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Lake Valley Fire
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Meeks Bay Fire
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South Lake Tahoe
Fire Department

Fallen Leaf Fire
Department

Lake Tahoe Basin

Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy



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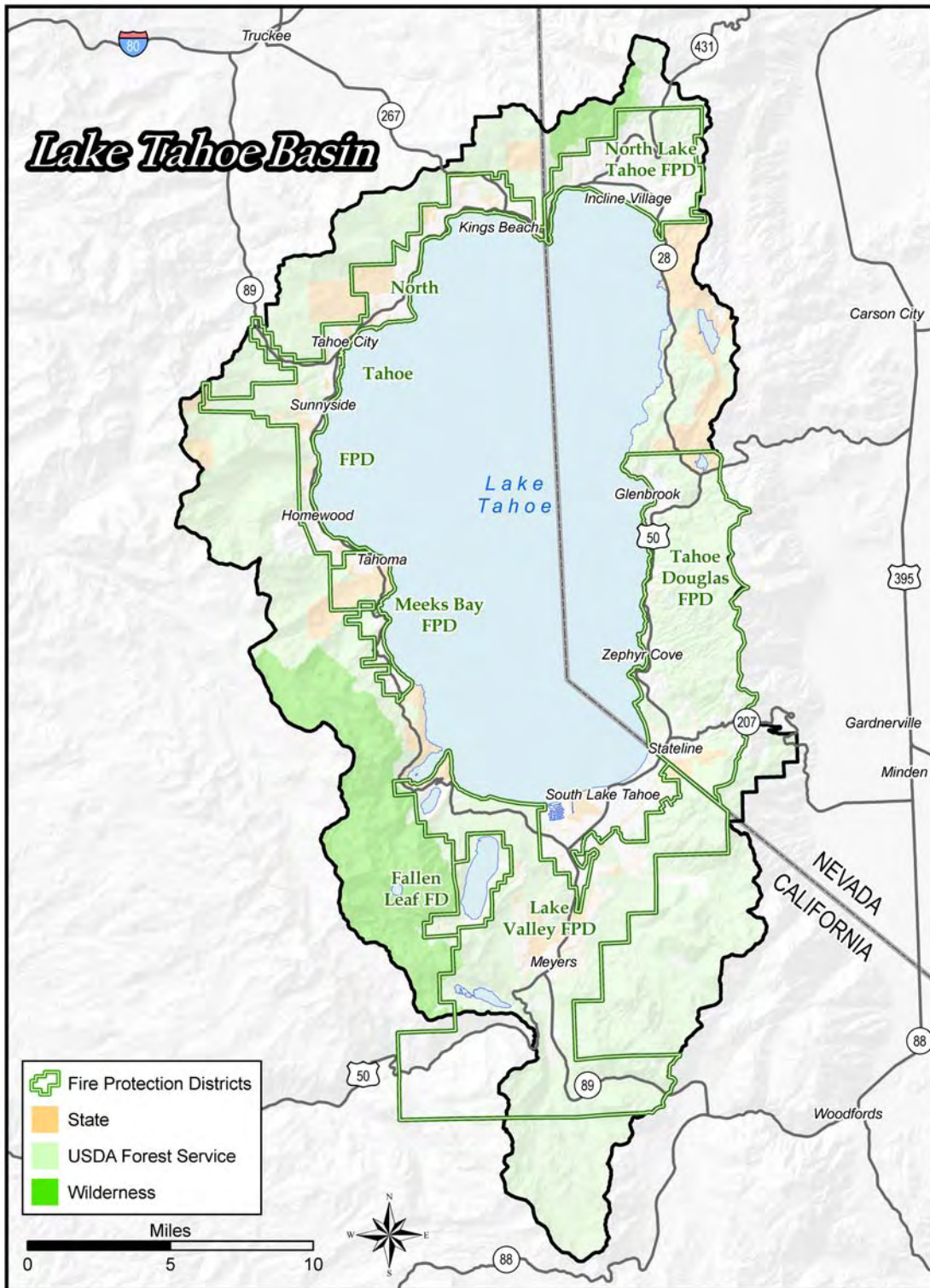
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Figure 1. Lake Tahoe Basin Comprehensive Fuels Plan planning area



Executive Summary

This Multi-Jurisdictional Fuels Plan for the Lake Tahoe Basin (Basin) facilitates the strategic decisions that must be made by land management, fire, and regulatory agencies to reduce the probability of a catastrophic fire in the Basin. It was developed to comply with the White Pine County Conservation, Recreation, and Development Act of 2006 (Public Law 109-432 [H.R.6111]). It comprehensively combines all existing plans that have been developed within the Basin, and provides a framework for participating agencies to identify priority areas and a strategy to work collaboratively on accomplishing those priorities. In addition, it builds upon fuel reduction projects that have already occurred on more than 13,000 acres and the efforts of community-based fire departments and fire safe chapters that are actively treating fuels around residences.

The plan incorporates approximately 208,800 acres, including portions of Placer, El Dorado, and Alpine Counties in northeastern California; and portions of Carson City, Washoe, and Douglas Counties in western Nevada. It includes nearly 42,000 homes or buildings in the communities of Incline Village, Crystal Bay, Sand Harbor, Glenbrook, Kingsbury, South Lake Tahoe, Homewood, Tahoe Pines, Sunnyside, Tahoe City, Dollar Point, Carnelian Bay, Tahoe Vista, Meeks Bay, Rubicon, Tahoma, and Kings Beach.

Studies in the Basin indicate that current wildland fuels conditions could support high-intensity wildfires that are difficult to suppress. Most communities in the Basin, as part of the National Fire Plan, were designated in the *Federal Register* (2001) as high risk for damage from wildfire. In addition, values uniquely associated with the Basin are also at risk. These include its entire commercial and public infrastructure, the clarity and beauty of Lake Tahoe and its scenic landscapes, its tourism-based economy, and the ecological values of its surrounding forests. Based on this, and because of the recent Angora Fire there, it is commonly acknowledged that the attributes that make the Basin a special place are at an unacceptably high risk of loss from wildfires and that something urgently needs to be done to reduce that risk.

The plan recognizes that wildfire protection in the Basin requires three components:

1. Buildings and homes in the Basin should be built of fire-resistant materials and have effective defensible space¹;
2. Accumulations of hazardous vegetative fuels must be reduced in the areas directly adjacent to communities (Community Defensible Space); and
3. Accumulations of vegetative hazardous fuels surrounding the Community Defensible Space should be reduced in the general forest.

¹ Structures in the Basin should be built using flame and ember resistant materials, and have effective defensible space. In California, all structures built after January 1, 2008 shall be required to be constructed to the Wildland Urban Interface (WUI) Building Standards. In California, all parcels having a structure and which are located on State Responsibility Area (non-federal lands and non-city lands; however, the City of South Lake Tahoe adopted PRC 4291 August 2007) are required to comply each year with Public Resource Code 4291 and California Code of Regulations §1299 for defensible space. The defensible space requirement does not apply to parcels not having structures.

To accomplish these needs, the plan proposes a continued public involvement strategy to work with homeowners on making their residences fire safe. In addition, the plan proposes 49,000 acres of first-entry vegetative fuel treatments and 19,000 acres of maintenance treatments across multiple jurisdictions to create Community Defensible Space and reduce fuels in the general forest. The treatments are designed to reduce potential fire behavior and facilitate conditions that will ensure safe and effective fire suppression. They are prioritized to protect communities and people in areas that are most at risk. Final implementation of the plan will ultimately result in greater protection of the unique values at risk in the Basin including its people, infrastructure, and natural resources.

Implementing all of the proposed projects and maintenance treatments will increase annual accomplishments by 280 percent in the Basin. Implementation of this plan is predicted to cost from \$206,000,000 to \$244,000,000 over 10 years with annual predicted expenditures of \$18,500,000 to \$25,500,000. These activities will increase the availability of biomass, wood-based products, and jobs associated with vegetation removal. To ensure its success, cooperating agencies will focus on several key factors. These include addressing current staffing levels and the availability of qualified mechanical operators, collaborating with regulatory agencies, and identifying pathways to implement projects with multiple ownerships. While each responsible agency may have its own prescriptions, guidelines, philosophies, and principles, all agree to the overall priorities and strategic guidelines of this plan. It is recognized that unforeseen events, such as wildfires, may affect the priority, scheduling, size, timing, or implementation of any given proposed treatment; consequently, the plan will be reviewed annually to meet changing conditions within the Basin. The federal, state and local land managers, Lake Tahoe Fire Agencies and Nevada Fire Safe Council will meet annually to review the results of the prior year fuels reduction efforts and identify fuels reduction projects and priorities, within the scope of this Strategy, for each upcoming year. Future projects identified by this group will meet the intent of this Strategy and meet the intent of all the underlying implementation plans including the Community Wildfire Protection Plans for the Lake Tahoe Basin. Projects will be prioritized for funding submission consistent with this Strategy and current direction and intent. Where projects cross jurisdictional boundaries, the group will collaborate on implementing the project with the goal of reducing environmental compliance, permitting and contracting costs.

Section 1: Introduction

Purpose of this Plan

Since 2000, various planning efforts have been completed to study wildland fire risk in the Lake Tahoe Basin. These plans include those prepared by the USDA Forest Service, Lake Tahoe Basin Management Unit (LTBMU), Tahoe Regional Planning Agency (TRPA), California Department of Forestry and Fire Protection (CAL FIRE), Nevada Division of Forestry (NDF), California Tahoe Conservancy (CTC), California State Parks, local Fire Protection Districts including three approved Community Wildfire Protection Plans, and recommendations for the City of South Lake Tahoe. This comprehensive fuels reduction and wildfire prevention plan is a unified, multi-jurisdictional strategic synopsis of these planning efforts. The proposed projects in this plan provide a 10-year strategy to reduce the risk of uncharacteristic wildfire in the Lake Tahoe Basin. The plan's purpose is to propose projects to create community defensible space, to comprehensively display all proposed fuel reduction treatments, and to facilitate communication and cooperation among those responsible for plan implementation. If implemented, this plan will provide greater protection to the people, infrastructure, and resources of the Lake Tahoe Basin.

