

CAL FIRE

Shasta - Trinity Unit

2008 Fire Plan



**Community Wildfire
Protection Plan**

**CALIFORNIA DEPARTMENT OF FORESTRY
AND
FIRE PROTECTION
*CAL FIRE***

SHASTA – TRINITY UNIT

FIRE PLAN

Community Wildfire Protection Plan



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1. EXECUTIVE SUMMARY

The Shasta – Trinity Unit Fire Management Plan documents the assessment of the wildland fire potential within the Unit. It includes stakeholder contributions, priorities, and identifies strategic targets for pre-fire solutions. *This plan is a living document to be amended as new information is collected.*

The goal of this plan is to reduce total cost and losses from wildfire by protecting assets at risk through focused prefire management prescriptions and increasing initial attack success.

This plan utilizes the five strategic objectives and fire plan framework identified in the California Fire Plan and incorporates them into the planning and implementation process.¹

- **Wildfire Protection Zones.** To create wildfire safety zones to reduce citizen and firefighter risks from future large wildfires.
- **Initial Attack Success.** The fire plan utilizes an assessment process to measure the level of service provided by the wildland fire protection system. This measure is used to assess the department's ability to provide an equal level of protection to lands of similar type as required by the Public Resources code 4130. This is measured in terms of a percentage of fires that are successfully controlled before unacceptable costs and losses are incurred. Knowledge of the level of service will help define the risk of wildfire damage faced by public and private assets in the wildlands.
<http://www.forestsandrangelands.gov/success/index.cfm>
- **Assets Protected.** The plan has utilized a methodology for defining assets protected and their degree of risk from wildfire. The assets addressed in the plan are citizen and firefighter safety, watersheds and water, timber, wildlife and habitat (including rare and endangered species), rural communities, unique areas (scenic, cultural, and historic), recreation, range, structures, and air quality. Stakeholders for each of the assets at risk are identified. The assessment will enable the Unit and other fire service managers to set priorities for fire management project work.
- **Prefire Management.** This aspect focuses on alternatives to protect assets at risk. Projects include a combination of fuels modification, ignition management, fire-safe engineering activities such as regulation and zoning, educational programs, public information and road accessibility, department infrastructure including fire stations and water systems, alarms, and forest health. Prefire management prescriptions designed to protect these assets will also identify those who benefit and who should share in the project costs. Project priorities will be determined based on stakeholder input and support.

¹ "California Fire Plan" Executive Summary

- **Fiscal Framework.** The California Board of Forestry and CAL FIRE are developing a fiscal framework for assessing and monitoring annual and long term changes in California's wildland fire protection systems. State, local and federal wildland fire protection agencies, along with the private sector, have evolved into an interdependent system of prefire management and suppression forces. As a result changes to budgeted levels of service of any of the entities directly affects the others and the services delivered to the public. Monitoring system changes through this fiscal framework will allow the Board and CAL FIRE to address public policy issues that maximize the efficiency of local, state, and federal firefighting resource.

Unit Fire Plan Assessments and Data Layers

The unit continues to progress on the Fire Plan. Level of Service assessments have been completed and require only annual updating. Initial assessments have been completed for the fuels, weather and assets at risk.

Review of the fuels data indicate some incorrect fuel typing in the foothill regions of Shasta County. These areas are currently experiencing urban growth increasing the risk of catastrophic loss from wildfire. Obtaining an accurate fuels inventory of these lands is very important. In addition fuels within Federal Jurisdiction have not been completely validated. The Shasta Trinity National Forest has completed its fire plan.

<http://www.fs.fed.us/r5/shastatrinity/fire/>

The timbered areas within the SRA lands of the Unit have been re-evaluated and the fuel type, crown closure, and ladder fuels were updated in 2004 and some of the brush lands were reassessed in 2005. Resource Management personnel within the Unit are assisting in the refinement of this data as individual Timber Harvest Plans are assessed.

The majority of the assets at risk have been identified and partially validated, however other resource values such as historical buildings and historical and cultural sites have not been completely identified. We are receiving cooperation in this assessment from Shasta and Trinity County Historical Societies as well as assistance from CAL FIRE's Archaeologist.

Population within the Unit is dramatically increasing therefore population density and structure locations require updating and validation. The Shasta County portions of the Unit have seen the greatest population expansion and will require additional time to validate. With assistance from the Trinity County Fire Safe Council and the Trinity County Planning Department, we were able to produce structure and water source location maps for urbanized areas within Trinity County.

Fire Plan Applications

The Unit has been involved in community pre-fire management projects since 1992 (Shingletown Community Fire Safe) and has a history of fuels management cooperation with stakeholders involved in CAL FIRE's Vegetation Management Program.

Additional fuels management projects have been cooperatively implemented throughout the Unit. Recent studies of fires burning into treated areas indicate these projects are successful in reducing fire damage. Continued funding and support are critical to the success of these projects.

Hindrances to the fire plan are concentrated on the financial process that the Department must follow in order to expend grant monies on projects and the lack of specific funding for pre-fire fuels management. The continued success of the fire plan requires streamlining this process.

Community Wildfire Protection Plan

In 2005, both Shasta and Trinity Counties completed **Community Wildfire Protection Plans (CWPP)**. These plans were developed in response to the Healthy Forest Restoration Act of 2003 (HFRA). Both counties have worked on fuels and watershed management plans for several years prior to the adoption of the HFRA. Rather than rewrite the existing plans, they were reviewed for HFRA consistency and compiled. These compiled plans combined with the Shasta – Trinity Unit Plan were presented to and adopted by the respective County Boards of Supervisors in October, 2005. Like the Unit Fire Plan, these CWPPs are living documents that require annual review and updates when appropriate.

Shasta County Communities Wildfire Protection Plan:

http://www.shastacountyfiresafecouncil.org/Wildfire_CPP.html

Trinity County Community Wildfire Protection Plan:

http://www.tcrd.net/pdf/TC_Wildfire_Protection_Plan.pdf

Unit Fire Plan Responsibilities

The primary fire plan responsibilities in the Unit are assigned to the Prevention Bureau within the Special Operations Division. The Bureau led by one Assistant Chief, two Battalion chiefs, one Fire Captain Specialist-Law Enforcement, one Fire Captain-Prefire Engineer, one County Planning Inspector and one Fire Prevention Specialist. Field Battalion Chiefs are responsible for Community Fire Safe Projects within their Battalions with assistance from the Fire Prevention Bureau.

Key Issues

Both Shasta and Trinity Counties have a history of large and damaging fires. The continued urbanization of the Unit's wildland areas significantly increases both the damage and ignition potential. It is imperative that the Unit continues to have accurate and current assessments. The Unit must also, while working with local government and stakeholders, incorporate the fire plan analysis into current and future policy decisions when they relate to the wildland areas.

Significant amounts of the population and their properties are at risk within the Unit. Residents must provide and maintain a defensible space around their properties. Fuels along existing roadways should also be maintained in order to ensure safe passage. Fuel breaks and post-fire fuel management are required to help alleviate the risk of fire and help restore a healthy wildland environment. To achieve these; education, enforcement, fuels management and financial assistance should continue to be made available.

It is imperative that CAL FIRE and our stakeholders continue to seek funding and methods to mitigate the current risk as well as any future risks. Pre-fire planning and fuels management projects including those identified by the Vegetation Management Program and the California Forest Improvement Program should receive specific line item status in the California budget.

Prevention and education efforts must continue and when possible, concentrate on the reduction or elimination of preventable fire ignitions.

2. STAKEHOLDERS

Stakeholders are defined as any person, agency, or organization with a particular interest (a stake) in fire safety and protection of assets from wildfires. The process of identifying stakeholders and their interests is an ongoing process and will be continuously evaluated through the evolution of future pre-fire management plans. It is the goal of the Shasta – Trinity Unit to participate with as many stakeholders as is possible and to continually update planning efforts involving stakeholder input.

The Shasta – Trinity Unit recognized that residents of Shasta and Trinity Counties have an interest in fire protection issues. The following Stakeholder groups represent some that have been identified as having interest associated with the issue of fire protection. Stakeholders within the Unit include Federal and State agencies, Resource Conservation Districts, Fire Safe Councils and groups, Watershed groups and individual and corporate landowners.

Fire Safe Organizations

Shasta County Fire Safe Council

Contact: Shasta County Fire Safe Council
c/o Western Shasta Resource Conservation District
6270 Parallel Road, Anderson, CA 96007
(530) 365-7332

Website:

<http://www.westernshastarc.org/shasta%20county%20fire%20safe%20council%20home%20page.html>

Trinity County Fire Safe Council

Website: <http://users.snowcrest.net/tcrccd/index.htm?forest.htm>

Day Bench Fire Safe Council

Contact: Kris Bertelson-Wms / Fire Safe Council
kbertelsonwm@shasta.com

Cottonwood Creek Fire Safe Council / Cottonwood Creek Watershed Group

Contact: Maureen Teubert
PO Box 1198
Cottonwood, CA 96022
ccwg@shasta.com
Office: (530) 347-6637 Fax: (530) 347-6346

Cow Creek Fire Safe Council

Contact: Shasta County Fire Safe Council

Hat Creek Valley Fire Safe Council

Contact: Tim Weaver
Fall River Resource Conservation District
P.O. Box 83
McArthur, CA 96056
(530) 336-6591 FAX: (530) 336-6591
fallriverred@telis.org

Fire Safe Organizations

Shingletown Fire Safe Council

Contact: Shasta County Fire Safe Council

Lakehead Fire Safe Council

Contact: Sharol Schaefer
P.O. Box 244
Lakehead, CA 96051
sfs@snowcrest.net

Victoria Project

Contact: Shasta County Fire Safe Council

Resource Conservation Districts

Western Shasta Resource Conservation District

Contact: Western Shasta Resource Conservation District
6270 Parallel Road, Anderson, CA 96007
(530) 365-7332

Website: <http://www.westernshastarc.org/>

Fall River Resource Conservation District

Contact: Tim Weaver
Fall River Resource Conservation District
P.O. Box 83
McArthur, CA 96056
(530) 336-6591 FAX: (530) 336-6591
fallriverrcd@telis.org

Trinity County Resource Conservation District

Website: <http://users.snowcrest.net/tcrd/index.htm?forest.htm>

Watershed Contact List

Battle Creek

Contact: Sharon Paquin-Gilmore - Watershed Coordinator
Battle Creek Water Conservancy
P.O. Box 606
Manton, CA 96059
(530) 474-3368 FAX (530) 474-3366

spaquin@shasta.com
Website: <http://www.battle-creek.net/>

Watershed Contact List

Bear Creek

Contact: Leslie Bryan – Watershed Coordinator
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 211 FAX (530)365-7271
leslie@westernshastarc.org
Website: <http://www.westernshastarc.org>

Churn Creek

Contact: Mary Schroeder – District Manager
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 202 FAX (530)365-7271
mary@westernshastarc.org
Website: <http://www.westernshastarc.org>

Clear Creek – Upper

Contact: Jack Bramhall – Assistant Projects Manager
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 213 FAX (530)365-7271
jack@westernshastarc.org
Website: <http://www.westernshastarc.org>

Clear Creek – Lower

Contact: Jack Bramhall – Watershed Coordinator
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 211 FAX (530)365-7271
jack@westernshastarc.org
Website: <http://www.westernshastarc.org>

Cottonwood Creek

Contact: Maureen Teubert - Coordinator
Cottonwood Creek Watershed Group
P.O. Box 1198
Cottonwood, CA 96022
530 347-6637
[mailto:ccwg@shasta.com](mailto:maureen@ccwg@shasta.com)
Website: <http://www.cottonwoodcreekwatershed.org>

Watershed Contact List

Cow Creek

Contact: Bob Harris, President – Cow Creek Watershed Management
P.O. Box 158
Whitmore, CA 96096
(530) 472-1436
rising-eagle@prodigy.net
Website: <http://www.westernshastarc.org/cowcreekwg.htm>

Fall River

Contact: Tim Weaver
Fall River Resource Conservation District
P.O. Box 83
McArthur, CA 96056
(530) 336-6591 FAX: (530) 336-6591
fallriverrcd@telis.org

Keswick Basin

Contact: Mary Schroeder – District Manager
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 202 FAX (530)365-7271
mary@westernshastarc.org
Website: <http://www.westernshastarc.org>

McCloud River

Contact: George Stroud
McCloud River CRMP
The Nature Conservancy
McCloud River Preserve
P.O. Box 409
McCloud, CA 96057
(530) 926-4386

Pit River

Contact: Mark Steffek
Pit River Watershed Alliance
North-Cal-Neva RC&D
806 W. 12th Street
Alturas, CA 96101
(530) 233-4314 FAX: (530) 233-8869
Marc.steffek@ca.usda.gov
Website: <http://www.californiarcandd.org/nocarc&d.htm>

Watershed Contact List

Shasta West

Contact: Leslie Bryan – Watershed Coordinator
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 215 FAX (530)365-7271
leslie@westernshastarc.org
Website: <http://www.westernshastarc.org>

Squaw Creek

Contact: Mary Schroeder – District Manager
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 202 FAX (530)365-7271
mary@westernshastarc.org
Website: <http://www.westernshastarc.org>

Stillwater Creek

Contact: Mary Schroeder – District Manager
Western Shasta Resource Conservation District
6270 Parallel Road
Anderson, CA 96007-4833
(530) 365-7332 ext. 202 FAX (530)365-7271
mary@westernshastarc.org
Website: <http://www.westernshastarc.org>

Sulfur Creek

Contact: John McCullah - Sulfur Creek CRMP
Sacramento Watersheds Action Group
225 Locust St., Suite 203
Redding, CA 96001
(530) 241-4001 Fax: (530) 247-1601
info@watershedrestoration.org
Website: <http://www.watershedrestoration.org/>

Upper Sacramento

Contact: Upper Sacramento River Exchange
3819 Sacramento Avenue, Dunsmuir CA 96025
(530) 235-2012
Website: www.riverexchange.org

Government Agencies

Federal

United States Forest Service
Lassen National Forest
<http://www.fs.fed.us/r5/lassen/>

Shasta – Trinity National Forest
<http://www.fs.fed.us/r5/shastatrinity/>

Bureau of Land Management
<http://www.shastacascade.org/blm/redding/redding.htm>

State

State Fish & Game
601 Locust Rd
Redding, CA 96001

Department of Forestry and Fire Protection
875 Cypress Ave
Redding, CA 96001
(530) 225-2418

Water Quality Control board
415 Knollcrest Dr.
Redding, CA

Local

Shasta County
City of Redding
City of Anderson
City of Shasta Lake
Shasta County Fire Department
Trinity County

3. UNIT OVERVIEW

The Shasta – Trinity Unit is located at the northern end of the Sacramento Valley. It encompasses most of Shasta County and portions of eastern Trinity County. Federal lands administered by the Shasta – Trinity and Lassen National Forest, Bureau of Land Management, Bureau of Indian Affairs, Bureau of Reclamation, and the National Park Service adjoin and are contained within the Unit.



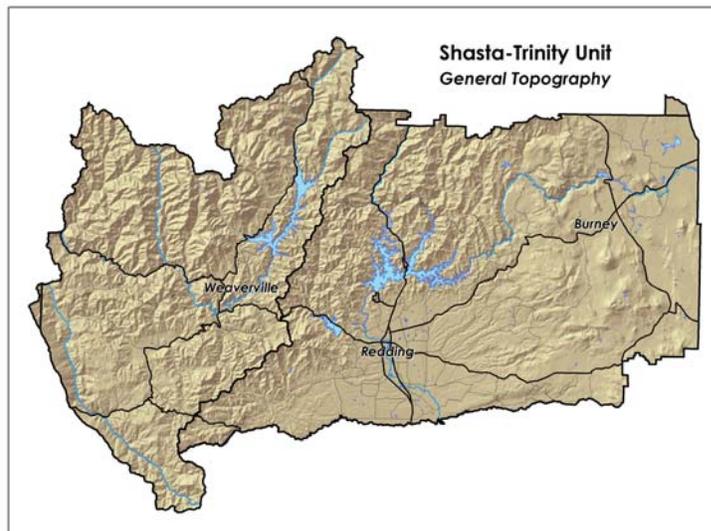
Traveling west to east on Highway 299 from Weaverville to the Lassen County line is approximately 150 miles. South to north on Interstate 5 from Cottonwood to the Siskiyou County line is approximately 75 miles. In these distances there are distinct differences in climate, fuels and topography, all of which affect fire behavior and fire danger rating.

Year 2000 national census data indicates that 176,392 people live within the unit boundary; 161,555 in Shasta County and 14,837 in Trinity County (A January 2003 Shasta County survey indicates a population of 172,000). In Shasta County 111,000 people live within the boundaries of incorporated cities or districts located in Local Responsibility Areas. The majority of Trinity County’s population is located within State Responsibility Areas or small pockets of private land within Federal Responsibility Area. (2000 census Population and housing density maps follow).

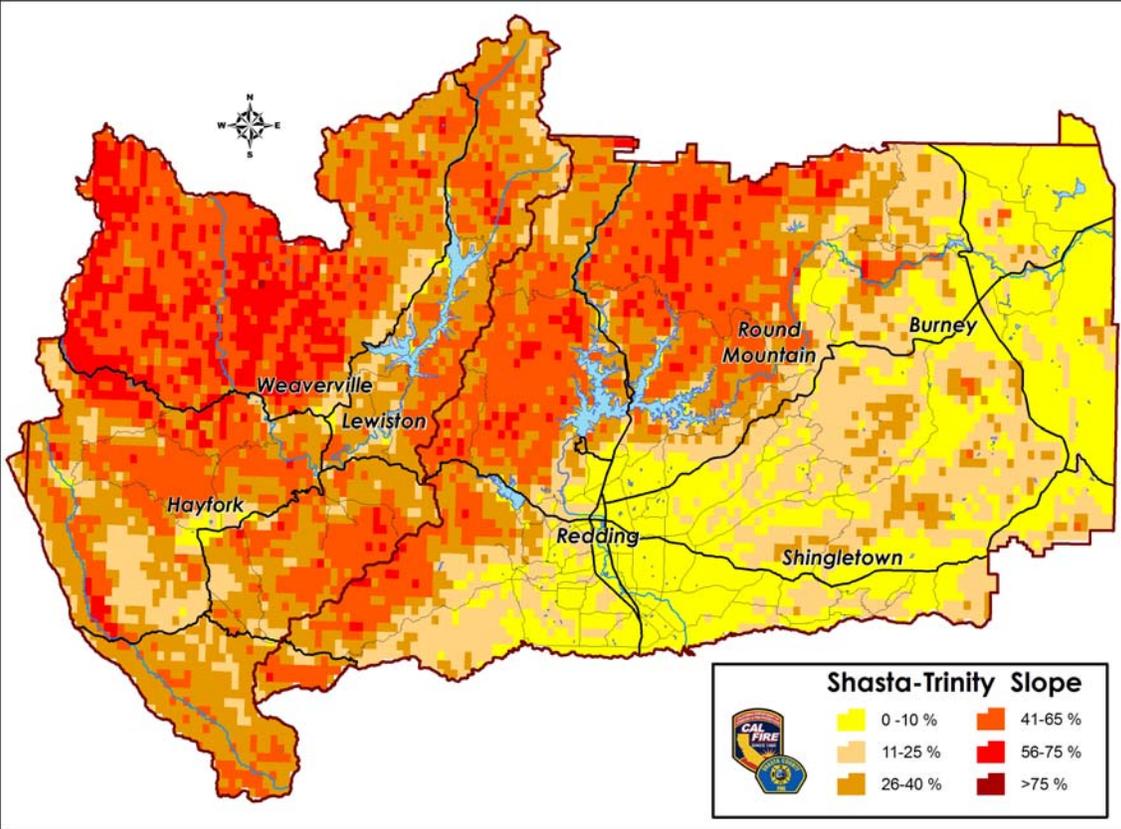
Location

The Unit is located at the extreme northern end of the Sacramento Valley with the Sacramento River bisecting the Unit. The Unit includes portions of the Great Valley, the Southern Cascade and North Coast Ranges, and the Modoc Plateau. The Eastern slopes of Shasta County gently rise across the toe of the Southern Cascade Range towards the Modoc Plateau while to the West and North the land abruptly rises to the Klamath Mountains. Southern Trinity County and the southwest corner of Shasta County are partially located in the North Coast Range.

Having mountains to the north, west, and east, the Sacramento Valley to the south, and the Pacific Ocean 150 miles to the west makes weather forecasting difficult and produces some unique weather.



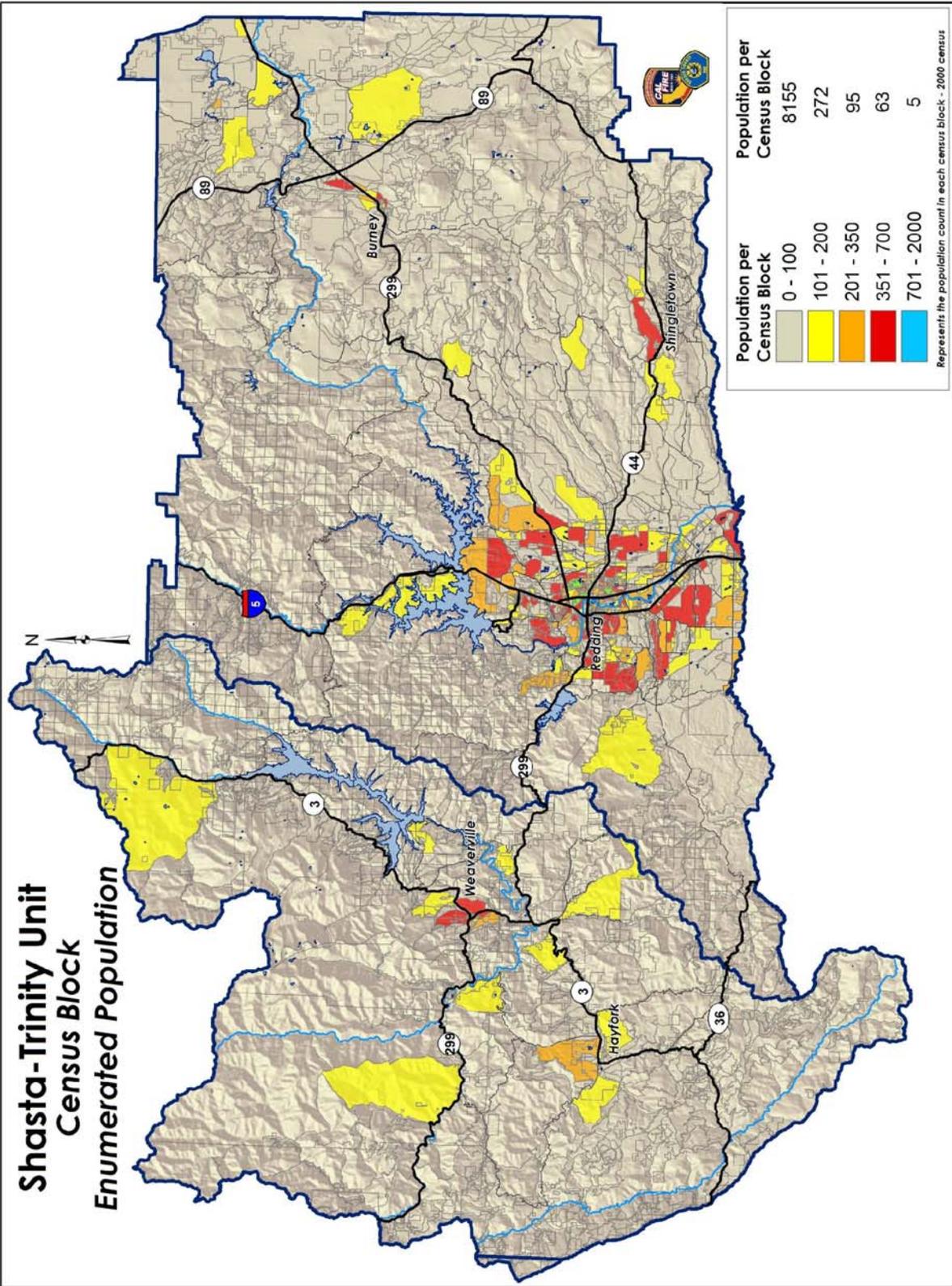
The “Topography – Slope” map indicates the variable nature of the geomorphic regions that intersect within the Unit.

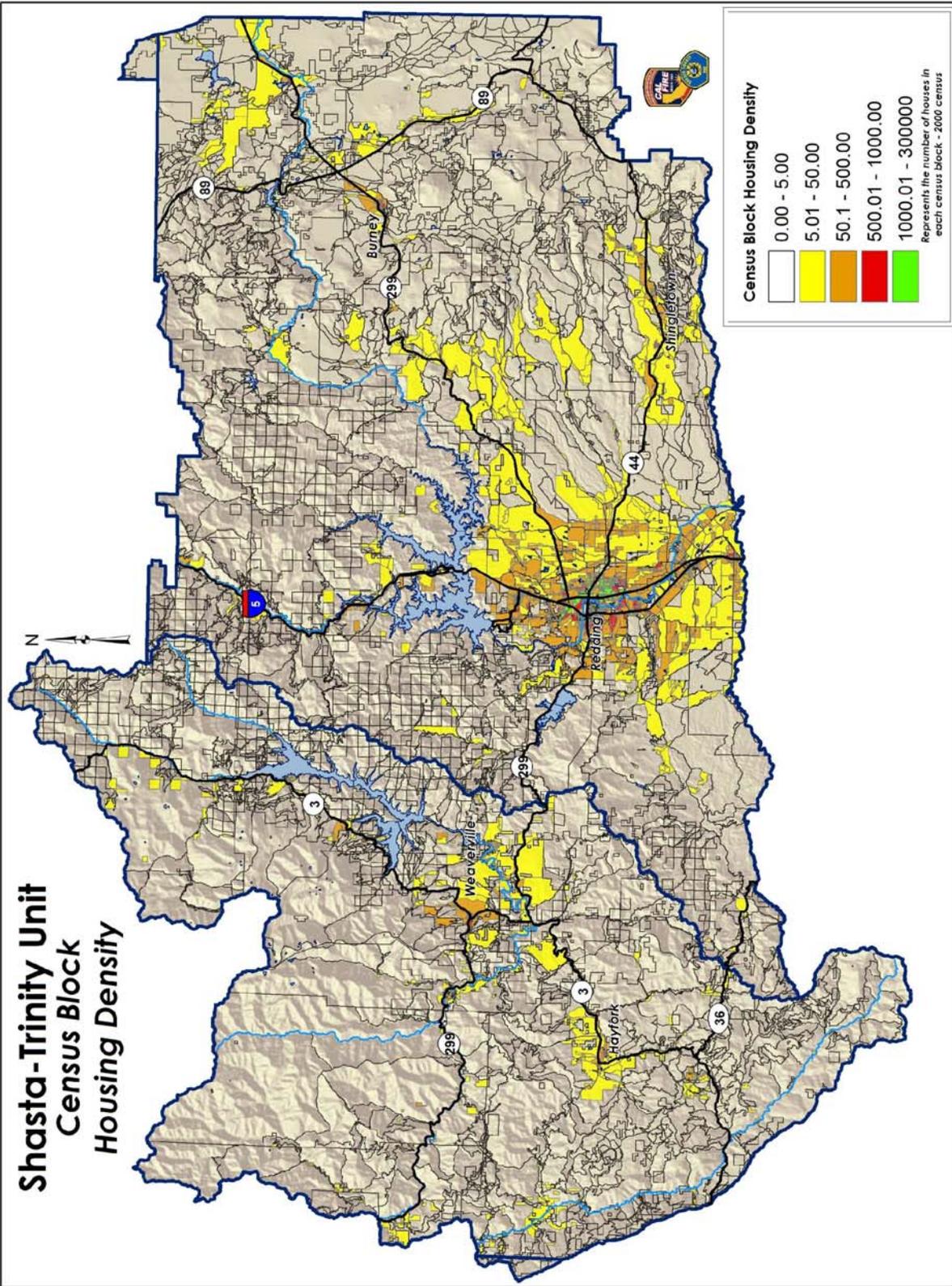


Trinity Alps

West Redding







Political Boundaries

Besides the County boundaries, three incorporated cities lie within the boundaries of the Shasta – Trinity Unit, Anderson, Redding, and the City of Shasta Lake. The remaining communities within the Unit are not incorporated.

Thirty-one Independent Special Districts provide services to portions of the unincorporated areas of Shasta County.

