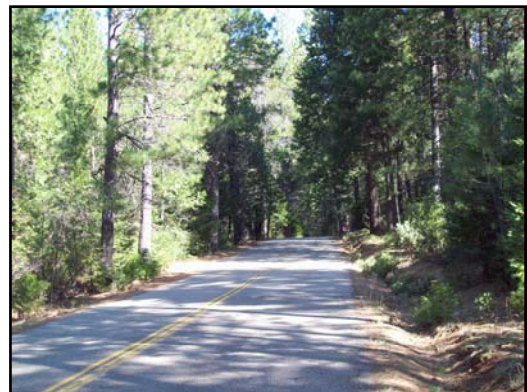
- Links to the Oak Run to Fern Road Fuelbreak, providing a continuous fuelbreak from Highway 299 to Whitmore Road;
- Is perpendicular to prevailing winds;
- Helps protect life and property of the numerous private residences that are vulnerable to being destroyed by wildfire;
- Provides a critical access route for fire suppression forces accessing both sides of the Cow Creek Watershed; and
- Identifies firefighter safety zones in conjunction with the fuelbreak development will provide fire suppression forces strategic locations for planning fire management and suppression actions.

Proposed Solution:

1. Construct shaded fuelbreaks along Fern Road East: 7.7 miles long x 100 feet on each side = 187 acres.
2. Encourage residents to develop defensible space/Firewise activities around their homes.

Ownership = 100 % private land
Number of dwellings = 150
Value of dwellings = \$44,563,500
Number of people = 390
Number of outbuildings = 300
Value of outbuildings = \$13, 500,000

Fern Road East Fuelbreak. Note dense brush and trees up to the edge of the road



#5 Concern – Poor Fire Access and Escape Along Oak Run Road: Implementation of the Oak Run Fuelbreak is an important project to be implemented because it:

- Provides the start of a north-south fuelbreak that will begin to divide the Cow Creek Watershed, helping to keep fire from spreading up the watershed into heavier fuels and will be perpendicular to prevailing winds in most locations;

- Helps protect numerous private residences that are vulnerable to being destroyed by wildfire, and fuel reduction will help protect life and property;
- Identifies firefighter safety zones in irrigated pastures and other clearings in conjunction with the development of the fuelbreak that will provide fire suppression forces strategic locations for planning fire management and suppression actions; and
- Enables vegetation to be treated with mechanical methods and commercial harvests (both biomass and timber), which will speed implementation and reduce overall project costs.

Proposed Solution:

1. Construct shaded fuelbreaks along Oak Run Road: 18 miles long x 100 feet on each side = 437 acres.
2. Encourage residents to develop defensible space/Firewise activities around their homes.

Ownership = 100% private land
 Number of dwellings = 180
 Value of dwellings = \$52,887,600
 Schools = 1
 Value of schools = \$5,000,000
 Fire Station = 1
 Value of Fire Station = \$200,000
 Number of people = 468
 Number of outbuildings = 360
 Value of outbuildings = \$16,200,000

Oak Run Road between Highway 299 and Buzzards Roost Road. Lower elevations along Oak Run Road are dominated by oak woodlands which do not require construction of a shaded fuelbreak.



#6 Concern – Poor Fire Access and Escape Along Whitmore Road: Implementation of the Whitmore Fuelbreak is an important project to be implemented because it:

- Provides a significant east-west fuelbreak from Millville to Whitmore, effectively bisecting the southern 1/3 of the watershed;
- Reduces fuels around residences, helping to protect them from being destroyed by wildfire;

- Develops large block burning activities through the CVMP on lands adjacent to the fuelbreak, effectively protecting much larger areas of the watershed; and
- Enables vegetation to be treated with mechanical methods and commercial harvests (both biomass and timber), which will speed implementation and reduce overall project costs.

Proposed Solution:

1. Construct shaded fuelbreaks along Whitman Road: 6 miles long x 100 feet on each side = 146 acres
2. Encourage residents to develop defensible space/Firewise activities around their homes.

Ownership = 100% private land
 Number of dwellings = 103
 Value of dwellings = \$30,263,460
 School = 1
 Value of School = \$5,000,000
 Number of people = 268
 Number of outbuilding = 206
 Value of outbuildings = \$9,270,000

Whitmore Road east of Whitmore. Lower elevations along Whitmore Road are dominated by oak woodlands which do not require construction of a shaded fuelbreak.



#7 Concern – Poor Fire Access and Escape Along McCandless Gulch Road: The McCandless Gulch Road Fuelbreak is an important project to be implemented because it:

- Provides an north-south fuelbreak through commercial timberlands that can have extremely active fire behavior and very high fire severity;
- Utilizes existing and planned fuelbreaks and forest management activities;
- Provides protection to the upper watershed, as part of a series of three interconnected fuelbreaks (Tamarack, Ponderosa, and Bateman); and

Proposed Solution:

1. Construct shaded fuelbreaks along McCandless Gulch Road: 12.5 miles long x 100 feet on each side = 303 acres.

- Encourage residents to develop defensible space/Firewise activities around their homes.

Ownership = 100% private land
 Number of dwellings = 2
 Value of dwellings = \$531,080
 Number of people = 6
 Number of outbuildings = 4
 Value of outbuildings = \$180,000



McCandless Gulch Road Fuelbreak: Note dense brush and trees up to the edge of the road.

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

BASIC ASSUMPTIONS	
People	2.6 per dwelling
Dwellings	818
Property Value:\$281,315 per dwelling	\$230,115,670
Outbuildings: 1636 @ \$45,000 per building	\$73,620,000
Schools @ \$5 million per school	\$15,000,000
Power line -216 miles @ \$250,000/mile	\$54,000,000

Community, structure or area at risk	Map Number	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignit-ability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Buzzards Roost Road FB	1	High	High	High	Low/High	High	Very High
Phillips Road FB	2	High	High	High	Low/High	High	Very High

Community, structure or area at risk	Map Number	Fuel Hazard	Risk of Wildfire Occurrence	Structural Ignitability	Preparedness and Firefighting Capability	Overall Risk	Fire Hazard Severity Zone Rating
Oak Run-to-Fern Road FB	3	High	High	High	Low/High	High	Very High
Fern Road East Road FB	4	High	High	High	Low/High	High	Very High
Oak Run Road FB	5	High	High	High	Low/High	High	Very High
Whitmore Road FB	6	High	High	High	Low/High	High	Very High
McCandless Gulch Road FB	7	High	High	High	Low/High	High	Very High

C. 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
Buzzards Roost Road FB	1	High	39	Low	Hand Labor	Brush and tree removal, pruning	1
Phillips Road FB	2	High	156	High	Hand Labor	Brush and tree removal, pruning	2
Oak Run-to-Fern Road FB	3	High	188	High	Hand Labor	Brush and tree removal, pruning	3
Fern Road East Road FB	4	High	150	High	Hand Labor	Brush and tree removal, pruning	4
Oak Run Road FB	5	High	180	High	Hand Labor	Brush and tree removal, pruning	5
Whitmore Road FB	6	High	103	High	Hand Labor	Brush and tree removal, pruning	6
McCandless Gulch Road FB	7	High	2	High	Hand Labor	Brush and tree removal, pruning	7

D. ESTIMATED COSTS:

The following table displays a list of projects recommended by the TAC and the community.

Project Name	Map Number	Acres	Funding Needs (\$)¹	Community Priority Recommendation
Buzzards Roost Road FB	1	110	\$277,400	1
Phillips Road FB	2	202	\$534,400	2

¹ Projected costs for planning only. More precise costs will be determined when grant applications are prepared.

Project Name	Map Number	Acres	Funding Needs (\$)¹	Community Priority Recommendation
Oak Run-to-Fern Road FB	3	6	\$46,500	3
Fern Road East Road FB	4	108	\$303,000	4
Oak Run Road FB	5	24	\$86,500	5
Whitmore Road FB	6	106	\$293,400	6
McCandless Gulch Road FB	7		\$197,900	7

E. PROJECT MAINTENANCE PRIORITY

Project	Map Number	Completed	Maintenance Priority
Backbone Ridge DFPZ FBs	8	2003 - 2005	1
Tamarack Road FB	9	Unknown	2
Bateman Road FB	10	Unknown	3
Backbone-McCandless Gulch FB	11	2010-2011	4
Ponderosa Way FB	12	Ongoing	Maintained by CAL FIRE

#1 Maintenance concern: Backbone Ridge Defensible Fuel Profile Zone (DFPZ)

Fuelbreaks: When initially conceived, the Backbone Ridge DFPZ was divided into 5 sections: 1. Sugarpine Shaded Fuelbreak, 2. Jones Valley East Shaded Fuelbreak, 3. Fenders Ferry Shaded Fuelbreak, 4. Jones Valley West Shaded Fuelbreak, and 5. McCandless Gulch Shaded Fuelbreak. Sections 1 through 4 of the Backbone Ridge DFPZ were constructed from 2003 – 2005.

Proposed solution: Conduct maintenance on Sections 1-4 shaded fuelbreaks: 17 miles long x 300 feet on = 619 acres.

#7 Concern – Regrowth of flammable fuels along Tamarack Road:

Proposed Solution:

1. Conduct maintenance along Tamarack Road: 11 miles long x 200 feet wide = 267 acres.
2. Encourage residents to develop defensible space/Firewise activities around their homes.