This plan was developed to comply with the White Pine County Conservation, Recreation, and Development Act of 2006 (Public Law 109-432 [H.R.6111]), which amended the Southern Nevada Public Land Management Act of 1998 (Public Law 105-263) to include the following language:

“development and implementation of comprehensive, cost-effective, multi-jurisdictional hazardous fuels reduction and wildfire prevention plans (including sustainable biomass and biofuels energy development and production activities) for the Lake Tahoe Basin (to be developed in conjunction with the Tahoe Regional Planning Agency), the Carson Range in Douglas and Washoe Counties and Carson City in the State, and the Spring Mountains in the State, that are--

(I) subject to approval by the Secretary; and

(II) not more than 10 years in duration”

The *comprehensive* plan is supported by 17 partners that each with a role in wildland fuels or fire management in the Lake Tahoe Basin (see “Agencies Involved”). The proposed strategic treatments are *multi-jurisdictional*, occurring on federal, state, county, and private lands (Figure 1 shows plan area). The strategic treatments are *cost effective* because they are economical, based on the tangible benefits produced for the money spent (see “Proposed Project Costs”). “Cost effective” is defined here as targeted, priority-based fuel reduction treatments conducted at a reasonable cost that produce meaningful protection of life, property, and the environment within the operating guidelines defined by this plan. Finally, the plan details potential utilization

strategies of vegetation removal products, including *biomass*, which could occur when the plan is implemented (see section “Utilization Potential”).

Agencies Involved or Consulted

This plan was developed by the following cooperators:

- California Tahoe Conservancy
- California Department of Forestry and Fire Protection
- California State Parks
- Fallen Leaf Fire Department
- Lake Valley Fire Protection District
- Meeks Bay Fire Protection District
- Nevada Division of Forestry
- Nevada Division of State Lands
- Nevada Division of State Parks
- Nevada Fire Safe Council
- Nevada Tahoe Resource Team
- North Tahoe Fire Protection District
- North Lake Tahoe Fire Protection District
- USDA Forest Service, Lake Tahoe Basin Management Unit
- South Lake Tahoe Fire Department
- Tahoe-Douglas Fire Protection District
- Tahoe Regional Planning Agency

Collaborative Process

The USDA Forest Service Lake Tahoe Basin Management Unit (LTBMU) assumed the lead role in coordinating the development of this plan. LTBMU recruited a cadre of representatives (Planning Cadre) from fire districts and land management and regulatory agencies (see Planning Cadre Members section) to function as a plan work group. The group met at the LTBMU office on February 9, March 9, April 12, and May 7, 2007. Subsequent review and coordination of the plan occurred after those meetings. Participants reviewed and discussed the White Pine legislation, and agreed on a plan outline that would best address the requirements of the bill. Work group representatives served as points of contact for their respective groups or agencies, and provided information used in the development of this plan. Two public informational meetings were held to present the draft recommendations of this plan. The first meeting occurred on August 1 in Kings Beach and the second occurred on August 2 in South Lake Tahoe. These meetings were attended by the Planning Cadre members.

Roles and Responsibilities

The roles and responsibilities of individuals and agencies involved with wildland fire management and prevention planning in the Basin are summarized in Table 1. All individual

landowners and most agencies have land management responsibilities. This includes identifying concerns on parcels under their ownership or administration, and recommending and implementing actions that remedy those concerns.

Table 1. Summary of roles and responsibilities of agencies and individuals to implement the strategy

Agency	Land Management	Regulatory	Lead Agency for Environmental Compliance	Funding	Programmatic Oversight
Individual Landowners	X			X	
Tahoe Regional Planning Agency		X	X	X	X
Tahoe Chapter Nevada Fire Safe Council				X	X
USDA Forest Service Lake Tahoe Basin Management Unit	X	X	X	X	X
Fire Protection Districts	X		X		X
California Tahoe Conservancy	X		X	X	
California Department of Forestry and Fire Protection	X	X	X	X	
California State Parks	X		X	X	
Lahontan Regional Water Quality Control Board		X	X	X	
Nevada Division of Forestry	X	X		X	
Nevada Division of State Parks	X			X	
Nevada Division of Environmental Protection		X			
Nevada Division of State Lands	X			X	X

Section 2: Wildland Fuel Reduction Projects

All current planning efforts were reviewed and the proposed wildland fuel reduction treatments were synthesized into this comprehensive plan. In addition, participating agencies reviewed past planning efforts and revised or provided additional treatments. In places, separate planning efforts have called for treatments in the same location. In this scenario, the treatments are designated by the lead implementation agency. In addition, treatments were prioritized into an implementation schedule. Since this plan is strategic, a majority of projects will require site-specific design and planning, which may result in final projects that vary in size, location, and scheduling as compared to this plan. Coordination between agencies as to the implementation and prioritization of projects in the Community Wildfire Protections Plans, to which this plan is tiered, is critical to the overall success of this comprehensive plan.

This plan combines projects from the following sources:

1. *Fuel Reduction and Forest Restoration Plan for the Lake Tahoe Basin Wildland Urban Interface – Tahoe Regional Planning Agency (TRPA Plan) (Holl 2007)* which included:
 - a. *North Lake Tahoe Community Wildfire Protection Plan – Nevada Community Wildfire Risk/Hazard Assessment Project* (Resource Concepts, Inc. 2004)
 - b. *Tahoe-Douglas Community Wildfire Protection Plan – Nevada Community Wildfire Risk/Hazard Assessment Project* (Resource Concepts, Inc. 2004)
 - c. *Community Wildfire Protection Plan for the California Portion of the Lake Tahoe Basin* (C.G. Celio & Sons et al. 2004)
 - d. Recommended treatments for the City of South Lake Tahoe based on *Improving Fire Hazard Assessment in South Lake Tahoe, California* (deJong 2003) and *Fire Planning Process for the Urban – Wildland Interface in the City of South Lake Tahoe* (Citygate Associates 2004).
2. *USDA Forest Service Stewardship Fireshed Assessment (SFA) – 2007*
3. *CALFIRE Annual Plans for Amador-El-Dorado Unit and the Nevada-Yuba-Placer Unit*
4. California State Parks
5. California Tahoe Conservancy
6. Nevada Tahoe Resource Team representing Nevada Division of State Lands, Nevada Division of Forestry, and Nevada State Parks

Current Accomplishments

Elected officials and agencies have recognized the need to reduce hazardous fuels and restore forest health in the Lake Tahoe Basin, and several key steps have been taken to address that

need. In response to the challenges of elected officials, three Community Wildfire Protection Plans (two in Nevada and one in California) were prepared and approved by local and state agencies (Resource Concepts, Inc. 2004a, 2004b; C.G. Celio & Sons et al. 2004). TRPA consolidated those plans and identified regulatory, operational, and administrative constraints to implement those plans (Holl 2007). The LTBMU completed its Stewardship Fireshed Assessment identifying hazardous fuel treatments throughout the Basin. The City of South Lake has commissioned studies that recommend a series of treatments in and around the city.

All of the land management and most of the local fire agencies have been actively treating hazardous fuels near communities. Prior to 2000, many of the projects did not remove sufficient vegetation to mimic earlier levels of disturbance or achieve the desired condition. However, since 2000, most of the projects have placed forests on a trajectory toward the desired condition. Over 14,000 acres of treatments have been completed in the Lake Tahoe Basin since 2000 (Table 2), with an average annual accomplishment of 1,856 acres in 2005–2006. While acre summaries describe part of the accomplishments in the Basin, it should be noted that many of the urban lots in the Basin are quite small and the number of lots treated Basin-wide is much higher.

The Tahoe Regional Office of the Nevada Fire Safe Council has formed 21 local fire safe chapters in the Basin. These local chapters are community-based organizations where local residents actively engage in obtaining political and financial support to create defensible space and implement projects around their communities.

Table 2. Acres of fuel reduction projects completed by Lake Tahoe Basin agencies since 2000

Year	USDA Forest Service LTBMU	North Lake Tahoe FPD*	California Tahoe Conservancy	California State Parks	Nevada State Parks	Nevada State Lands	Total
2000	677	151	120	36	50	26	1,060
2001	691	215	105	56	55	24	1,146
2002	1,260	240	148	80	100	23	1,851
2003	1,254	145	100	53	270	32	1,854
2004	1,918	178	105	91	253	12	2,557
2005	1,913	377	130	96	101	17	2,634
2006	2,160		180		829	20	3,189
Total	9,873	1,306	888	412	1658	154	14,291

* North Lake Tahoe FPD includes projects on federal lands, which were also reported by the LTBMU; therefore, the North Lake Tahoe FPD accomplishments were reduced by 42%, the amount of federal land in the fire district.

Source: TRPA Fuel Reduction Plan prepared by Steve Holl Consulting (2007), Nevada Division of State Lands, LTBMU.

Proposed Projects

Projects were proposed through a variety of plans. For this plan, projects are delineated by lead implementation jurisdiction. For example, projects proposed by Community Wildfire Protection Plans on LTBMU-administered lands are shown as LTBMU projects. In all, over 6,000 fuel reduction units are proposed (see “Lake Tahoe Basin Fuel Reduction and Wildfire Prevention

Strategy Supplement: Proposed Treatment Units”). The treatment units range from 0.1-acre urban lots to 500-acre general forest treatments. They include:

- 1,700 acres of California State Parks
- 3,952 acres of California Tahoe Conservancy lands
- 902 acres of Nevada Division of Forestry-administered or Nevada State Parks lands
- 214 acres of Nevada Division of Lands parcels
- 56,000 acres of USDA Forest Service LTBMU-administered lands, and
- 3,300 acres of treatments on private lands or under local government jurisdictions.

Combined, these represent approximately 68,000 acres of fuel reduction treatments (49,000 acres of first entry and 19,000 acres of maintenance treatments) or approximately 25 percent of the area considered in this plan (Figure 2). More importantly, these proposed treatments occur on a majority of lands in the Community Defensible Space (WUI) and those areas having high to extreme fire behavior. Many of the proposed treatments have not been field verified; therefore, over the lifetime of the plan, the actual acreages may change.