2 Resource Conservation Districts

6 Community Service Districts

1 Irrigation District

3 Mosquito Abatement Districts

1 Hospital District

10 Fire Districts

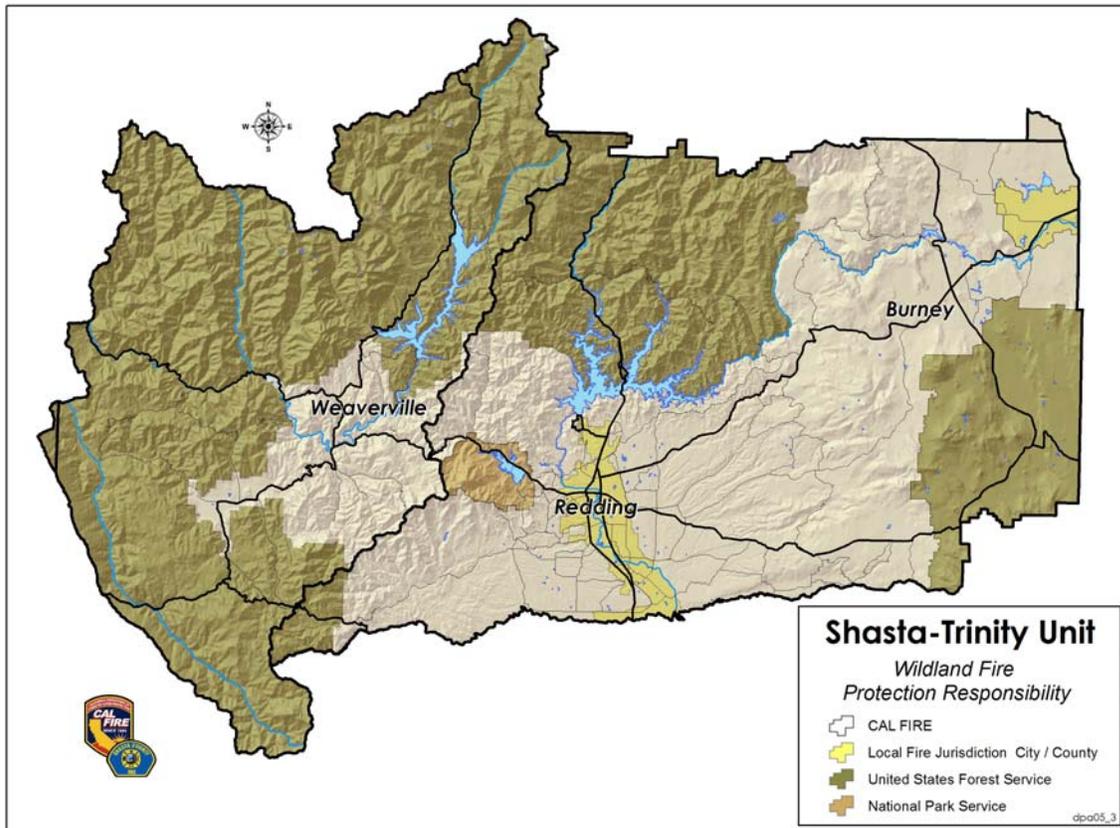
8 Cemetery Districts

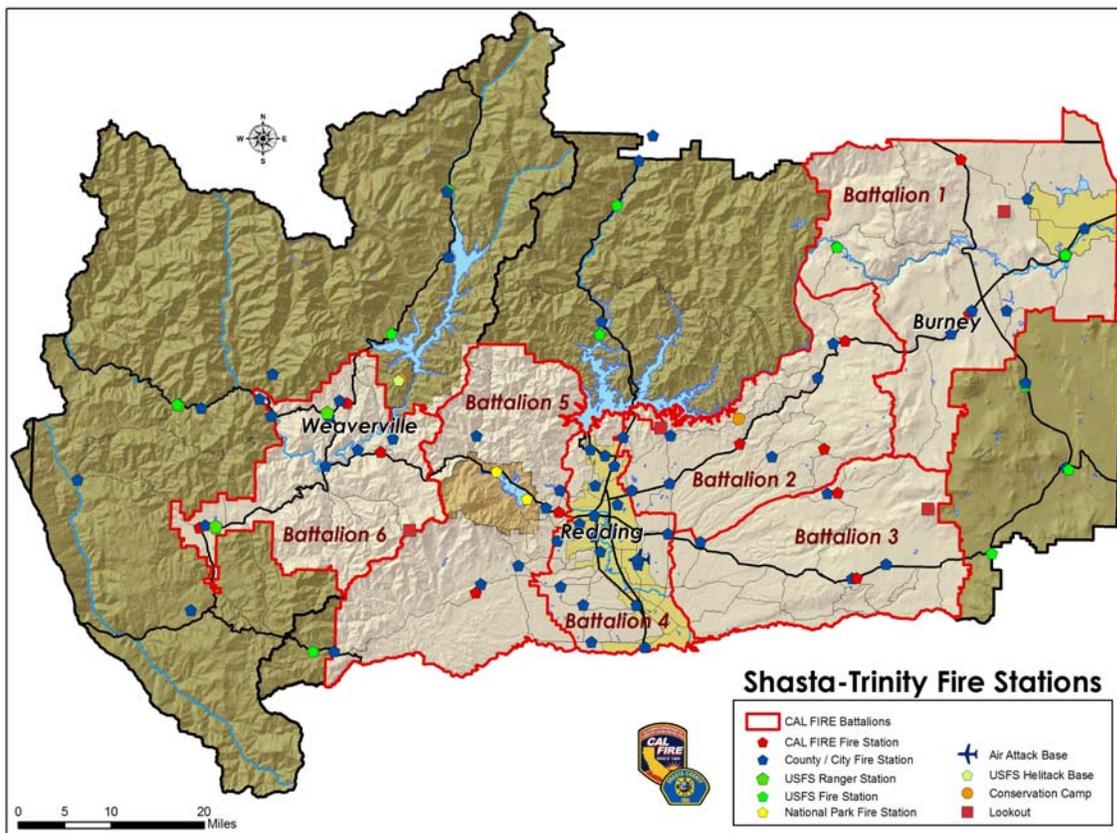
Fourteen dependent special districts called County Service Areas (CSAs) provide other services. CSA 1 provides funding for fire protection for all the unincorporated areas within Shasta County that are not in a Fire District.

Seventeen Special Districts provide services to Trinity County.

Fire Protection Services

Wildland fire protection areas within the Unit are administered by CAL FIRE, the United States Forest Service, and the National Park Service -Whiskeytown National Recreation Area. (Lassen National Park is administered by the Lassen – Modoc Unit.)





The State Responsibility Area of the Unit is divided into six field battalions. During declared fire season, the Shasta – Trinity Unit operates nineteen fire engines, three dozers, eleven hand crews, one Air Tactical Supervisor aircraft and two Air tankers. Redding City Fire Department, 10 fire districts, and the Shasta County Fire Department provide local fire protection responsibility for improvements within Shasta County. 5 fire districts, 4 community service districts and 3 volunteer fire companies and one PUD provide local responsibility fire protection within Trinity County.

<i>Shasta County</i>	<i>Trinity County</i>
CAL FIRE	CAL FIRE
USFS	USFS
WNPS	Coffee Creek Volunteer Fire Company
Anderson Fire Protection District	Douglas City Fire Protection District
Burney Fire Protection District	Down River Volunteer Fire Company
City of Redding	Hayfork Fire Protection District
Cottonwood Fire Protection District	Hawkins Bar Community Service District
Fall River Fire Protection District	Hyampom Community Service District
Happy Valley Fire Protection District	Junction City Fire Protection District
McArthur Fire Protection District	Lewiston Fire Protection District
Millville Fire Protection District	Trinity Center Community Service District
Shasta County Fire Department	Salyer Community Service District
Shasta College Fire Protection District	Post Mountain Public Utility District
Shasta Fire Community Service District	Weaverville Fire Protection District
Shasta Lake Fire Protection District	Wildwood Volunteer Fire Company

Mapping Analysis used in this Document

The Department has adopted ESRI² Graphical Information System (GIS) software products for the mapping and analysis needed for the California Fire Plan. Along with mapping surface features a grid pattern is used to facilitate analysis. Sectioning a United States Geological Survey (USGS) 7.5 minute quadrangle map with a 9 by 9 grid pattern creates 81 cells. Each cell is approximately 450 acres and is called a Q81st. Data such as fuel type, assets at risk, ignitions, and etc is collected and stored for each cell. Each Q81st includes a Planning Belt Identification (PBID) that designates the cell as Interior Conifer, Brush, Grass, Woodland, Barren/Rock/Other, Desert, and Coastal Conifer. The Unit can be divided into Planning Belts when mapped using the PBID.

The current fuel and Q81st PBID are in error in the foothill regions of Shasta County. The fuel errors are most prevalent in western Shasta County, to the east and north of Redding. Most of the area is currently listed as woodland or grasslands. This area was historically woodlands with some timber but was converted into brush lands as a result of early 20th century copper mining. In addition, much of the woodland areas east of Redding have sufficient brush to create a significant ladder fuel problem and they exhibit brush fuel model fire behavior and are treated as brush in the Danger Rating System.

The CAL FIRE Direct Protection Area (DPA) within the Unit is divided into five distinct NFDRS areas based on climate, topography, and fuels, and modified to match existing Wildland Fire Response Area boundaries. These Fire Danger Rating Areas reflect historical average burning conditions and have been used for fire dispatch and planning in the Unit since 1994.

The Emergency Command Center uses the areas to determine the Fire Danger Rating and Dispatch Levels for the Unit based on daily weather observations taken from a Remote Automatic Weather Station in each area. The Fire Danger Rating Areas are similar to, but not the same as the planning belts identified in the Units Q-81 data.

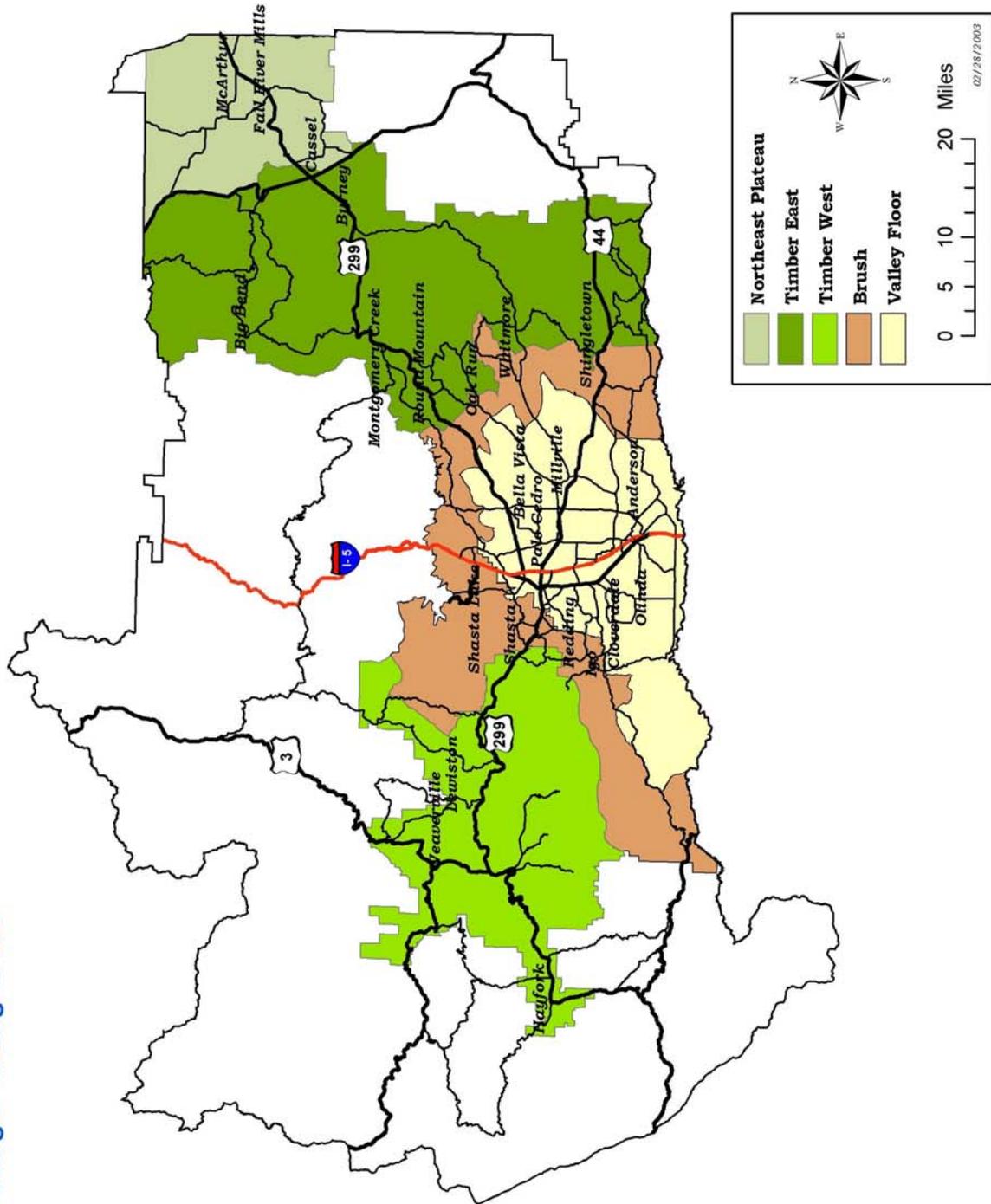
Many assessments of the Unit display the Q81st data utilizing the Fire Danger Rating Areas in order to be consistent with local fire dispatch policy and to more accurately reflect fuel types.

Areas of the Unit not included in the NFDRS areas are in the USFS Direct Protection Area and are mostly in the Interior Timber planning belt.

The following map indicates the NFDRS Zones.

² <http://www.esri.com/index.html>

NFDRS Operating Plan
 Shasta - Trinity Unit
 Fire Danger Rating Areas



Fire Danger Rating Areas

Timber West

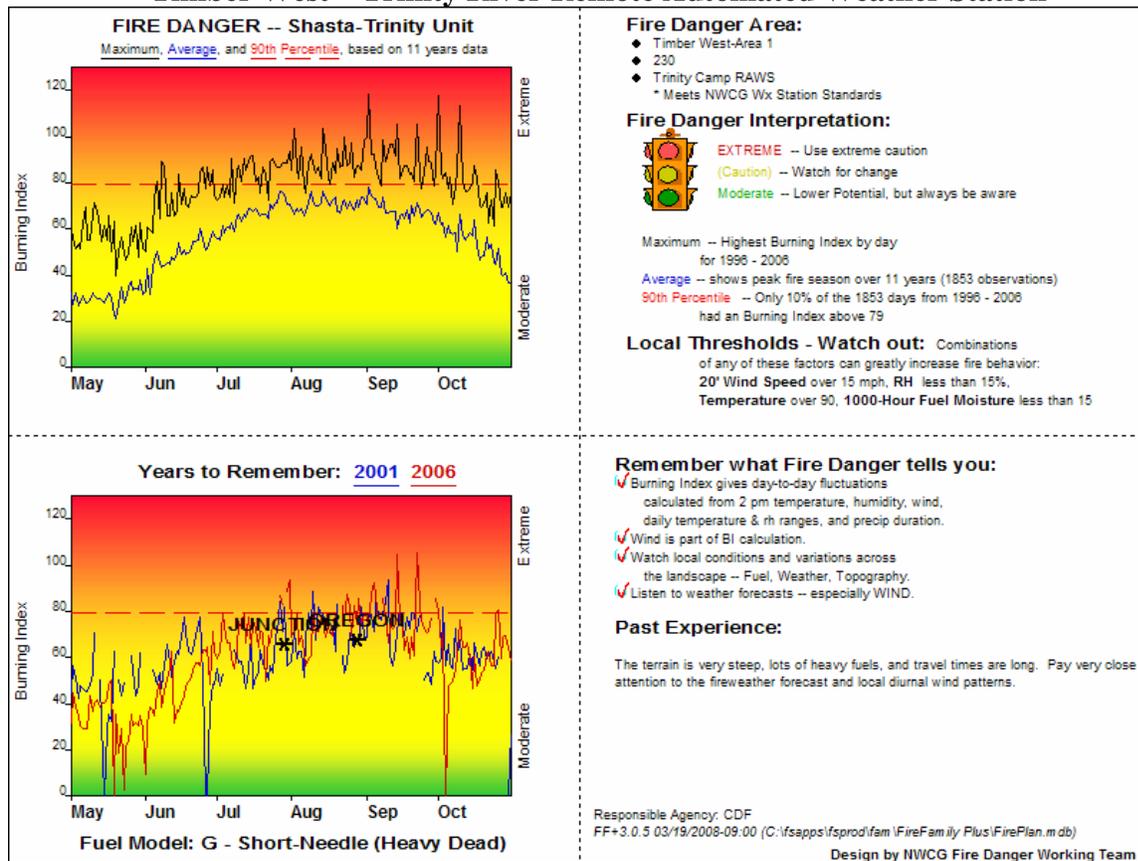
This area is the Douglas-fir/Ponderosa Pine forest of the CAL FIRE Direct Protection Area in Trinity County. It is in the Interior Conifer Q81st Planning Belt. The area is managed for timber production; therefore logging slash is a common fuel component. Sufficient undergrowth of ceanothus and manzanita is present to require consideration of a live fuel component. Fire Behavior fuel model 10 and NFDRS fuel model G are used in this area. The larger communities within this area are Hayfork, Lewiston, and Weaverville. Smaller communities exist as well as various areas of urbanization. Most of the urbanization lies in the lower elevations of Trinity County in valleys or along streams.

The terrain is very steep; there is a large amount of heavy fuels, and travel times are long in this area.

Trinity County has experienced several catastrophic fires in recent history, damaging not only valuable timberlands, but also causing significant structure and private property loss.

Indicates a General Assessment of Fire Danger Potential based on historic weather

Timber West – Trinity River Remote Automated Weather Station



The Burning Index (BI) reflected on this and the following graph is a measure of fire intensity. It is represented by a number that relates to the potential amount of effort needed to contain a single fire in a particular rating area. It combines the Spread Component (SC) which rates the forward rate of spread, and the Energy Release Component (ERC), which is the estimated potential available energy released per unit area in the flaming zone of a fire. The BI generally, is ten times the flame length of the fire (BI of 40 = 4 foot flame length).³

³ <http://www.fs.fed.us/r2/fire/drgloss.htm> Common terms - National Fire Danger Rating System (NFDRS)

Brush Area

The mid elevations (1,000 – 2,000 ft.) surrounding the Sacramento Valley are merged into the brush area. The area is typically chaparral with chamise and manzanita. These elevations include oak woodland fuels with a high mixture of brushy fuels. Communities include the City of Shasta Lake, Mountain Gate, Shasta, Keswick, and French Gulch.

Most of the lands to the northwest of Redding were void of vegetation by the early 1900's due to copper mining and smelter operations. This area now consists of mostly brush fields that are 50 years old or older. There have been few significant fires in this area, as the brush did not contain sufficient dead material to sustain the fires (fuel models 5 and 6)⁴. The brush in these areas now has sufficient dead fuel and fine fuel to sustain large and damaging fires (Fire Behavior fuel model 4, NFDRS model F).

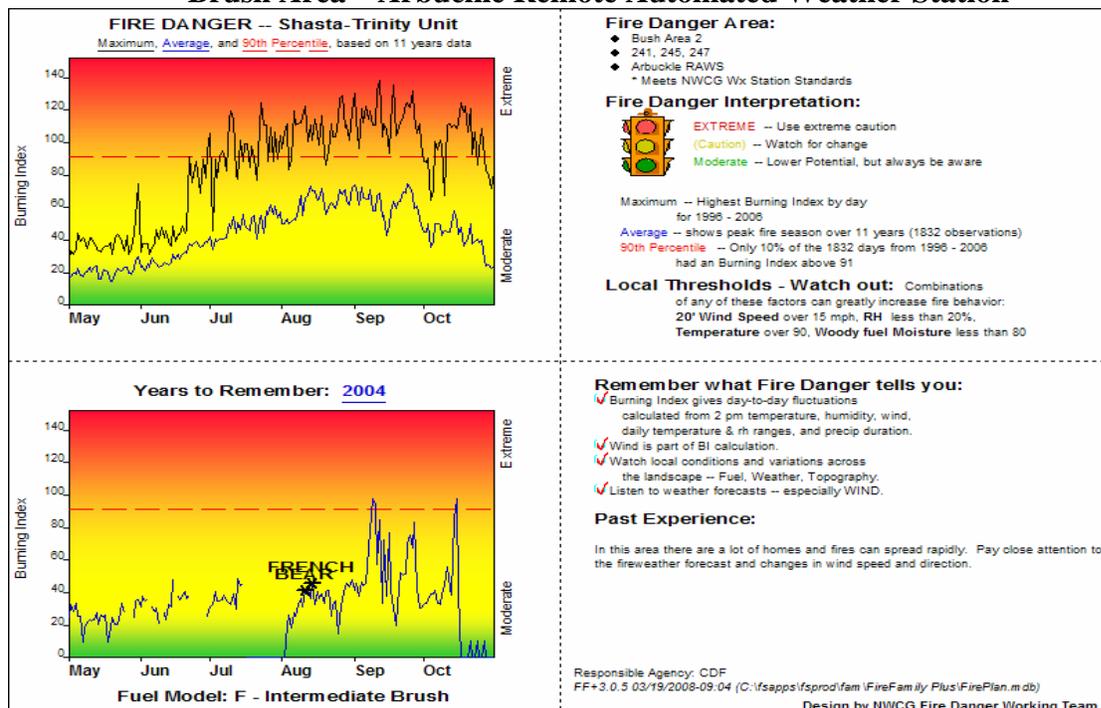
The lands to the west of Redding located at the base or lower levels of the mountains are covered mostly in brush or oak woodland with a heavy brush under story.

Most of the land west of Redding is highly urbanized which creates a high threat to life and property from wildfire. Subdivisions that were developed prior to 1982 often have narrow one-lane roads and no community water systems. Often the structures have a single access road. Some subdivisions were developed with "Fire Emergency Access" roads, however many of these roads are not maintained and are overgrown to the point of being impassable.

Communities in the Brush Area, west of Redding, include Igo, Centerville, Shasta, Keswick, The City of Shasta Lake, and portions of the City of Redding.

The brush area east of Redding is generally located in rangeland. However urbanization in the brush area exists in the western edge of the communities of Shingletown, Whitmore, Oak Run, Round Mountain, and Montgomery Creek. This area has experienced significant fires in the past and with the current urbanization can expect future fires to be more damaging.

Brush Area – Arbuckle Remote Automated Weather Station



⁴ “Aid to Determining Fuel Models for Estimating Fire Behavior” H.E. Anderson
2008 Shasta – Trinity Unit Fire Plan

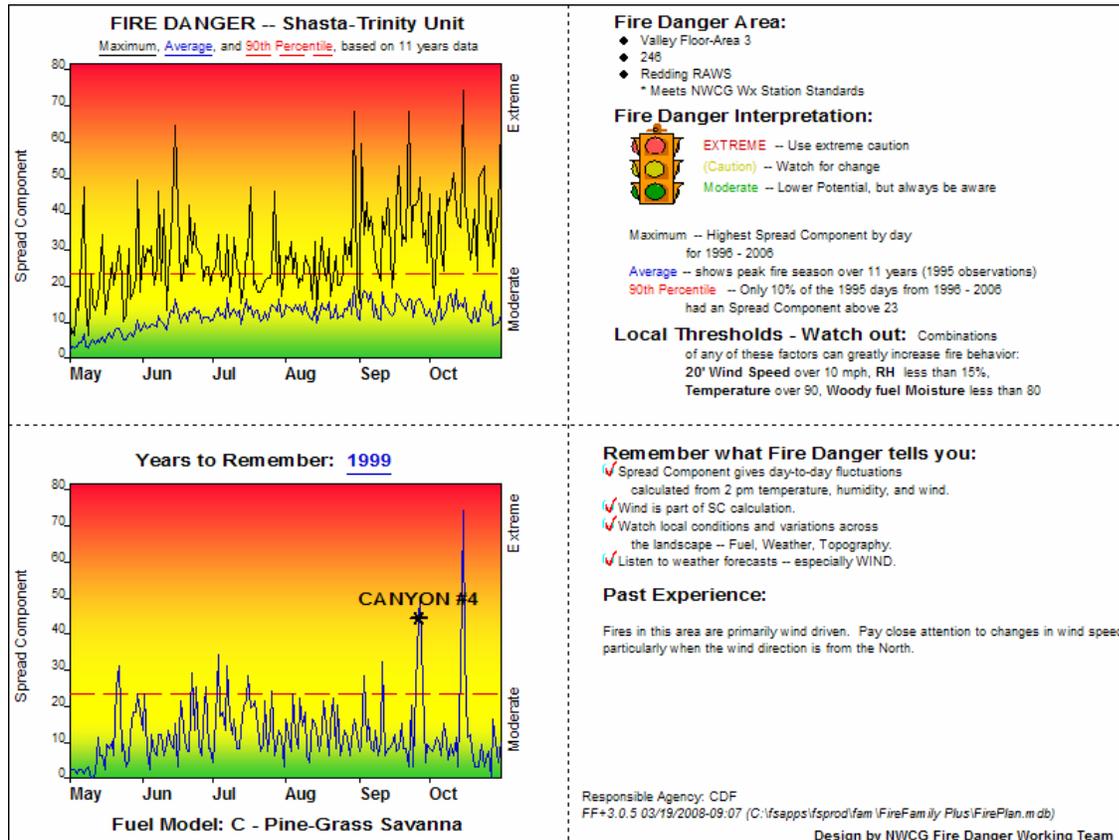
Valley Floor (Grass Area)

This is the south-central part of the Unit extending from the Sacramento River outwards to an approximate elevation of 1000 feet. This is the most urbanized area of the Unit and includes the cities of Anderson, Redding, and the communities of Bella Vista, Cloverdale, Millville, Olinda, and Palo Cedro. The area is typically grassy woodland with blue oak, valley oak, gray pine, and annual grasses. There are also large areas covered by brush types and some of the woodland areas have a dense brush under story.

Significant fires have occurred on the valley floor, especially during the North Wind events. Because the primary fuel is annual grasses, each year the fire danger is recurring.

The fine fuels react quickly to weather changes, especially wind. Fire Behavior model 2 and NFDRS model C are used.

Valley Floor – Redding Remote Automated Weather Station



Timber East

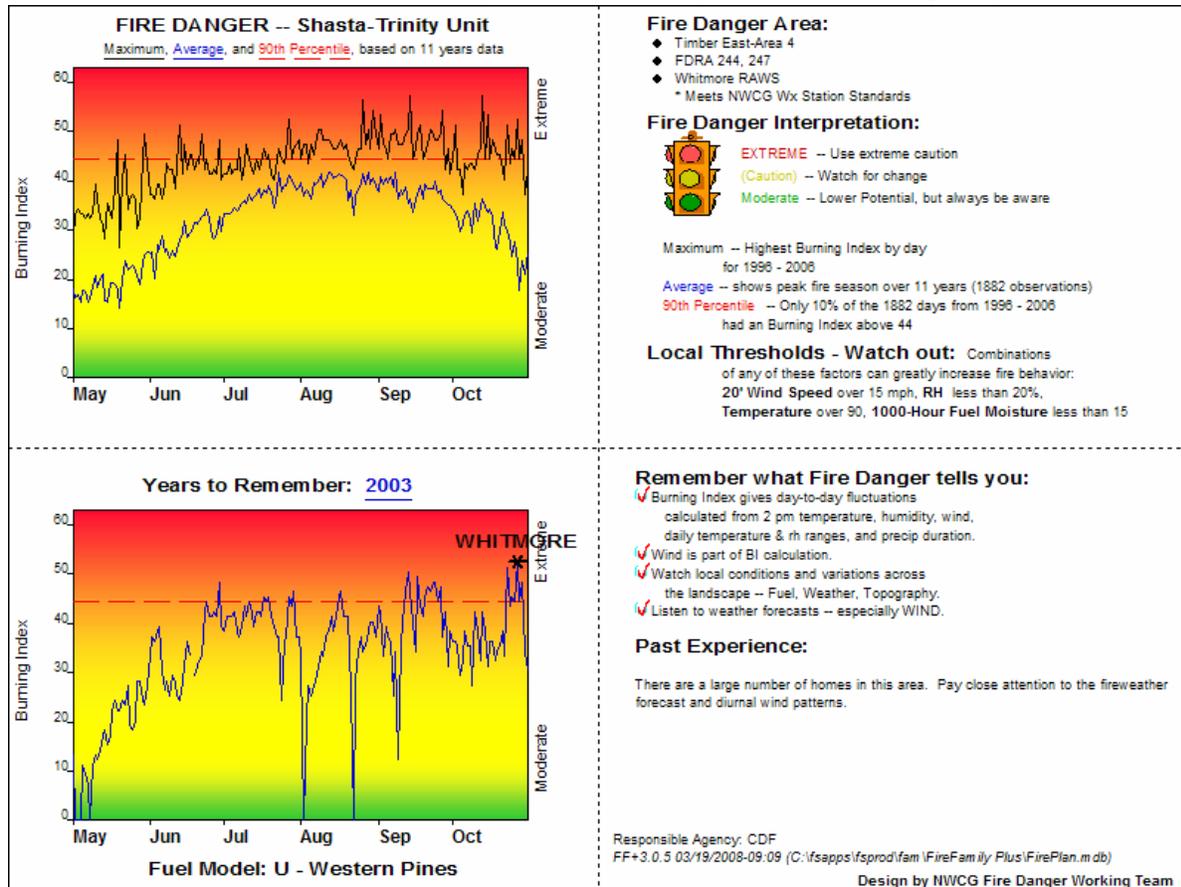
The Timber East area is the forested area east of Redding. The area extends from the 2,000-foot elevation of the Sacramento Valley to Highway 89. The majority of the area is managed for timber production. This is a mixed species conifer forest that varies from the Timber West Zone in topography, weather and some hardwood species. Slash and brush are part of the fuel component.

Several communities exist within this zone including, Shingletown, Whitmore, Oak Run, Round Mountain, Montgomery Creek, and Burney.

Significant damaging fires have occurred in this area resulting in large structure and timber loss.

Fire Behavior Fuel Model 9 and NFDRS Fuel Model U are used in this area.

Timber East – Whitmore Remote Automated Weather Station



Northeast Plateau

The Northeast Plateau is the area of CAL FIRE DPA east of highway 89. Much of the area is high elevation sagebrush, juniper and Ponderosa Pine. Large tracks of agricultural lands are in the Fall River Valley.