#8 Concern – Regrowth of flammable fuels Along Bateman Road:

Proposed Solution:

1. Conduct maintenance along Bateman Road: 12.5 miles long x 100 feet on each side of the road = 303 acres.

2. Encourage residents to develop defensible space/Firewise activities around their homes.

#4 Maintenance concern: Regrowth of flammable fuels along Back Bone Ridge DFPZ Section 5, McCandless Gulch (newly constructed in 2010-2011)

Proposed solution: Conduct maintenance on the existing fuelbreak 7.1 miles long x 300 feet wide = 259 acres.

V. PLAN UPDATES:

The Cow Creek Fire Safe Council and Fire Agencies intend to annually assess progress 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 and approved by the Shasta County Board of Supervisors.

VI. VALUES AT RISK

A. RESIDENCES AND MAJOR STRUCTURES

The landscapes of residential settlements are a particularly sensitive aesthetic resource. Research has demonstrated that as many as one in five residents in the wildland-urban intermix feel a lush landscape today is more important than saving their home from a wildfire that may or may not occur. Comments in focus groups and public meetings reinforce the notion that rich vegetation across the landscape is essential to the quality of life they experience as part of living in a forest landscape



Oak Run Country Store



Oak Run Volunteer Fire Department Station



Whitmore Community
Center



Whitmore School

In community discussions throughout the west, the importance of the landscape arose many times. Saving the landscape from catastrophic fire was a common motivation of those strongly supporting hazard fuel reduction efforts; while others objected to removal of the understory for fear the openness would decrease their privacy. Those people in particular wanted to keep the landscape in what they perceived to be a natural state.

B. FOREST LAND

Private timber production zones occupy about 71,690 acres in the higher elevations in the Planning Area. These lands are managed primarily by William Beatty and Associates, Roseburg Lumber and Sierra Pacific Industries for commercial purposes and are regulated by the California Forest Practice Rules. The intent of the Forest Practice Act is to “create and maintain an effective and comprehensive system of regulation and use of all timberlands so as to assure that: a) where feasible, the productivity of timberlands is restored, enhanced and maintained; and b) the goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to recreation, watershed, wildlife, range, forage, fisheries, regional economic vitality, employment and aesthetic enjoyment.”

C. VEGETATION AND WILDLIFE (MAPS 3 & 4)

The Cow Creek planning area contains a diverse number of vegetative communities and wildlife habitats ranging from coniferous forests, to oak woodlands, to chaparral, to mixed vegetative communities, to farmland, and urban communities (MAP 3). Consequently, there are a wide range of wildlife and plant species present. Some of these species are rare and have some form of either state of California or federal protection (Special Status Species). The following table shows these Special Status Species known to occur within the area. These species sighting locations is 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 planning 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 Cow Creek Planning Area

Scientific Name	Common Name	Legal Status ¹
<i>Accipiter gentilis</i>	northern goshawk	CSC
<i>Actinemys marmorata</i>	western pond turtle	CSC
<i>Agrostris hendersonii</i>	Henderson's bentgrass	CNPS-1B
<i>Ascaphus truei</i>	Pacific tailed frog	CSC
<i>Bothrychium crenulatum</i>	Scalloped moonwort	CNPS 2
<i>B. virginianum</i>	Rattlesnake fern	CNPS 2
<i>Branchinecta lynchi</i>	Vernal pool fairy shrimp	Fed. Threat.
<i>Calochortus syntrophus</i>	Callahan's mariposa lily	CNPS-1B
<i>Clarkia borealis ssp. borealis</i>	northern clarkia	CNPS-1B
<i>Cryptantha crinita</i>	Silky cryptantha	CNPS-1B
<i>Euderma maculatum</i>	Spotted bat	CSC
<i>Erythronium citrinum var. roderickii</i>	Scott Mountains fawn lily	CNPS-1B
<i>Falco peregrinus anatum</i>	American peregrine falcon	Fed.-delisted
<i>Haliaeetus leucocephalus</i>	bald eagle	Fed. De-listed.
<i>Hydromantes shastae</i>	Shasta salamander	CA Threat.
<i>Juncus leiospermus var. leiospermus</i>	Red Bluff dwarf rush	CNPS-1B
<i>Lepidurus packardi</i>	Vernal pool tadpole shrimp	Fed. Endang.
<i>Limnanthes floccosa ssp. bellingeriana</i>	Bellinger's meadowfoam	CNPS-1B
<i>Neviusia cliftonii</i>	Shasta snow-wreath	CNPS-1B
<i>Oncorhynchus tshawytscha winter-run</i>	Chinook winter-run	CA End.; Fed. End.
<i>Orcuttia tenuis</i>	Sender orcutt grass	CNPS-1B
<i>Pandion haliaetus</i>	osprey	Formerly Protect. Under CA For. Pract. Rules
<i>Paronychia ahartii</i>	Ahart's paranychia	CNPS-1B
<i>Parnassia cirrata var. intermedia</i>	Cascade Parnassia	CNPS-2
<i>Potentilla newberryi</i>	Newberry's cinquefoil	CNPS-1B
<i>Rana boylei</i>	foothill yellow-legged frog	CSC
<i>R. cascadae</i>	Cascades frog	CSC
<i>Riparia riparia</i>	Bank swallow	CA Threat.

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.

D. SOILS

Fuels management activities located on unstable soils or on slopes in excess of 40% can stimulate erosion processes or exacerbate existing erosion problems; therefore, prior to any fuels management activities, all soil types within any future project area will be identified and evaluated to determine the erosion hazard. Projects will 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 fire resistant vegetation as a means to provide soil stabilization. The locations of major soil types have been illustrated in Map 6; however, more detailed soils mapping information should be examined once specific project boundaries have been established.

High intensity wildfire also damages soil by incinerating roots and the humus layer (organic portion of soils) that hold soils together and provide 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 also destroyed. These invertebrates eventually re-establish their populations, but time is lost in maintaining and building up the soils. Therefore, continual burning over time will result in gradual soil depletion, much the same as continual plowing and crop harvesting will deplete the soil of mineral nutrients and negatively affect the soil structure (Richards, 2002). 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 the negative effects.

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. Conversely, 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 120 degrees Fahrenheit (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 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 also 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 pre-fire 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 pre-fire management and suppression and increased emergency fund expenditures, disaster funding, and private taxpayers' expenditures and losses.

CAL FIRE is responsible for fire suppression on privately-owned wildlands and provides emergency services under cooperative agreements with the counties. The overall goal of the plan is to reduce total costs and losses from wildland fire by protecting assets at risk through focused pre-fire 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. 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 www.firesafecouncil.org 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.

D. UNITED STATES FOREST SERVICE

The USDA Forest Service administers about 3,653 acres (Shasta Trinity NF = 481; Lassen NF = 3,172) or 1.3% of the land within the planning area. The lands are managed by the STNF are part of the Shasta Trinity National Recreation Area. The LNF lands are managed as part of the Hat Creek Ranger District of the Lassen National Forest. Responsibility for fire incidents is dependent upon where the fire is located, and can include CAL FIRE, the Hat Creek Ranger District, The Shasta Lake Ranger District, or the Shasta County Fire Department (Shingletown VFD, Hat Creek VFD, Oak Run VFD, and Whitmore VFD).

The Shasta-Trinity National Forest Service (STNF) completed a *Fuels Analysis and Strategy* to provide a basis for managers to make decisions concerning placement and priorities of fuels management projects. It is a unit level analysis meant for forest level considerations. The report states it may also be used as a tool for project level planning.

The analysis characterizes the STNF in terms of hazard, risk and value. Hazard is defined as fire behavior potential, which has implications for resource damage as well as suppression capability. Risk is the probability of a fire occurring based on local fire history. Value refers to the monetary, ecological or political worth of a definable area. All three values (hazard, risk and value) are quantified by a measure of low, moderate, or high through a combined use of scientific data and technical expertise, and displayed in a GIS map. The three are then combined to get an overall rating.

The final step of this analysis prioritizes the forest in terms of critical fire danger areas based on the hazard, risk and value ratings and management needs. These priorities align with the National

Fire Plan and the Cohesive Strategy and will guide resource management considerations on the forest, such as natural fuels project priorities and identification of essential road access for protection purposes. The national priorities are wildland-urban interface, readily accessible municipal watersheds, threatened and endangered species habitat, and maintenance of existing low risk Condition Class I areas.

E. BUREAU OF LAND MANAGEMENT

The Bureau of Land Management (BLM) administers about 3,201 acres or 1% of the land in the planning area. All BLM lands with burnable vegetation must have an approved Fire Management Plan (FMP), a strategic plan that defines a program to manage the wildland and prescribed fires based on the area's approved land management plan (U. S. Department of Interior, U.S. Department of Agriculture, 2002). The FMP provides for firefighter and public safety, includes fire management strategies, tactics and alternatives, addresses values to be protected and public health issues, and is consistent with resource management objectives, activities of the area and environmental laws and regulations. Until an FMP is approved, BLM units must take aggressive suppression action on all wildland fires consistent with firefighter safety and public safety and the resources to be protected. The BLM Fire Management Officer is responsible and accountable for providing leadership for the BLM fire and aviation management program at the local level.

BLM strategically focuses fuel treatment activities by placing priorities on areas where actions will mitigate threats to the safety of employees and the public, areas where actions will protect, enhance, restore and/or maintain plant communities and habitats that are critical for endangered, threatened or sensitive plant and animal species, and areas where actions will reduce risks and damage from a wildfire.