Given the number of units and the wide range in proposed treatment sizes, maps contained in this report summarize potential treatments (Figures 3, 4, 5, and 6). Specific treatment units are listed in the supplement to this plan: “Lake Tahoe Basin Fuel Reduction and Wildfire Prevention Strategy Supplement: Proposed Treatment Units.” Although most treatments are scheduled by a specific year (see “Proposed Project Schedule”), for these maps, projects are displayed in 5-year intervals.

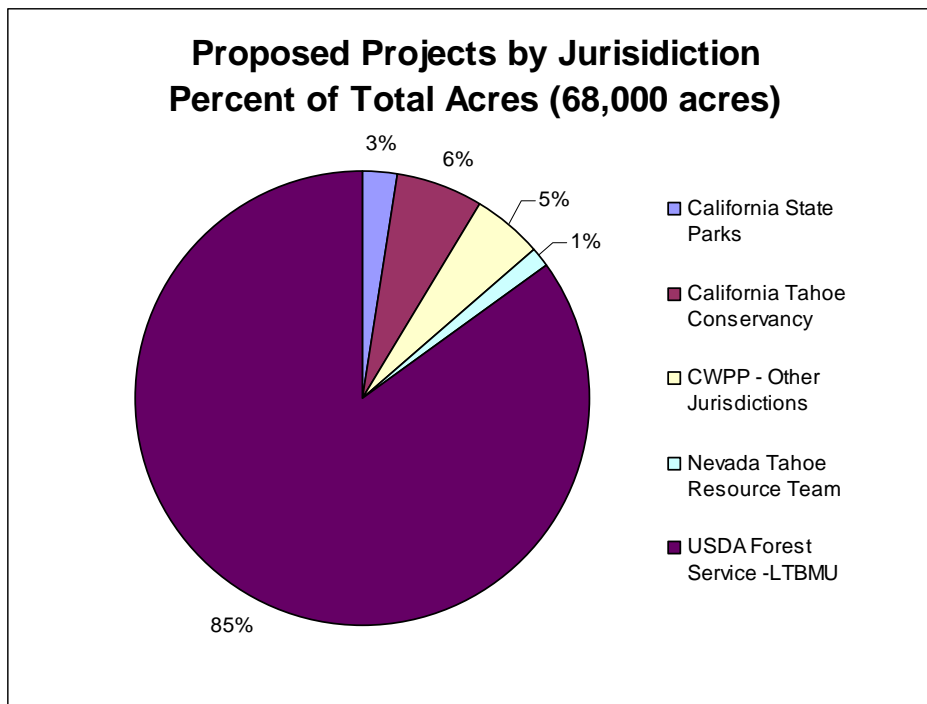


Figure 2. Percent of proposed projects lead by each jurisdiction

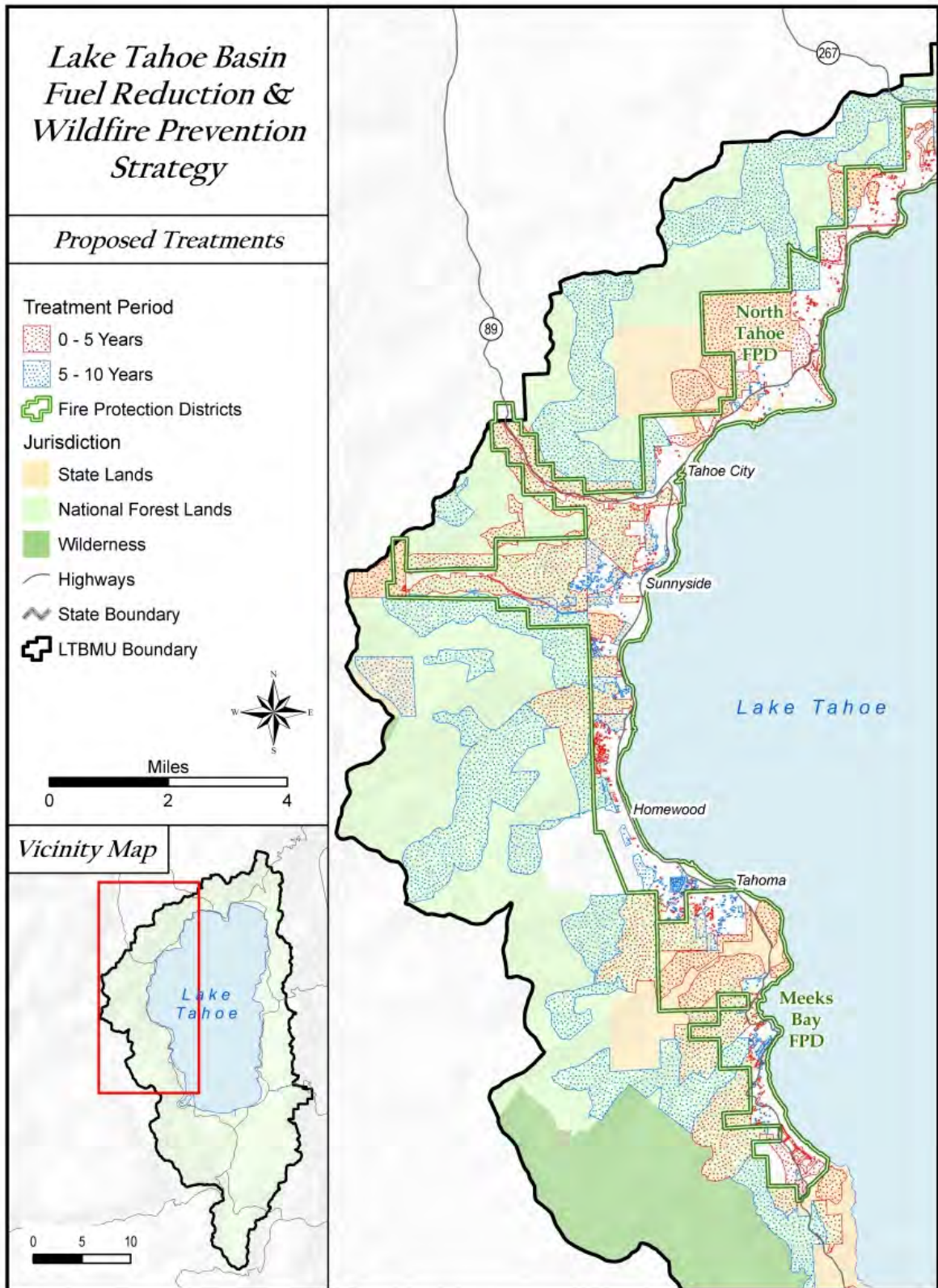
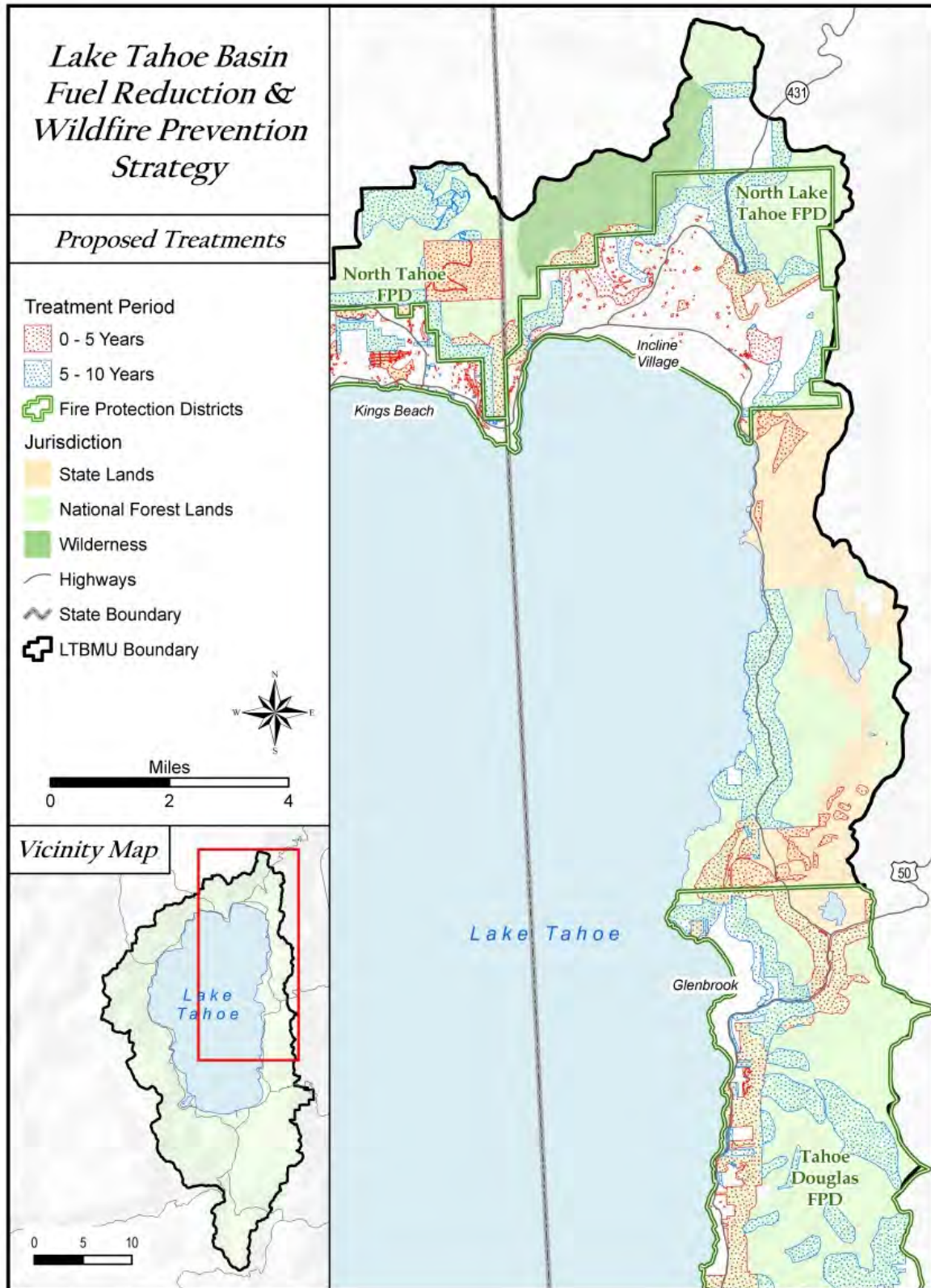