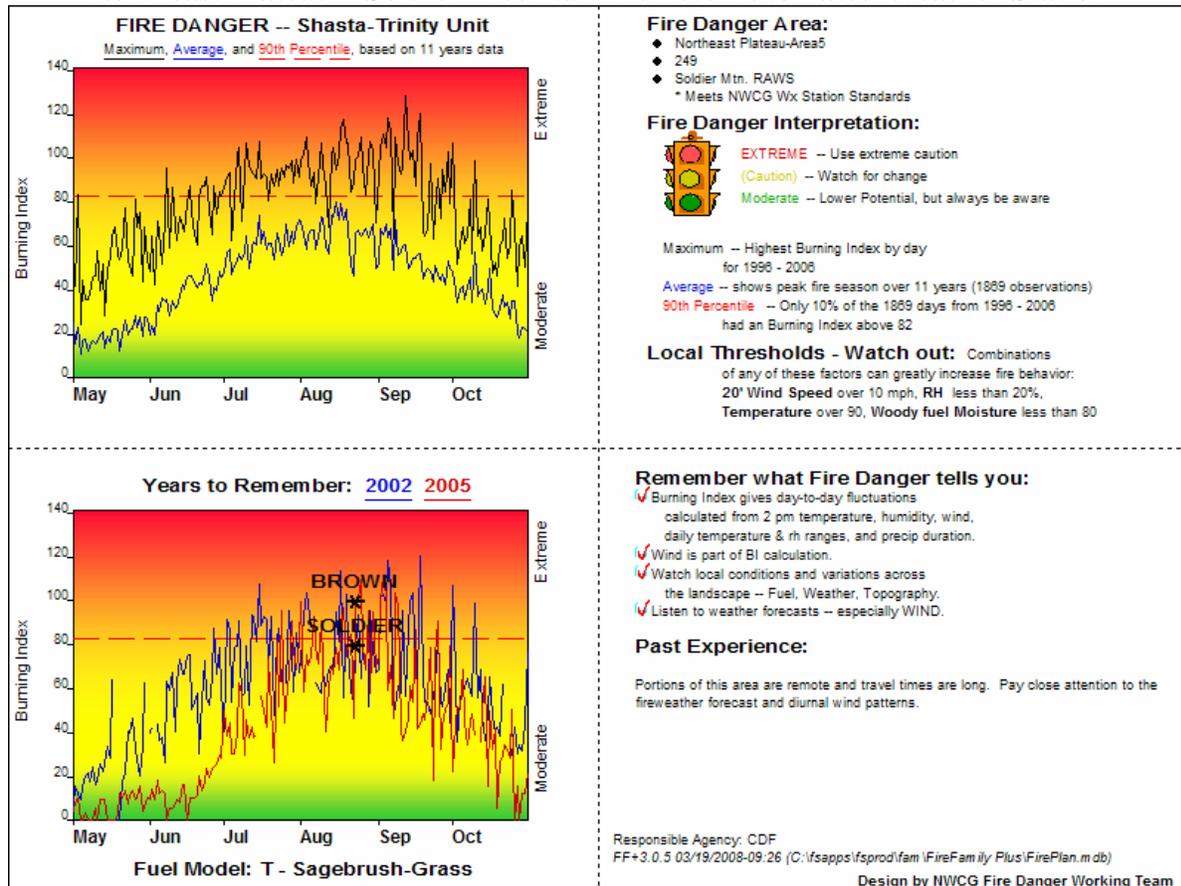
The larger communities in this area are Cassel, Fall River, and McArthur with significant urbanization occurring outside of these communities.

With the exception of the irrigated Fall River Valley, the area has experienced damaging fires. The most significant fires were located to the north of Highway 299E and east of Highway 89. Large and damaging fires have also occurred along Highway 89 south of the SRA lands near and around the communities of Hat Creek and Old Station.

Portions of this area are remote and travel times are long. The fuels are very sensitive to changes in the wind speed and direction.

Fire Behavior Fuel Model 6 and NFDRS Fuel Model T are used in this area.

Northeast Plateau – Soldier Mountain Remote Automated Weather Station



Fuels

The ability to predict fire behavior and rate fire danger became possible with the development of fuel models for specific types of fuels. The fuel models used in this assessment are those developed by the United States Department of Agriculture - Forest Service⁵ and are described in “Aid to Determining Fuel Models for Estimating Fire Behavior” (Anderson, Hal; 1982)

Understanding the current fuel situation in the unit is paramount in determining the fire risk to assets. Fuel is any organic material that is living or dead, in or on the ground or above ground level that can ignite and burn. There are two classes of fuels; live and dead. Fuels are usually classified into four groups; grasses, brush, timber and logging slash. The fuel bed is a complex system that includes seven principal characteristics: fuel loading, fuel size and shape, compactness, horizontal continuity, vertical arrangement, chemical content and moisture content.⁶ The combined effects of fuel, weather, and topography determine how fire behaves.

⁵ Albini, “Estimating Wildfire Behavior Effects” and Rothermel “How to Predict the Spread and Intensity of Forest and Range Fires”.

⁶ Intermediate Wildland Fire Behavior S-290

Definitions

Fuel Loading:

The mass of fuel per unit area, live and dead, grouped by particle size classes, expressed in tons per acre.

Fuel Size and Shape:

The surface-area-to-volume ratio. Typically small flat fuels such as grass have a higher surface-area-to-volume than larger fuels such as logs.

Fuel Compactness:

The spacing between fuel particles. Closely compacted fuels have less surface area exposed, restrict oxygen, and inhibit convective and radiant heat transfer.

Fuel Horizontal Continuity:

Horizontal distribution of fuels at various levels or planes. Continuous horizontal fuels allow the fire to spread easier than sparsely distributed horizontal fuels.

Fuel Vertical Arrangement:

The relative height of fuels located above the ground. This is the ladder fuel component.

Chemical Content:

Chemicals makeup of individual fuel. Some fuels contain chemical compounds that are more volatile than others.

Moisture Content:

The amount of water in fuel expressed as the percentage of the oven-dry weight of the same fuel.

In order to consider the fuel bed characteristics the Fire Plan fuels assessment categorizes fuels in three broad levels – Surface fuels, Ladder fuels, and Crown Fuels. Combining these fuel levels with topography (slope) allows a fuel hazard ranking.

Surface Fuels

The fuel at ground level that is most likely to carry the fire; for example grass, pine needles or leaves, brush, or slash. This fuel will carry active fire without the addition of wind or topographic influence.



The surface fuel in the left foreground is a grass fuel model 1.

The surface fuel model on the right is a fuel model 9: needle and leaf litter with the majority of ground litter less than three inches in diameter.



The fuel at the left is a brush model. This particular brush has sufficient dead fuel loading to qualify it as a fuel model 4.

Ladder Fuels

This is the vertical arrangement component of fuels. These fuels might consist of small trees, brush, low hanging branches, and leaf or needle litter suspended in the branches of shrubs or trees. This fuel is typically ignited by surface fuel fire. The burning of the ladder fuels easily allows the fire to move into the canopy fuels or if the canopy is open to cause individual torching of trees.



In the foreground of the left photograph grass, leaf litter, and dead woody material can carry the fire to the brush that in turn ignites the lower branches of the trees.

In the photograph at the right the forest floor grasses and leaf/needle litter can ignite the younger trees and shrubs and take the fire to the crown of the trees.



Both of these depict a continuous horizontal and vertical arrangement of the fuels.

Crown Fuels

This is the tops of the vegetation whether timber or tall shrubs. Canopy closure is the major concern. Canopy closure is usually given as a percentage. It can be demonstrated by looking at the canopy from the air and seeing what percentage of the ground is visible. If 25% of the ground is visible than there is a 75% canopy closure. Typically a crown fire will be sustained if the canopy closure is greater than 50%. Unless strong winds are present, crowning fires are unlikely without a closed canopy.



Here a fire is burning in a mixed coniferous forest where continuous crown fuels exist. This area also has widespread, continuous ladder fuels.

In the foreground of this photograph, both the ladder and continuous crown fuels have been removed creating a more fire safe environment.



The following three maps indicate the fuel rankings for surface, ladder and crown fuels. The fourth map calculates a total fuel ranking which combines the fuels and slope factor. The crown and ladder fuels in the timber belts within the State Responsibility Area were reassessed in 2002. The fuels were not reassessed in the USFS protection area and have a lower ranking on these maps. Sample evaluations indicate that the crown and ladder scores in the USFS DPA should be elevated. An additional three maps indicate the surface fuel types of the Unit.

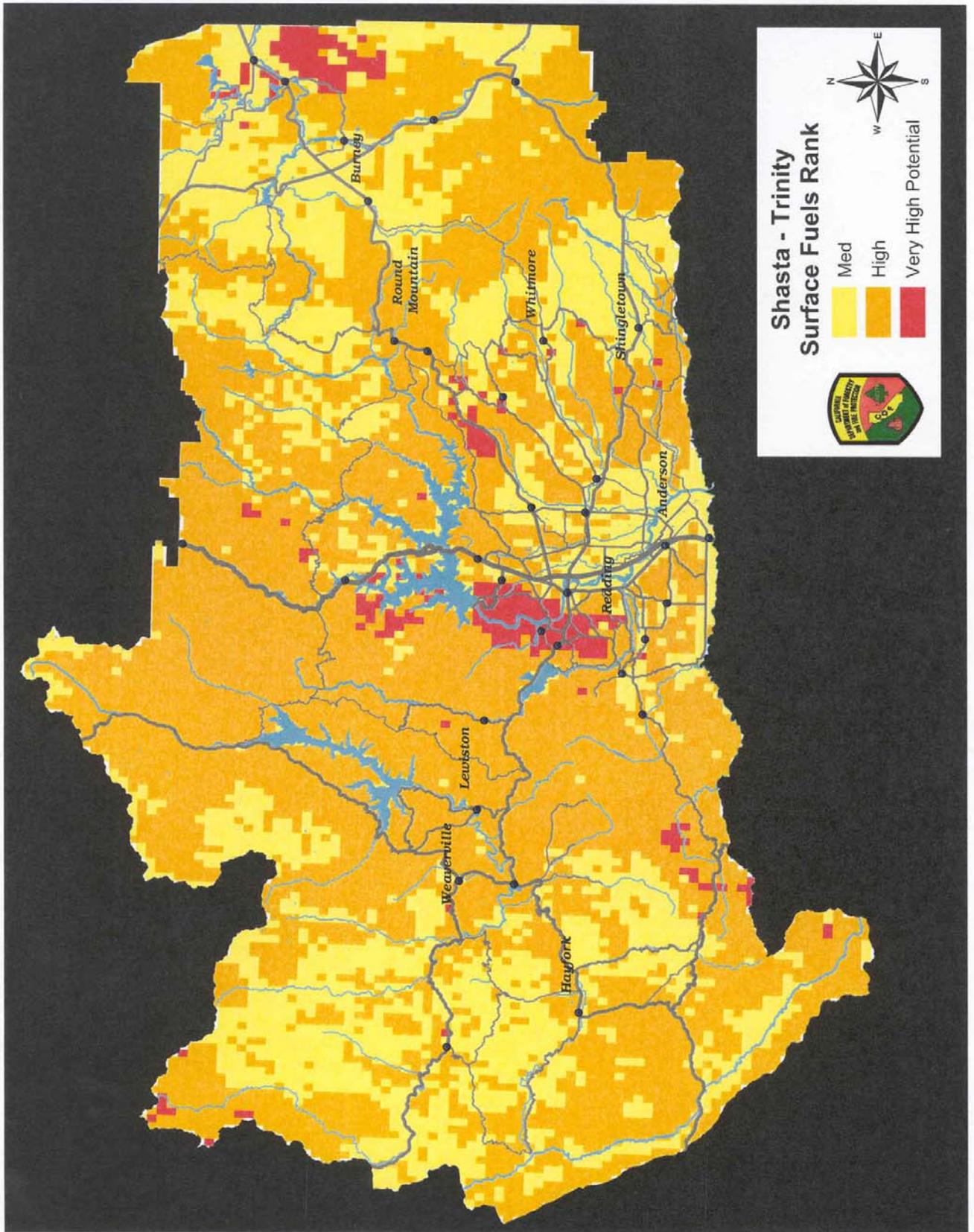
The Unit’s brush belt fuel types and fuel ranking are in error. Sampling of the Brush Zone indicates that the crown and ladder fuels are at a higher volume than indicated. The Brush Zone shown on the Grass and Brush Zone fuel map indicates grass in many areas where brush has become the primary surface fuel. A goal for the fire plan is to ground truth the brush and grass fuel zones. Some fuel corrections were made in the urbanized areas west of Redding in 2003. ***Maps utilizing the current fuel data indicate a lower fuel ranking than actually exists in portions of the Brush and Grass Zones.***

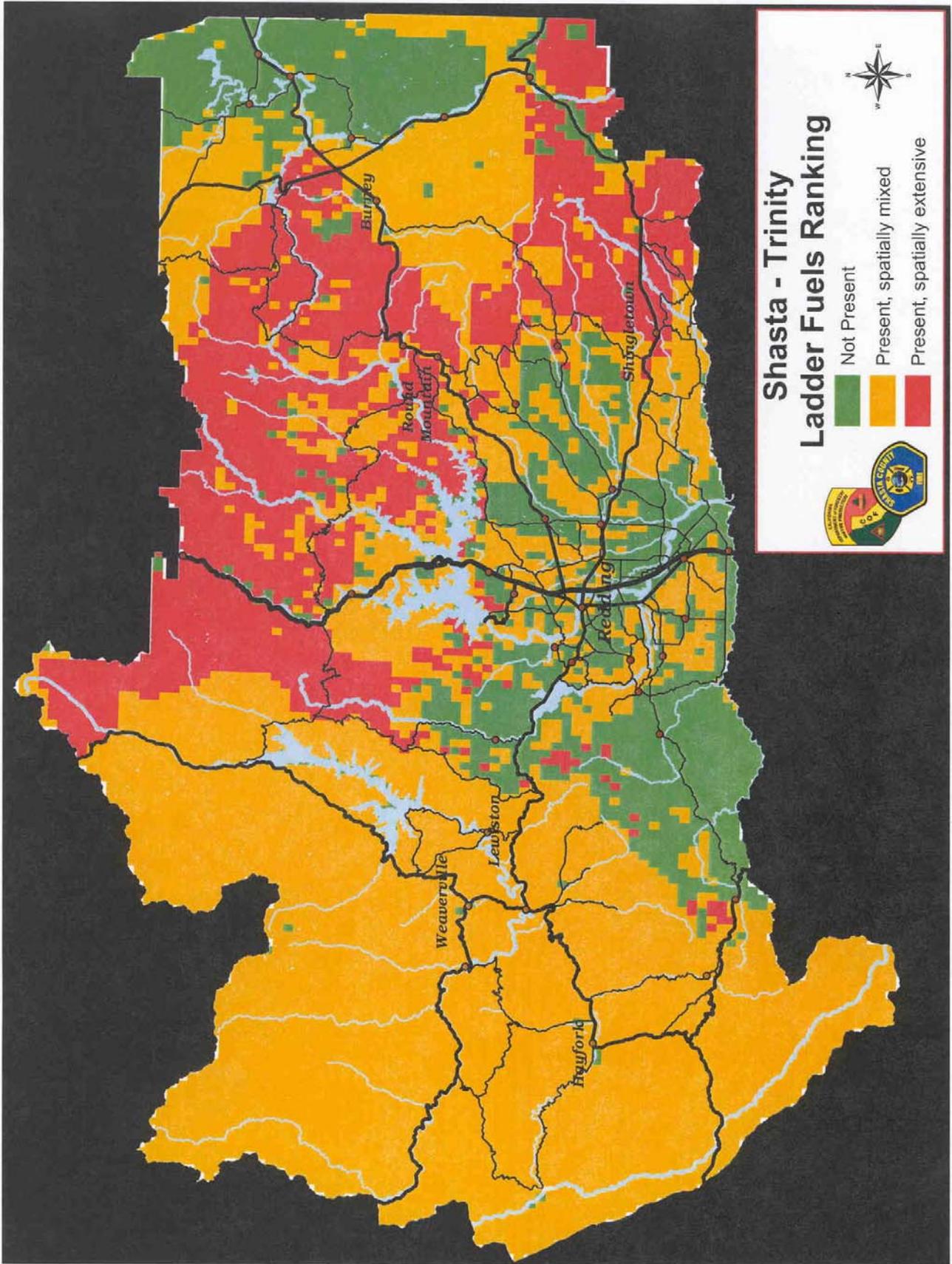
The following guidelines are used to rank the Q81st fuels. The ranking considers both the spatial continuity of the fuel attribute and how much area of the Q81st cell is covered.

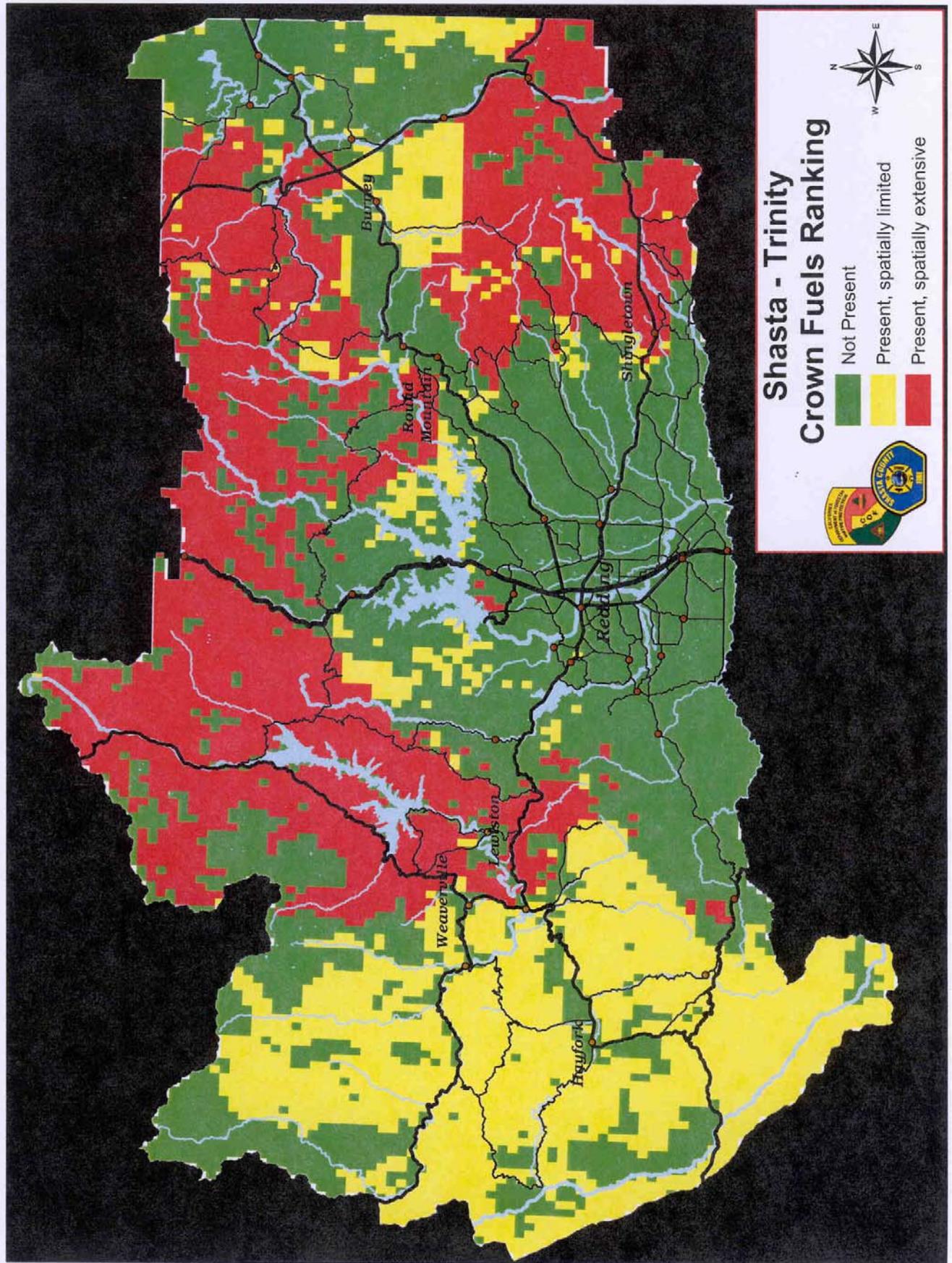
	<u>Ladder Fuel Continuity</u>	<u>% of Q81 Area</u>
Not Present	< 30% Ladder Fuel Canopy	>99%
Present, Spatially Limited	> 30% Ladder Fuel Canopy	1 - 25%
Present, Spatially Extensive	> 30% Ladder Fuel Canopy	> 25%
	<u>Crown Fuel Continuity</u>	<u>% of Q81 Area</u>
Not Present	< 50% Over story Canopy	>99%
Present, Spatially Limited	> 50% Over story Canopy	1 - 25%
Present, Spatially Extensive	> 50% Over story Canopy	> 25%

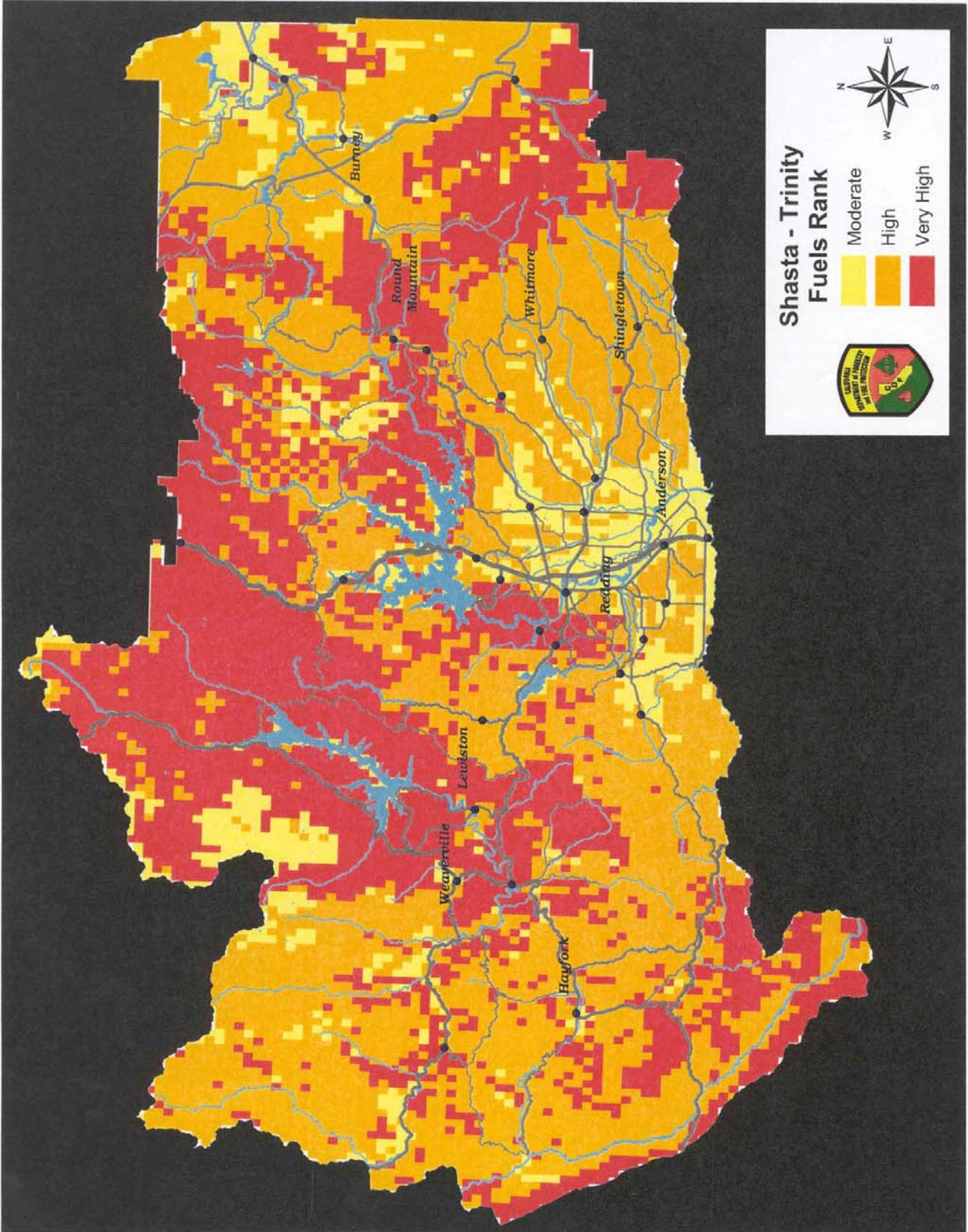
The fuel hazard ranking system is based on estimates of potential fire behavior associated with the particular fuel type: and as such have a direct relationship to the characteristics – rate of spread, fire line intensity, heat intensity, heat per unit area, etc.- that are a result of that fuel complex burning under a particular set of weather conditions. The idea is to provide a basic means of stratifying the landscape into areas of low, medium, and high hazard as it is related to fire behavior potential.⁷

⁷ Appendix VIII of the “Unit Vegetation-based Products” of the California Fire Plan
2008 Shasta – Trinity Unit Fire Plan