Although structural fire suppression is the responsibility of tribal, state or local governments, BLM may assist with exterior structural protection activities under a formal agreement with CAL FIRE (as of 2003, CAL FIRE is under contract to provide fire protection to BLM lands). There are three categories of structures: those not threatened; those threatened; those lost or too dangerous to protect. In the wildland-urban interface, BLM lists several "Watch Outs" that assist personnel in sizing up a wildfire situation. These Watch Outs may be beneficial to readers of this report in assessing the fire-safe condition of personal property. Watch Out for:

- Wooden construction and wood shake roofs
- Poor access and narrow one-way canyons
- Bridge weight and size limits when using heavy equipment
- Inadequate water supply
- Natural fuels 30' or closer to structures
- Evacuations of public, livestock, pets, animals (planned or occurring)
- Power lines and poles overhead and fallen lines
- Propane and above-ground fuel tanks with nearby vegetation or wooden improvements
- Local citizens attempting suppression actions
- Level of coordination with multiple agencies

F. TIMBER PRODUCTION ZONES

About 71,690 acres or 26% of the planning area are owned by commercial forest landowners who manage the lands as Timber Production Zones (TPZs), which are restricted to timber production and certain compatible uses. Sierra Pacific Industries, Roseburg Lumber, and W. M. Beatty & Associates are the primary commercial forest landowners in the watershed.

Typically, all contractors and employees permitted on private forest land are required to make every effort and take all precautions necessary to prevent fires. A sufficient supply of hand tools are 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 forest land 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 in the watershed totals about 187,691 acres or 68% of the Cow Creek FSC Area. Use is primarily agriculture, grazing, and residential.

VIII. ANALYSIS OF FUEL INVENTORY AND FIRE 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.

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 fuel breaks 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)

- 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 - the oven dry weight of fuels in a given area, usually expressed in 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 2000 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 - either retards or increases the rate of combustion.

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

B. RECENT HISTORY OF MAJOR FIRES (MAP 5)

The Cow Creek Watershed has experienced several major fires in the last 30 years, plus numerous smaller fires each year that were caught in initial stages by aggressive fire suppression or otherwise restrained by less than perfect fire weather conditions. CAL FIRE records indicate a total of 42 wildfires have occurred within the planning area. Nine have been in excess of 3,000 acres. The two largest fires were the 1992 Fountain Fire at 65,300 acres and the 1999 Jones Fire at 26,020 acres.

Seven other major fires occurred in Shasta County in the last two decades: the 2001 Canyon Fire near Happy Valley burned 2,580 acres; the 2001 Jones Fire near Bella Vista burned 26,020 acres; the 2004 French Fire burned 12,675 acres; the 2008) Motion Fire burned 28,330 acres; the 2008 Moon Fire burned 35,312 acres, and the Chalk Fire burned 6923 acres. These fires were wind driven events, resulting in extreme fire behavior and great property and timber losses.

In summary, with heavy fuel loading, hot temperatures, critically low humidity, and strong north winds, a major wildfire potential exists in the Cow Creek watershed.

C. FUEL INVENTORY

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 basically related to the fuel load and its distribution among the fuel diameter-size classes. In 1972, 13 mathematical fire behavior models or Fuel Models were developed by Rothermel (1972) to be utilized in fire behavior predictions and applications for every vegetation type. These Fuel Models represent the types of fuel most likely to support a wildfire.

**TABLE 3
FUEL MODEL TYPES**

Fuel Model	Fuel Complex
	Grass and Grass-Dominated
1	Short Grass (1 foot)
2	Timber (grass and understory)
3	Tall Grass (2.5 feet)
	Chaparral and shrub fields
4	Chaparral (6 feet)
5	Brush (2 feet)
6	Dormant brush, hardwood slash

Fuel Model	Fuel Complex
7	Southern rough
	Timber litter
8	Closed timber litter
9	Hardwood litter
10	Timber (litter and understory)
	Slash
11	Light logging slash
12	Medium logging slash
13	Heavy logging slash

The fuel models were designed to estimate fire behavior during severe fire hazard conditions when wildfires pose greater control problems and severely impact natural resources. 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.

D. RESULTS OF FUEL INVENTORY

Personal communication with CAL FIRE staff familiar with the planning area, revealed nine of the thirteen fuel models occurring in the planning area. These include Fuel Model 1 (grass), Fuel Models 4 and 5 (shrub), Fuel Models 8, 9, and 10 (timber litter), and Fuel Models 11, 12, 13 (logging slash).

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 FUEL BREAKS

Shaded fuel breaks are constructed to create defensible space where firefighters can conduct relatively safe fire suppression activities. Shaded fuel breaks 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 fuel breaks 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 fuel break, exempts community fuel breaks 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.
- Fuel breaks 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, fuel breaks should compliment natural or man-made barriers such as meadows, rock outcroppings, and roadways.
- A maintenance plan should be developed before construction of a fuel break. 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 fuel breaks. 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. 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 have the potential to be converted into alternative fuels (biofuels), such as ethanol, methanol, and biodiesel. The typical use of biomass is for as boiler fuel to be used 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 a majority 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 potential development and utilization of biofuels as a means to reduce the world's dependency on non-renewable fossil fuels. Presently, a majority of the electricity in the U.S. is generated by burning fossil fuels such as coal, natural gas, and oil. On the local level, the development of biotechnology also offers both economic and socioeconomic benefits. The Cottonwood Creek Watershed contains thousands of acres of forestland, which produce a substantial amount of renewable biomass each year. The biomass market associated with wood products production has been long developed, and biomass harvesting for fuel reduction has been a common practice within managed forestlands in Northern California. Biomass production, since the late 1980's, 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 chaparral, which produce a significant amount of renewable biomass, and although only a small portion of the biomass produced from chaparral landscapes is utilized for biomass.

The potential for biomass production within the Cow Creek Watershed is good given that the watershed contains a substantial amount of raw material (chaparral and forestland species). In

addition, the watershed is located within close proximity to a 50-megawatt wood-fired power plant, Wheelabrator Shasta Energy in Anderson, 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 Cow 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, moisture, 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 transport van, moisture content of the fuel, 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 determines the economic feasibility of an operation. However, the value of fuel reduction to the landowner is a real value and should be considered 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.

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



Using mechanized equipment for reducing fuels loads on suitable topography and with 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 contractor 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 XII 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 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 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, as a means to minimize erosion and compaction. 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 fast becoming the acceptable method of fuel reduction in urban interface areas. Compared to prescribed fire, mechanical treatment involves less risk, produces less air pollutants, is more aesthetically pleasing, and allows landowners to leave desirable vegetation.

Pursuant to the California Forest Practice Rules, if biomass operations involve the harvest of commercial species, the project requires a permit issued by the California Department of Forestry and Fire Protection. Biomass operations which do not involve the harvest of commercial species are not subject to the California Forest Practice Rules, but 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.

Although the biomass 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 biofuel 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 fuel breaks, as well as a maintenance strategy for all planned shaded fuel breaks need to be formulated as soon as funding can be made available. A maintenance section needs to be added to all planned shaded fuel breaks. 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 fuel break. 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. 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 fuel breaks 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 fuel breaks:

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. Dozer Lines

The use of dozer/disc trails parallel to roadways is a common method to create a firebreak for ranchers in the north state. The firebreak is normally scraped, dug, bladed, or disced to mineral soil and provides a control point from which firefighters can work. Dozer lines are not aesthetically pleasing, but on a ranch are very effective

3. Herbivores

Herbivore (goat) grazing may be used as a means of maintaining fuel breaks, 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. Fire control or containment with goats takes coordination of the stock owner, land steward, local fire patrol, professional fire abatement teams, CAL FIRE, DFG, and others.

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 stock owner, land steward, local fire patrol, professional fire abatement teams, CAL FIRE, CDFG, 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.

Herbivores Used In Fuel Reduction



4. 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 forest land will entail a thorough investigation of the site. Soil depth, type, aspect, and exposure will all 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 forest land 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 communities, homes, and wild places in the watershed. Additionally, roads provide strategic locations for roadside fuel breaks and offer a defensible space from which firefighters can conduct direct attack on wildfires. Roadside fuel breaks also provide a safe escape route for residents in the event of a wildfire.

The primary east-west roads in the planning area are State Highway 44 and Highway 299E. They intersect the Interstate 5 corridor, which is the major connection route throughout the area. Other highly important east-west roads are Oak Run Road and Whitmore Road. The primary north-south road through the western portion of the planning area is Deschutes Road, which intersects both Highway 299E and State Highway 44. Several small narrow winding interconnected roads serve as the primary north-south corridor in the eastern portion of the area. These include Buzzards Roost Road, Phillips Road, Oak Run to Fern Road, which intersect with Highway 299E, Oak Run Road, and Whitmore Road. Other similar roads provide access in the eastern portion of the planning area. These include Fern Road East, Tamarack Road, Bateman Road, and Ponderosa Way Road.

XI. POTENTIAL COST SHARE FUNDING SOURCES

The following table is a list of cost share programs provided by the University of California, Cooperative Extension Service (UCCE).

**TABLE 4
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 RCD.
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 involve 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 & woodland health, water quality, or wildlife & fisheries

Program	Goals	Services	Will Fund	Agency	Who	Limitations
						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 create 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
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	Approved practices up to \$10,000 per producer per year. Must have

Program	Goals	Services	Will Fund	Agency	Who	Limitations
		ance			needs	Conservation Plan approved by RCD.
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

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
- Tehama County Regional Advisory Committee, Title II Funds, Secure Rural Schools and Community Self-Determination Act of 2000

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 USDA Forest Service' National Fire Plan. This plan provides grant funding for fuel reduction projects on private lands. In addition, many of the programs listed in Table 4 above also provide funding opportunities for fuels reduction and maintenance. Future legislation, such as AB 1983, may also provide funding for fuels reduction projects.