Figure 3. Treatment Map 1



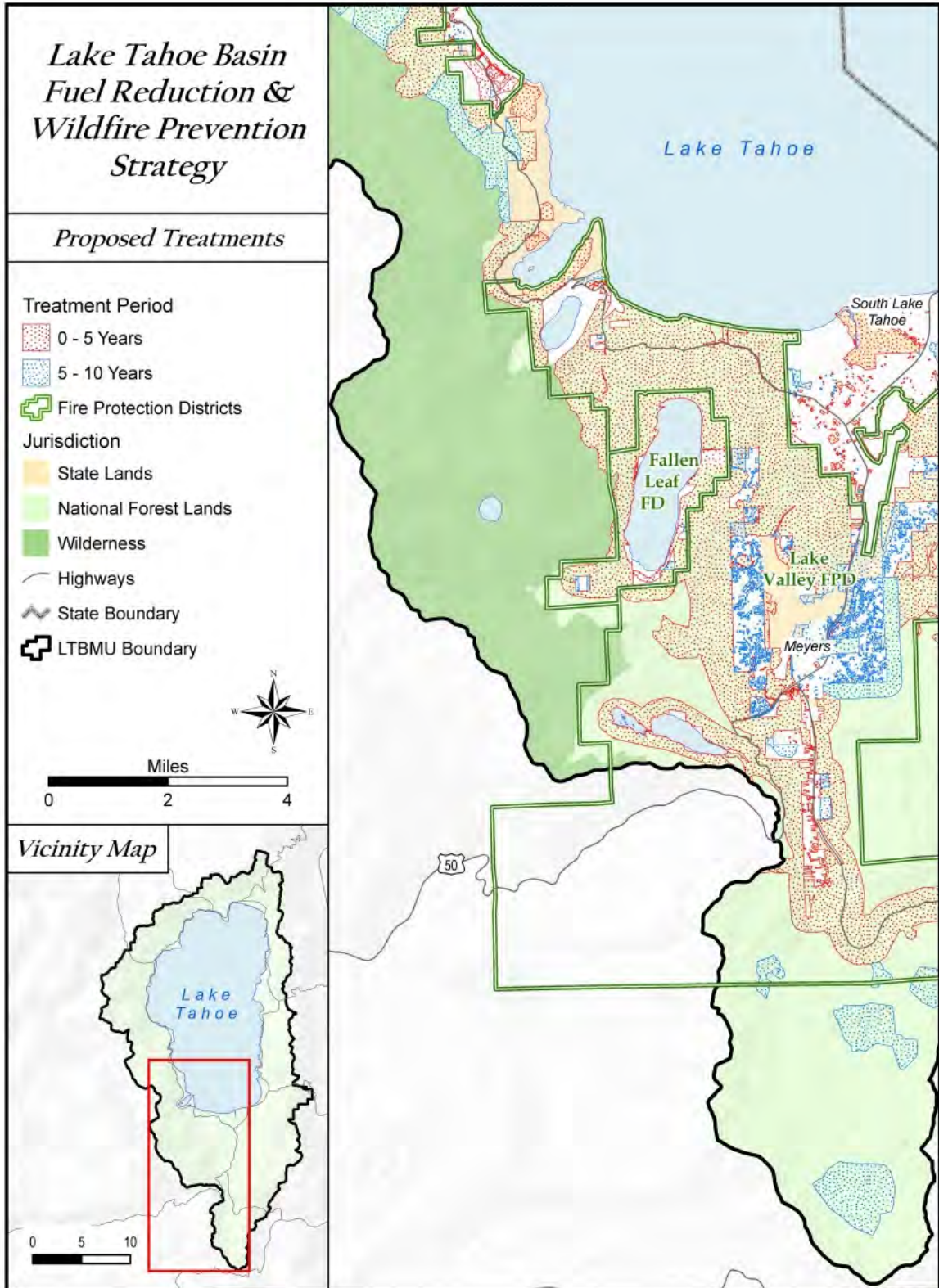
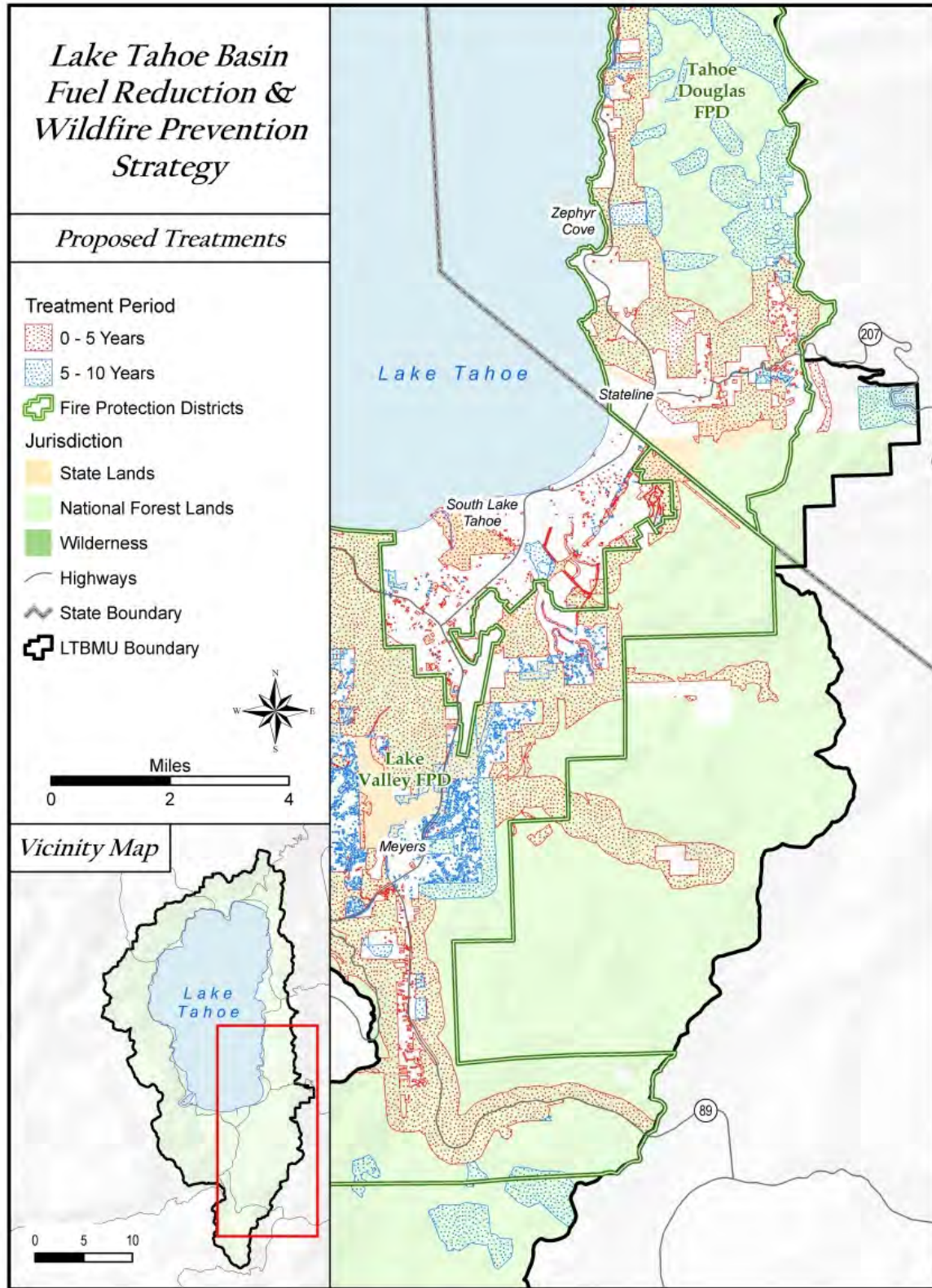


Figure 5. Treatment Map 3



Prescriptions and Treatment Methodologies

In all proposed projects, vegetation structure and composition will be modified with the objective to reduce fire behavior (see “Desired Future Conditions” section). Site-specific *prescriptions* will be developed for each project that explicitly define what vegetation will be removed in the project. To achieve these prescriptions, each project will define a cost effective *treatment* that should be used for that project. General prescriptions and treatment methodologies are described in the subsequent sections.

Prescriptions

Prescriptions vary with location and objective, and in most cases, will require a combination of treatments. Generally, prescriptions will be developed to reduce surface and ladder fuels, thus altering predicted fire behavior by reducing predicted flame lengths to 4 feet or less (under high fire risk conditions), and to reduce tree densities to reduce the potential for a crown fire, reduce competition for resources, and restore forest health.

Treatment areas in the Basin fall into two basic categories: WUI (see Figure 7) and the general forest, the latter being beyond the communities. In general terms, treatment prescriptions within the WUI establish community defense space and focus on the protection of life and property. Prescriptions for the general forest are designed to reduce current wildfire behavior, improve forest health, and achieve other resource management objectives identified during project planning.

Community Defensible Space - Wildland Urban Interface

WUI definitions, terminology, and prescriptions differ among the plans in which this comprehensive plan tiers. However, although each takes a slightly different approach, they all are defining needs of the community defensible space. The TRPA plan, and associated CWPPs, defined WUI as areas generally within ¼ mile of urban centers. The LTBMU extended this WUI definition to be consistent with its Agency management plan. The most inclusive boundary among the plans was used for this comprehensive plan.