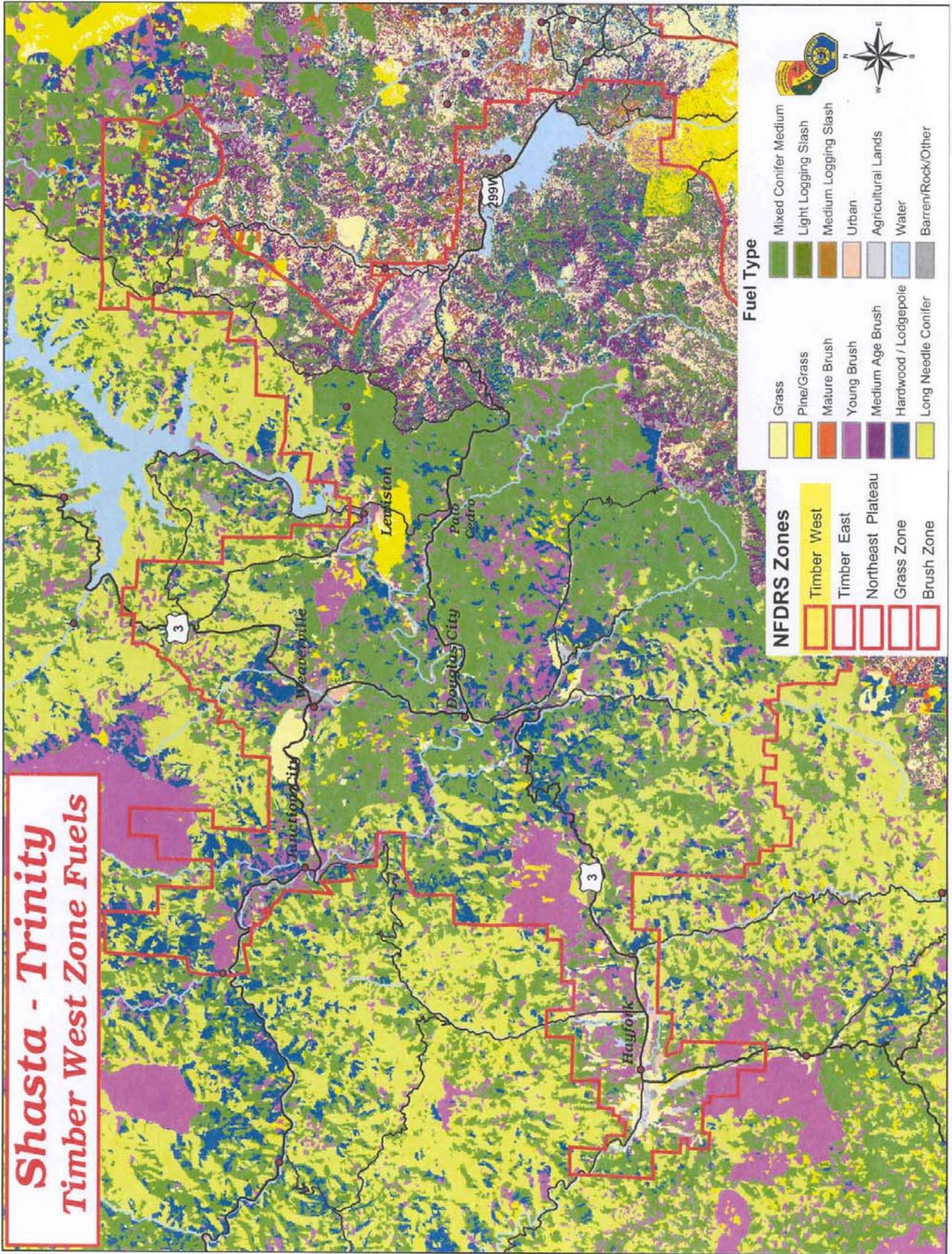


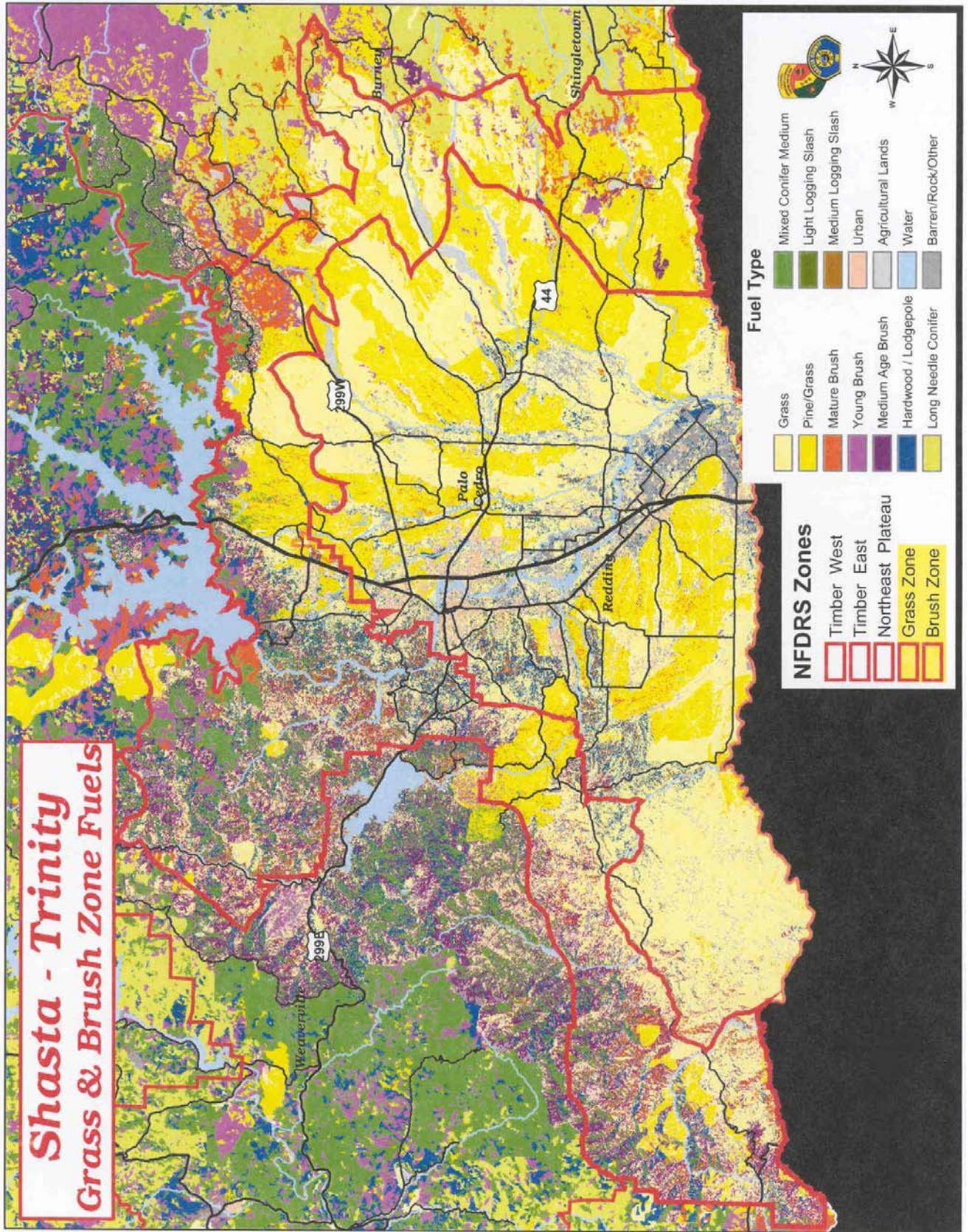






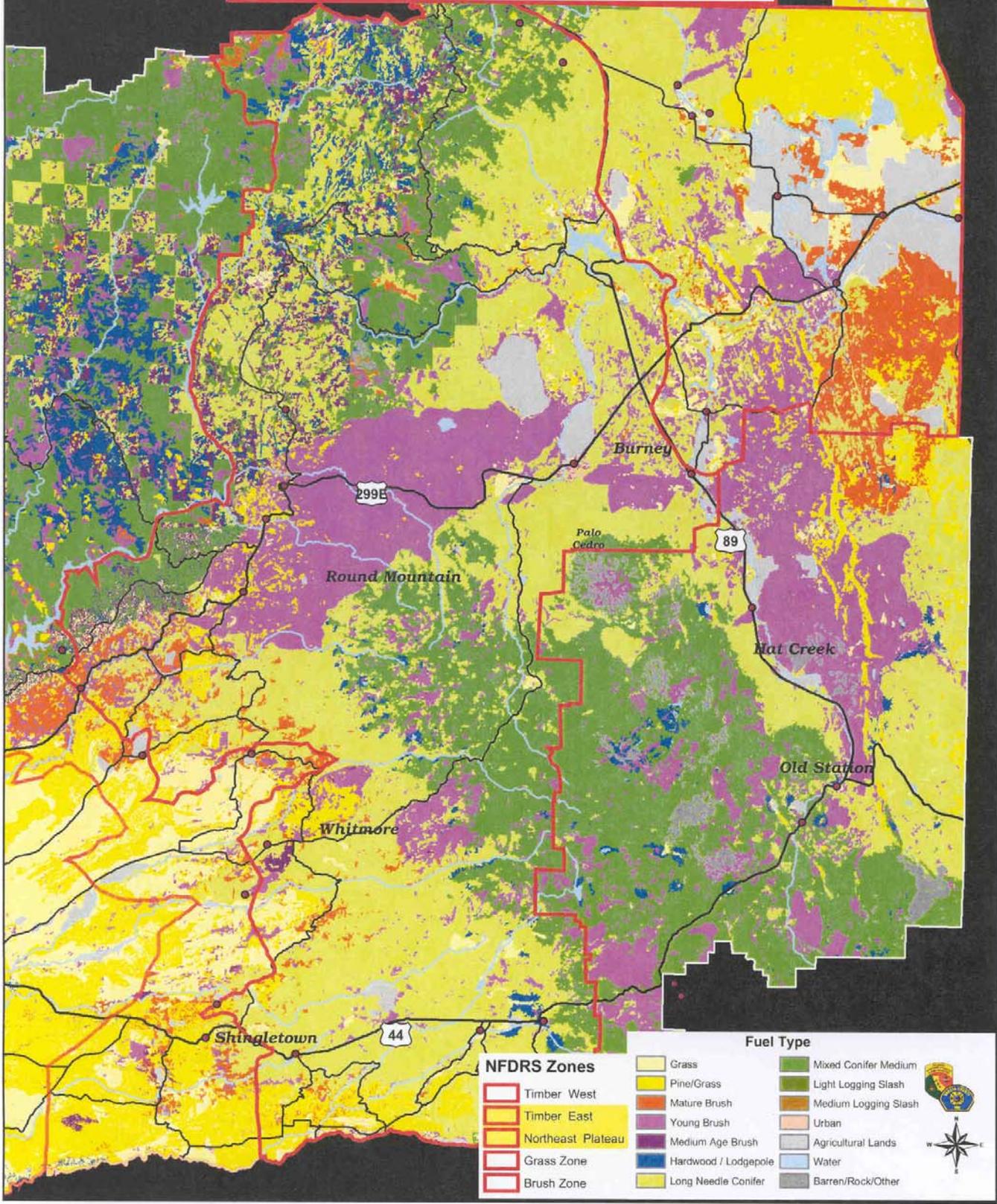
Shasta - Trinity Timber West Zone Fuels





Shasta - Trinity

Timber East & NE Plateau Zone Fuels



Fire History

The study of the Shasta –Trinity Unit’s fire history is not only a view of the past but also a representation of what can be expected from future fires in similar locations and conditions. Mapping of historical fires often indicates a pattern of fire behavior in a particular area that can be utilized when planning fuel breaks or fire safe zones.

The fire plan process utilizes the fire history data to help evaluate fuel conditions. As new fire perimeters and information are collected the fuel data layer is changed to represent the effects of the fire. Previous burned areas are “aged” to represent changes in fuel volume and maturity.

The majority of large fires within the Shasta – Trinity Unit have been documented since 1910. Local historical information provides other snippets of fire history such as:

“The third (Buzzard Roost Hotel) was destroyed along with the town in a raging forest fire in 1926” is the caption of a historical photograph stored at the Shasta Historical Society⁸ Office.

An October 1870 fire started in the vicinity of the Fritz and Thatcher mills in Shingletown and burned approximately ten square miles of land as well as local homesteads. A 1917 fire in the Shingletown area also destroyed the village of Plateau and burned approximately 4 sections of land.⁹

October 10, 1905 “The Enterprise and Pacheco districts southeast of Redding were in the grasp of a fierce forest fire that already had burned an area 10 miles long by 2 miles wide. The fire fanned by heavy winds, had at times leaped 200 feet.”¹⁰

Some evidence of historic destructive fires exists. A brush field covering approximately forty square miles located east of Lassen Volcanic National Park was noted by immigrants using the Noble’s Route into Shasta County and called “The Chute” or the “Manzanita Chute”.¹¹

1870 Shingletown Ridge fire scar



Undocumented 1940’s fire southwest of Redding



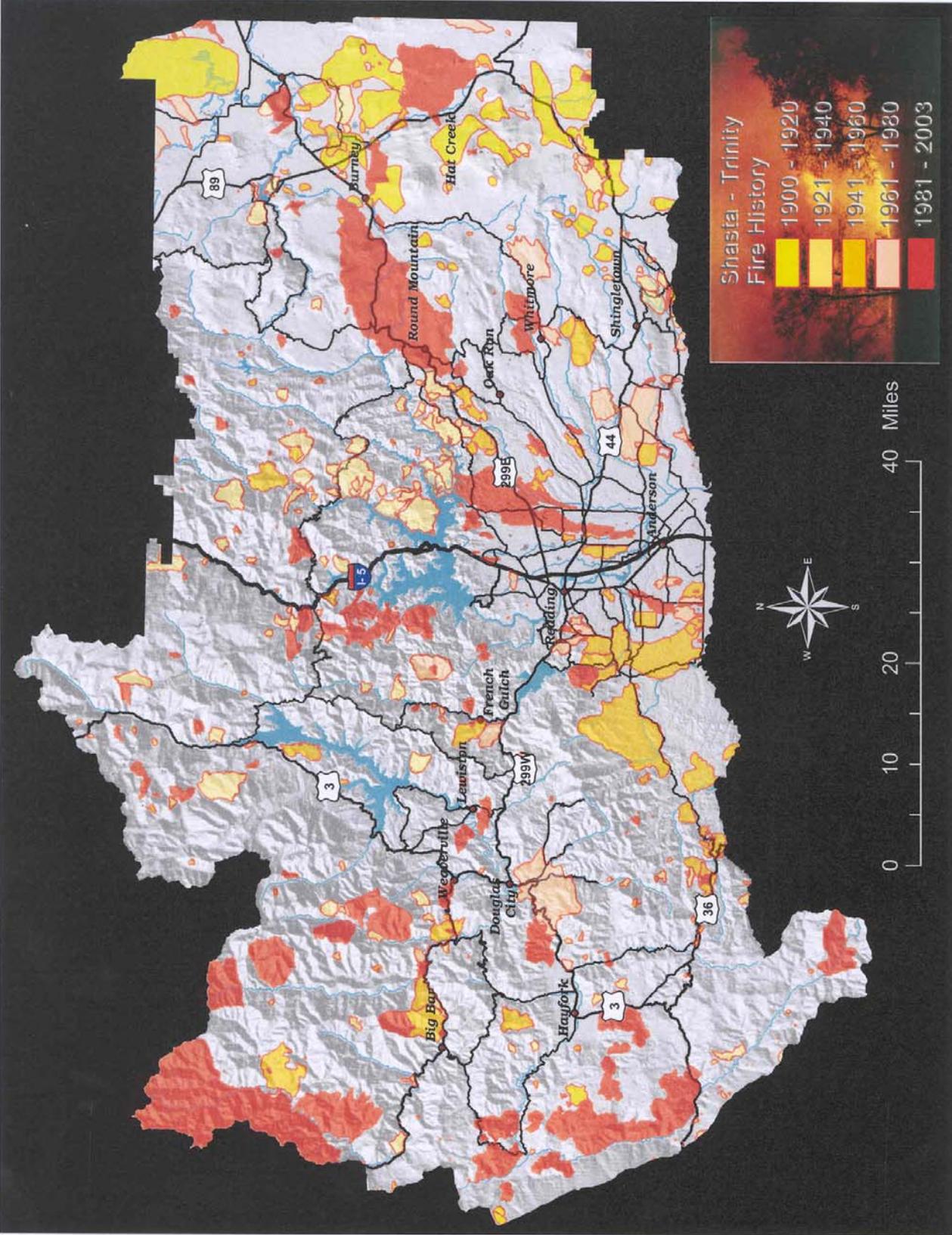
⁸ Shasta County Historical Society 1449 Market St. Redding

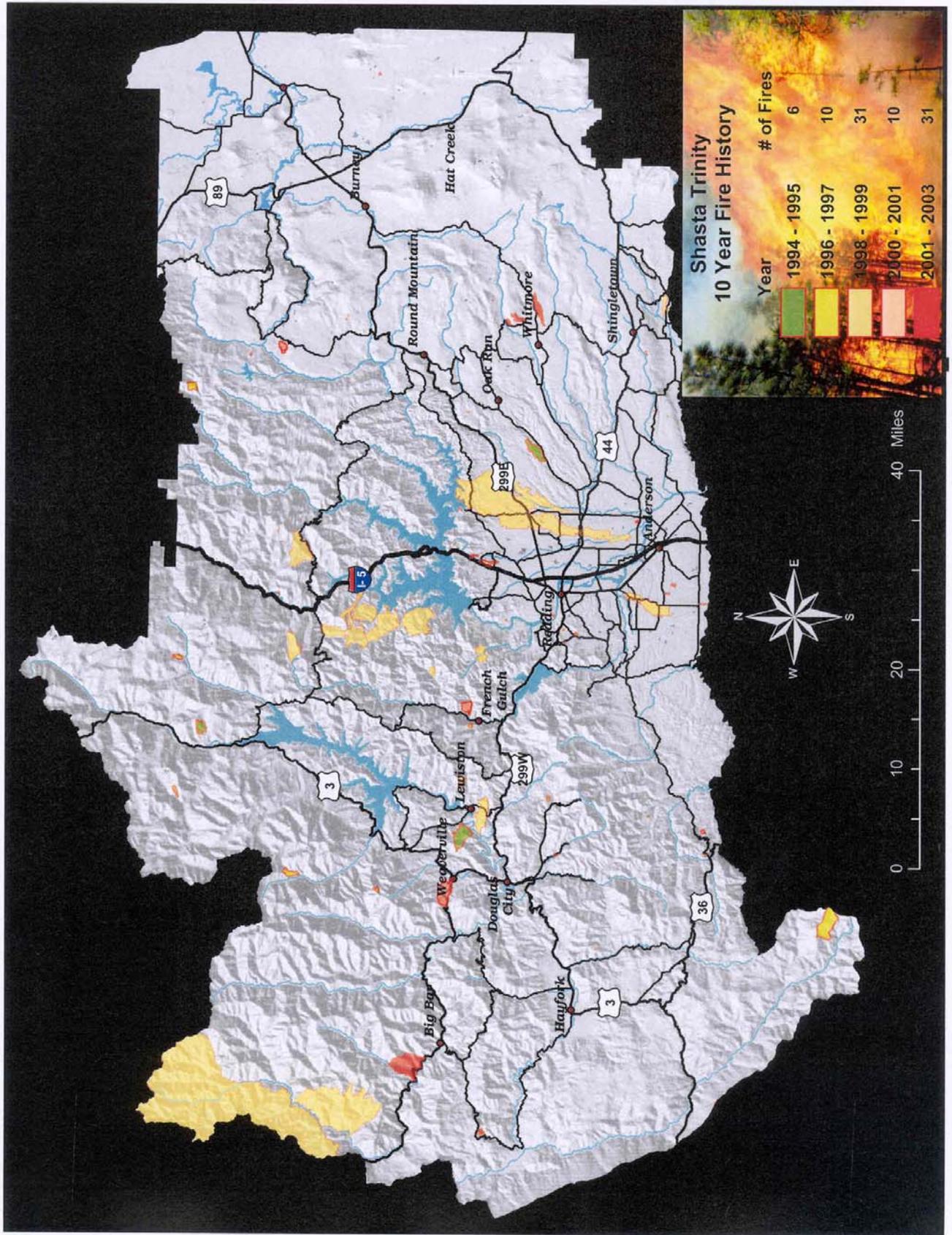
⁹ “The Covered Wagon” 1970 Shasta County Historical Society

¹⁰ Record /Searchlight Oct.10, 2005

¹¹ “The Covered Wagon” 1970 Shasta County Historical Society

The following 1900 – 2003 Fire History Map indicates that the Shasta – Trinity Unit has experienced many large and damaging fires during the last century.





Fire history within the Unit shows that a large and damaging fire can occur almost anywhere within the Unit. Recent large fires within the Unit have destroyed almost 2000 structures.

	Fire Name	Acres	Structures
Aug-92	Fountain	63,960	636
Jul-99	Lowden	1,945	43
Sep-99	Canyon	2,580	230
Oct-99	Jones	26,200	954
Aug-01	Oregon	1,694	33
Aug-04	Bear	10,484	114
Aug-04	French	12,898	42

Both the Jones and Canyon fires burned mostly in woodland areas covered by grass and brush. These were fast moving fires causing the majority of the damage in one day. The Fountain Fire started in grass and brush lands and quickly spread into timber. The Lowden and Oregon fires burned in timber.

The destruction of structures and other properties is not confined to large acreage



fires. Almost every year relatively small vegetation fires damage or destroy homes and other private assets.

This five-acre fire destroyed three outbuildings, two cars, and wood fencing. (Note: dry standing grass immediately next to properties. Main house with garden and lawn received no damage.)



Historical Fuel Modification

In addition to fire damage, many of the fuels within the Unit have been modified by human activity. In Western Shasta County, thousands of acres of land became barren because of copper mining activities that occurred between 1896 and 1919. A large amount of wood was cut to fuel copper smelting operations. The fumes resulting from smelting the heavy sulfide ores killed and damaged vegetation as far south as agricultural lands in the south of the county. In 1910, USFS Forester John D. Coffman reported on areas of complete devastation and that Pine species were the most sensitive to the smelter operations whereas Black Oak and Poison Oak were the least. In 1921, State Forester E. N. Munns in a report to the legislature estimated that 180,000 acres of forestland had been damaged by smelter operations.¹²

Early smelting operations utilized “open air roasting that destroyed all the vegetation within a radius of several miles of Keswick”¹³ Even when the open air roasting was replaced by mechanical roasting, fume damage continued to destroy vegetation and damage agricultural crops as far away as Corning. By 1910 litigation and declining copper prices led to the cessation of most smelting.

Vegetation killed by smelter operations created a large fire hazard resulting in 275 fires in the Kennett area between 1929 and 1936. Some of these fires are shown on the “1900 to Present Fire History” map.

Land devoid of vegetation suffered a high amount of erosion estimated at 35 million cubic yards of soil in ten to fifteen years in the Kennett area. In 1922 E.N. Munns planted twenty-five experimental plots of various plants for erosion control with minimal success. Between 1932 and 1938 reforestation efforts also occurred.¹⁴ Until the construction of Shasta Dam, eroded soils washed down the Sacramento River. After the construction of Shasta and Keswick Dams, it was feared erosion would reduce water storage capacity. Starting in 1946 an erosion control program was started which included check dam construction, broadleaf plantings and watershed reforestation. These efforts continued through the mid 1960’s and were successful in slowing the erosion.

Today, much of the landscape is covered in brush, however several areas have small stands of timber. On north facing slopes and in drainages pockets of pine exist. Unfortunately much of this land is primed for burning which has the potential to lose the last 80 years of regeneration. South of the town of Keswick much of this land has become urbanized.

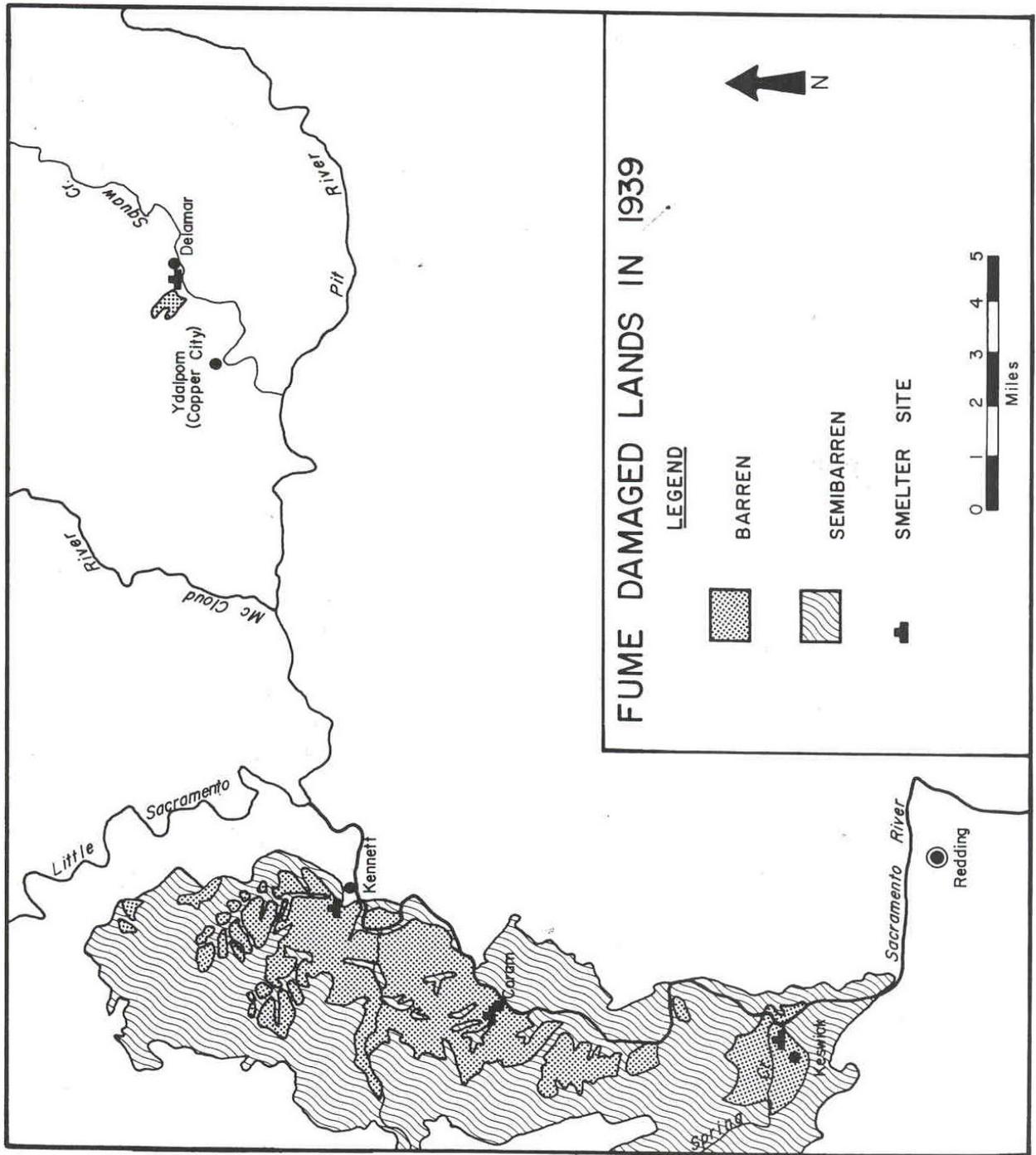
The Cow Creek Watershed Fuels Plan¹⁵ indicates that fuels in eastern Shasta County were removed for smelter fuel in mining operations, possibly for the Ingot Smelter as well as lumber milling operations. Kristofors’ work does not include any environmental information concerning the Ingot Smelter but does state that it was never included in any litigation perhaps because of its remote location and that air currents carried fumes away from populated areas. Looking at the fuels map of the Ingot area indicate expanses of brush fields surrounding the Ingot mine that would indicate similar environmental damage.

¹² “The Copper Mining Era in Shasta County, California, 1896 – 1919, An Environmental Impact Study, pg.97
Kris Vidar Kristofors

¹³ Ibid pg.40

¹⁴ Ibid pg.101

¹⁵ <http://wim.shastacollege.edu/>



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¹⁶ “The Copper Mining Era in Shasta County, California, 1896 – 1919, An Environmental Impact Study, pg.96

Kris Vidar Kristofors

Ignition Workload Assessment

Fire Cause

It is extremely important to determine how fires are caused, where fires occur, and whether the Unit is meeting the Department’s goal of containing 95 percent of all wildfires at 10 acres or less. Determining causal trends can direct the Unit to specific prevention efforts to change that causal trend. The location where the majority of fires occur can help determine where prevention and pre-fire efforts might produce the greatest result.

The ignition workload assessment is derived from data collected from CAL FIRE’s Emergency Activity Reporting System (EARS). This fire reporting system utilizes the National Fire Protection Association (NFPA) Standard 901 coding convention. CAL FIRE has historically classified fire causes into twelve General Causes while the NFPA causal data is collected as causal factors. EARS reports extrapolate the causal factors into the twelve general causes. This results in some differences in fire cause totals.

The Fire Plan data only uses ignitions that have caused a vegetation fire. The Shasta Trinity Unit collects data for all ignitions including non-vegetation fires such as structure or vehicle fires. Many of these ignitions could have spread to the wildland vegetation, but suppression activity contained the fire to the original material ignited. This Unit data includes only State Responsibility Area (SRA) fires.

This plan utilizes both sets of ignition data. Percentage of causes in the two data sets very nearly mirrors one another. There is a discrepancy in the Equipment-Use category. This is partially because many of the non-vegetation type fires are equipment-use caused. EARS data under reported arson caused fires in 2003. Fire cause data entered as “suspicious – probable arson” were reported as “other miscellaneous” in EARS.

Unit Wide Incident Data

Ears Fire Cause data extrapolated from NFPA 901 causal factor data.

10 Year Vegetation Fire Cause

Fire Cause	Number of fires by cause										10 year percentage	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals	10 yr avg.
Unidentified	14	18	15	26	41	30	39	31	39	38	291	10.23%
Lightning	13	20	40	42	73	13	30	9	15	40	295	10.37%
Campfire	6	11	4	3	10	2	4	6	4	2	52	1.83%
Smoking	30	31	27	29	23	12	20	30	17	13	232	8.15%
Debris	27	30	45	10	44	19	35	35	22	33	300	10.54%
Arson	51	44	36	44	74	22	35	29	11	21	367	12.90%
Use of Equipment	43	58	28	45	57	41	43	37	57	48	457	16.06%
Vehicle	25	45	26	18	27	18	24	29	25	30	267	9.38%
Railroad	0	3	0	3	3	0	1	1	0	0	11	0.39%
Powerline	11	11	6	2	7	11	16	11	8	6	89	3.13%
Playing with Fire	28	20	29	6	18	8	16	14	7	13	159	5.59%
Other/Misc.	41	32	28	25	62	31	31	26	31	18	325	11.42%
Totals	289	323	284	253	439	207	294	258	236	262	2845	

Unit Fire Cause data including non-vegetation fire data.

5 Year Shasta - Trinity Fire Cause

Fire Cause	2000	2001	2002	2003	2004	Totals	Avg #	% Cause
Undetermined	46	47	29	42	20	184	36.80	11.56%
Lightning	13	42	12	14	49	130	26.00	8.17%
Campfire	7	3	12	5	10	37	7.40	2.32%
Smoking	11	18	18	20	10	77	15.40	4.84%
Debris Burning	27	47	33	36	42	185	37.00	11.62%
Arson	39	40	40	24	28	171	34.20	10.74%
Use Of Equipment	57	74	45	68	85	329	65.80	20.67%
Vehicle	15	28	34	20	59	156	31.20	9.80%
Railroad	0	1	0	0	0	1	0.20	0.06%
Powerline	22	23	19	17	9	90	18.00	5.65%
Playing W/ Fire	23	24	18	18	17	100	20.00	6.28%
Other/Misc.	12	21	29	25	45	132	26.40	8.29%
Totals	272	368	289	289	374	1592	318.40	

Comparison of Unit fire cause data and EARS data. Unit data includes non-vegetation fires.

	EARS	UNIT #
Undetermined	10.23%	11.56%
Lightning	10.37%	8.17%
Campfire	1.83%	2.32%
Smoking	8.15%	4.84%
Debris	10.54%	11.62%
Arson	12.9%	10.74%
Use of Equipment	16.05%	20.67%
Playing with Fire	5.59%	6.28%
Misc.	11.42%	8.29%
Vehicle	9.38%	9.80%
Railroad	.39%	.06%
Powerline	3.13%	5.65%

Unwanted vegetation fires damaged approximately 71,240 acres of land during the last ten years (1995 – 2004 inclusive), causing an estimated \$91,336,617 property loss. **Use of equipment** was the leading fire cause during this time period.

The majority of equipment-use caused fires result from lawn mowers cutting dry grass. 53% of mower caused fires resulted from sparks when a mower blade struck a rock. Mower engine exhaust caused 47%; both faulty exhaust systems and exhaust contact with vegetation.

Efforts are under way to educate persons not to mow on hot dry afternoons when fire start conditions are highest. These education efforts should continue as well as efforts to ensure equipment exhaust systems are properly maintained and compliant with Public Resources Code 4442.

The remaining equipment caused vegetation fires vary from small-motorized tools to heavy equipment where no specific equipment type caused a substantial number of fires.

Arson is the second leading fire cause in the Unit. Historically one or two years may experience a high number of arson caused fires and the following years have minimal arson activity due to prevention efforts including arrest and conviction of arsonist.

Miscellaneous fire causes are those fires started by events or activities that cannot be logically placed in any of the other cause classes.

Debris burning caused fires still account for a sizable amount of fire incidents. These usually result because of inadequate clearance, weather conditions, a lack of attendance or a combination of these factors. Since the mid 1980's a statewide debris burn suspension has been in effect during the active fire season. This has resulted in fewer debris burn escapes. In 2004 the Air Quality Management Board instituted a ban on incinerator usage that may impact ignitions. There is a possibility of fewer ignitions because of reduced debris burning but also a potential of more escaped fires as some people may burn refuse in open fires in an attempt to avoid the incinerator use ban. Current fire prevention methods to control debris burn escapes are homeowner education and enforcement of the burn suspension and regulations.