California Assembly Bill AB 1983 was introduced by Assembly Member Dickerson on February 14, 2002. The bill would enact the California Fuel Hazard Reduction Act to be administered by the California Department of Forestry and Fire Protection (CAL FIRE), in consultation with the Department of Food and Agriculture, to encourage the development of wildland fuel reduction practices. The bill would establish the Fuel Hazard Reduction Fund in the State Treasury to fund the program. CAL FIRE would be authorized to spend up to 5% of the fund balance for program administration and wildfire cost collection. The bill would authorize the allocation of up to 10% of the fund balance to agencies and institutions each fiscal year for fuel management

research purposes. In addition, the bill would establish a cost-share assistance program and would permit the director to fund up to 90% of the cost to complete an eligible wildland fuel reduction project. This bill would establish both the procedure by which applicants may apply for assistance and the process used by the director to grant funds. The full text of the bill can be found at www.leginfo.ca.gov. As of this writing, the bill will likely be reintroduced at the next legislative session.

In addition, many private sector programs are available. 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. WSRC has the mechanism in-place to seek funding for any projects generated through this plan. The Lakehead FSC is a 501-c-3 non-profit, and will be able to apply for grant funds also. 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), USDA Forest Service, 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

APPENDIX A: GLOSSARY

APPENDIX B: COMMUNITY FIRE SAFE FUEL REDUCTION GUIDELINES

MAPS

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.

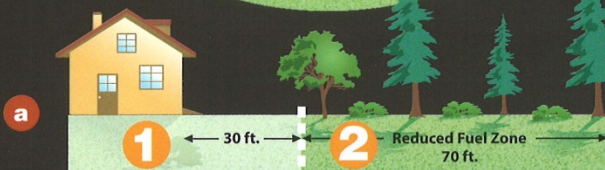
Shaded Fuelbreak – A wide strip or block of land on which the vegetation has been modified by reducing the amount of fuel available, rearranging fuels so that they do not carry fire easily, and replacing particularly flammable fuels with others that ignite less easily and burn less intensely.

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

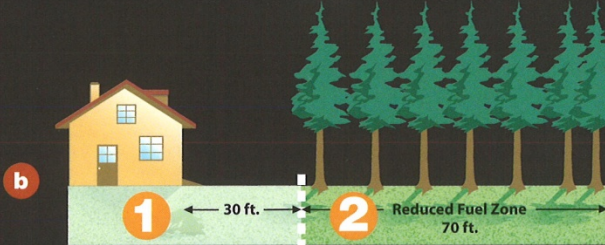
Topography – The configuration of the earth's surface, including its relief and the position of its natural and manmade features.

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.

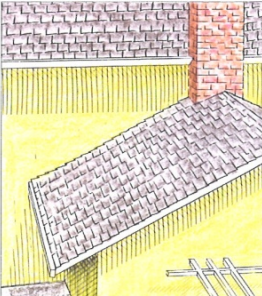
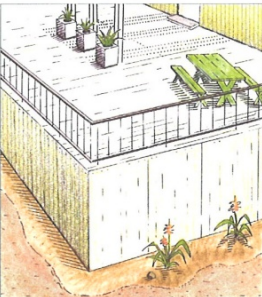
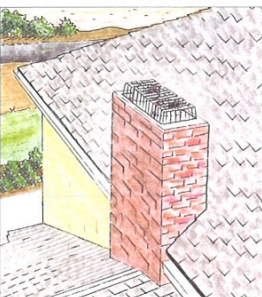
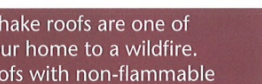


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P.O. Box 2106
Glendora, CA 91740
Phone: 626/335-7426
www.FireSafeCouncil.org

- 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.

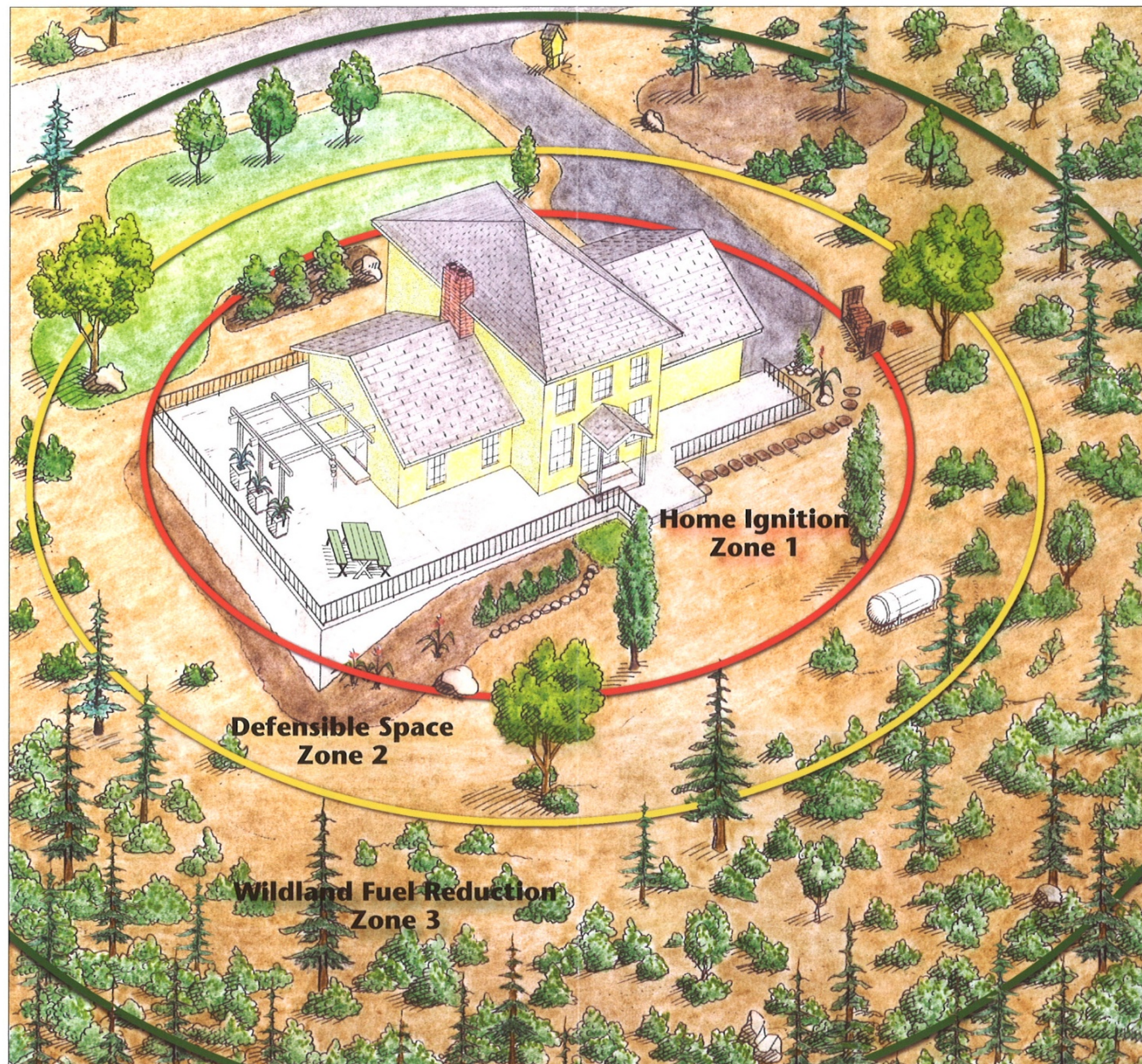
Defensible Space Zone (100 feet or more distance) • Keep this area lean and green!

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

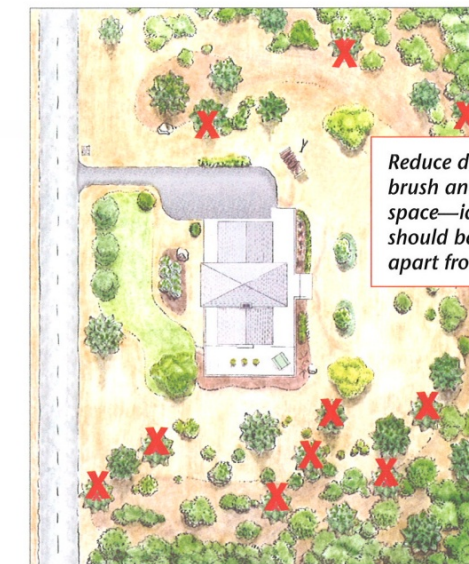
Wildland Fuel Reduction Zone (Beyond 100 feet distance)

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.



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 brushlands 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.

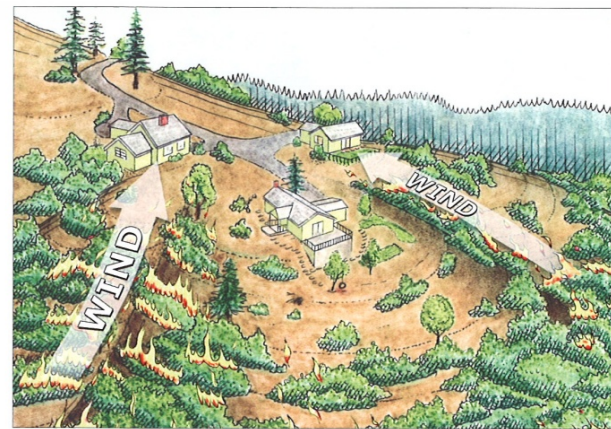
Fuels: Any flammable materials that will burn. This includes everything from the home itself to plants, dried leaves in the rain gutter, brush, wood shingles, patio furniture and decking material. If it will burn, it's a fuel.