Community Wildfire Protection Plan WUI Prescriptions

The three approved Community Wildfire Protection Plans (Resource Concepts, Inc. 2004a, 2004b; C.G. Celio & Sons et al. 2004) identified 110 projects in and around communities. General prescriptions for each project were identified describing vegetation that should be removed to achieve the desired conditions. Recognizing that each agency will develop its own prescription, guidelines for development of prescriptions were identified in the TRPA Plan (Holl 2007) for the covered CWPPs and suggested treatments around South Lake Tahoe. These guidelines focused on vegetation and fuel management in the urban core and defense zone.

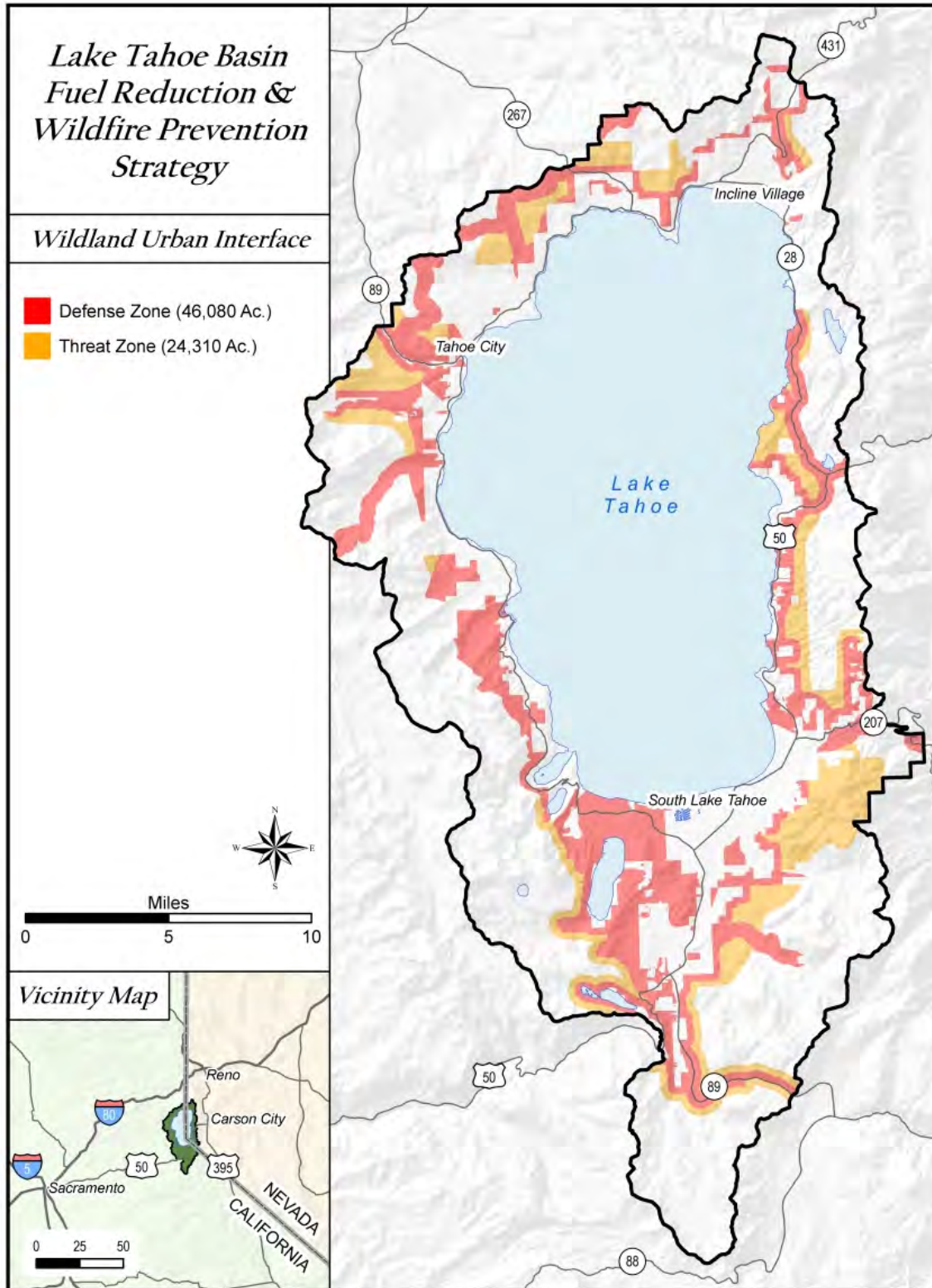


Figure 7. Wildland-urban interface (WUI) areas in Lake Tahoe Basin

Urban Core

All projects on private developed lots and small individual undeveloped lots will be consistent with prescriptions and management practices described in “Living with Fire” (Smith 2004), and in California, the requirements in the California Public Resources Code (section 4291). In California, all parcels having a structure and which are located on State Responsibility Area (“SAR”) [non-federal lands and non-city lands] are required to comply each year with Public Resource Code 4291 and California Code of Regulations §1299 for defensible space. The defensible space requirement does not apply to parcels not having structures. The PRC 4291 statute was amended effective January 1, 2006 to increase the defensible space requirement from 0-30 feet to 0-100 feet around structures on SRA lands (California State Board of Forestry and Fire Protection, 2006). Treatments on USDA Forest Service developed and undeveloped lots, as well as other partners owning urban lots, including Nevada Division of State Lands and California Tahoe Conservancy, will be treated in accordance with the following defense zone philosophy.

Defense Zone

Defense zone treatments should be approximately 0.25-mile wide to be as consistent as possible with the historic 5- to 18-year fire return interval. They should reduce the density and basal area of stands (Taylor 2004) by thinning trees from below and retaining tree crown cover of randomly spaced trees. Defense zone treatments should remove sufficient trees or prune residual trees to reduce the risk of a crown fire, reduce surface fuels in conifer stands to achieve surface fire behavior, and reduce the canopy cover and fuel continuity in brush stands to reduce the intensity of fires. In meadows, live and dead and dying lodgepole pines should be removed so that only widely-scattered individual mature lodgepole pines remain.

General Forest Prescriptions

Most of the lands in the general forest are administered by the LTBMU; thus most prescriptions are tiered to the Framework. Prescriptions in areas beyond the WUI maintain the goal of reducing fire behavior to less than 4-foot flame lengths and often balance the needs for other resource goals. In addition, general forest treatments are strategically located to reduce fire potential on a landscape scale. The strategy for implementing treatments relies on an approach where disconnected, but overlapping fuel treatments are effective in changing fire spread and intensity. These disconnected fuel treatments are called *strategically placed large area treatments* (SPLATS). To be effective, the pattern of the SPLATS must interrupt fire spread and the prescriptions must significantly modify fire behavior. The LTBMU Stewardship Fireshed Assessment is a spatially explicit modeling effort that proposed SPLATS in relation to the other previously proposed fuel reduction projects such as those in Community Wildfire Protection Plans. The prescriptions in these SPLATS will be site specific. A visual representation of SPLAT application is presented in Figure 8.

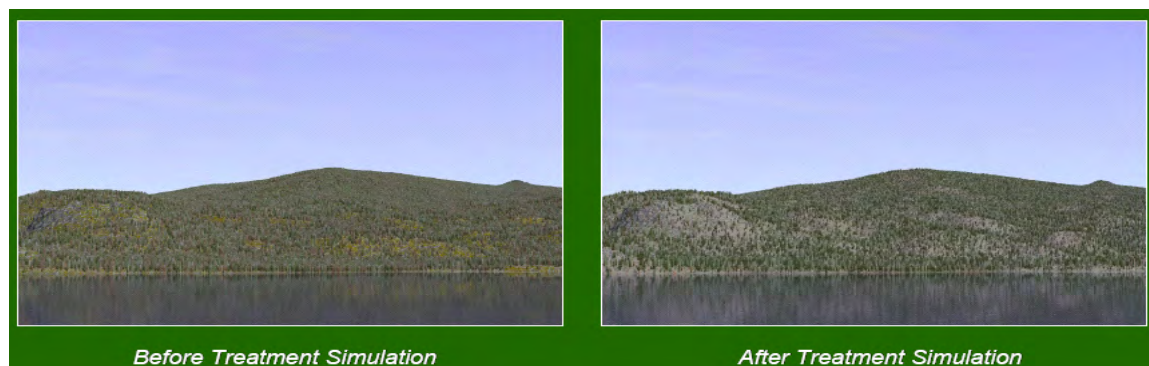


Figure 8. Computer simulation of SPLAT treatments in the Basin

Treatment Methodologies

Treatments are methods used to achieve the prescriptions and desired conditions. Which treatment strategy to use depends upon cost effectiveness, availability of implementation resources, the size and type of vegetation to be removed, and site-specific resource protection needs. The primary treatments used in the Lake Tahoe Basin include (may not apply to every agency):

- thinning (hand and ground based or aerial mechanical)
- pruning
- prescribed burning (pile, broadcast, and understory burning)
- mastication
- chipping

Thinning

Mechanical and hand thinning are used to reduce the number of trees, which affects crown fire potential. Mechanical thinning is generally more cost effective than hand thinning for removal of large trees (trees greater than 16 inches dbh), and allows removal of larger trees to achieve spacing objectives. Ground-based mechanical thinning is generally restricted on slopes more than 30 percent and on sensitive areas, such as stream environment zones. Aerial-based mechanical thinning uses helicopter or cable-based systems to remove trees on slopes greater than 30 percent. Hand thinning is generally limited to the removal of trees less than 16 inches dbh, on steeper slopes, and in sensitive areas.

Pruning

Pruning removes lower branches on trees, increasing the crown-base height (the distance from surface fuels to tree crowns). Pruning is a hand treatment used in conjunction with thinning. Because it is inefficient, its use is generally limited to small areas, such as developed and undeveloped lots where machines may not be able to operate.

Prescribed Burning

Prescribed burning reduces surface fuels using pile burning, broadcast burning, or understory burning. Pile burning is used on steep slopes where machines are prohibited and adjacent to developed areas. Broadcast burning is used on flatter areas to remove slash created by machine thinning and as a maintenance treatment in areas previously treated. Understory burning is the application of surface fire below an overstory of large trees and is used to restore forest health and to mimic the historic process of low-intensity fire.