Vehicle-caused fires are the result of the vehicle burning and spreading to the wildland or fires caused by the operation or some mechanical failure of vehicles. These fires usually start along the road edge. *(Some of the vehicle fires in this data set may be fires that were confined to the vehicle.)*

Smoking-caused fires are generally located along the roadside. Education and awareness programs should continue and possibly target specific areas. Roadside fuel treatments may often slow the fire spread.

Undetermined fires are those where no specific causal factor was discovered after investigation. Most often multiple fire causes cannot be eliminated and the fire is given an unidentified cause until further investigation can pinpoint the exact cause.

Playing with fire is a fire caused by children or adults with diminished mental capacity and do not understand the consequences of their actions. Involved children are counseled following FEMA's Juvenile Fire Setters /Arson Prevention Program guidelines

Powerline-caused fires may be started by vegetation touching the powerline, fallen wires, animals or other objects coming in contact with the wires, or mechanical failure of transmission connectors and equipment. Utility companies clear the vegetation near the powerlines in accordance with Public Resources Code 4293 – 4296.

Campfire-caused fires are not a major cause of vegetation fires, however they have caused fires within the Unit resulting in substantial damage.

Railroad fires are those fires caused by railroad equipment. The Unit has enforced railroad right of way clearance that has kept these fire starts at a minimum.

Lightning causes numerous fires throughout the year. Wildland vegetation, structures, and improvements such as power poles are affected. The majority of lightning caused vegetation fires are contained while small, however severe weather and the total number of ignitions can lead to large fires.

Fire Incidents by Land Use

The majority of fires originate in the wildlands, along side roads, or on residential property. Wildland fires are not necessarily located in a remote area but are often fires that start outside the perimeter of residential property or open areas within the wildland urban interface. Plotting fire locations on Unit maps shows what one would expect; the majority of fires occur where the majority of people are concentrated

Approximately 22% of fires starting on domestic properties resulted from equipment-use, followed by debris burning, 21%, miscellaneous, 18 %, and playing with fire, 11%. Leading fire causes along roads are vehicle and equipment-use, 35%, arson 22%, and smoking, 17%.

Number of Fires by Land Use -- Shasta Trinity							
	2000	2001	2002	2003	2004	total	
Domestic	72	92	69	98	83	414	26.80%
Ranch/Farm	12	26	14	22	20	94	6.08%
Dump	3	2		1	2	8	0.52%
Road	90	111	106	84	86	477	30.87%
RXR	2	2	6	0	1	11	0.71%
Electric	0	0	2	0	0	2	0.13%
Utilities	0	1	2	1	0	4	0.26%
Forest Industry	7	3	12	9	9	40	2.59%
Recreation	4	4	3	6	1	18	1.17%
Commercial - Industrial	2	5	6	5	0	18	1.17%
Wildland	79	117	68	61	123	448	29.00%
Non-Wildland	0	3	0	0	2	5	0.32%
Other	1	2	1	2	0	6	0.39%
total	272	368	289	289	327	1545	100.00%

Land Use determined by Unit Daily Fire Record, FC16 SHU 2000 – 2004

Acreage by Fuel Type -- Shasta - Trinity							
	2000	2001	2002	2003	2004	total	
Timber	29	2747	627	1024	15276	19703	48.83%
Woodland	305	482	153	55	12274	13269	32.88%
Brush	40	536	121	118	1405	2220	5.50%
Grass	161	479	75	296	4036	5047	12.51%
Ag-Prod	2	0	0	0	111	113	0.28%
total	537	4244	976	1493	33102	40352	100.00%

Data from Unit Daily Fire Record, FC16 SHU 2000 - 2004

Level of Service

The California Fire Plan defines an assessment process for measuring the level of service provided by the fire department's ability to provide an equal level of protection to lands of similar type, as required by Public Resources Code 4130. This measurement is the percentage of fires that are successfully controlled before unacceptable cost is incurred.¹⁷

System success is defined as initial attack (IA) fires that are managed without either adversely affecting the initial attack system's ability to respond to other incidents or expending significant unallocated resources (emergency fund).

A Level of Service (LOS) rating is determined by dividing the number of successful initial attack fires by the total number of fires.

$$\text{Success rate} = \frac{\text{Annual number of fires that were small and extinguished by initial attack}}{\text{Total number of fires}}$$

✱ 100 = Success rate in percent

Initial Attack Success Rate 1995 – 2004 By Shasta - Trinity NFDRS Zones

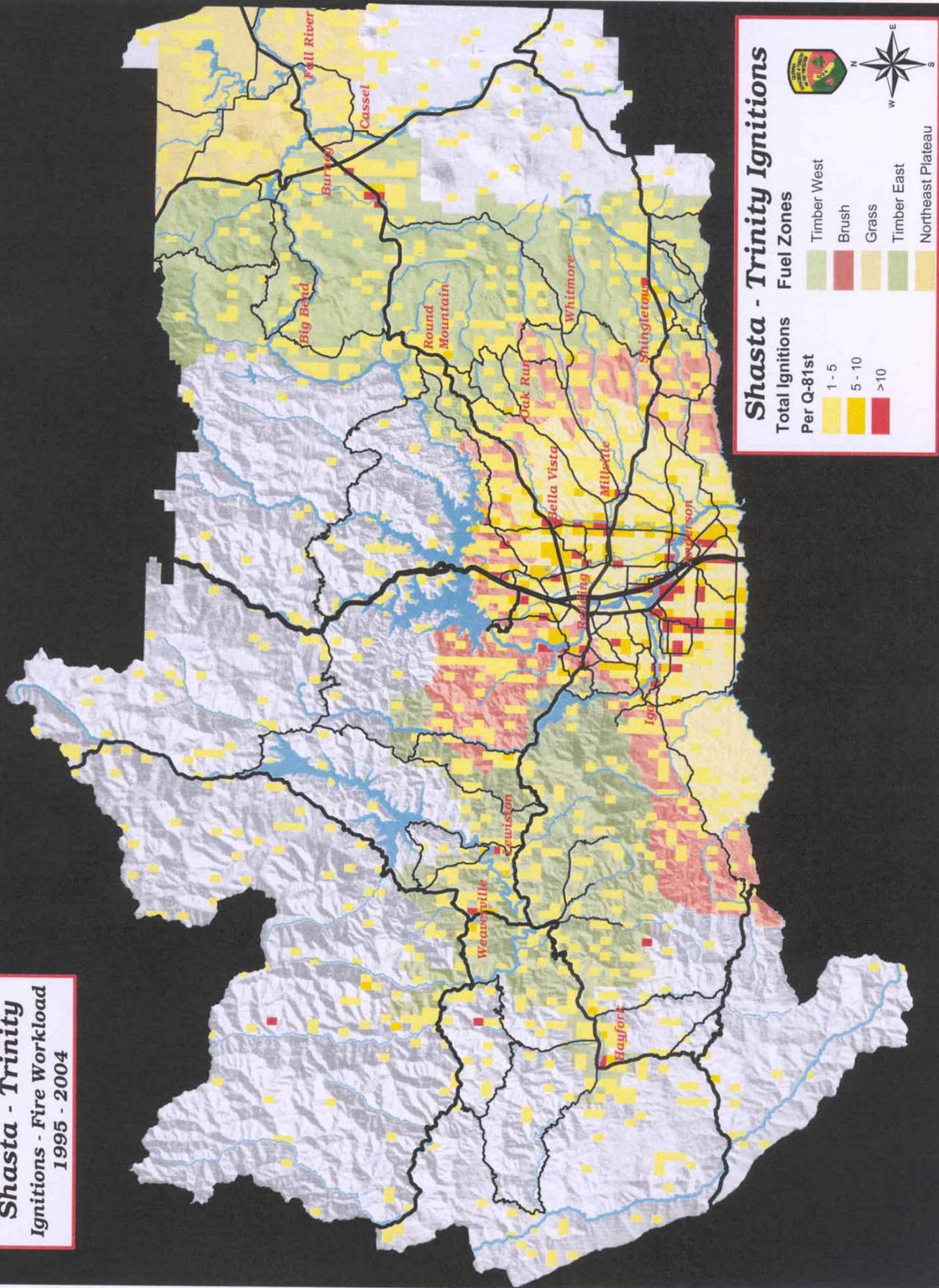
Planning Belt	Success Rate
Timber West	95.3%
Brush	97.0%
Valley Floor	96.3%
Timber East	97.4%
NE Plateau	99.2%

Initial attack success and failures are plotted on the following five maps utilizing the Q 81st grid pattern. The number of ignitions per Q 81st cell appears in the "Fire Workload Map" and the close up NFDRS Zonal Maps.

The fire locations designated on the following maps are located in the center of the section where the fire occurred and do not pinpoint the exact fire location. Each point may represent more than one fire (note total ignitions per Q81st).

¹⁷ "California Fire Plan Appendix B

Shasta - Trinity
Ignitions - Fire Workload
1995 - 2004



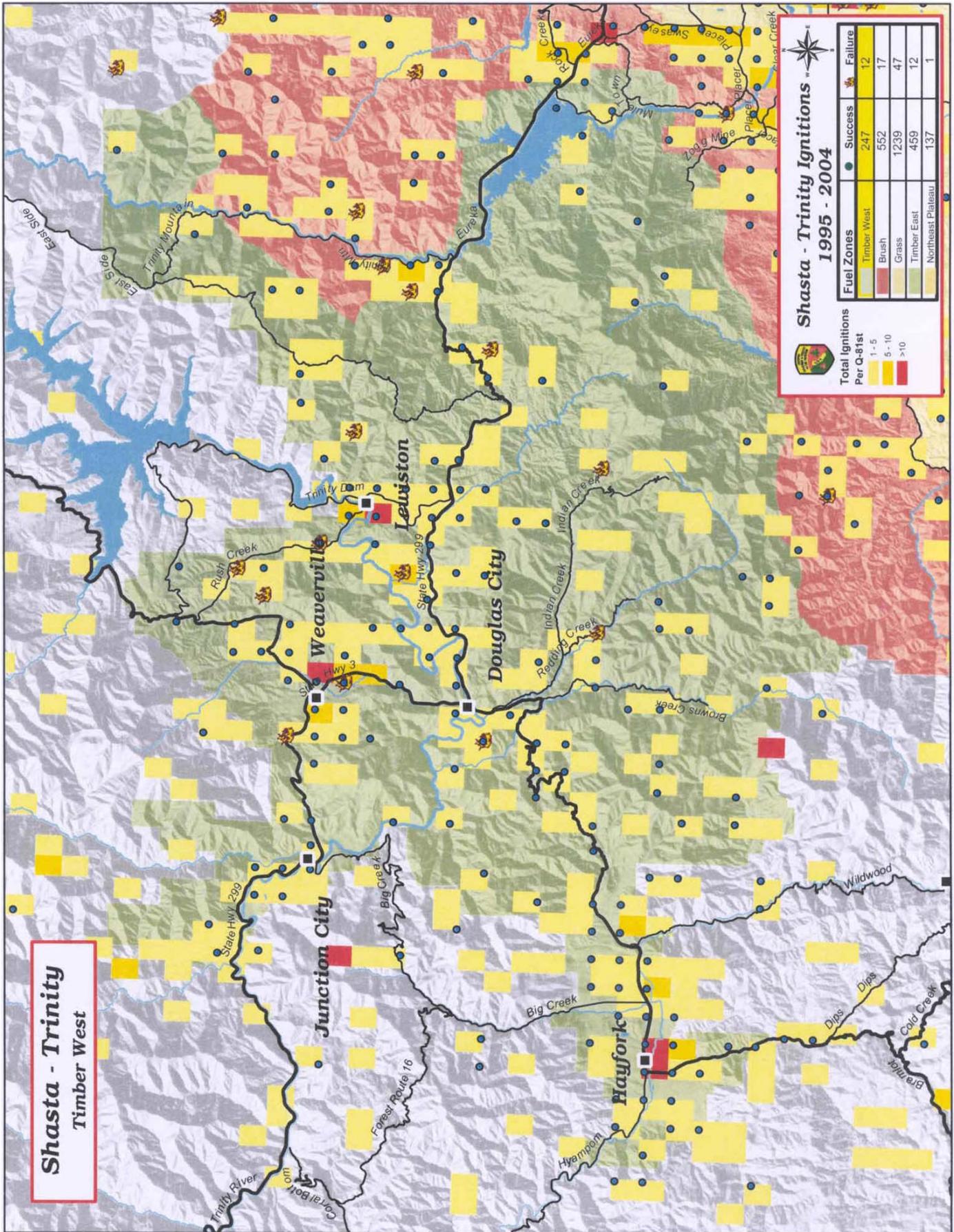
Shasta - Trinity Ignitions

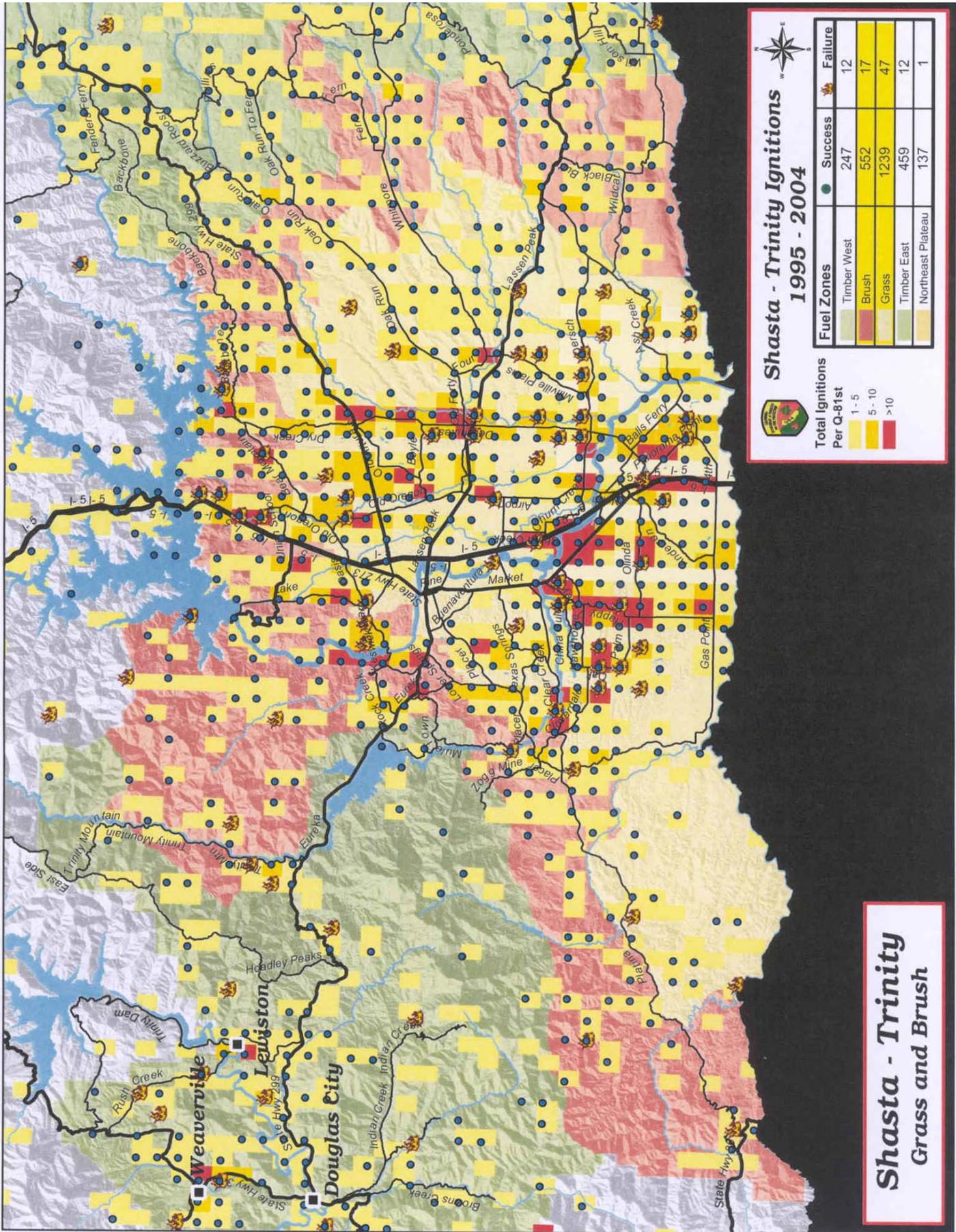
Total Ignitions Per Q-81st

- 1 - 5
- 5 - 10
- >10

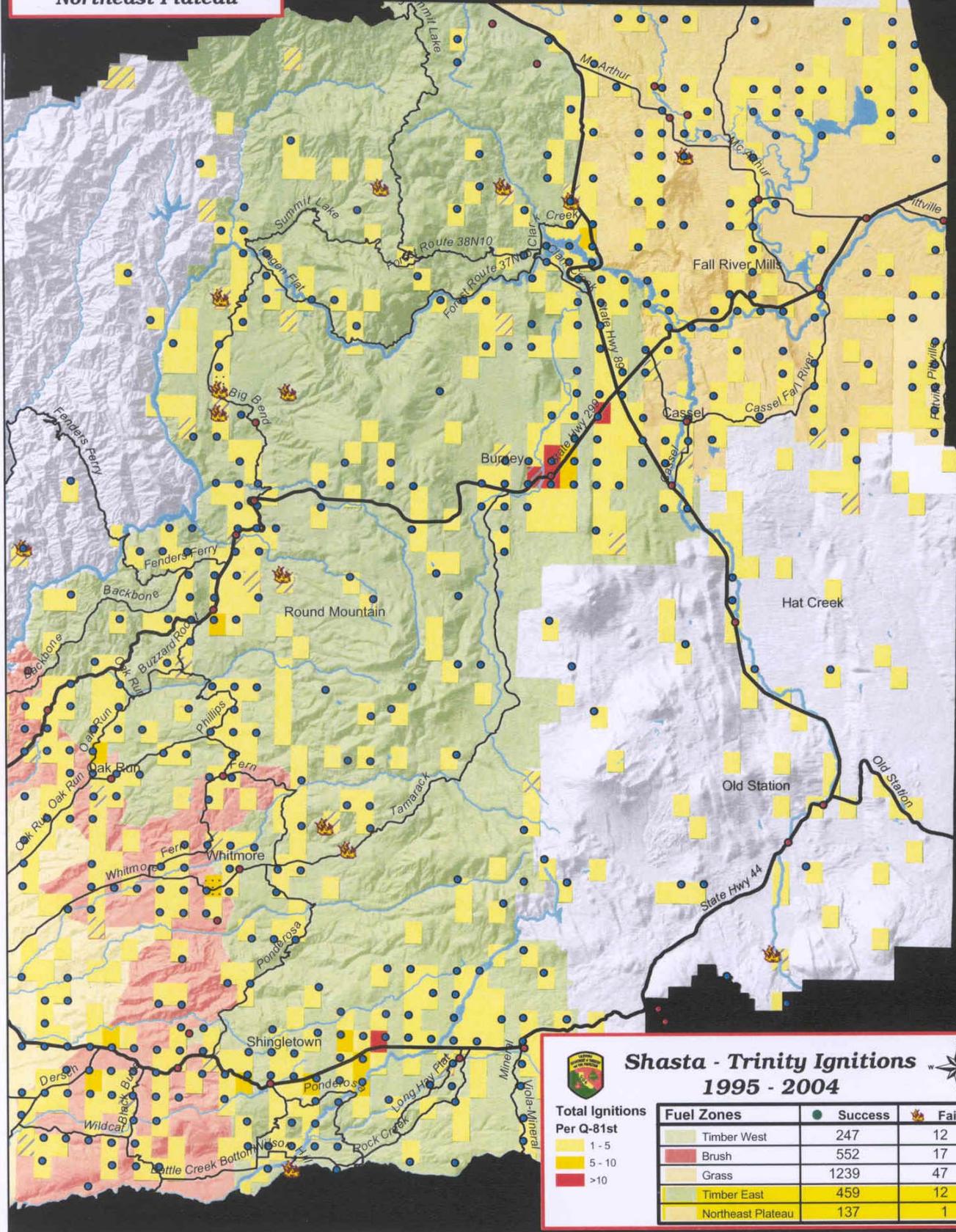
Fuel Zones

- Timber West
- Brush
- Grass
- Timber East
- Northeast Plateau





Shasta - Trinity
Timber East
Northeast Plateau



Shasta - Trinity Ignitions 1995 - 2004

Total Ignitions Per Q-81st	Fuel Zones	Success	Failure
1 - 5	Timber West	247	12
5 - 10	Brush	552	17
>10	Grass	1239	47
	Timber East	459	12
	Northeast Plateau	137	1

Communities at Risk

Congress, through the FY2001 Appropriation Bill called for a list of "...all urban wildland interface communities, as defined by the Secretaries, within the vicinity of Federal lands that are at high risk from wildfire, as defined by the Secretaries." In the fall of 2000, representatives from CAL FIRE, Forest Service, Bureau of Land Management and the National Park Service developed criteria to select communities at risk.

The communities in the following list and the designated areas on the "Communities at Risk Map" were selected by this validation process and submitted for inclusion in the National listing of Communities at Risk in March of 2001.

Shasta – Trinity Communities at Risk

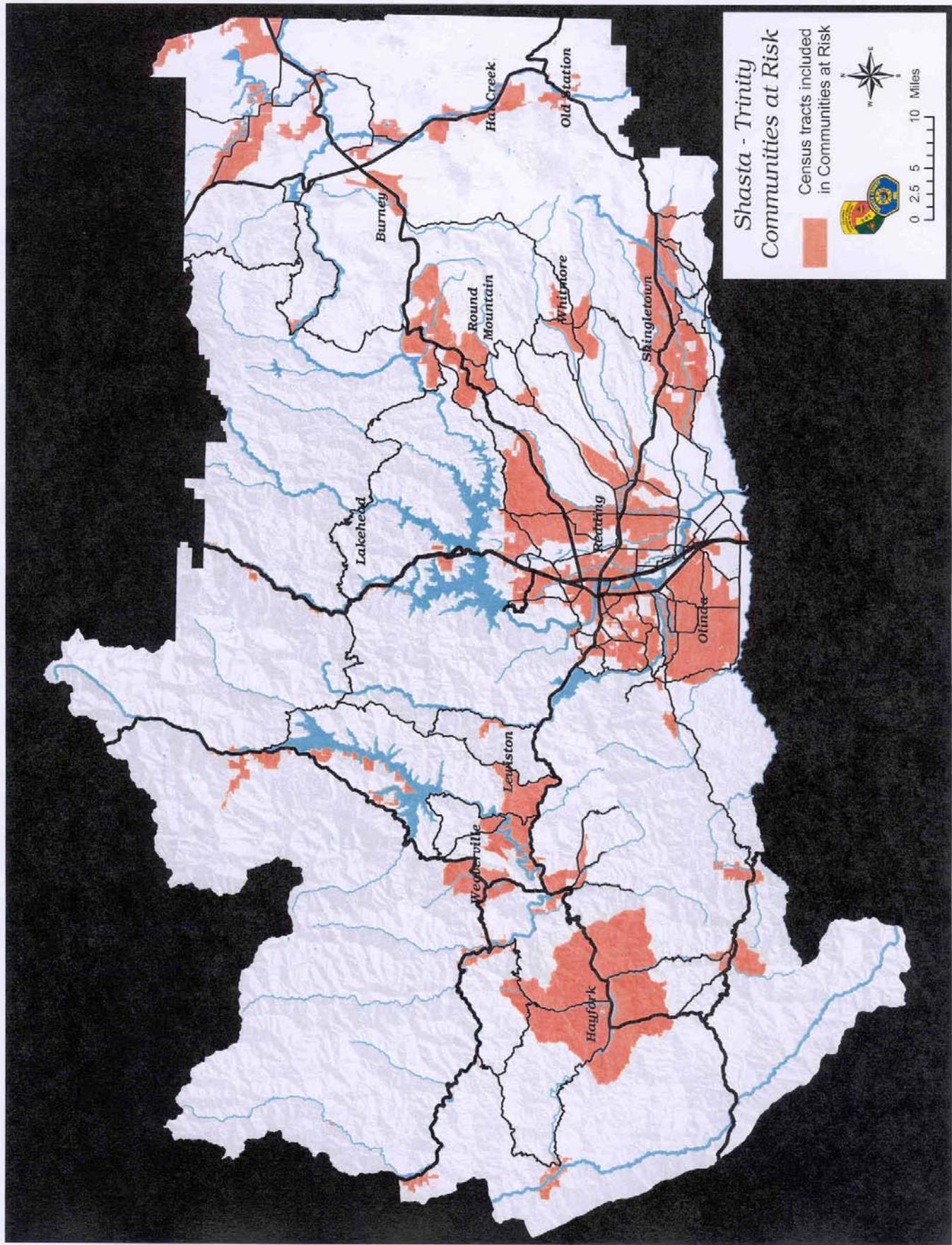
Anderson	Fall River Mills	O'Brien
Bella Vista	Forest Glen	Oak Run
Big Bar	French Gulch	Old Station
Big Bend	Gibson	Ono
Burney	Glenburn	Palo Cedro
Burnt Ranch	Hat Creek	Pitville
Cassel	Hayfork	Platina
Castella	Hyampom	Redding
Centerville	Igo	Redding Rancheria
Central Valley	Junction City	Round Mountain
Cloverdale	Keswick	Shasta
Coffee	Lakehead	Shingletown
Cottonwood	Lamoine	Sims
Covington Mill	Lewiston	Trinity Center
Dana	Manton	Weaverville
Day	McArthur	Whitmore
Del Loma	Millville	Wildwood
Denny	Montgomery Creek	
Douglas City	Mountain Gate	

Boundaries for the Communities at Risk were created using 1990 census tracts. The 1990 Census did not include names for communities without a Post Office thus many named communities within the unit are contained within the boundary of an adjacent community (example: Jones Valley had to be included with Bella Vista)

A process has been developed in 2004 to add communities to the list that were not included in the previous selection.

Shasta – Trinity Unit communities not listed on the California Fire Alliance list are:

- Cloverdale
- Inwood
- Jones Valley
- Lakeshore
- Olinda
- Pine Grove
- Post Mountain
- Shasta Lake City (listed as Central Valley)
- Viola



Fire Condition Summary

The vegetation in the Unit has been modified since the introduction of non-native settlers. Early survey reports and settler communications indicate that both the oak woodland and timberlands were more open. Ladder fuels were limited probably because of low intensity natural and Native American caused fires. Historical information indicates that major fuel modification occurred within the Unit because of mining, logging, and farming.

By the 1870's large damaging fires occurred, not just within the Unit but also throughout the United States. The most documented of these fires are those that occurred in the Great Lakes region. The Peshtigo fire claimed 1300 lives and burned over 1,100,000 acres and an unnamed fire in Michigan burned an estimated 1,200,000 acres and killed over 200 people. The Great Lakes region's fuels had been heavily modified and hundreds of fires starting in slash destroyed millions of acres and killed over 2000 people¹⁸¹⁹.

An excerpt from "The Marinette and Peshtigo Eagle" printed Saturday October 14, 1871 gives one key to wildfire survival.

"The whole country is scene of devastation and ruin that no language can paint or tongue describe. There is only one family of any note in the entire bush that has escaped. This is the fine farm of Mr. Abram Place in the upper bush. He having an immense clearing and protected also by the roads was enabled to save his house, barn and nearly all of his stock and supplies. His house has been an asylum for the suffering ones of that region, and he has rendered them all the assistance in his power."

One of the results of the 1870 fires was a national effort to control unwanted vegetation fires. The 1905 USFS Handbook states "Every ranger or guard must go to and fight every fire he sees or hears of at once, unless he clearly can not reach it, or is already fighting another fire..."²⁰ By the early 1900's efforts were made within the Unit to control all unwanted fires.

As vegetation reclaimed the modified or denuded lands all fires were extinguished which helped promote today's fuel loading. In addition, fuel types such as brush and timber require sufficient dead fuel or sufficiently low live fuel moisture in order to burn. Many areas with this type of fuel have not burnt because the proper burning conditions were not met.

Now many of the open woodlands of the valley floor and foothills of the Shasta – Trinity Unit are congested with decadent brush fields. A tightly closed canopy has replaced the timberland's openness and contains sufficient ladder fuels to create a tinderbox. Most of the land within the Unit, where large fires have occurred in the last 100 years, has also been reclaimed by impenetrable brush and forest. Lands burned as recently as thirty years ago have returned to the flammable conditions that existed the day of the fire.

The exceptions to this are those lands where the landowner, private or governmental, has made a concerted effort to thin the regenerating vegetation via manual or mechanical fuel removal or by the use of prescribed burning. **This thinning and maintenance can be the impetus to break the cycle of large and devastating fires within the Unit.**

¹⁸ "The Great fires of 1871 in the Northwest" I.A. Lapham <http://www.library.wisc.edu/etext/WIReader/WER0133.html>

¹⁹ History & Ecology of Fire in Michigan" http://www.michigan.gov/dnr/0,1607,7-153-10367_11851-24038--,00.html

²⁰ 1905 USFS Handbook pg.68 (www.lib.duke.edu/forest/usfscoll/publications/1905_Use_Book)

Vegetation within the boundary of the 1972 Swasey Fire.



These Swasey Drive fuels are again a fuel model 4 below a young pine and oak canopy. A fire burning in these fuels will likely destroy all of the vegetation including the grey pines and oaks.



1992 Fountain Fire Reforestation.

This is a single age plantation with some hardwood in the drainage. This particular section has received some thinning. The entire plantation will require subsequent maintenance to protect it from fire. As maintenance continues this will return to a healthy forest. Areas of this fire not maintained have already aged into a hazardous condition.