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



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
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www.FireSafeCouncil.org

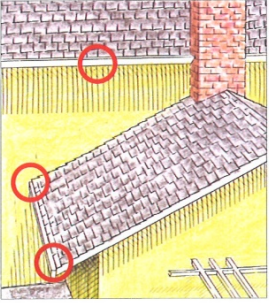
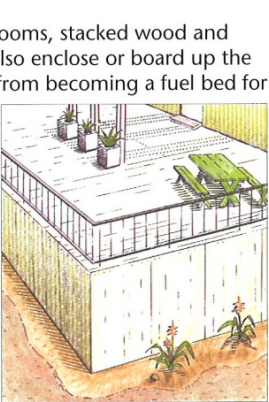
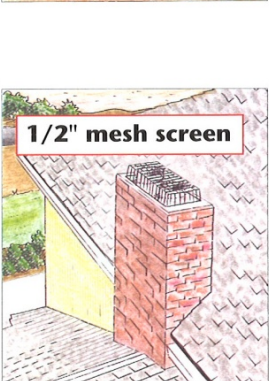
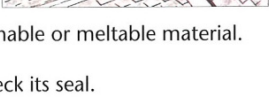
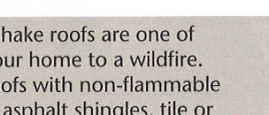
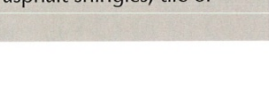




For more information:

- 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.

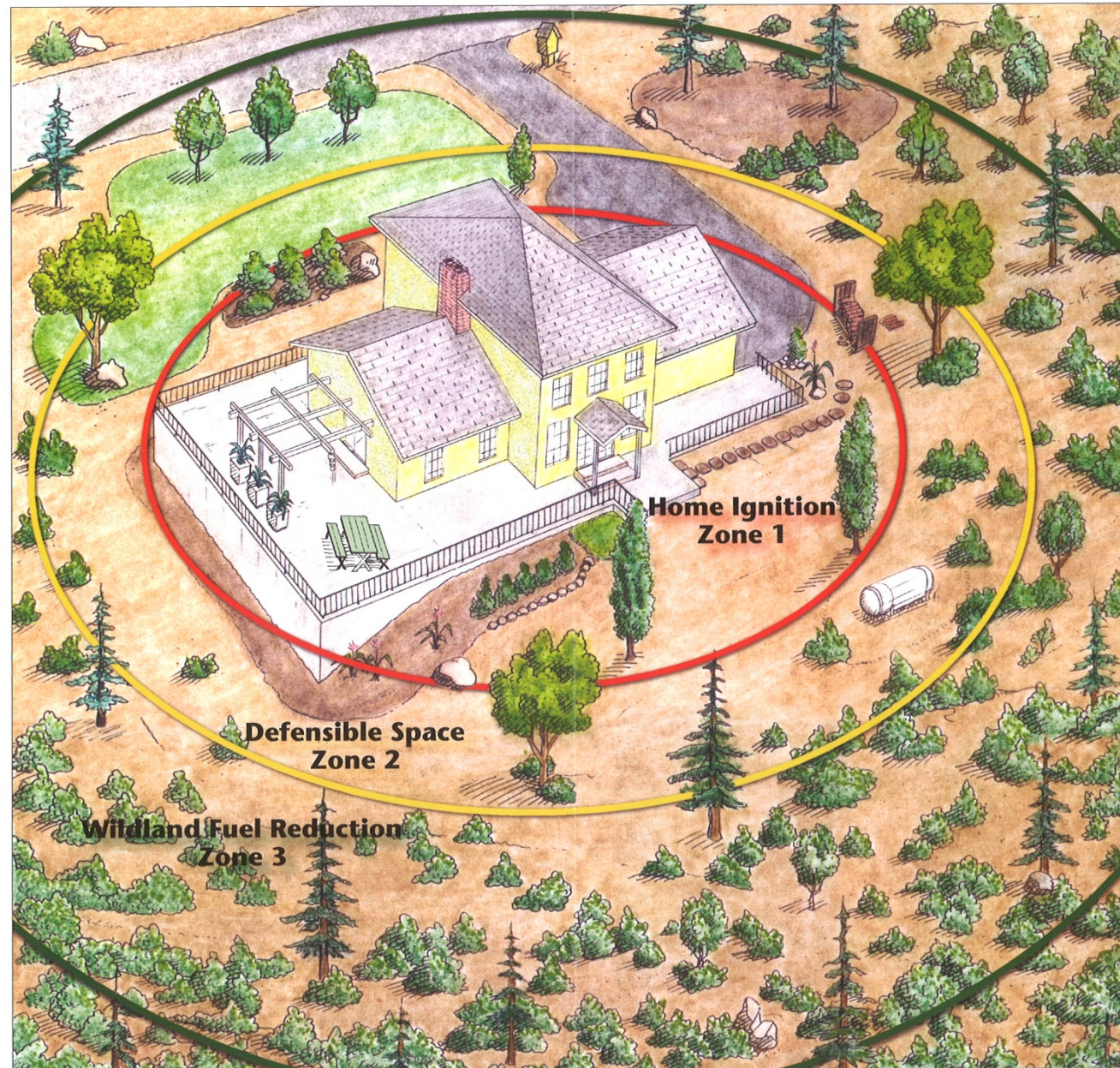
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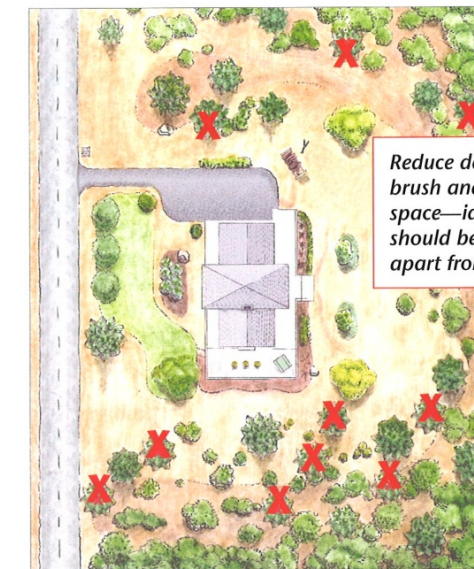
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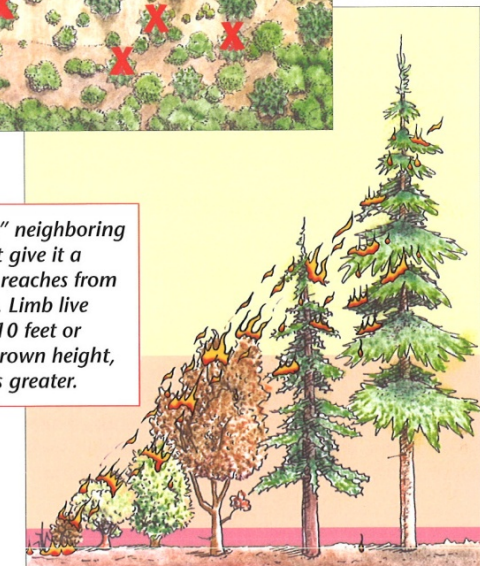
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It's possible, depending upon the size of your property, that you will be limited by your property boundary and unable to complete the fire safe measures identified in Zones 2 and 3. If this happens, talk with your neighbors and ask for their cooperation.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

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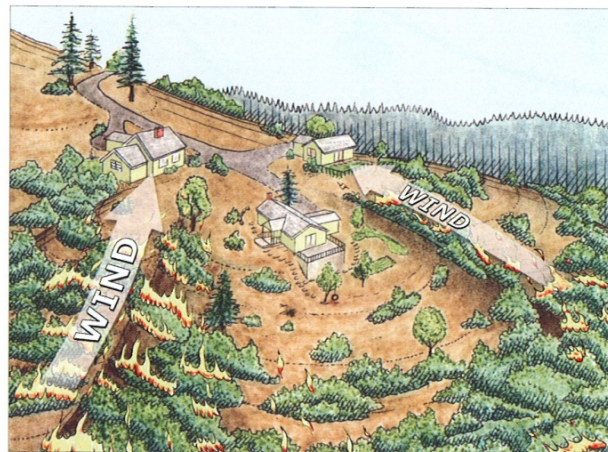
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A Homeowner's Guide to Fire Safe Landscaping



Grassland

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www.FireSafeCouncil.org

April 2005

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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

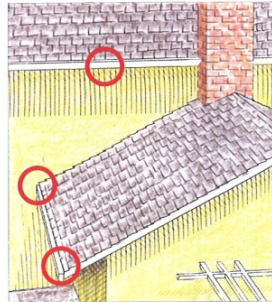
Fire Safe COUNCIL

Home Ignition Zone

(The home plus 10 ft distance)