Mastication and Chipping

Mastication and chipping are used to reduce ladder and surface fuels. Masticators consist of a head on the end of an articulated arm that moves through the forest on a tracked or rubber-tired machine. Fuels are ground up into irregular-shaped chunks and left on the ground. The irregular-shapes allow air and water to seep between them, hastening decomposition. Chips are created when material is fed into a chipper and either removed from the site as biomass or spread on site. Chipping creates uniform-sized chips that can form an interlocking mat that decomposes very slowly and inhibits regeneration of shrubs and grasses.

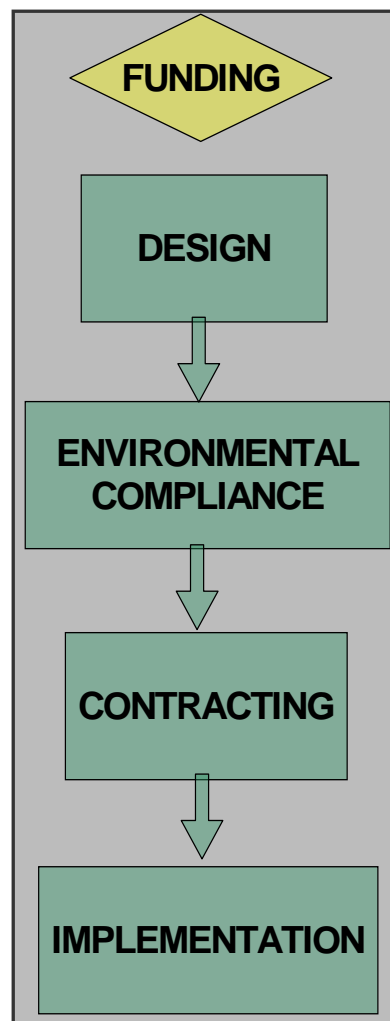
Section 3: Proposed Project Schedule

In general, projects were prioritized within the individual plans from which they originated. Those plans gave first priority to establishing community defense zones within the WUI. To combine these prioritizations, an initial schedule of annual treatments was developed using the Scheduler Program available in the “Forest Service Stewardship Fireshed Assessment.” The Scheduler Program identifies the sequence of treatments over the entire landscape by maximizing the number of acres treated annually, given an assumed funding level.

Maps of all of the proposed fuel reduction projects were reviewed and individual scheduling units were subjectively identified based on aggregations of proposed treatment units. Scheduling units represent areas of proposed projects and the year when those sets of projects could be treated. Areas of highest risk in the WUI and where treatments were already initiated were designated first. Within all other scheduling units, a set of variables, such as the number of acres in the WUI, treatment costs, treatment acres, and acres of adjacent projects, were assigned a weighted index. These variables were then used by the program to evaluate the most cost effective and efficient distribution of treatments given a set funding level.

Another consideration is the time frame it takes to move an individual project through the process of design, compliance, contracting, and final implementation (see flow chart at right). This process may take several months to several years. The Planning Cadre reviewed the results of the Scheduler Program and made adjustments based upon local knowledge of site-specific projects and to transition more units proposed in the WUI to earlier treatment

intervals. The final version of the project schedule, as agreed to in this plan, represents a strategic guide of the general order of project accomplishment. In some cases individual priorities of each participating agency may not be fully represented. Therefore, the schedule of proposed projects in Figure 9 is based on current assumptions. In reality, the schedule would be revised regularly, based on previous accomplishments and anticipated funding levels. Acres of proposed projects by year are displayed in Figures 10 and 11.