4. UNIT FIRE PLAN RECOMMENDATIONS

With the exception of the most urbanized areas of Redding and Anderson, and irrigated agricultural lands, the entire Unit is susceptible to devastating vegetation fires. Every community within the Unit is at risk from vegetation fires. Local fire history indicates that a running grass fire can be as destructive to communities as brush or timber fires.

The following recommendations are listed by priority based on stakeholder and fire agency input. Individual Watershed Groups, Fire Safe Councils, Communities, and Community Groups have set localized priorities for fire-safe improvements in their affected areas. Those priority lists are located in the individual fire plans that are listed in the projects section.

The fire risk in the Unit is two-fold. One is the fire ignition and the other is the fuel condition. In order to reduce total cost and losses from wildfire we must reduce the fire ignitions and reduce the fuel loading.

To reduce the number of fire ignitions a concerted effort must occur to reduce the number of human caused fires through education and enforcement. For instance a 50% reduction of equipment use caused fires would result in nearly 100 fewer fires each year.

Targeted fuel modification is required to protect individual assets, allow safe ingress and egress, help slow incipient fire spread, provide fire safe zones, and to help slow large fire progress.

Structure Protection

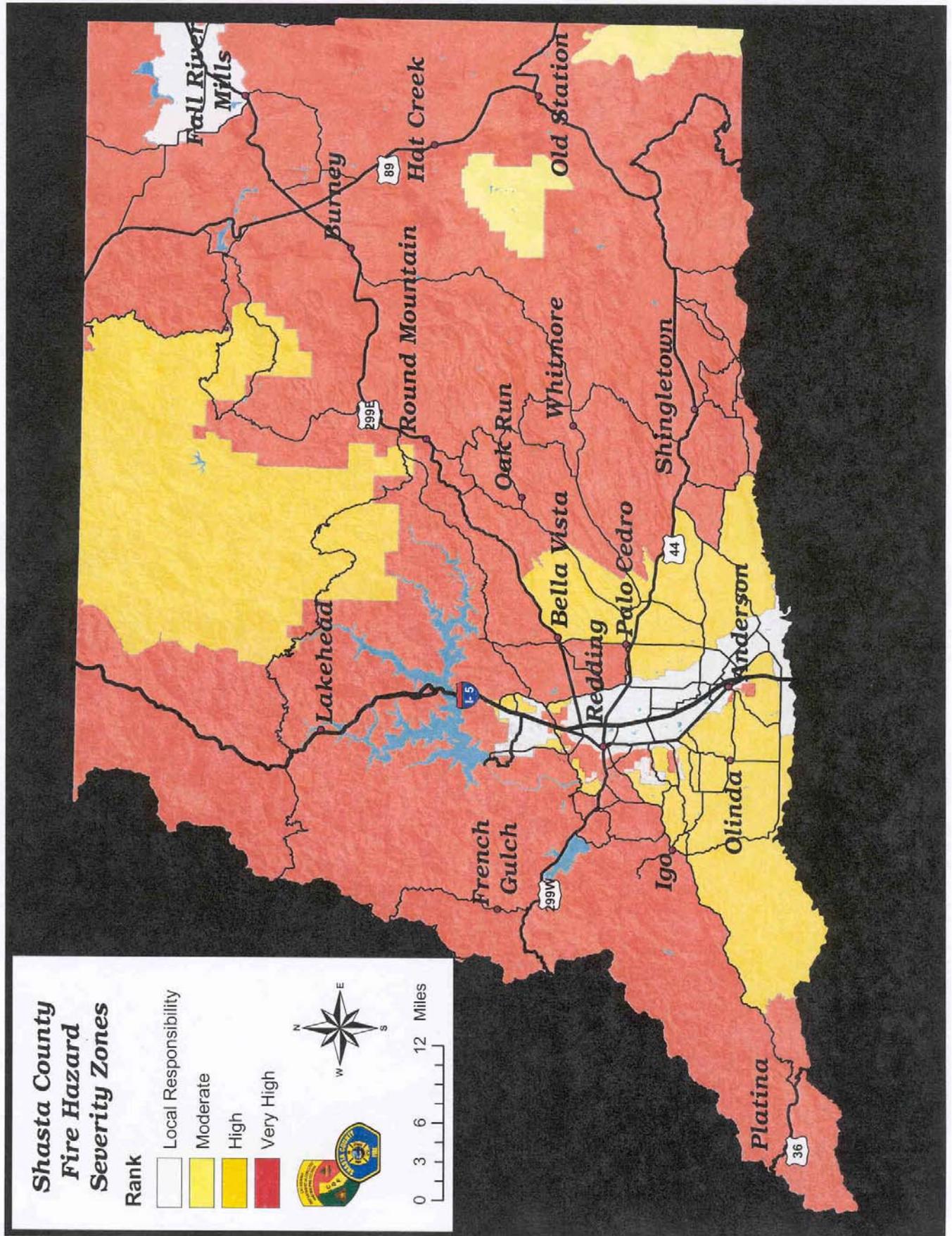
The protection of life and property, most often structures, is the primary concern of firefighters and stakeholders. What was true in the 1871 Peshtigo Fire is true today. **The primary method to protect the structure asset is for residents to provide a defensible space around their property!**

The California Public Resource Code 4291 and Government Code 51182, amended by Governor Schwarzenegger signed into law on September 23, 2004, Senate Bill 1369 and became effective January



1, 2005, which increase the minimum clearance (defensible space) requirement from 30' to 100'. It also provides that state law or local ordinance rules or regulations to specify requirements of greater than 100' around buildings because of extra hazardous conditions or where a firebreak of only 100 feet around such building or structure is not sufficient to provide reasonable fire safety.

http://www.fire.ca.gov/php/about_content/downloads/Defens_space_flyer2.pdf



Development and construction standards must be considered. Future standards should consider increased building setback from property lines as well as building placement on ridge tops, canyons, or any other location where fire intensity is increased by topography. The type of construction and construction material also affect a structure’s defensibility and should be considered. County General Plans should consider the fire hazard potential when developing or modifying land use zones.

An additional problem for defensible space around structures is the land adjoining developed parcels. Greenbelts are often created when subdivisions are developed in the wildland areas. These greenbelts are often in drainages below ridge-top development and are most often too steep for building placement.



Most often extremely flammable fuel conditions exist in these greenbelts and the fuels about the developed property lines. Structures built with a 30-foot setback from the property line do not have adequate clearance from the fuel in the greenbelt.

Fuel maintenance standards should be considered for the greenbelts in future and existing developments.



Ridge top home with inadequate setback or clearance. This structure received direct flame contact from the spreading vegetation fire.

Ingress and Egress

Public and private roads often provide inadequate clearance for safe passage during fires. Narrow one-lane roads have historically hampered fire department access while residents exit because there is inadequate room for vehicles to pass.

Resident fatalities in wildland fires in California have historically occurred on narrow roadways located in thick vegetation. Fire equipment access to structures is hampered because of inadequate clearance along roads and driveways.



Clearance here is adequate for passage of a single passenger vehicle. **However when this vegetation burns it will not provide safe passage.**

Current driveway standards require a 16-foot roadway with a 12-foot driving surface. A 16-foot wide driveway, in similar fuels as in this photograph, would still not provide safe passage.

Driveway and roadway clearance standards or recommendations should be developed based on fuel type and topography in order to provide safe ingress and egress. Fuel clearance along roadways and driveways must also be maintained.



Limited Driveway Clearance



Excellent Driveway Clearance

Throughout the Unit many Emergency Fire Escape Roads have been built in order to provide a second access for use in the event of a wildland fire. Unfortunately these roads were not built to any particular standard nor were there any requirements to maintain the roads after construction. Most of these roads have become overgrown with brush or blocked by fences and are impassable. Their condition is such that if a person tried to use the road to escape an encroaching fire could trap them. **A method must be developed to provide maintenance for these roads and second access issues must be resolved for future development in order to protect resident's lives.**

Fuel Breaks

Shaded fuel breaks provide an area where fire spread will slow and allow firefighter access. When a rapidly moving fire burns into a shaded fuel break, the fire will often change from a fast running “crown fire” in brush or timber to a slower ground fire.

Roadside Fuel Breaks

Roadside Fuel breaks provide multiple purposes:

1. Thirty percent of the Unit’s fires start along roadways. If the fuel along these roadways has been modified the incipient fire will spread with less intensity. Therefore the fire may be smaller when fire crews arrive. A typical fuel treatment would be to thin brush and timber and mow or treat grass located at the road edge or within the road easement.
2. Fuel break width should be contingent upon the fuel type, fuel height and topography. Road width provides additional fuel break width. Constructing fuel breaks along roadways is often easier and less expensive because of easy access to the fuel.
2. Roadside fuel breaks provide a safer ingress and egress.

Community Fuel Breaks

Fuel breaks built around the outside perimeter of a community provide protection from impinging wildland fires and slow fire spread from fires starting in and around residences. Greenbelt fuel breaks should also be considered to help alleviate the problems listed in the Structure Protection section.

Strategically Placed Fuel Breaks

Shaded fuel breaks can be strategically placed along ridge-tops to help confine a wildland fire to one side of a ridge. Fuel breaks can also be placed to separate one fuel type from another such as separating brush fields from timberlands.

Fuel break maintenance must be a consideration with each fuel break project. Finding reliable funding for fuel break maintenance should be as important as the construction.

Wildfire Protection Zones

While wildfire protection zones may be created by the development of fuel breaks, they can also be created by an area wide fuel modification. The removal of ladder fuels and the opening of the crown closure within an entire neighborhood may create a wildfire protection zone. This would include not only the minimum clearance around structures, but also a continuous clearance through any greenbelt areas or undeveloped lots within the neighborhood. Consideration should be given to the creation of wildfire protection zones in communities or neighborhoods where a fire could inhibit or stop a safe evacuation. Any creation of such a wildfire protection zone would also need to have a plan and funding in place for future maintenance.

Post Fire Rehabilitation

The Unit fire history data indicates 509 large and damaging fires burned over 1,130,682 acres since 1910. Many large fires and most fires less than 300 acres are not represented. Fire is acknowledged to be an active part of the wildland ecosystem. However the fuel condition within the Unit is such that many fires burn with devastating results, removing most of the live vegetation. Within a short time after a fire, a continuous uniform fuel returns to the burn area not a mosaic of various aged fuels. Unless modified this uniform fuel returns to its pre-fire hazardous condition. When another fire occurs the results are often repeated.

The fuel bed is currently too dense to achieve the desired low intensity fire that occurred before European settlement. This creates a burn - re-growth - burn cycle. This cycle does not allow the woodland or forested areas to become re-established. It's stated that fire suppression is the cause for the current fuel conditions. While fire suppression may be a factor the major factor appears to be a lack of fuel rehabilitation after fuel modification by fire or other means.

The burn – re-growth – burn cycle needs to be broken.

Funding should be acquired to provide post fire rehabilitation. This could include the removal of dead fuels that present a fire hazard and the replanting of native species, both for erosion control and the re-vegetation of the land. After initial rehabilitation, periodic fuel maintenance should occur to keep the fuel hazard from re-occurring. The use of prescribed fire should be considered in any rehabilitation plan.

Though post fire rehabilitation is listed after other recommendations; any new fires should be considered to become a high priority candidate for fire safe project funding.

Mine Damaged Areas

A considerable effort and investment was made to rehabilitate lands damaged by historic copper mining in Shasta County. The prime reasoning for this effort was to control erosion. There has been no known effort to follow up on the rehabilitation effort since 1967.

The erosion control aspect of this project has been successful. Unfortunately these lands are now choked with fuels and are highly susceptible to devastating fires. Fires within this area could destroy the last 80 years of rehabilitation.

A large vegetation fire could cause at least two major problems:

Erosion within the area could return to pre-rehabilitation rates, which at that time were considered to be sufficient to cause a major reduction of water storage capacity in Shasta Lake and Keswick Reservoir.

A great amount of hydroelectric transmission infrastructure exists along the Sacramento River in these areas. Fires could not only temporarily shut down electricity transmission but could also cause major damage to the system itself including power substations as well as the powerlines.

Fuel modification should be implemented to protect the hydroelectric infrastructure and strategically place fuel breaks should be considered for erosion prone areas.

Data Collection

The GIS data used in this Fire Plan and the individual Strategic Fuels Management Plans is not as accurate as it should be. In some cases it is highly inaccurate. Some data is completely lacking and needs to be collected

Along with individual Fire Safe projects, data collection and accuracy needs to be improved. Specific items that need to be collected include:

1. Aerial imagery for the Unit needs to be collected. This data can be used to accurately gather and verify most of the required data elements needed for the Fire Plan
2. Reassess the detailed fuels data in order to correct the inaccurate data in the brush and grass zones of the Unit.
3. Parcel data needs to be completed for Shasta County. This data will assist the collection of the Assets at Risk and give a more accurate representation of structure locations at risk in the Wildland Urban Interface.
4. The Assets at Risk within the Unit need to be verified and quantified.
5. Individual timber harvest projects, including biomass and thinning operations are a major impact on the fuels within the Unit. Most of this data is available from the Timber Harvest Plans required for the projects. These Timber Harvest Plans need to include GIS data in order to truly determine changes in the Units Fuels.
6. The Soil data for the Unit needs to be made available in a GIS format.

Education Outreach

The success of the Fire Plan is dependant on the acceptance of the public. All Fire Agencies have promoted fire safety and some education component in their fire prevention programs. This public safety message is additionally being spread by various organizations such as Fire Safe Councils, Resource Management Districts, Watershed Groups, and other community organizations.

This Plan recognizes these efforts and supports continued and additional education and public outreach efforts.

5. PROJECTS

Information concerning local fire safe and watershed planning projects can be found at the following websites:

Shasta County Projects

Shasta County Watershed Information Model

<http://wim.shastacollege.edu/>

Cottonwood Creek Watershed Fuels Management Plan

<http://wim.shastacollege.edu/catalog.aspx?ws=5&act=Fuels%20Management%20Plan&format=Document>

Cow Creek Fuels Watershed Management Plan

<http://wim.shastacollege.edu/catalog.aspx?ws=6&act=Fuels%20Management%20Plan&format=Document>

Lower Clear Creek Watershed Fuels Management Plan

<http://wim.shastacollege.edu/watersheds.aspx?ws=8>

Upper Clear Creek Watershed Fuels Management Plan

<http://wim.shastacollege.edu/catalog.aspx?ws=17&act=Fuels%20Management%20Plan&format=Document>

Shasta West Fuels Management Plan

<http://wim.shastacollege.edu/catalog.aspx?ws=13&act=Fuels%20Management%20Plan&format=Document>

Inwood / Bear creek Organization

<http://www.inwoodbearcreek.org/index.html>

Whiskeytown National Recreation Area

<http://www.nps.gov/whis/exp/fireweb/firehomepage.htm>

Trinity County Fuels Management Plans

<http://www.tcrd.net/>

Unit Fuel Break Projects

The following maps show the location of existing and planned fuel breaks. Details of many of these fuel breaks are located in the strategic fuels management plans listed above. These are not in any way the only fuel breaks needed. More fuel breaks will be identified as detailed evaluations of the Unit continue.

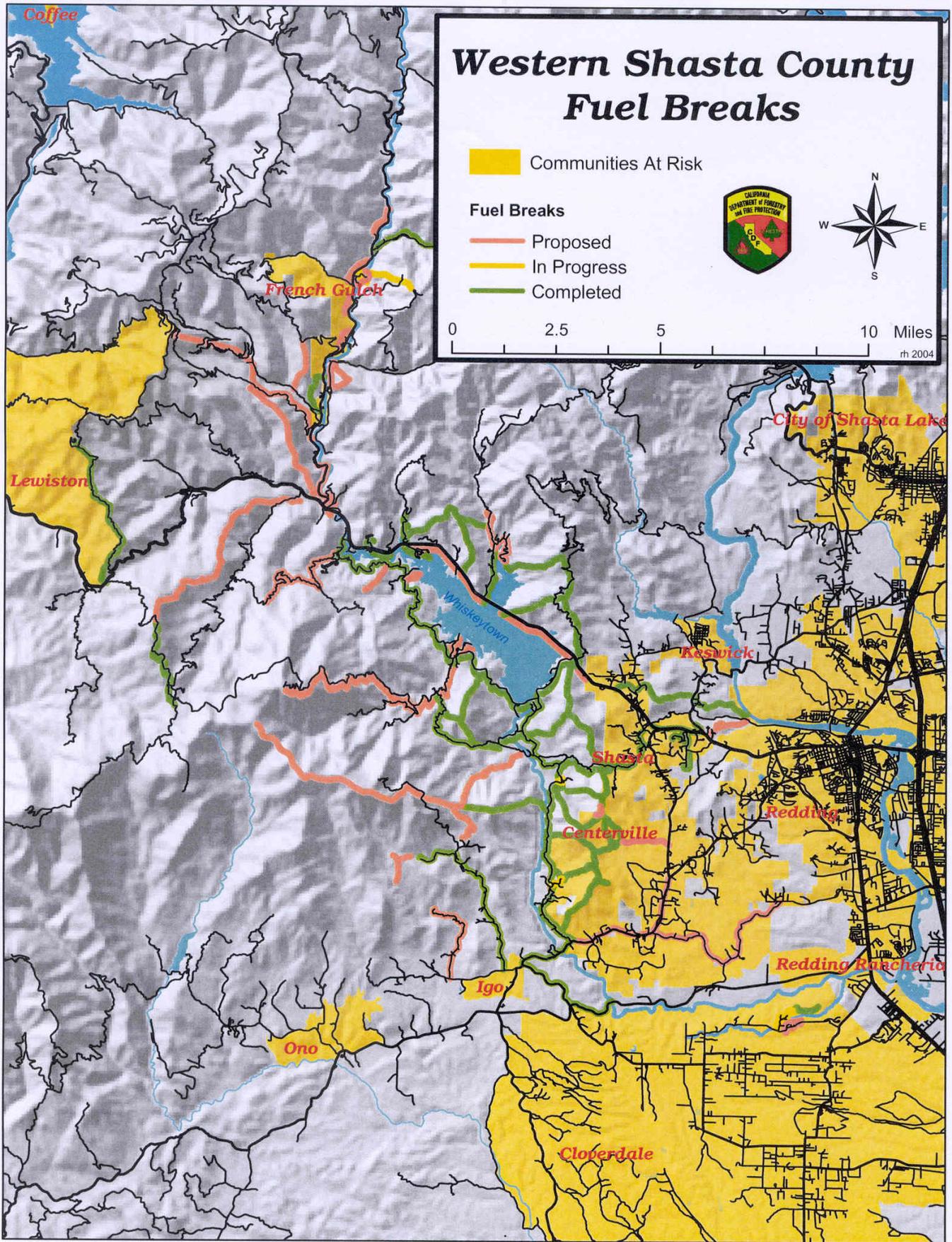


Before



After



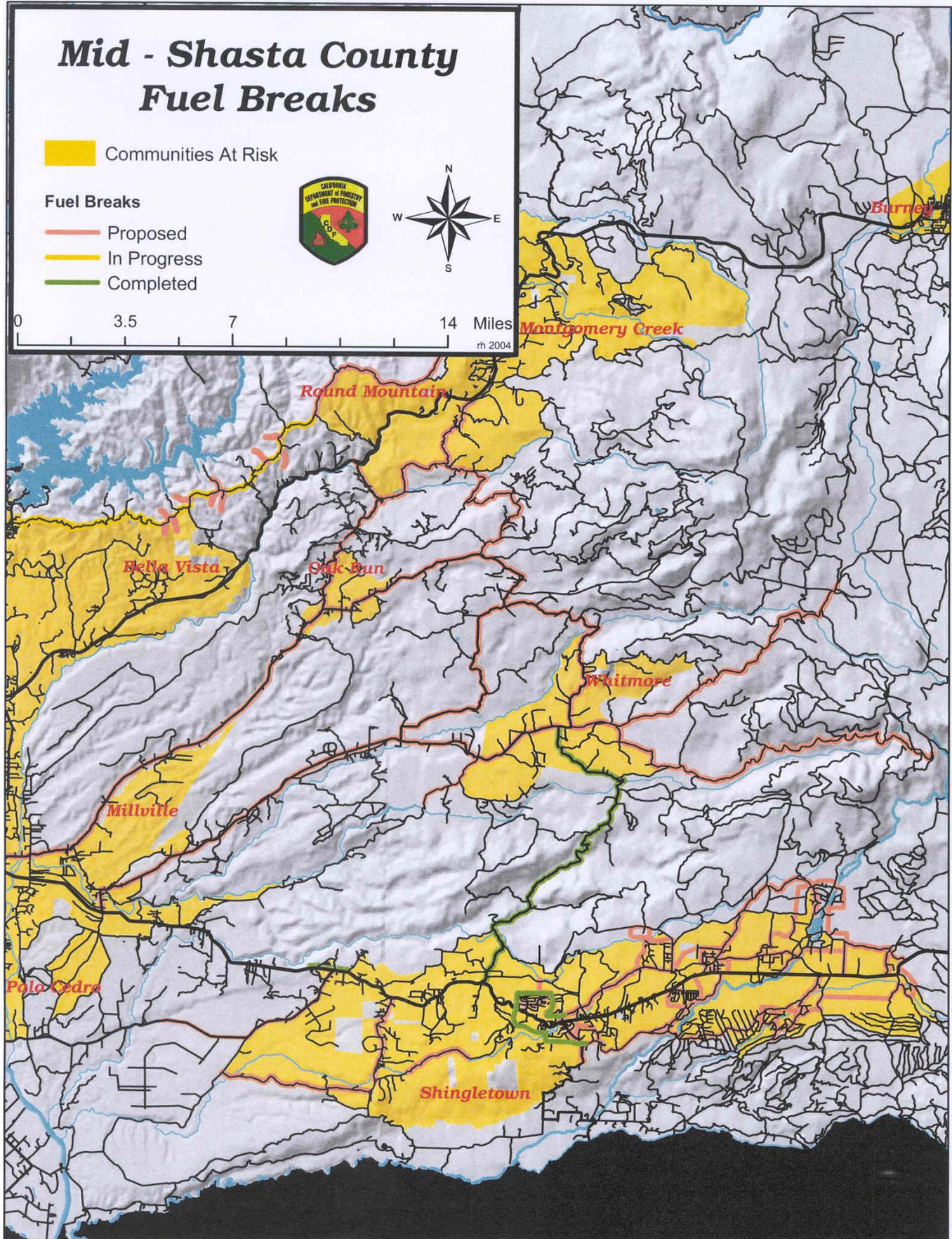


Mid - Shasta County Fuel Breaks

 Communities At Risk

Fuel Breaks

-  Proposed
-  In Progress
-  Completed

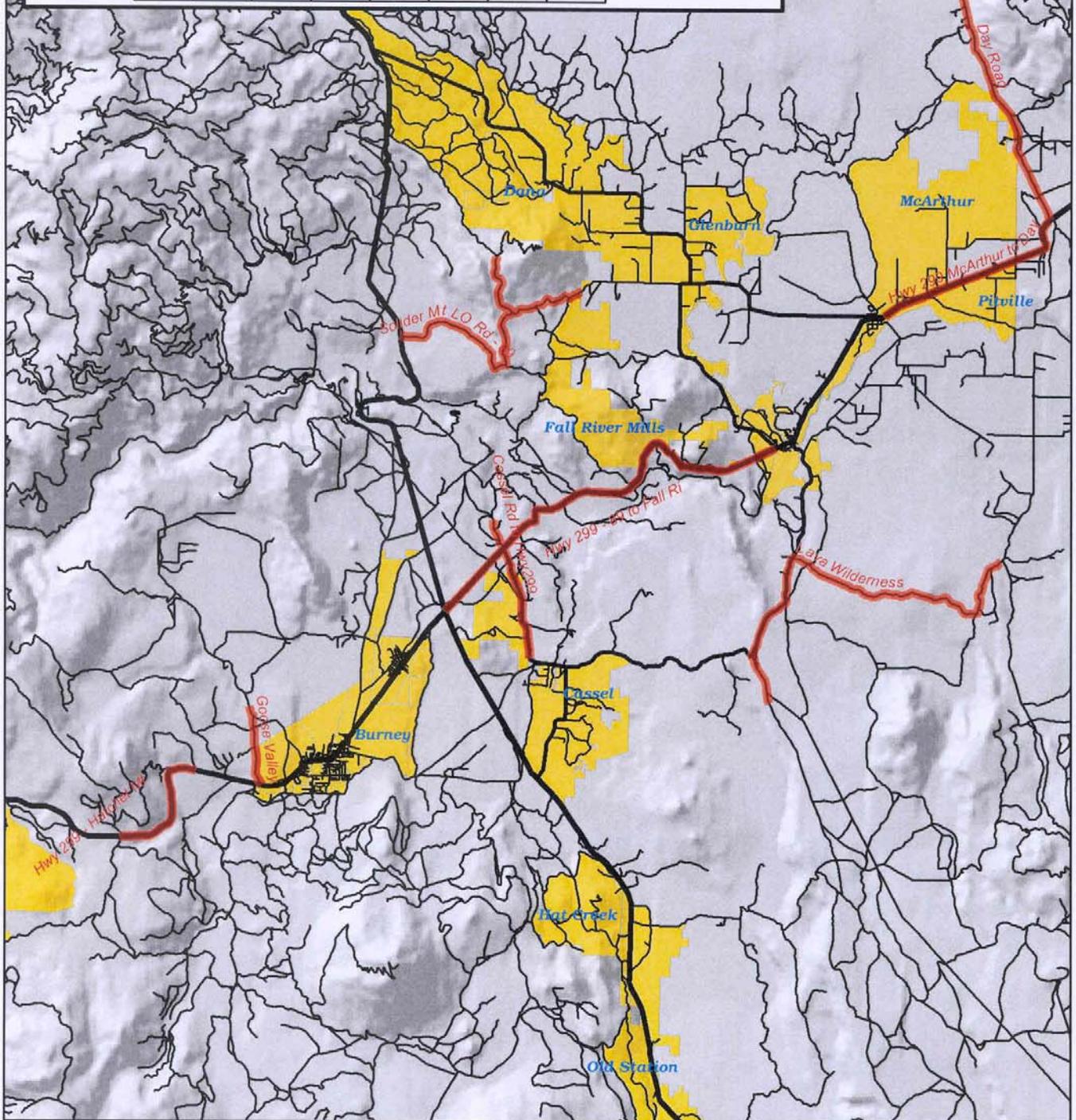


Eastern Shasta County Roadside Fuel Breaks

-  Roadside Fuel Break
-  Communities At Risk



0 3 6 12 Miles



Other Projects

Evacuation Plans

Evacuation plans were developed for Shingletown, French Gulch and the West Redding/Centerville/ Shasta/Keswick areas. The plans included wildfire safety tips as well as designated evacuation collection points. Maps were included that showed the location of the evacuation collection points. The plans were distributed to residents residing in these areas.

In 2003 – 2004 evacuation plans were developed for the Lakehead and Igo/Platina areas

Trinity County Map Projects

Trinity County has experienced several large urban interface fires in recent years. Most recently the 1999 Lowden fire and the Oregon Fire of 2001 caused substantial structure and property destruction.

Initial attack forces assigned to these fires were quickly overwhelmed by the fire's magnitude and intensity so additional resources were ordered. The additional resources responded to Trinity County from throughout the state. The closest of these are located one to two hours away. The out of area fire equipment operators were not familiar with Trinity County roads, water systems or the location of structures.

With this in mind, structure / water source location maps were created for several of the larger communities. Copies of these maps will be given to incoming fire equipment to help them locate and protect threatened properties.

Previous road maps for Trinity County were not very detailed nor were they indexed. Responding fire equipment often did not know where to find individual roads in Trinity County. An indexed map book was created in the Shasta – Trinity Unit's Pre-Fire office and included details of the Trinity County communities located within State Responsibility Area. Trinity County GIS Department has taken over the project and extended detailed map coverage to those areas not included in the initial map book.

These mapping projects should be continually maintained.

Day Bench Fire Safe Council

The Day Bench Fire Safe Council was formed in June of 2001 and serves the residents living in the vicinity of the Day Bench located on the Eastern Shasta County boundary. The area served includes portions of Shasta, Lassen and Modoc counties. They have completed some fuel removal demonstration sites and evacuation plans. The Lassen - Modoc Unit has been the main CAL FIRE contact with this Fire Safe Council.

The Hat Creek Ranger District of the Lassen National Forest has also proposed a fuels reduction project for the Day Bench. In addition the Bureau of Land Management has planned to use some prescribed fire for fuel reduction on their lands located in the Day Bench area.

The Day Bench Fire Safe Council is now (2004) developing a detailed Fire Safe Plan for the community and surrounding area.

Shasta West Fire Safe Council

The Shasta West Fire Safe Council was formed in early 2004. This group developed from members of the Victoria Project, Shasta West Watershed Group, and several neighborhood and community groups that lie within the boundaries of the Shasta West Watershed. A Strategic Fuels Management plan was developed by the watershed group and has been adopted by the fire safe council. Several fuel breaks have been completed and some are being constructed, and others planned.

<http://wim.shastacollege.edu/catalog.aspx?ws=13&act=Fuels%20Management%20Plan&format=Document>

The Victoria Project is a neighborhood effort to reduce and/or eliminate the dense vegetation from around the homes within the Victoria Drive and Highland Circle areas. Local residents organized, coordinated, and managed this project. The project goal is to ensure that homes within the project area meet or exceed Section 4291 of the Public Resources Code (PRC 4291).

Mountain Gate Projects

In April 2004 CAL FIRE, Mountain Gate Fire Protection District, and the Western Shasta Resource Conservation District presented a fire safe informational meeting to the community members in and around the community of Mountain Gate. Since that meeting many residents have initiated fire safe fuel modification projects on their properties including multi-acre fuel modification. Most of the larger projects were accomplished with mechanical mastication of the brush and ladder fuels.