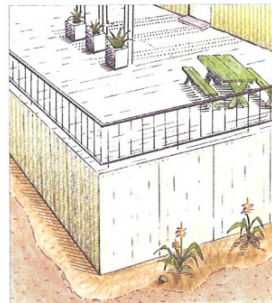
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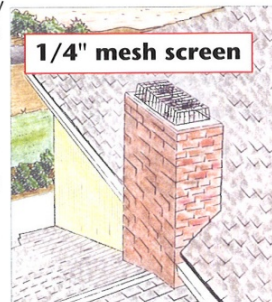
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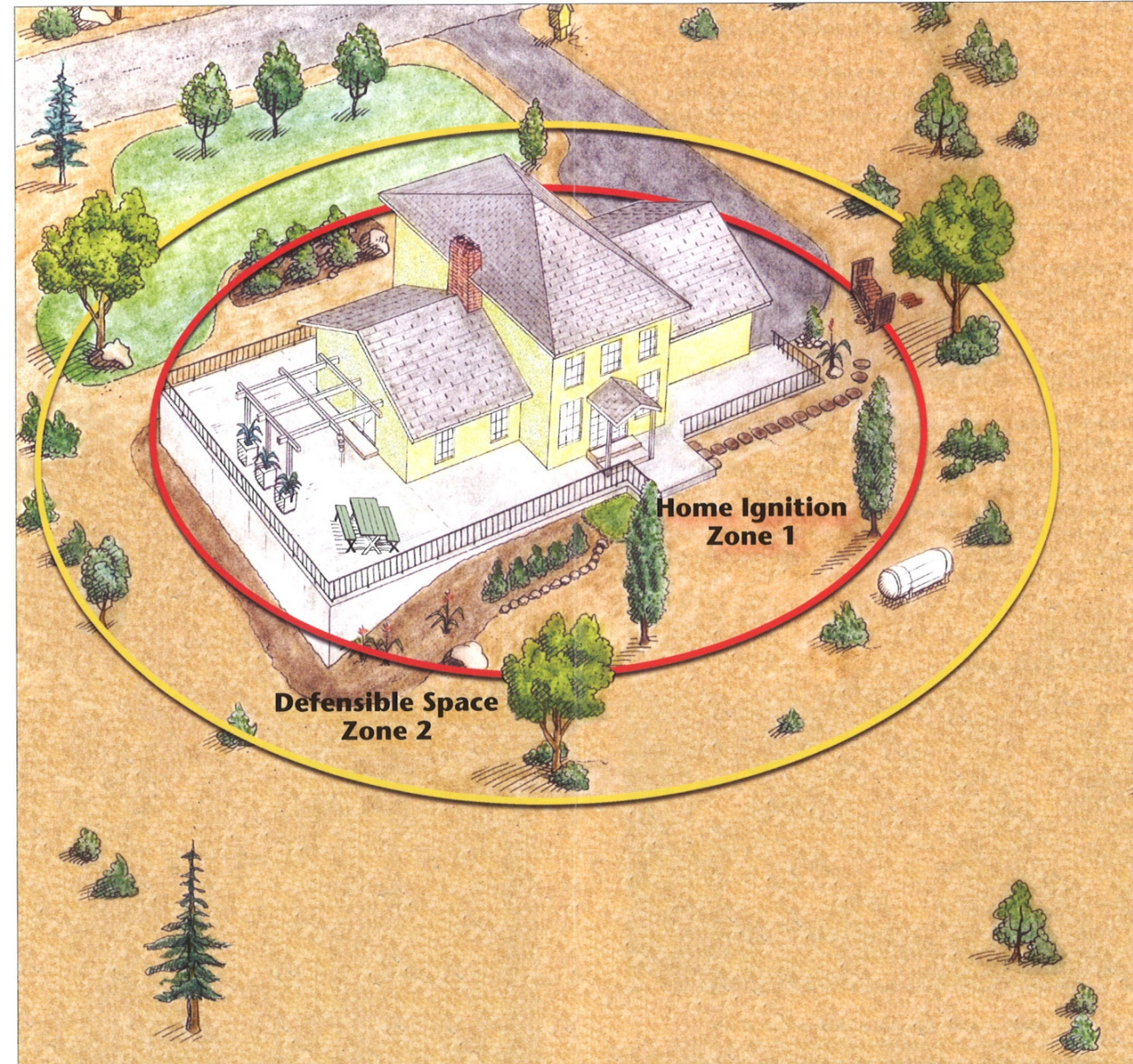
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Find out more ways to make your home fire safe: www.FireSafeCouncil.org

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, weed eaters, 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:

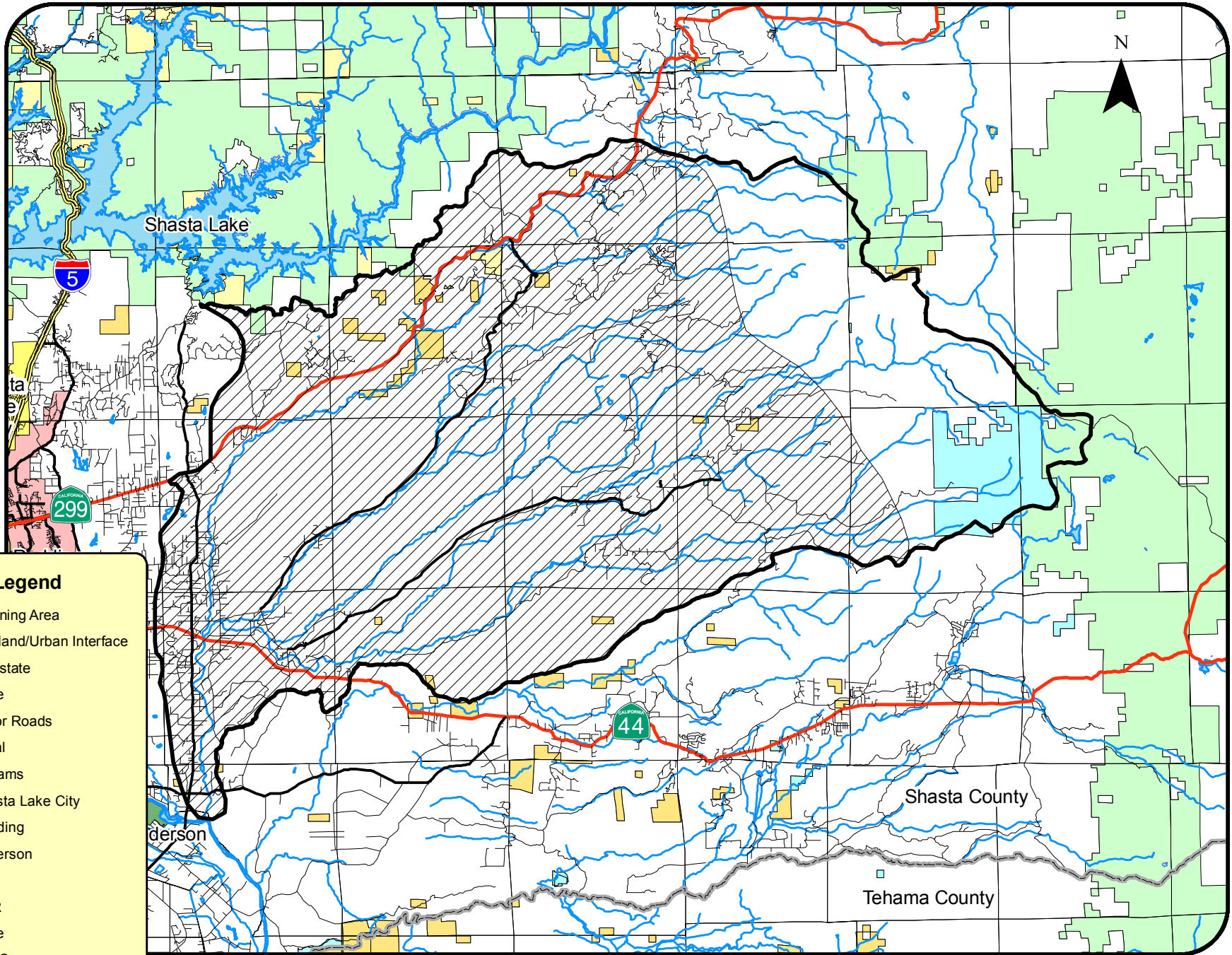
- Mow before 10 a.m. If it's too hot for you, it's too hot to mow. **REMEMBER, DON'T MOW DURING THE HEAT OF THE DAY OR WHEN THE WIND IS BLOWING!**
- **Beware**—Lawn mowers are designed to mow lawns, not dry grass, weeds or rocks! A grass-hidden rock is enough to start a fire when struck by a metal blade. 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, weed eaters 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.

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MAPS

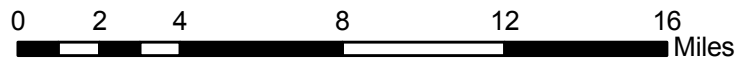
1. PLANNING AREA BOUNDARY/LAND OWNERSHIP
2. FIRE HAZARD SEVERITY MAP
3. VEGETATION
4. SPECIAL STATUS WILDLIFE AND PLANT SPECIES
5. FIRE HISTORY
6. PROJECTS