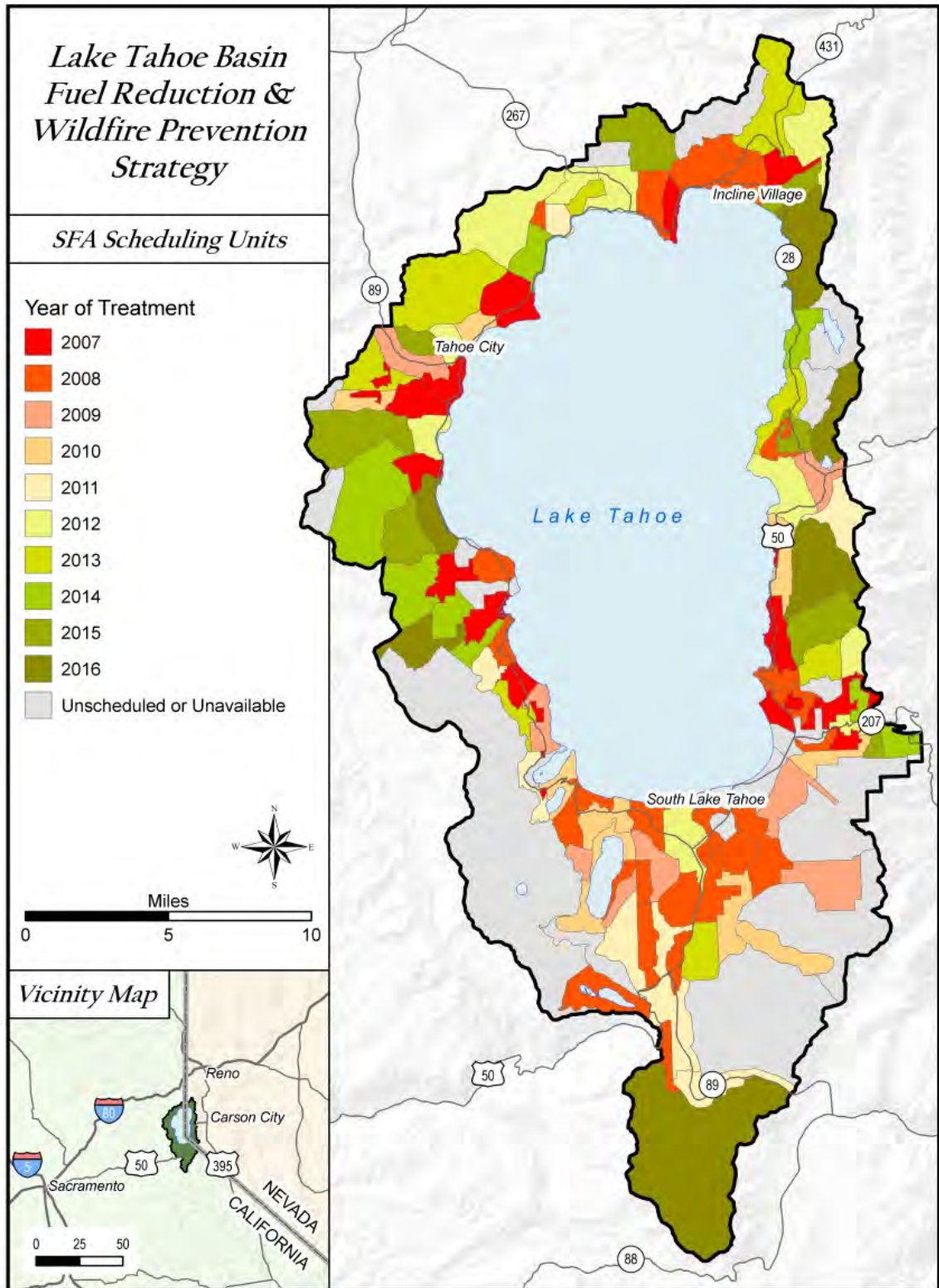


Figure 9. Ten-year proposed project schedule map

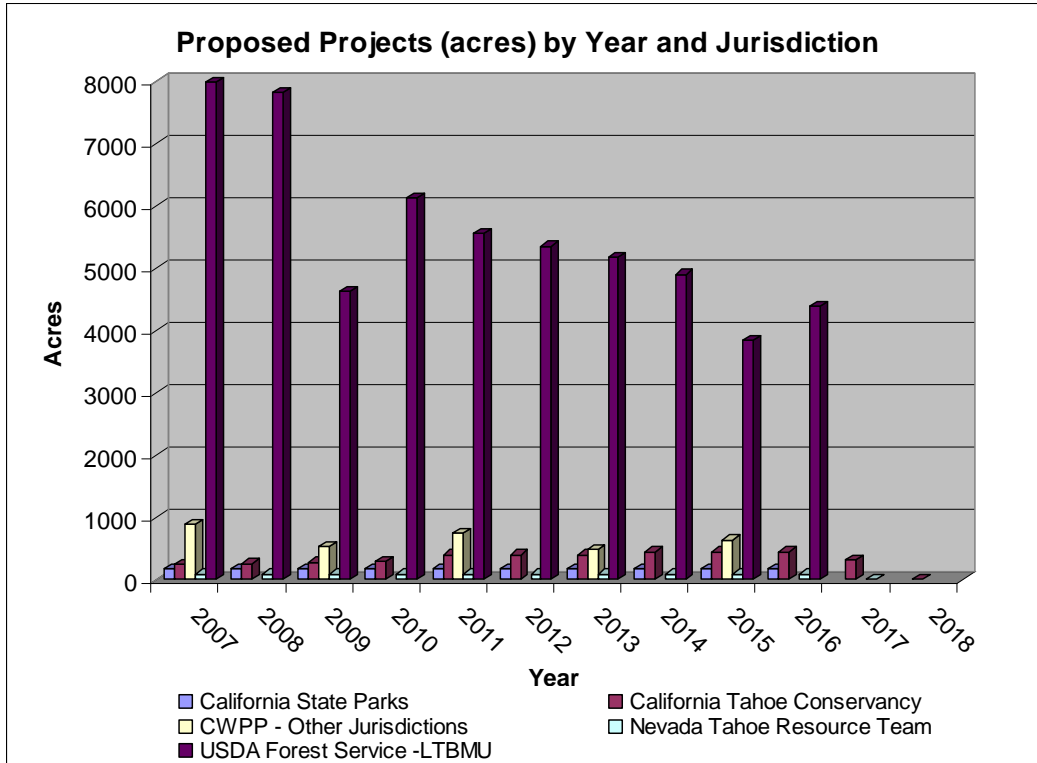


Figure 10. Project acres by year and lead implementation jurisdiction

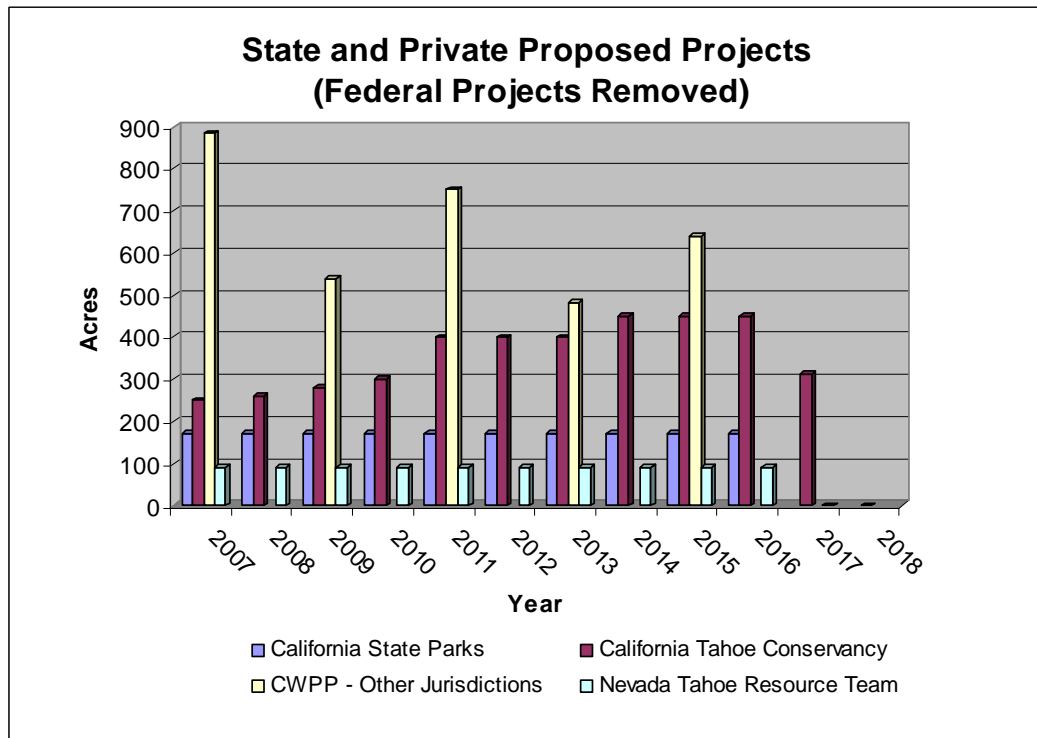


Figure 11. Project acres by year on state and private jurisdictions

Section 4: Proposed Projects Costs

Proposed projects costs reported by different agencies in the Lake Tahoe Basin vary by treatment (Table 3). Accurate comparisons among communities are difficult because of variations in the condition of individual treatment areas and accounting methods, and because the sequence of implementing treatments affects costs. The most detailed projected cost estimates are found in the individual plans from which this comprehensive plan is tiered.

Implementation Costs

In general, implementation costs in the Basin are similar to those reported by Fire Safe Councils or individuals in nearby communities. The exception is mechanical thinning costs, which are generally higher in the Lake Tahoe Basin. This is the result of using a cut-to-length system in the Lake Tahoe Basin that is less cost effective than whole-tree-removal systems, commonly used in other areas. Access required by both systems is similar; however whole tree harvest systems generally require larger landings for processing materials. The key advantage to whole-tree harvest systems is that they do not require a second entry to treat slash and tree tops left by cut-to-length systems as required by most fuel reduction prescriptions. The cut-to-length system has been used almost exclusively in the Basin because it results in less soil disturbance than the whole-tree removal system.

Table 3. Implementation costs in the Lake Tahoe Basin and adjacent communities

Treatment	Cost/Acre in Different Sierra Nevada Communities					
	Lake Tahoe Basin	Amador County FSC	Foresthill FSC	El Dorado County FSC	Plumas County FSC	Truckee
Mechanical thinning	\$1,000–3,500		\$1,250		\$600–2,300	\$500
Hand thinning	\$650–3,500	\$1,500–3,000	\$1,300*	\$1,425	\$750–900*	
Chipping	\$200–700		\$1,100			
Mastication	\$700–1,500	\$900–1,800			\$700–1,300	\$700–1,400
Pile burning	\$300–700					
Broadcast burning	\$400–1500					

* hand thinning and pile burning

Although costs per acre can be lower, hand thinning is not necessarily less expensive than mechanical thinning because it may also require pile burning or chipping to remove all of the harvested material. Additionally, material that is removed is limited to small trees (generally less than 16 inches dbh) and sufficient trees may not be removed to achieve forest health objectives. Mitigation measures associated with environmental compliance, lack of road access, steep topography, operating near residential areas and areas with high recreational use, a limited operating season, and coordination between multiple agencies add significant cost to treatments.

Treatments on urban lots are generally more expensive than those in other areas, where cost estimates have been as high as \$10,000 per acre (Resource Concepts, Inc. 2004, page 37).

Planning Costs

Treatment costs in Table 3 represent implementation costs; they do not include costs for project planning (surveys and project design), environmental compliance, final project layout, contracting, or monitoring. Accurate costs for these items are difficult to establish because agencies track these costs differently. Preparation costs of CAL FIRE-required harvesting documents, such as harvesting exemptions and timber harvest plans ("THPs"), for commercial timber operations on non-federal timberland in California vary depending on the project size and complexity. Preparation costs by a registered professional forester, as required by California law for THP documents, typically range from \$5,000 to \$10,000 per THP. Preparation of exemption documents range from approximately \$500 to \$5000 per document. Logging costs also vary, depending on project size, complexity, size of material being harvested, harvesting method used, and what the mills are paying per board foot. CAL FIRE does not charge a fee of any type for submittal and review of harvesting documents. Costs are incurred by the registered professional forester and the licensed timber operator for environmental compliance for both project planning and implementation. Landowners must pay a yield tax in most situations.

Cost estimates for planning, environmental compliance, and final layout by the California Tahoe Conservancy on public lots and by California State Parks for approximately 10-acre projects range from \$1,500 to \$1,800 per acre. The Nevada Tahoe Resource Team estimates that planning costs for their projects range from \$700 to \$1,500 per acre. Cost estimates for project planning, compliance, and final layout on National Forest System-administered lands in the Basin are approximately 45 percent of their annual appropriation for fuel reduction projects. Using 2006 appropriations and accomplishments (acres treated), these costs were approximately \$2,250 per acre. Actual planning costs are substantially less because USDA Forest Service planning areas are much larger than final project areas.

Total Costs of the Proposed Projects

Note that all implementation and planning costs estimates in this plan represent the best-known data at the time of this writing. Market forces and inflation can obviously affect project costs over time. In addition, because all specific prescriptions and treatment methodologies have not been determined for all projects, projected cost estimates must rely on average cost-per-acre ranges. The TRPA plan projected costs for nearly 95 percent of the proposed projects in this plan. That plan estimated average annual expenditures of \$21,750,300 over the next 10 years for a total plan cost of \$228,613,042 (Figure 12).

Additional proposed treatments and revised planning costs are reflected in this comprehensive plan. For instance, current USDA Forest Service LTBMU projections estimate that proposed projects within their jurisdiction may cost approximately \$100,000,000 over the

next 10 years or annual expenditure of \$10,000,000. Given this wide range of variables and estimates, this comprehensive plan projects that total plan implementation cost will range between \$206,000,000 and \$244,000,000 over all jurisdictions, with annual expenditures ranging between \$18,500,000 and \$25,500,000 (based on variation in acres treated by year).

Cost Item		Acres	Cost
CWPPs (acres by jurisdiction)	Federal	6,552	\$25,280,736
	California*	2,293	\$19,957,600*
	Nevada	75	\$289,386
	Local	1,150	\$4,437,248
	Private	2,408	\$9,291,211
CWPP Subtotal		12,478	\$59,256,180*
Community Defense Programs			\$9,983,000
Program Leadership/Staffing			\$43,088,587
LTBMU Other Acres		33,260	\$96,972,685
Nevada Other Acres		3,100	\$9,028,750
Maintenance		18,100	\$10,283,842
		Total	\$228,613,042*
* Reflects revised cost estimate for CTC not in original report			

Figure 12. TRPA Plan projected costs (Holl 2007)

For the reasons described above, treatment costs in the Basin may exceed those in some other areas. However, these costs in the Basin are effective, given the values at risk that are being protected (see section “Values at Risk”) and avoidance costs, such as the loss of structures, fire suppression, and post-fire soil, forest and watershed restoration and rehabilitation. For example, the Angora Fire damaged or destroyed more than 240 structures where assessed real estate values averaged \$625,000 per acre. Overall Basin residential property values range from \$14 to \$15 billion in assessed value (see “Values at Risk”). Suppression costs for the 2002 Gondola Fire were \$4,500 per acre and those for the recent Angora Fire were \$3,800 per acre, which exceed hazardous fuel treatment costs.

Section 5: Utilization Potential

The primary objectives of the proposed hazardous fuel reduction projects are to reduce the potential of a catastrophic fire, protect valuable assets at risk, and restore forest health. As a result, forest materials that are removed will generally be small trees. Materials that are removed may provide some revenue to reduce the cost of the proposed projects, allowing public funds to be used elsewhere for hazardous fuels reduction. Potential forest products from the proposed projects include biomass, small logs, and large logs.

Biomass

Biomass is used to generate heat, steam, and electricity, and create products such as ethanol, soil amendments, or landscaping material. Developing a biomass facility or utilizing existing facilities in or near the Lake Tahoe Basin would be consistent with recent federal and state policies (Appendix A). However, sustainable production of biomass may be limited because projected biomass outputs from treatments proposed in this plan will decrease significantly in 10 to 15 years.