Before

After



Private Landowner Pre-Fire Management

Several private landowners throughout the Unit are conducting pre-fire management fuel modifications on their properties. Timberland owners and managers have instituted thinning and biomass projects. A biomass project conducted on lands managed by Beaty and Associates, in the Whitmore area, removed both the ladder fuels as well as opening the crown closure of a dense conifer forest. On October 27, 2003 a campfire escape propelled by 15 to 20 mile per hour winds quickly turned into a 1,063 acre crowning timber fire that was burning toward the town of Whitmore. When the fire burned into the project area, it immediately fell out of the crowns of the trees and was able to be contained by fire personnel. The project was instrumental in the containment of the fire.

Some woodland areas have also been improved. Some for enhanced grazing others for wildfire prevention.



Participation of landowners both large and small, are an important part of the Fire Plan Process. The Unit and the Stakeholders need to continue educational outreach programs and continue to encourage private landowner participation.

Shingletown Community Fire Safe Program

In 1993, the Fire Safe Program began in Shingletown. The primary goal was to generate community-wide involvement in the reduction of fuels in and around the individual residences of this subdivision. Brush and other ladder fuels was cut by the individual property owners and moved to street side for pick-up by CAL FIRE personnel. This program has grown to involve the entire ridge from Viola to Black Butte Road. Over twenty-five volunteer neighborhood coordinators assist with over 200 property owners participating annually. The material collected is chipped and transported to a local co-generation plant for electricity generation. The annual program normally begins the week after Memorial Day and participants are asked to donate \$10.00 per pile to help offset costs.



To date, over 5 million pounds of vegetation has been removed as a result of the Community Fire Safe Program.

For the last several years, the number of participants and the amount of vegetation removed annually have leveled off. The program will need to evolve and seek ways to increase participation and decrease costs. The residents of the Shingletown Ridge area are eager to see this program continue and fully understand that in order to do so, some changes in the program are to be expected.



Shingletown Shaded Fuel Break Project



The 1995 Shingletown Area Fire Defense Plan identified the need for significant fuel reduction in and around the developed areas of Shingletown. The Shingletown fuel break is an effort to create a 300-foot wide shaded fuel break to separate two subdivisions, Woodridge Lake Estates and Shasta Forest Village, from the larger undeveloped wildland areas. The project was designed to reduce the potential fire-causing catastrophic damage in the Shingletown Ridge area. Brush and non-commercial trees in the understory were removed from the corridor.

The original proposal called for treatment of 4.2 miles, a very ambitious goal considering monetary constraints, inclement weather, and competition for

fire crew time. However, in the spring of 2001, our goal was successfully accomplished. The fuel loading was dramatically reduced, fire equipment can access the area, health of the remaining trees will be enhanced, and visually the corridor has a park-like appearance.

The following measures were utilized to reduce any potential impact to environmental and cultural resources:

- a) Retained vegetation canopy (over-story trees) of 50-70 percent crown closure.
- b) Retained base layer of litter and duff of at least 2" of ground cover.
- c) All vegetation was cut and piled by California Department of Forestry and Fire Protection (CAL FIRE) fire crews and either burned or transferred to a chipper site for ultimate use in cogeneration plants.
- d) Riparian zones and potential archaeological sites were delineated and no mechanized activity occurred in these zones.

The original project budget estimate was \$70,870. However, the final cost of the project was \$119,637. Shasta County Fire applied for and received two FEMA Hazard Mitigation grants, which funded \$56,209 of the cost. This was approximately 47 percent of the total.

Top Picture: Before thinning

Bottom Picture: After thinning



Ponderosa Way Fuel Break



The Civilian Conservation Corps (CCC) originally established the Ponderosa Way Fuel Break in conjunction with the construction of Ponderosa Way. This fuel break is one of the oldest continuously existing fuel breaks in the state of California. The intent of the fuel break was to separate large tracts of privately owned timber from the lower elevation non-commercial vegetation.

Maintenance of this fuel break has been on going since its original construction and consisted of several different methods of removal over the years. Treatments have included cut, pile, and burn, cut and scatter, and the introduction of low intensity ground fire to remove unwanted vegetation.

Local records indicate that Crystal Creek Conservation Camp worked on the fuel break in the late 1960's. Since the establishment of Sugarpine Conservation Camp in 1988, crews have annually re-treated sections of the fuel break. This year alone, crews from Sugarpine spent over 20 days on the Ponderosa Way Fuel Break, or over 2,400 man-hours.



Top Picture: Before

Bottom Picture: After

Education / Inspection Project

In 2003 the Student Conservation Association Inc., a national conservation organization, through a contractual agreement with the Bureau of Land Management (BLM) in cooperation with the California Department of Forestry and Fire Protection (CAL FIRE) provided a Fire Education Corps team, for the purpose of educating the public, specifically residents in the wildland-urban interface, about how to best prepare and protect their homes in the event of a wildland fire.

The primary goal of the Fire Education Corps was to conduct defensible space evaluations of residential properties for CAL FIRE in the wildland urban interface. These defensible space evaluations will include recommendations on defensible space, landscaping, and building materials currently used and alternatives. Ancillary goals will be to educate the general public about the dangers of wildland fires and how to protect themselves and their property, and to demonstrate the effectiveness of investing in partnership with youth development agencies.

The team worked with BLM to coordinate and implement the BLM Vegetation Hazard Reduction Program for private landowners adjacent to BLM.

The education/inspection continued in 2004 and 2005 with CAL FIRE personnel conducting inspections in high fire hazard severity areas. In 2006 the program will continue with CAL FIRE personnel who will educate residences in the new amendments to PRC 4291. The phase of the project will emphasis property inspections and educate residents to prepare for a defensible space during the winter months when they can easily dispose of excess fuel.

Equipment Use Education Program

The major cause of wildland fires in the Unit is equipment use, which includes the improper use of equipment, improperly maintained equipment and equipment failure. Leading causes are the use of lawn mowers and wheeled string trimmers.

This year several television and newspaper advertisements were developed and distributed in order to educate people in the hazard and the safe use of equipment use.

Defensible Space Video Project



Before

The California Department of Forestry and Fire Protection was awarded a \$50,000 Western Wildland Urban Interface grant for the production and distribution of an educational and instructional video. The content of the video demonstrates to homeowners how to remove the vegetation from around their homes that are located within the wildland urban interface areas of Shasta County.

In addition, the grant funding was used for the development and distribution of a Wildland Fire Evacuation Plan for the residential area known as the Victoria/Swasey areas located west of the Redding City Limits.

The video depicts a non-fire safe residence and follows the homeowner through the steps necessary to achieve a fire safe residence and obtain a 100-foot “Defensible Space” around the home.



After

Emergency Fire Escape Road Evaluation

As part of the Ingress/Egress priority, emergency fire escape roads within Shasta County were identified and evaluated. Previous development plans within the county were researched to determine if and where these roads existed and which parcels were effected by the roads. The roads were physically inspected to see if they complied with the original requirements, were still accessible, and if they provided a safe passage. A problem with most of the roads is the lack of maintenance requirements and that some do have deeded easements.

Shasta County Supervisors adopted new building standards that require an assessment on future emergency fire escape roads that will be used for maintenance. This does not alleviate the problems associated with the existing roads but will prevent future problems from developing.



Appendix

1. Swasey Fires Success Story:

1972 Swasey Fire

This fire started on August 11, 1972 shortly after 2:00 P.M. The fire report states that the wind was 10 mph from the South. No relative humidity or temperatures are listed in the report. The fire cause was listed as arson / playing with fire (12 year old male with matches). Fire behavior was reported as extreme. Several firefighters were trapped and sought refuge in a house located at the end of Gas House Hill Rd. The fire rapidly burned from its origin into the historical town of Old Shasta. Several spot fires burnt north of Hwy 299W. The hillsides were left bare after the fire.

The fire damage listed in the report is:

1933 acres

8 Dwellings

2 Mobile Homes

4 barns

9 sheds

4 miles of power lines

\$123,725.00 damage

The area has re-grown with dense stands of brush, knob cone pine, and a mix of hardwoods. This area was previously denuded by mining activity as noted in the Historical Fuels Modification section. It is also an example of the need for post-fire maintenance. The original landscape was modified by human activity and has grown, burnt, and re-grown back to a hazardous condition.

2002 Swasey Fire

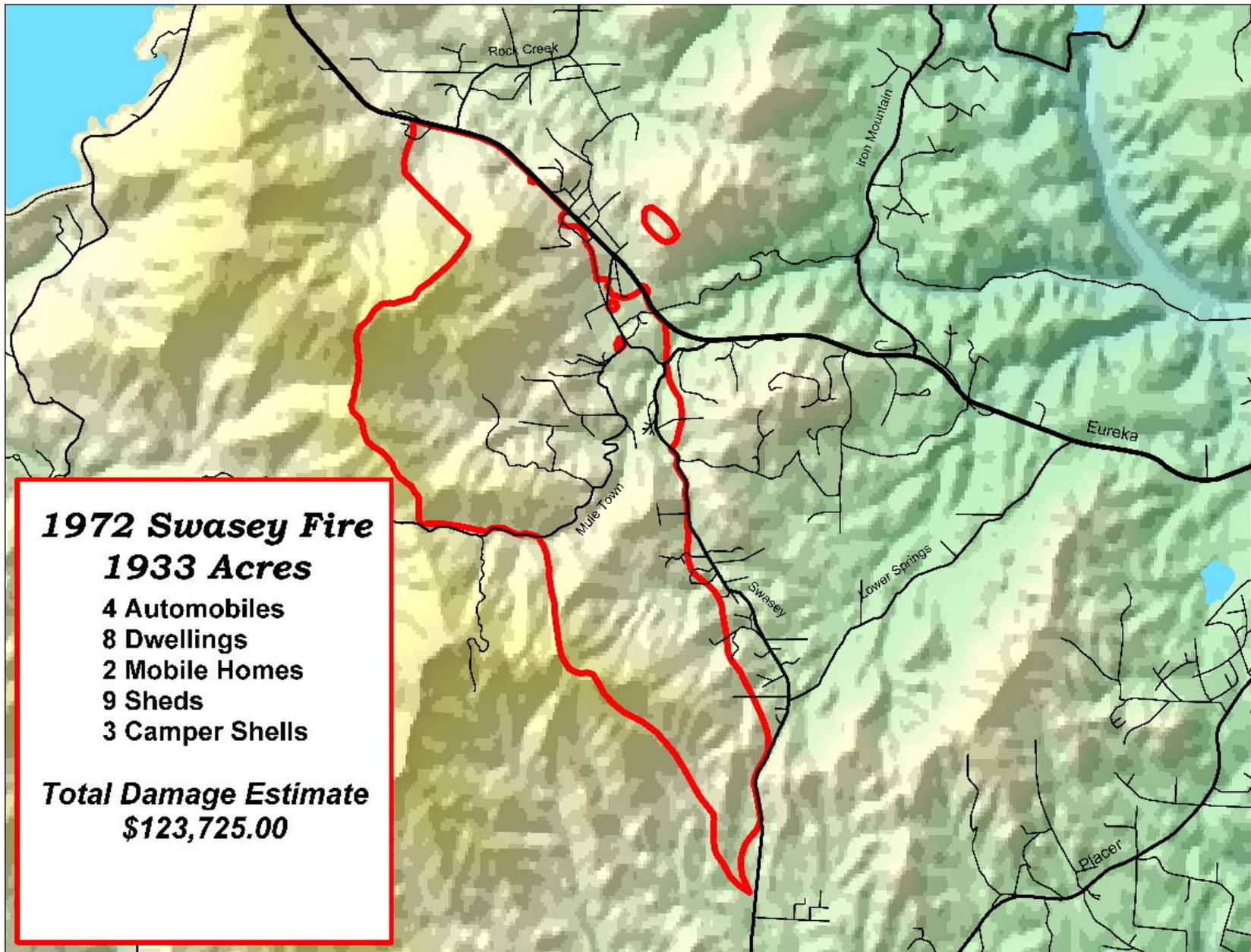
This fire started on September 2, 2002 at approximately 12:06 P.M. Reported Weather conditions recorded at 2:00 P.M. were; wind 4 – 6 mph gusting to 10 from the East. The temperature was 100° F and the relative humidity 12 %. The average live fuel moisture collected from Swasey Drive between 08/12/02 and 10/30/02 was 63%.

Responding fire personnel noticed two distinct columns of smoke indicating the possibility of two separate fires. Witness reports confirm the existence of two separate fires that burnt into one larger fire. The fire cause was undetermined. Several outbuildings, contents, and numerous vehicles were damaged or destroyed totaling an estimated \$69,000.00. Power and telephone utility lines were also damaged but no damage estimate was reported.

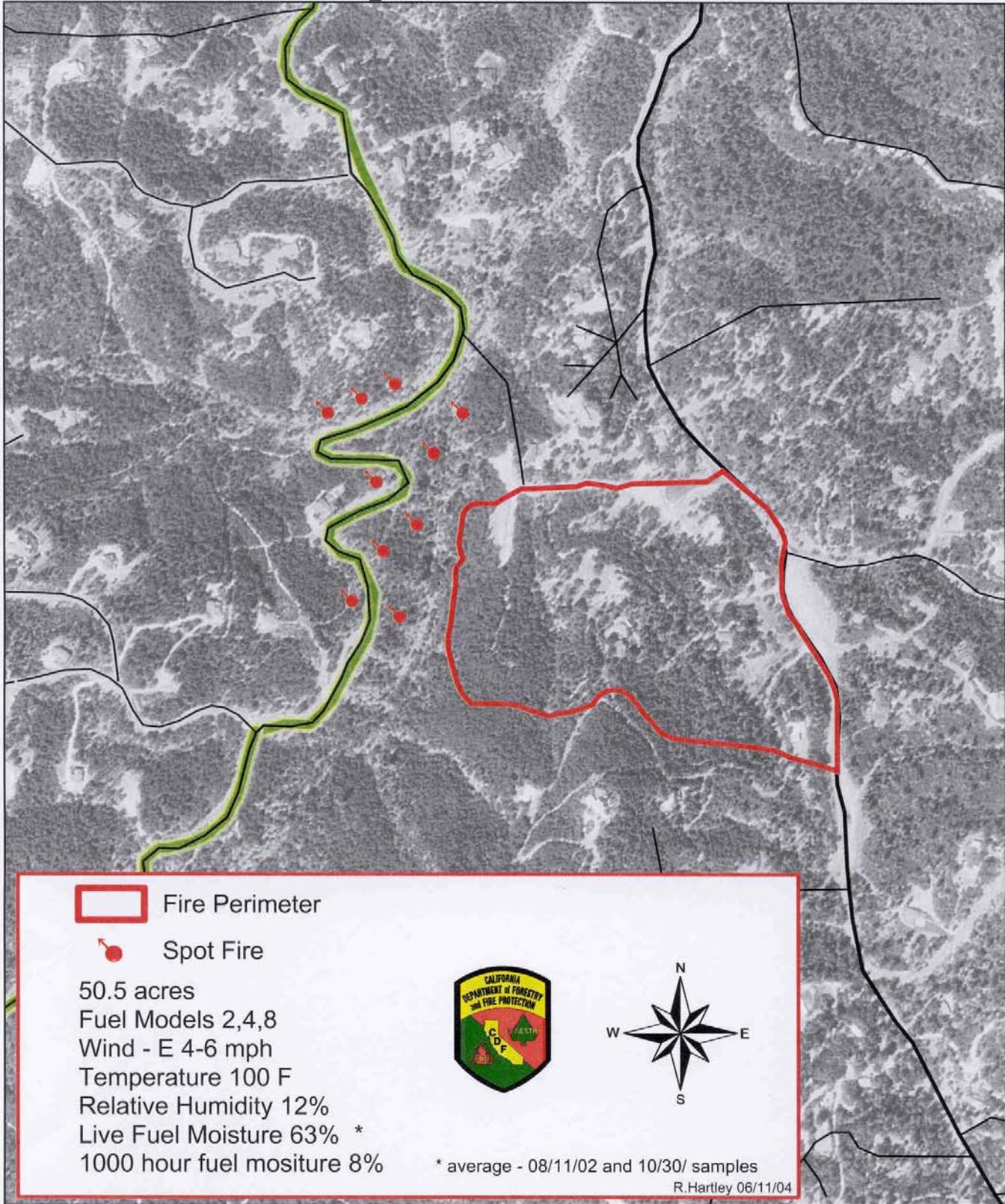
The fire rapidly spread uphill from two separate fires located approximately 400 yards apart. Initial fuels on the road were grass that quickly transitioned into brush and trees both conifer and hardwood. Ladder fuels were extensive and the canopy was continuous. The fire in the brush and conifers had an estimated 30-foot flame length with heavy spotting downwind from the fire up to ¼ mile ahead of the main fire. Spot fires occurred as far away as east of Mule Mountain Road. Fire activity slowed slightly after cresting the hill and began spreading into the Middle Creek drainage. Torching, crowning and spotting continued.

Spot fires landing in the fuel break along Mule Town Road were very small and slow growing whereas those occurring outside the fuel break quickly caused torching and additional spotting. Also spot fires starting in individual treatment areas below residences on Winthrop Ct. grew no larger than two to four feet in diameter. The slow spread of the spot fires in the treated areas was critical in controlling the fire.

Had these leading edge spot fires occurred in the fuels that existed prior to treatment, the fire most likely would have rapidly spread across Mule Town Rd to the ridgeline.



Swasey Fire September 9, 2002



2. Shasta County Fire Safety Standards

CHAPTER 6

FIRE SAFETY STANDARDS

Adopted: September 22, 1981

Revised: August 7, 1986

September 29, 1988

April 1, 1992

September 4, 1992

May 15, 2001

June 1, 2003

6.0 GENERAL POLICIES

6.01 AUTHORITY

These standards shall be administered and implemented by the County Fire Warden, his or her designees, and as otherwise authorized by the Board of Supervisors by adoption of these standards.

6.02 SCOPE

These standards shall apply to subdivisions, parcel maps, use permits, administrative permits, building permits, mobile home installation permits, and other developments which require the issuance of a permit by the County of Shasta.

6.03 CONSISTENCY WITH OTHER STANDARDS AND REGULATIONS

- a. Portions of these standards are required by the California Code of Regulations (CCR) Title 14, Division 1.5, Chapter 7, Subchapter 2, Articles 1-5. Such sections are noted with the CCR section in parenthesis after the section. As minimum State of California Regulations, these sections would supersede other Shasta County regulations and standards.
- b. Sections not noted with the CCR in parenthesis are locally adopted standards which exceed or differ from the requirements of the regulations of the State of California. These standards are adopted by resolution and may be superseded by other Shasta County Ordinances.
- c. These standards are intended to be minimum standards. If other County Standards require a higher standard of development, then the other standard prevails. Where these standards require a higher standard of development, these standards prevail.

6.1 ACCESS

- a. The following standards shall establish minimum access requirements for public safety. The road and driveway networks shall provide safe access for emergency wildland fire equipment and civilian evacuation concurrently and shall provide unobstructed traffic circulation during a wildfire emergency. The road and driveway network shall also provide all-weather, safe access for emergency personnel responding to medical aids, traffic accidents, and structure fires. The standards shall apply to subdivisions, parcel maps, use permits, administrative permits, building permits, mobile home installation permits, and any other developments which require the issuance of a permit by the County of Shasta.
- b. In accordance with Sections 6.91 thru 6.94 of these standards, the County Fire Warden or the approving authority may approve or recommend the approval of exceptions to the access standards where the same practical effect can be achieved and where reasonable access can be provided to assure adequate evacuation routes for the public and adequate access routes for emergency personnel and equipment. In determining whether the same practical effect can be achieved, the approving authority shall apply and make findings concerning the performance criteria set forth in Section 6.92.
- c. For single family residential building permits and residential mobile home installation permits, off-site improvements will not be required if adequate physical access exists as determined by the County Fire Warden. Private bridges on access roads must be certified by a licensed engineer when required by the County Fire Warden. If modifications are necessary in order to provide adequate physical access for fire apparatus, then a building or grading permit shall be obtained and the necessary modifications shall be made.
- d. For administrative and use permits, off-site improvements will not be required on public roads and streets constructed prior to January 1, 1992, if adequate physical access exists and the County Fire Warden finds that any increase in personal density created by the project will not adversely affect public safety.

6.11 GENERAL ROAD DESIGN REQUIREMENTS

Scope:

It shall be the intent of the Fire Safety Standards to provide for safe access for emergency fire equipment, civilian evacuation, and unobstructed traffic circulation by requiring the construction of continuous or through roadways and limiting the length and use of dead-end roads.

6.11.1 Dead-end Road Length:

The maximum length of dead-end roads shall not exceed the following cumulative lengths, regardless of the number of parcels served. Cumulative lengths refer to the combined lengths of dead-end roads accessed from the particular dead-end road in question.

- Parcels less than one acre in size - 800 feet
- Parcels one acre or larger in size - 1000 feet

6.11.1.1 Exception:

The County Fire Warden or approving authority may grant an exception to the maximum length dead-end road standards for parcels 40 acres or larger in size providing the cumulative dead-end road(s) servicing such a parcel are not over 5280 feet in length. In considering such an exception, the County Fire Warden or approving authority shall make findings that the exception does not adversely affect public safety in the area.

6.11.2 Construction Standard:

Continuous or through roads constructed in areas designated by the General Plan as Urban (UR), Suburban (SR), Commercial (C) and Industrial (I) shall be constructed in accordance with Chapter 2 of the Development Standards. Continuous or through roads constructed in all other areas, may be constructed as emergency fire escape roads as determined by the County Fire Warden and the Director of the Department of Public Works. Emergency fire escape roads shall be constructed in accordance with the minimum road standards as specified in Section 6.14 of the Fire Safety Standards.

6.11.3 Density:

When an area or project is accessed by a single paved road and the area or project contains more than 50 parcels or is intended to be occupied by more than 150 persons, then the area or project shall be required to construct a continuous road system that provides a minimum of two (2) paved access roads designed in accordance with Chapter 2 of the Development Standards

6.11.4 Open Space and Greenbelts:

Projects creating open space and greenbelt areas shall provide adequate fire department access to such areas as determined by the County Fire Warden or approving authority.

6.12 PRIVATE ROAD, PUBLIC ROAD, AND NON- RESIDENTIAL DRIVEWAY STANDARDS

- a. The following standards are minimum standards and may be superseded by the requirements of Chapter 2 of the Development Standards when said requirements are more stringent than these minimum standards.
- b. Non-residential driveways shall provide fire department access from nearest Shasta County recognized private or public roadway to within 150 feet of any portion of the exterior wall of each building on the premises. An exception to subsection (b) may be approved by the County Fire Warden when buildings (s) are completely protected with an approved automatic fire sprinkler system.
- c. Following are minimum road and non-residential driveway construction standards:
 - 1. Width – Eighteen (18) feet, unobstructed. (CCR T. 14, Section 1273.01)
 - 2. Shoulders - one (1) foot wide on each side of driving surface.
 - 3. Vertical Clearance - Fifteen (15) feet, unobstructed. (CCR T. 14, Section 1273.07)
 - 4. Surface
 - a. All-weather, capable of supporting 40,000 pound load. (CCR T.14, Section 1273.02)
 - b. Those portions of roadways and driveways with grades greater than 12% shall be paved in accordance with Chapter two of the Development Standards.
 - 5. Horizontal Curvature (CCR T.14, Section 1273.04)
 - a. Not less than 50 feet inside radius
 - b. Curves having an inside radius of 50-100 feet shall have a minimum surfacing width of 22 feet.
 - c. Curves having an inside radius of 100-200 feet shall have a minimum surfacing width of 20 feet.
 - 6. Vertical Curvature – Vertical curves shall be designed by a licensed engineer to accommodate fire apparatus.

7. Turnarounds
 - a. Dead-end roads shall be provided with a turnaround.
 - b. Dead-end non-residential driveways over 150 feet in length shall be provided with a turnaround within 50 feet of the building.
 - c. Turnarounds shall be constructed in accordance with Figure 2-40. Turnarounds shall have all-weather surfaced radius of not less than 40 feet on roads. On roads, the right-of-way shall have a radius of not less than 50 feet.
 - d. Hammerhead or "T" turnarounds may be approved for parcel maps by the approving authority upon considering recommendations by the Department of Public Works and the County Fire Warden. Alternative turnarounds shall be constructed in accordance with Figure 2-40.
 - e. Hammerhead or "T" turnarounds may be approved on non-residential driveways by the County Fire Warden. Alternative turnarounds shall be constructed in accordance with Figure 2-40.
8. Hydrant Turnouts
 - a. Roads and commercial driveways less than 28 feet in width shall be provided with turnouts at each fire hydrant.
 - b. Turnouts shall be a minimum of 10 feet wide and 30 feet long with a minimum 25 foot taper at each end as per attachment FS-4. (CCR T. 14, Sections 1273.06 and 1275.15)
 - c. An exception to the turnout requirement may be granted by the County Fire Warden when fire hydrants are required at intersections.
9. Structures (Bridges, Culverts, etc.)
 - a. Structures shall be designed and constructed to AASHTO HS20-44 loading or to carry the maximum legal load specified in the California Vehicle Code (CCR T.14, Section 1273.07)
 - b. Bridges having limitations shall be provided with signing that designates the limitations including vertical clearance limitations, weight limitations, and single lane conditions. (CCR T.14, Section 1273.07)
 - c. One-lane bridges shall provide unobstructed visibility from one end to the other and shall be provided with turnouts at both ends as per attachment FS-4. (CCR T.14, Section 1273.07)
10. Grades – shall not exceed 16%. (CCR T.14, Section 1273.03)

11. One-way roads may be allowed by the approving authority upon considering recommendations from the County Fire Warden that such roads will provide safe emergency access for fire equipment, civilian evacuation, and unobstructed traffic circulation during emergencies. One-way roads shall provide a minimum twelve (12) feet wide traffic lane. One-way roads shall not exceed 2,640 feet in length. One-way roads over 1320 feet in length shall provide a turnout at approximately the midpoint. One-way roads may not provide direct access to more than 10 dwelling units. One-way roads shall connect to a two-lane roadway at both ends. (CCR T.14, Section 1273.08)
12. Obstructions – minimum widths and vertical clearance shall be maintained.
13. Gates
 - a. Gates on private roads and commercial driveways shall be a minimum of 20 feet in width. (CCR T.14, Section 1273.11)
 - b. Gates shall be set back a minimum of 30 feet from the edge of pavement of adjacent roadways. (CCR T.14, Section 1273.11)
 - c. Electronic security gates shall provide for fire department access. Plans shall be submitted to the County Fire Warden or his / her designee for review and approval prior to any construction.
14. Speed Control Bumps on private roads and driveways shall not exceed four (4) inches in height.

6.13 RESIDENTIAL DRIVEWAY STANDARDS

- a. The following standards are minimum driveway standards to be applied to residential driveways serving no more than three (3) residences located on a single parcel. Residential driveways servicing four (4) or more residences shall meet the requirements of Section 6.12. (CCR T.14, Section 1271.00)
- b. Residential driveways shall provide fire department access from the nearest Shasta County recognized private or public roadway to within 50 feet of each residence on the parcel. (CCR T.14, Section 1273.10)
- c. Following are minimum residential driveway standards:
 1. Width
 - a. Sixteen (16) feet, unobstructed.
 - b. The County Fire Warden may approve widths of twelve (12) feet for short distances. The lesser widths may be utilized at bridges, culverts, gates, and cattle guards, and in areas where unique topographic conditions exist.
 2. Shoulders – One (1) foot wide on each side of driveway.
 3. Vertical clearance, fifteen (15) feet, unobstructed. (CCR T.14, Section 1273.10)
 4. Surface
 - a. Capable of supporting 40,000 pound load. (CCR T.14, Section 1273.02)
 - b. All-weather surface width of not less than twelve (12) feet of the driveway. Minimum surface thickness of 4" of compacted class 3 aggregate base rock.
 - c. Driveways with a grade of over 12% slope shall be paved in accordance with the flag lot driveway standard in Figure 2-16 of the Development Standards.
 5. Horizontal curves shall have an inside radius of not less than 50 feet.
 6. Vertical curves shall have a minimum length of not less than 100 feet or be designed to accommodate fire equipment as approved by the County Fire Warden or approving authority. See illustration FS-5.
 7. Turnarounds

- a. Driveways exceeding 200 feet in length shall be provided with a turnaround within 50 feet of the residences. (CCR T.14, Section 1273.10)
 - b. Turnarounds shall be constructed in accordance with Figure 2-42 of the Development Standards.
8. Hydrant Turnouts – If a fire hydrant is located along a residential driveway, then a turnout shall be provided as per Attachment FS-4. (CCR T.14, Sections 1273.06 and 1275.15)
9. Bridges and Culverts
 - a. Bridges and culverts shall be designed and constructed to AASHTO HS20-44 loading or to carry the maximum legal load specified by the California Vehicle Code. (CCR T.14, Section 1273.07).
 - b. Bridges having limitations shall be posted with signs designating the limitations including vertical clearance and weight limitations. (CCR T.14, Section 1273.07)
10. Grades shall not exceed 16%. (CCR T.14, Section 1273.03)
11. Gates
 - a. Gates shall be a minimum of twelve (12) feet wide. (CCR T.14, Section 1273.11)
 - b. Gates shall be set back a minimum of 30 feet from the edge of pavement of the adjacent roadway. (CCR T.14, Section 1273.11)
 - c. Electronic security gates shall provide for fire department access. Plans shall be submitted to the County Fire Warden or his/her designee for review and approval prior to any construction.