COW CREEK PLANNING AREA

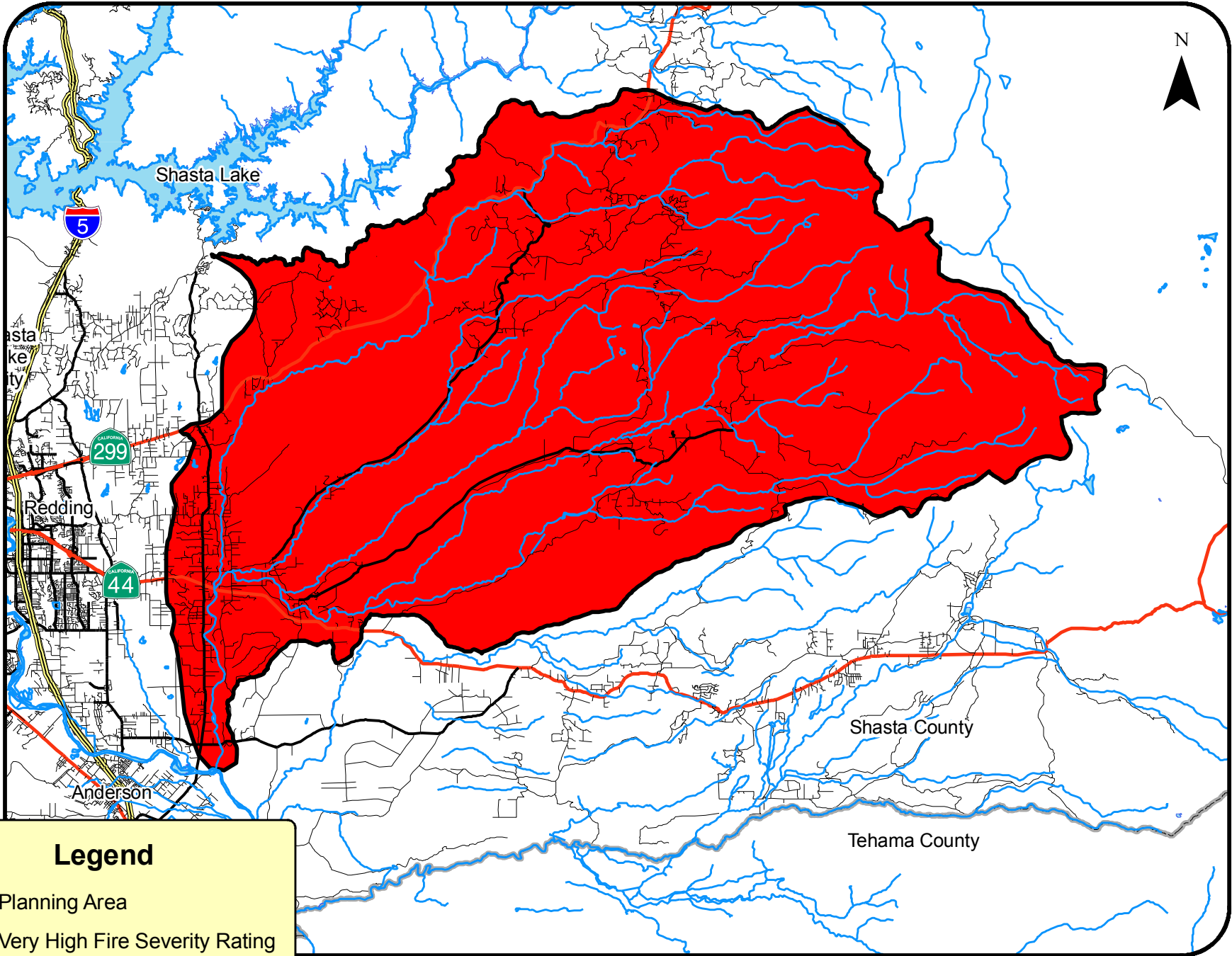


Legend



- Planning Area
- Wildland/Urban Interface
- Interstate
- State
- Major Roads
- Local
- Streams
- Shasta Lake City
- Redding
- Anderson
- BLM
- BOR
- State
- USFS
- Private



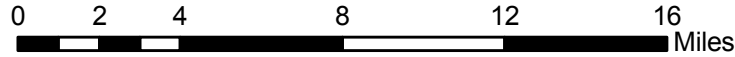
COW CREEK FIRE SEVERITY RATING



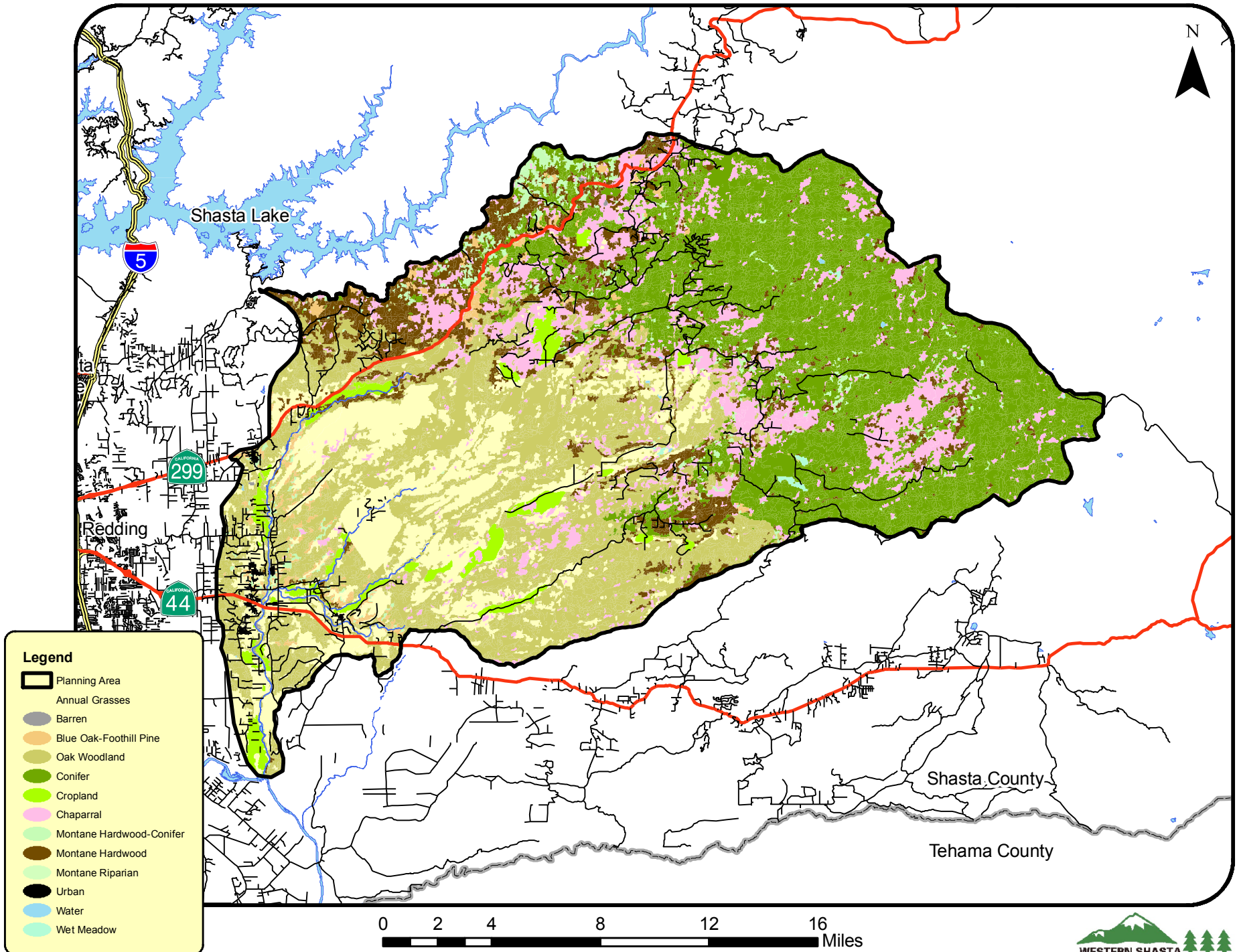
Legend

-  Planning Area
-  Very High Fire Severity Rating

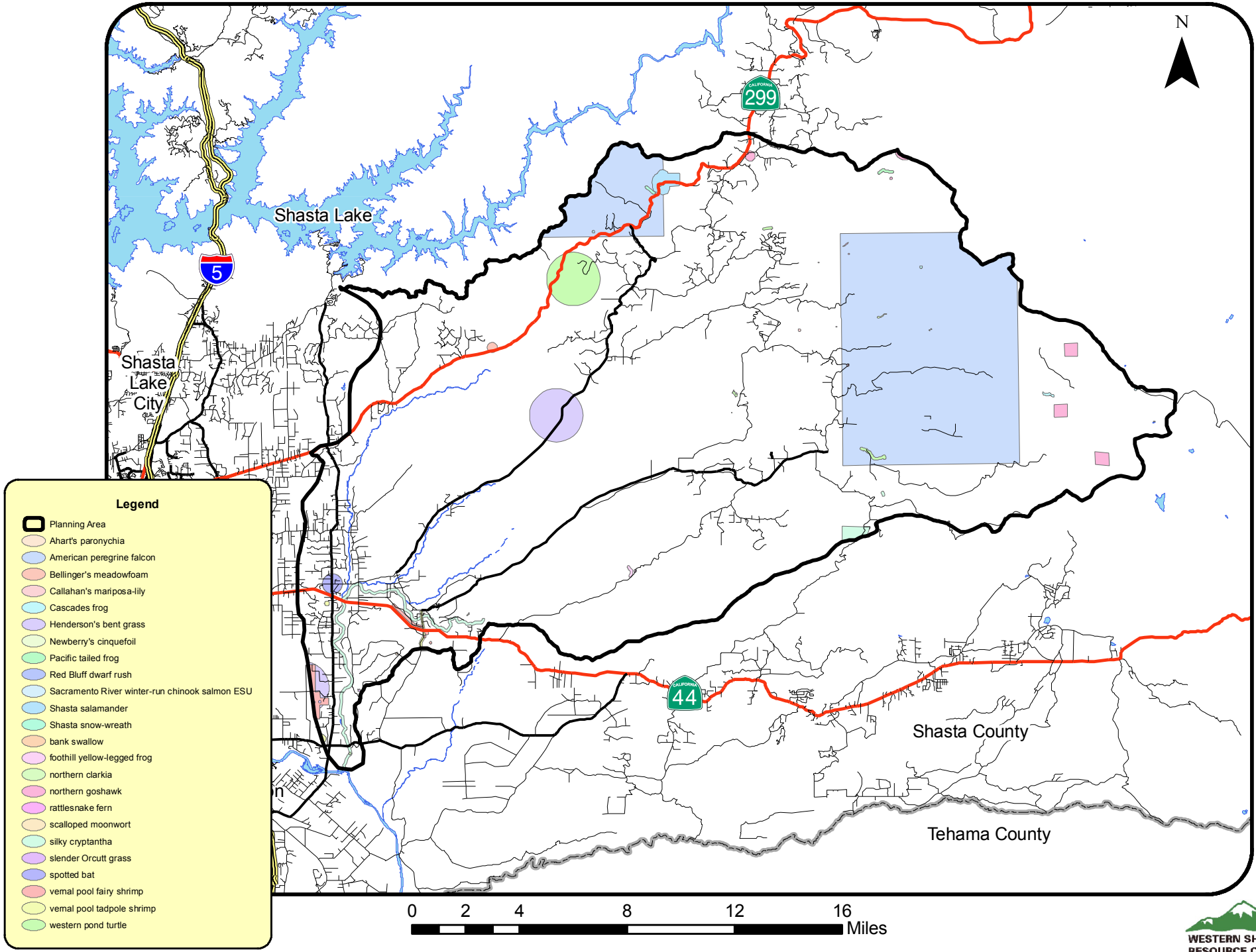
VERY HIGH FIRE HAZARD SEVERITY ZONE
as Recommended by CAL FIRE



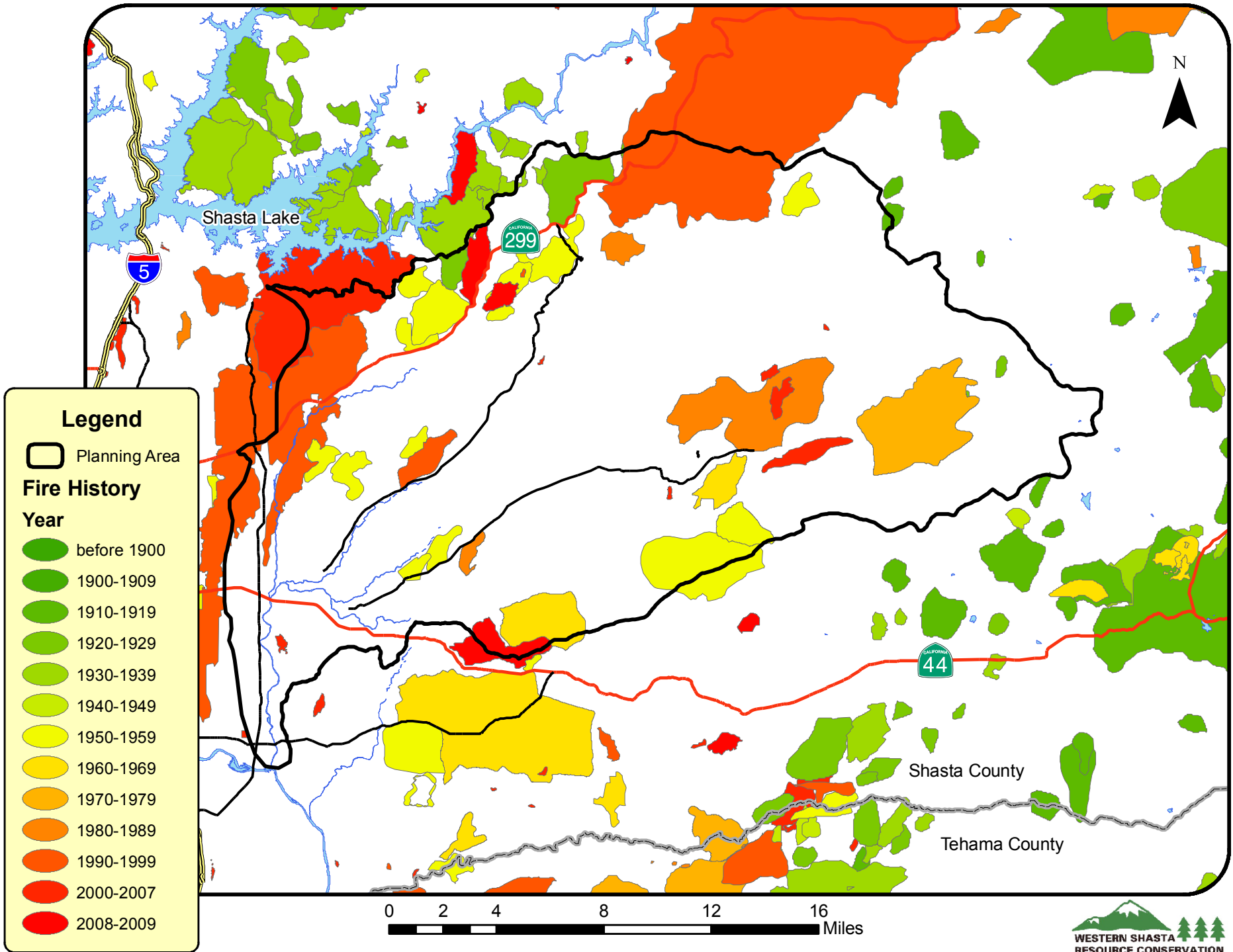
COW CREEK VEGETATION MAP



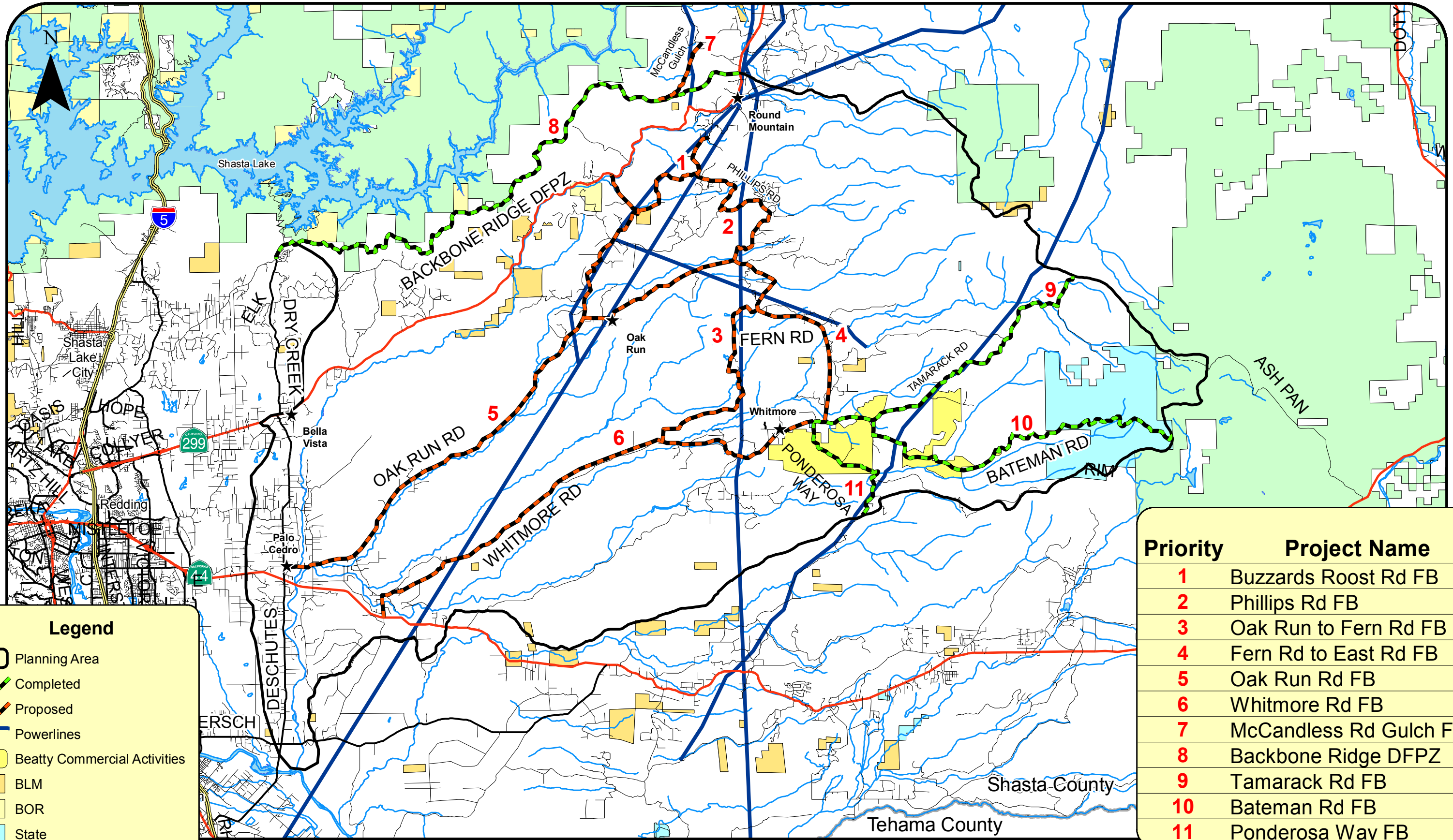
SPECIAL STATUS WILDLIFE AND PLANT SPECIES



COW CREEK FIRE HISTORY



COW CREEK PROJECT MAP



Legend

- Planning Area
- Completed
- Proposed
- Powerlines
- Beatty Commercial Activities
- BLM
- BOR
- State
- USFS
- Private

Priority	Project Name
1	Buzzards Roost Rd FB
2	Phillips Rd FB
3	Oak Run to Fern Rd FB
4	Fern Rd to East Rd FB
5	Oak Run Rd FB
6	Whitmore Rd FB
7	McCandless Rd Gulch FB
8	Backbone Ridge DFPZ
9	Tamarack Rd FB
10	Bateman Rd FB
11	Ponderosa Way FB