6.14 EMERGENCY FIRE ESCAPE ROAD STANDARDS

Scope:

The following construction standards shall apply to the creation of an emergency fire escape road. The construction standards shall apply only to the emergency fire escape road and not an existing road unless a portion of an existing road becomes part of an emergency fire escape road.

The following standards are minimum standards and may be superseded by the requirements of Chapter 2 of the Development Standards.

6.14.1 Definition:

Emergency Fire Escape Road: A road designed and constructed primarily to provide an alternate route of civilian vehicular egress, in the event of a wildfire, from an area accessed by only one ingress/egress road, and that the area served by the one ingress/egress road exceeds the minimum dead-end road length as indicated in Section 6.11.

6.14.2 Delineation:

Applicant shall submit improvement plans indicating the proposed location and placement of the emergency fire escape road to the Shasta County Fire Department and the Department of Public Works.

6.14.3 Location and Placement:

The County Fire Warden and the Director of the Department of Public Works shall determine the final location and placement of emergency fire escape roads. Emergency fire escape roads shall be located in relationship to topography, fuel types and fuel density in the project area, and serviceability of existing ingress road.

Emergency fire escape roads shall provide a second means of vehicular egress and shall be sufficiently separated from the primary vehicular ingress road to prevent both roadways from being simultaneously obstructed during a wildland fire.

6.14.4 Right of Ways:

Right-of-ways or easements shall be a minimum of 30-feet in width and shall be sufficient to permit construction and maintenance of the required road improvements. Applicant shall acquire and offer rights-of-ways or easements for dedication to the County of Shasta.

6.14.5 Construction Standards:

Emergency fire escape roads shall be either:

- A) Constructed to the standards of a permanent road division emergency fire escape road pursuant to Section 6.14.6 and be maintained by the permanent road division or,
- B) Constructed to the standards of a paved emergency fire escape road pursuant to Section 6.14.7.

6.14.6 Permanent Road Division Emergency Fire Escape Road Construction Standards:

Emergency fire escape roads constructed as a permanent road division emergency fire escape road shall be constructed to the following standards and as shown in Figure

FS-8:

6.14.6.1 Width:

- A) Shall be a minimum of 18 feet in width, unobstructed; and
- B) Shall provide 1-foot shoulders on each side of road.

6.14.6.2 Surface:

Shall be an 18-foot wide all-weather surface with a minimum thickness of 4 inches of compacted class-3 aggregate base rock (excluding shoulders).

6.14.6.3 Vertical Clearance:

Vertical clearance shall not be less than 15 feet unobstructed.

6.14.6.4 Grades:

Grades shall not exceed 16%.

6.14.6.5 Horizontal Curves:

- A) Horizontal curves shall have an inside radius of not less than 50 feet.
- B) Curves having an inside radius of 50-100 feet shall have a minimum surfacing width of 22 feet.
- C) Curves having an inside radius of 100-200 feet shall have a minimum surfacing width of 20 feet.

6.14.6.6 Vertical Curvature:

Vertical curves shall have a minimum length of not less than 100 feet.

6.14.6.7 Bridges and Culverts:

Bridges and culverts shall be designed by a licensed engineer, and be constructed to AASHTO HS20-44 loading (40,000 pound vehicle load) or to carry the maximum legal load specified in the California Vehicle Code.

6.14.6.8 Gates:

Gates may be installed in areas so that an emergency fire escape road not provide through access on a continual basis.

- A) The minimum gate opening shall be 20 feet in width.
- B) Gates shall be designed to open without the use of a key, tools, or any special knowledge or effort. Gates shall not be locked.
- C) Gates shall not be rendered unusable by using chains, bolts, and latches or barricaded.

6.14.6.9 Signs:

Signs shall be constructed and installed adjacent to the beginning of the emergency fire escape road as shown in Figure FS-9.

6.14.7 Paved Emergency Fire Escape Road Construction Standards:

Emergency fire escape roads constructed as paved emergency fire escape roads shall be constructed to the same standards in accordance with Section 6.14.6 as a permanent road division emergency fire escape road, except that the aggregate base shall be surfaced with 0.17' X 18' of asphalt concrete as shown in Figure FS-8.

6.2 STREET SIGNS AND BUILDING NUMBERING

6.21 ADDRESS FOR BUILDINGS

- a. Every building or structure, except accessory buildings shall be provided with a street address marker located with respect to the nearest public highway, street or road servicing such building or structure so as to be clearly visible and legible at all times from the roadway. Each dwelling unit shall be separately identified. (CCR T.14, Section 1274.08)
- b. Numbers and/or letters shall be a minimum of 4 inches in height, 3/8 inch stroke, reflectorized, and contrasting with the background color. (CCR T.14, Section 1274.09)
- c. Each building, except accessory buildings, shall have a permanently posted address which shall be posted at the intersection of the driveway and the road. Addresses shall be visible from both directions of travel. Where multiple addresses are required at a single driveway, they shall be mounted on single post. (CCR T.14, Section 1274.10)

Exception: Buildings located within 100 feet of the road may post the address on the surface of the wall facing the road providing that the address is clearly visible from the road.

- d. The address shall be posted prior to the final building inspection by the Shasta County Building Division.
- e. Address posting shall be maintained. (CCR T.14, Section 1274.10)

6.22 STREET IDENTIFICATION SIGNING

- a. Newly constructed or approved public and private roads shall be identified by a name or number that is non-duplicating and consistent with the Shasta County road naming system. (CCR T.14, Section 1274.04)
- b. Signs identifying roads, streets, and private lanes shall be placed at the intersection of those roads, streets and/or private lanes and shall be clearly visible from both directions of travel for a distance of at least 100 feet. (CCR T.14, Sections 1274.02 and 1274.05)
- c. Letters and numbers for street and road signs shall be a minimum of 3 inches in height, 3/8 inch stroke, reflectorized, and contrasting with the background color. (CCR T.14, Section 1274.01)

6.23 STREET LIMITATION SIGNING

- a. Newly constructed and approved public and private roads shall be provided with signs identifying any access limitations such as weight limitation, vertical clearance, dead-end road, one-way road, single-lane condition, and other similar limitations. (CCR T.14, Section 1274.06)
- b. Limitations shall be clearly posted at two locations:
 - the intersection proceeding the traffic limitation
 - at a location not more than 100 feet before the actual area of traffic limitation (CCR T.14, Section 1274.06)
- c. Letters and numbers for limitation signs shall be a minimum of 3 inches in height, 3/8 inch stroke reflectorized, and contrasting with the background color. (CCR T.14, Section 1274.01)

6.3 FIRE PROTECTION WATER STANDARDS

With A Central Water System

- a. The standards in this section apply to new developments within the boundaries of a public or private water service jurisdiction having a pressurized water system that contains water mains that are six inches in diameter or larger in size. The standards in Section 6.31 (c) will not be applied by Shasta County to permit applications for single-family residences on parcels that were created prior to January 1, 1989.
- b. For land divisions, the required water system, including hydrants, must be installed and in service or bonded for prior to recording the map.
- c. For use permits, building permits and other developments, the required water system must be installed and in service prior to the foundation inspection by the Shasta County Building Division.
- d. For single family residential construction, mobile home installation permit or for a building permit for substantial improvements to any such structures as defined by Section 5.01.080 of the Shasta County Ordinance Code, an approved fire hydrant shall be installed at an approved location on water mains four inches or larger in size within 750 feet of the parcel or, the applicant shall contribute to the fire hydrant fund.

6.31 FIRE FLOW AND HYDRANT SPACING

- a. New water facilities shall provide the following flow requirements in addition to the average daily demand.
- b. Proof of the ability to comply with the fire flow requirements shall be submitted with the application for development. Proof may consist of a letter of certification from the responsible water supply entity.
- c. See below:

	Land Use	Min. Flow	Min. Flow w/Sprinklers	Maximum Hydrant Spacing	Maximum Driving Distance *
1.	Single-family residential lots larger than one acre in size***	500 gpm	N/A	750'	750'
2.	Single-family residential lots, one-half to one acre in size.	750 gpm****	N/A	500'	300'
3.	Single-family residential lots, less than one-half acre in size and mobile home parks	1000 gpm****	N/A	500'	300'
4.	Multiple residential, 3-8 units per acre, one story, neighborhood business (C-1 Zone District)	1500 gpm	1000 gpm	500'	300'
5.	Multiple residential, 9 or more units per acre; one and two stories; commercial or industrial buildings not to exceed 10,000 square feet **	2000 gpm	1250 gpm	300'	200'
6.	Multiple residential, 3 stories or higher; commercial or industrial buildings over 10,000 square feet**	2500 gpm	1500 gpm	300'	200'

See next page for asterisked items.

- * Maximum Driving Distance from Hydrant to Building
 - ** For specific projects or occupancies, greater fire flows may be required.
 - *** For land divisions creating large lots, a maximum of one hydrant per proposed building site shall be required.
 - **** Fire flows of not less than 500 gpm will be acceptable if the responsible water supply entity is implementing an adopted capital improvement plan to upgrade the water system to provide the needed fire flows. Plans shall be approved by the County Fire Warden.
- d. Fire flows and hydrant spacing for new developments utilizing the planned development zone district, density averaging or clustering will be based upon the actual density created by the clustering.
 - e. In order to qualify for the sprinkler fire flow reduction, a building must be completely protected by an automatic sprinkler system installed in accordance with NFPA 13 and the latest edition of the Uniform Building Code Standards. Approved backflow prevention device(s) may be required by the responsible water supply entity.
 - f. If the fire flows listed above are greater than those required by the Insurance Services Office Guide for Determination of Needed Fire Flow, the lesser fire flow shall be allowed for the development. However, system design may be required to meet higher fire flow requirements for future development or expansion.
 - g. On residential and commercial projects where minimum fire flow or hydrant size or spacing cannot be achieved, the Fire Warden may, where reasonable fire protection can otherwise be supplied, approve reduced fire flows, hydrant size or increase spacing if alternate facilities or construction methods can be provided to assure reasonable fire protection.

6.32 DURATION

The minimum fire flow requirements detailed in Section 6.31 above shall be sustained for a period of at least two hours.

6.33 PRESSURE

The water supply system shall be designed to maintain normal operating pressures of not less than 20 psig at the required fire flow. Static pressure at the hydrant should not exceed 150 psig.

6.34 WATER LINE SIZE AND DESIGN

The distribution system shall be of adequate size and so designed, in conjunction with related facilities, to maintain the minimum fire flow and pressure required. Minimum pipe size for new water lines that supply or may be anticipated to supply fire hydrants shall be not less than six inches in diameter. Water line materials shall be approved by the responsible water supply entity.

6.35 LOCATION

- a. Fire hydrants shall be attached to the distribution system at locations approved by the responsible fire protection agency and water supply entity providing service.
- b. Fire hydrants should be located not closer than 50' to the building being protected unless a second hydrant is available as approved by the responsible fire department.
- c. Fire hydrants installed after January 1, 1992, shall be located at a turnout or turnaround along the road or driveway so that fire apparatus using the hydrant will not block the roadway. (CCR T.14, Section 1275.15) Turnouts shall be constructed in accordance with illustration FS-4. An exception to the turnout may be granted by the County Fire Warden when fire hydrants are located at intersections.

6.36 MATERIALS AND HYDRANTS

- a. Six inch fire hydrants shall conform to A.W.W.A. standards with one 4 ½" and two 2 ½" NST connections. All fire hydrants shall be a dry barrel type. Each hydrant shall be fitted with a 5 ¼" main valve opening and installed as per illustration FS-2.
- b. Fire hydrants shall be:
 1. Mueller Centurion A-423
 2. Kennedy Guardian K-81A
 3. Waterous Pacer WB-67
with oil reservoir
bronze seat ring
weather shield and one piece bronze nut
mechanical attached nozzles
 4. or equivalent, as approved by the respective water service and fire protection agency.
- c. Each hydrant gate valve shall be supplied with an 8" valve box with metal cover, set to finish grade and installed to allow operation of gate valve as per FS-2 illustration.
- d. All hydrants, valves, fittings, pipe, and installation shall be approved by the responsible fire protection agency and water supply entity providing service.

- e. Protective barriers shall be provided when required by the respective fire department or water supply entity and shall be installed as per illustration FS-3.

6.37 HYDRANT INSTALLATION

- a. Fire hydrants shall be installed in accordance with FS-2 illustrations and items 1 through 6 of illustration FS-1.
- b. Hydrant installations are to be inspected in a timely manner by the responsible water supply entity or fire agency prior to burial.

6.38 HYDRANT MAINTENANCE AND MARKING

- a. It is essential that hydrants be in operable condition when they are needed; therefore, hydrant maintenance is an important part of these standards.

It is recommended that water and fire districts enter into an agreement to specify which maintenance tasks will be the responsibility of each respective district.

- b. A written record of hydrant inspections and maintenance should be maintained.
- c. The following hydrant maintenance schedule is recommended:

2 year intervals

- paint hydrant - taking care that paint does not interfere with valve stem operation or cap removal

1 year interval

- flush and flow-test hydrant

6 month interval

- check for leaks in valves and repair
- operate and check street valve
- lubricate valve stem
- lubricate threads on outlets and caps

- d. Marking – public hydrant barrels should be painted chrome yellow in color; private hydrant barrels should be painted red in color.
- e. Hydrants installed after January 1, 1992, shall be identified by reflectorized blue markers.
 - 1) On paved roadways located below 2,000 foot elevation, reflectorized blue markers shall be installed in accordance with the State Fire Marshall's Guidelines for Fire Hydrant Markings along State Highways and Freeways, May 1988. See illustration FS-7;

Or

Hydrants shall be identified by a reflectorized blue dot (minimum three inch diameter) mounted on a metal post located within three (3) feet of the hydrant. The blue dot shall be three (3) feet to five (5) feet above ground level and clearly visible from the road/driveway. (CCR T.14, Section 1275.20)

- 2) Along paved roads located at or above the 2,000 foot elevation, and along unpaved roads or driveways, hydrants shall be identified by a reflectorized blue marker on a metal post as specified above. (CCR T.14, Section 1275.20)
- f. Flammable vegetation shall be cleared within eight (8) feet of fire hydrants (CCR T.14, Section 1275.15).
- g. Landscaping over four (4) inches in height shall not be permitted within eight (8) feet of fire hydrants.
- h. Fences, structures, obstructions, and hydrant protection posts shall not be permitted within three (3) feet of fire hydrants.

6.4 FIRE PROTECTION WATER STANDARDS
No Central Water System

The following standards shall apply for new developments within areas without a central water distribution facility (either public or private) as described in Section 6.3a.

6.41 DEVELOPMENT WITHIN WATER AGENCY SPHERE OF INFLUENCE

Developments within the sphere of influence of a public water agency or adjacent to a private water system (as described in Section 6.3) may be required to connect to the water system and to meet the requirements of Section 6.3. The respective Fire District and water supply entity shall make recommendations to the Planning Commission or other appropriate board as to whether or not connection to the water system should be required.

6.42 RESIDENTIAL REQUIREMENTS

- a. Each project shall be analyzed for individual requirements by the responsible fire department. Single-family residences outside the boundaries of a public or private water system will normally have water supplied by a fire department water tender.
- b. Land divisions that create parcels less than two acres in size shall construct a central water system meeting the requirements listed in Section 6.3.
- c. Land divisions that create parcels less than five acres in size shall be located within five road miles of a fire station. Said fire station shall be recognized by the County Fire Warden as being capable of providing fire protection services to the lots being created.
- d. If usable and reliable water supplies exist on site, the responsible fire department may require access to such supplies. Access may be either an all-weather road for direct drafting or a gravity flow minimum 3" feeder line with 2 ½" NST gated valve outlet. Examples of water supplies are swimming pools, ponds, lakes, creeks, streams, irrigation ditches, etc.

6.43 **FIRE FLOW – Commercial**

- a. Commercial, industrial, multiple residential (4 units or more) and public assemblies shall develop a private water system that meets the Insurance Services Office Schedule for Needed Fire Flow, June 1980 Edition;

Or

Shall participate in a public entity that has plans for developing a water system to provide the needed fire flows. Said plans shall be approved by the County Fire Warden or his representative.

- b. On projects where minimum fire flow, hydrant size or spacing cannot be achieved, the Fire Warden may, where reasonable fire protection can otherwise be supplied, approve reduced fire flows, hydrant size or increase spacing if alternate facilities or construction methods can be provided to assure reasonable fire protection.

6.5 BUILDING CONSTRUCTION STANDARDS

6.51 BUILDING SETBACKS

All buildings and accessory buildings constructed on parcels one acre or larger in size shall be setback a minimum of thirty (30) feet from all property lines and road easements. (CCR T.14, Section 1276.01)

6.52 ROOFING

Roofing materials on buildings and accessory buildings constructed within Shasta County shall have a Class "A" or Class "B" fire retardancy rating as specified by Uniform Building Code Standard No. 32-7.

6.53 CHIMNEY

Each structure equipped with a fireplace, stove, or other device that burns any solid or liquid fuel shall provide and maintain a spark arrester over the outlet of the chimney, stovepipe or duct as specified in this section (Public Resources Code 4291 (f)).

A spark arrester is defined as a device constructed of nonflammable material, 12 gauge minimum welded or woven wire mesh, with ½ inch openings or cast iron plate, 3/16 inch minimum thickness or other material found satisfactory by the enforcement agency and having ½ inch perforations for arresting burning carbon or sparks installed in such a manner as to be visible for the purposes of inspection and maintenance as required by Title 24, California Administrative Code, Section 2-1217.

6.54 RAFTERS

The spaces between rafters, the wall plate line and the underside of the roof sheathing shall be filled with solid blocking. No more ventilation than the minimum required by UBC shall be allowed. All vent spacing required by UBC shall be screened.

6.6 FUEL MODIFICATION

6.61 DISPOSAL OF VEGETATION

Disposal, including chipping, burning or removal to a landfill site approved by the local jurisdiction, of flammable vegetation and fuels removed during or caused by site development and/or construction, road and driveway construction, or fuel modification, shall be completed prior to recording the map for land divisions or final inspection for building permits. Disposal of vegetation by onsite burial is not permitted. (CCR T.14, Section 1276.02)

6.62 GREENBELTS

Subdivisions and other developments, which propose greenbelts such as parks, golf courses, irrigated landscaped areas, playgrounds, parking lots, orchards, etc. as a part of the development plan, shall locate said greenbelts strategically to provide a separation between wildland fuels and structures (CCR T.14, Section 1276.03). The location of greenbelts shall be approved by the County Fire Warden.

6.63 VEGETATION CLEARANCES AROUND STRUCTURES

Combustible vegetation shall be cleared around all structures for a distance of not less than 30 feet on each side; or to the property line. This does not apply to specimen trees or irrigated landscaping that will not transmit fire from the native vegetation to the structure. (Public Resources Code Section 4291)

6.7 FLAMMABLE AND COMBUSTIBLE LIQUIDS

6.71 ABOVEGROUND STORAGE TANKS FOR MOTOR VEHICLE FUEL – DISPENSING STATIONS

- a. Except as provided in Sections 6.72 and 6.73, flammable and combustible liquid storage tanks at motor vehicle fuel-dispensing stations shall be located in accordance with divisions VI and IX of Article 79 of the Uniform Fire Code as adopted by the County of Shasta.
- b. The County Fire Warden and his/her designees may grant approval in writing for the installation of aboveground storage tanks for flammable and/or combustible fuels for motor vehicle fuel-dispensing stations as set forth in Sections 6.72 and 6.73.
- c. Fuel-dispensing stations shall obtain any required permits or clearances from the Shasta County Planning Division.
- d. Prior to operation of a fuel-dispensing station, an approved Hazardous Material Business Plan shall be filed with the Shasta County Division of Environmental Health.
- e. Storage of over 600 gallons requires notification to State Water Resource Control Board.

6.72 VAULTED TANKS OF CONCRETE OR EQUIVALENT

- a. Vaulted tanks may be located at commercial, industrial, governmental, or manufacturing establishments and are only intended for fueling vehicles used in connection with the business.
- b. Class I and Class II liquids (such as diesel and gasoline) may be dispensed into motor vehicles from listed and approved concrete-vaulted tanks or tanks providing equivalent fire protection of not less than two hours on all tank surfaces. Tanks shall have UL Listing Label attached.
- c. Tanks shall not exceed 2,000 gallons individual or aggregate capacity, except for Class II liquids installed in accordance with Section 6.73 and/or exceptions processed in accordance with Section 6.91 through 6.94.
- d. Tanks shall be located a minimum of fifteen (15) feet from all property lines and fifteen (15) feet from any buildings on the same property.

- e. Vaulted Tanks shall be provided with automatic fuel shut-off devices capable of stopping the delivery of fuel when the level in the tank reaches 90 percent of tank capacity.
- f. Warning and identification signs shall be clearly posted on the tank in accordance with the current edition of the Uniform Fire Code. Signs shall identify tank contents and flammability; prohibit smoking and open flames within 25 feet; and require vehicle motors to be stopped when fueling.
- g. Protection posts shall be installed in accordance with Figure FS-3 to safeguard the tank against damage from vehicles.
- h. Dispensing systems shall be in accordance with the current edition of the Uniform Fire Code. Dispensing devices are allowed to be installed on top of vaulted tanks. Antisiphon devices shall be installed at each pipe connection when such piping extends below the top of the tank.
- i. Venting and electrical controls, including emergency pump shut-off switch, shall be in accordance with the current edition of the Uniform Fire Code. A permit shall be obtained from the Building Division for all electrical work.
- j. A fire extinguisher with a minimum 2-A, 20B:C rating shall be provided within 75 feet walking distance of the vaulted tank and dispensing area at a location approved by the fire agency having jurisdiction.
- k. Simultaneous tank filling and fuel dispensing into motor vehicles is prohibited and signs shall be posted to this effect.
- l. The vaulted-tank area and dispensing area shall be graded in such a manner that any fuel spilled will not drain towards buildings or other exposures.

6.73 ABOVEGROUND STORAGE TANKS WITHOUT VAULTS

- a. Aboveground tanks may be located at commercial, industrial, governmental, or manufacturing establishments and are only intended for fueling vehicles used in connection with the business and/or as otherwise permitted by Article 79 of the current edition of the Uniform Fire Code.
- b. Aboveground tanks without vaults may only be located in the following zone districts and/or as otherwise permitted by Article 79 of the current edition of the Uniform Fire Code:
 - 1) Exclusive Agriculture (EA) District
 - 2) Timber Production (TP) District
 - 3) Timberland (TL) District
 - 4) Mineral Resource (MR) District
 - 5) Light Industrial (M-L) District
 - 6) General Industrial (M) District
 - 7) Public Facilities (PF) District

- c. Only Class II fuels (such as diesel) may be dispensed into motor vehicles from approved or listed aboveground tanks without vaults. Class I fuels (such as gasoline) shall be dispensed from underground tanks special enclosures, or vaulted tanks as specified in Section 6.72 and the current edition of the Uniform Fire Code.
- d. Aboveground tanks shall have a maximum individual capacity of 12,000 gallons and a maximum aggregate capacity of 24,000 gallons.
- e. Tanks shall be located a minimum of:
 - 1) 100 feet from any property line.
 - 2) 50 feet from the nearest side of the edge of a road, not including internal driveways on the parcel.
 - 3) 50 feet from any building on the same property.
 - 4) 50 feet from any fuel dispenser.
- f. Only tanks that are designed, and approved or listed for aboveground storage of Class II combustible liquids shall be used. Underground tanks shall not be installed for aboveground use.
- g. The area surrounding the tank(s) shall be provided with a concrete and/or solid masonry-diked area with a concrete floor. The volumetric capacity of the diked area shall not be less than 115 percent of the amount of Class II fuel stored within the diked area. Walls of diked areas shall not exceed six (6) feet above the interior grade. Walls shall be designed and certified by a licensed engineer to be liquid-tight and to withstand a full hydrostatic head. The concrete floor of the diked area shall slope away from the tanks towards the walls of the dike. Diked areas containing two or more tanks shall be subdivided by channels or intermediate dikes. Provisions shall be made for draining or removing water from diked areas in a manner that will protect the environment and not constitute a hazard. Water removal by a sump and pump is preferred; however, drainage by a valve which is operable from outside the dike is acceptable. Such a valve shall be kept locked in the closed position except when water is being drained from the diked area.

- h. A means shall be provided for determining the liquid level in each tank and this means shall be accessible to the delivery operator. Provisions shall be made either to automatically stop delivery of liquid to the tank when the liquid level in the tank reaches 98 percent of capacity or to sound an audible alarm when the liquid level in the tank reaches 95 percent of capacity.
- i. Class II liquids shall not be dispensed from the tank by gravity flow or by pressurization of the tank. An antisiphon device shall be installed to prevent the release of fuel by siphon flow. A solenoid valve may be required at the tank outlet when the tank elevation produces a gravity head.
- j. If a submersible pump system is used, a listed emergency shut-off valve shall be installed at each dispensing device. If a suction pump-type dispensing device is used, a listed vacuum-activated shut-off valve with a shear section or equivalent-type valve shall be installed directly under each dispensing device.
- k. Piping shall be protected from physical damage. Piping subject to external corrosion shall be protected by approved or listed corrosion-resistant materials such as fiberglass reinforced plastic.
- l. Tanks shall be protected from unauthorized entry either by chain-link fence at least six (6) feet high around the tank or around the perimeter of the yard area.
- m. Diked areas shall be kept free of vegetation and combustible materials.
- n. The delivery connection shall be located within the diked area. A check valve and shut-off valve with a quick-connect coupling or a dry-break valve shall be installed at the connection and disconnection location for tank filling.
- o. Tanks and dispensing areas shall be clearly posted with warning and identification signs in accordance with the current edition of the Uniform Fire Code.
- p. The remote fuel dispensing system shall be protected against physical damage by a six (6) inch high concrete curb or protection posts installed in accordance with Figure FS-3.
- q. Venting and electrical controls including the emergency pump shut-off switch shall be in accordance with the current edition of the Uniform Fire Code.
- r. A permit shall be obtained from the Building Division for the tank foundations and all electrical work.

- s. A fire extinguisher with a minimum 2-A, 20B:C rating shall be provided within 75 feet walking distance of the diked-tank area and the dispensing area at a location approved by the fire agency having jurisdiction.
- t. Plans for the motor vehicle fuel dispensing facility and the aboveground tank installation shall be submitted to the County Fire Warden or fire agency having jurisdiction for review and approval prior to any construction.

6.8 (Reserved for future additions to Standards.)

6.9 POLICIES AND STANDARDS; EXCEPTIONS; APPEALS

6.91 POLICIES AND STANDARDS NOT A LIMITATION

The policies and standards established by this chapter are not a limitation upon the powers of an approving authority to protect public health and safety and to ensure consistency between the projects and all elements of the General Plan, all other applicable laws, policies and standards of Shasta County, and all applicable state and federal laws and standards. The approving authority by 4/5 vote or greater may, with appropriate findings, grant an exception to the design and construction standards for an individual project in order to avoid physical obstructions which are extremely difficult or impossible to remove; to avoid irreparable damage to natural features; and to handle similar situations which are unforeseen by these standards. Exceptions from the generally applicable Standards shall result in the same practical effect of the general standards by meeting the performance criteria listed in Section 6.92.

6.92 CRITERIA FOR EXCEPTIONS AND APPEALS

- a. The approving authority shall apply the following criteria when granting exceptions or appeals:
 1. Exceptions shall provide defensible space consistent with the “SRA Fire Safe Regulations.” (CCR T.14, Section 1270.09)
 2. Exceptions shall provide safe emergency access for fire equipment.
 3. Exceptions shall provide for unobstructed traffic circulation during an emergency.
 4. Exceptions shall provide for safe civilian evacuation during an emergency.
 5. Exceptions shall not cause delays in emergency response or interfere with the ability of emergency personnel to locate an incident.
 6. Exceptions shall provide a sufficient quantity of water for both wildfire and structural fire fighting at a location where it is immediately available to emergency personnel.
 7. Exceptions shall not result in fuel modification that would adversely affect access or defensible space thereby jeopardizing civilian and firefighter safety.

- b. The approving authority shall consider recommendations from the County Fire Warden and/or the fire agency having jurisdiction in the exception or appeals process. The County Fire Warden and/or fire agency having jurisdiction shall provide documentation outlining the effects of the requested exception on fire protection services.
- c. The approving authority shall make a written statement of findings as to the reason for the decision. A copy shall be provided to the applicant and the County Fire Warden.

6.93 EXCEPTIONS

- a. Requests for exceptions shall be made in writing to the County Fire Warden by the applicant or the applicant's authorized representative. Requests shall state the specific section(s) for which an exception is requested, material facts supporting or justifying the exception, and proposed alternative mitigation measures.
- b. For projects or permits under the jurisdiction of the Planning Division, the County Fire Warden will forward requests for exceptions to the Planning Commission or Board of Administrative Review along with his or her recommendations. The Planning Commission or Board of Administrative Review may grant or deny an exception in accordance with Section 6.92. A request for exception on a project subject to an administrative permit may, at the discretion of the Director of Resource Management, be referred to the County Fire Warden for approval or denial of the exception in accordance with Section 6.92.
- c. For permits under the jurisdiction of the Building Division, the County Fire Warden may grant or deny the exception in accordance with Section 6.92.

6.94 APPEALS

- a. Where an exception is not granted by the approving authority, appeals shall be processed in the manner provided for in the Shasta County Code. Planning Commission or Board of Administrative Review appeals shall be processed in accordance with Section 15.08.140. Building permit appeals shall be processed in accordance with Section 16.04.080.
- b. Upon appeal, the Board of Building Appeals may grant or deny an exception in accordance with Section 6.92.
- c. Upon appeal, the Board of Supervisors may grant or deny an exception in accordance with Section 6.92.