Holl (2007) determined approximately 4,900 acres would be burned annually if all initial and maintenance treatments were completed as scheduled. Although there are few limitations on burning in the Nevada portion of the Lake Tahoe Basin, the number of allowable burn days in El Dorado and Placer Counties is limited to approximately 55 and 70 days, respectively, between May 1 and November 30 (Placer County Air Pollution Control District 2007)². Assuming the majority of burning occurs during this period, approximately 60 acres per day would have to be burned during spring and fall in California to complete the proposed treatments. Approximately 20 acres would have to be burned daily in Nevada, where there are fewer constraints on allowable burn days. Assuming biomass could be removed on all acres proposed for broadcast burning, the number of acres burned could be reduced up to 25 percent (Holl 2007). Additionally, a modern, wood-fired heating system would substantially reduce most emissions compared to traditional burning (Table 4).

Table 4. Emissions from traditional forest burning and a modern wood-fired heating system

Source	Pounds/Green Ton Material				
	PM10	NOx	SO ₂	VOC	CO
Pile burning	19–30	3.5	0.01	8–21	154–312
Broadcast burning	24	4.0	nd	13	224
Efficient wood-fired heating system	1.6	2.13	0.2	0.48	1.3

nd = no data;

Source: McNeil Technologies (2003)

² Average percent of allowable burn days from May 1-November 30, 2004-2006. Placer County allows some burning on marginal burn days, dependent on predictions (A. Hobbs, Placer County Air Pollution Control District). Some pile burning may occur outside of those dates; however, it is minimal compared to the total number of acres burned.

Support for Biomass

Over the past 12 to 18 months, several strategic actions have occurred that collectively provide the impetus necessary to develop and support a biomass program in or near the Lake Tahoe Basin. Key to this success has been commitments for funding and exploration of solutions to resolve regulatory concerns affecting air quality, including:

- The White Pine County Conservation, Recreation and Development Act recently amended (December 2006) the Southern Nevada Public Land Management Act to provide funding for implementation of hazardous fuels treatments, including biomass energy development, in the Lake Tahoe Basin.
- The USDA Forest Service, Lake Tahoe Basin Management Unit provided \$355,000 in grants to the South Lake Tahoe High School for replacement of a boiler to heat the school with biomass. Additionally, the LTBMU has awarded a contract to remove excessive fuels as biomass from 105 acres.
- The USDA Forest Service has prepared a Coordinated Resource Offering Protocol study to determine the potential supply of biomass within a 100-mile radius of Grass Valley, California (Mater Engineering 2007).
- In California, the Governor's 2007 budget included \$4.7 million for implementation of hazardous fuels treatments in the Lake Tahoe Basin; including provisions for a \$3.5 million grant for development of a biomass facility. An interagency team has been convened to develop a request for proposal for a biomass facility.
- The California Department of Forestry and Fire Protection provided the Sierra Economic and Development District a grant to identify the potential biomass supply in the greater Lake Tahoe area.
- Placer County is providing curbside boxes for residents to deposit biomass removed from their properties and is evaluating construction of a 1-megawatt heat and power facility in the Lake Tahoe Basin.

Availability of Biomass

Machines are required to harvest trees, process them into biomass, and transport the biomass from the project site to a facility. Under current operating conditions, machine access is limited to 0.25 mile from existing roads, making approximately 16,000 acres available for biomass Basin-wide. Every acre available for biomass may reduce the number of acres that could be burned. Therefore, if access can be developed (temporary or permanent), the number of acres available for biomass Basin-wide increases approximately 30 percent to 23,200 acres (Table 5). Temporary access assumes it is only for the project; such access will be removed, and the site rehabilitated once the project is completed.

Table 5. Acres available for biomass removal in the Lake Tahoe Basin*

Jurisdiction	Available within 1/4 mile from roads			Available within 1/2 mile from roads		
	Total acres	Previously Treated	Available acres	Total acres	Previously Treated	Available acres
Federal	17,124	6,215	10,909	22,792	6,215	16,577
State	4,344	946	3,398	5,679	946	4,733
Local Government	1,682	435	1,247	1,828	435	1,393
Private	618	67	551	578	67	511
Total	23,768	7,663	16,105	30,877	7,663	23,214

* The available acres are the total acres of machine accessible land (< 15% slope on sensitive soils and < 30% slope on other soils) minus private lands in the urban area, wilderness, inventoried roadless areas, research natural areas, and lakes, minus an additional 20% to allow for stream environment zones, brush fields, and operational considerations during final project design. Previously treated acres include treatments completed between 2000 and 2005 (source LTBMU July, 2006).

Biomass availability is also affected by the timeframe identified for completion of the proposed projects. If access is limited to 0.25 mile from a road and all projects are completed within 10 years, approximately 1,600 acres would be treated annually. If temporary access is approved for machines, approximately 2,320 acres would be treated annually over 10 years, or approximately 930 acres annually over a 25-year period.

Additional biomass may be available from private residences in the course of clearing and maintaining defensible space (up to 100 feet clearance) around occupied buildings. Substantial amounts may be available from initial treatments; however, little will be available from subsequent maintenance treatments because little woody material will develop between the frequent treatments.

The amount of biomass available from fuel reduction projects was estimated assuming an average biomass yield of 14.4 green tons (GT) per acre (McNeil Technologies 2003)³. Based on the number of acres treated annually, this would provide approximately 23,200 GT annually for 10 years if access were limited to 0.25 mile from a road; or 33,400 GT and 13,400 GT annually, if temporary access was gained, and projects occurred over 10- and 25-year periods (Figure 13).

³ More recently, Mater Engineering (2007) estimated 11,330 GT of biomass would be available annually from National Forest System lands in the Lake Tahoe Basin. This assumes biomass is obtained from trees less than 7 inches dbh; whereas, the McNeil Technologies (2003) assumed biomass would be obtained from slash from harvested trees less than 12 inches dbh.

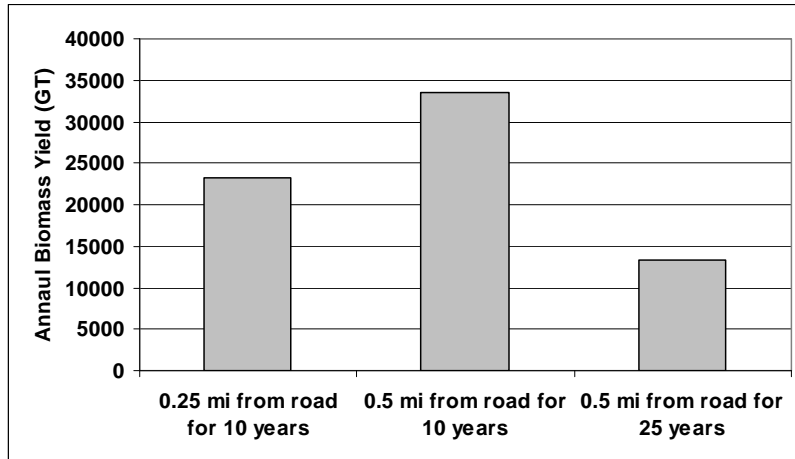


Figure 13. Estimated annual yields of biomass (GT) in the Lake Tahoe Basin with different access capabilities and time periods

Existing Demand for Biomass

Currently, seven agencies, organizations, or companies in or adjacent to the Lake Tahoe Basin are using or are planning to use biomass as product (Table 6). Based on these estimates, they could absorb at least 20,000 GT annually and perhaps more than 35,000 GT annually.

Table 6. Demand for biomass in and near the Lake Tahoe Basin

Facility	Use	Estimated Annual Capacity	Status
Northern Nevada Correctional Center (Carson City, NV)	Electricity—1MW capacity	12,000–24,000 GT ^{1/}	Operational June, 2007; expansion over the next 3 years is possible
South Lake Tahoe High School	Wood-fired heating boiler	2,200 GT tons ^{2/}	Planning
Placer County Justice Center	Heat and electricity—1 MW capacity	10,000–16,000 GT ^{3/}	Planning
Carson City Renewable Energy	Biomass processing yard; Wood chips for correctional center, landscaping, and soil amendment	Large quantities, but not quantified ^{1/}	Fully operational
Full Circle Compost (Minden, NV)	Landscaping mulches, compost, and soil amendment	3,000–4,000 GT ^{4/}	Fully operational
Bently Agrow Dynamics (Minden, NV)	Compost and soil amendment for application to company farm	Large quantities, but not quantified ^{5/}	Fully operational
South Lake Tahoe Refuse	Transfer facility for chips and needles, storage site for South Lake Tahoe High School	Variable ^{6/}	Operational, proposing to build storage facility

¹ Stan Raddon, Carson City Renewable Energy

² McNeil Technologies 2003

³ Brett Storey, Placer County

⁴ Craig Witt, Full Circle Compost

⁵ Carlo Luri, Bently Agrow Dynamics

⁶ Jeanne Lear, South Lake Tahoe Refuse

Firewood

When possible, agencies may also make available material that could be classified as biomass or small logs (see below) as firewood. For example, Nevada Division of State Lands provides, when possible, the use of firewood to local communities and the citizens of Nevada where treatment is accomplished. This benefits Nevada Division of State Lands by removing the material from the treated parcel and benefits the public by providing a resource at no cost. In addition, Nevada State Parks offers approximately 100 cords of firewood each year at a cost of \$45 per cord.

Small Logs

There is a growing interest in the use of small logs for constructing traditional structures (USDA USDA Forest Service 2000b). In the recent Coordinated Resource Offering Protocol study (Mater Engineering 2007), it was estimated the LTBMU would produce 39 million board feet of timber from small logs (defined as trees 7 to 12 inches dbh) during the next 5 years. This represented 5 percent of the volume from the entire study area, defined by a 100-mile radius from Grass Valley, California. This estimate is probably high because most of the material from small logs removed in the Lake Tahoe Basin is projected to be used as biomass.

Small logs have been used to produce pulp, veneer for laminated lumber, oriented-strand board, posts and poles, and sawn lumber. Sawn lumber provides the lower economic return because the juvenile wood that is sawn is subject to extensive warping and cupping. Posts and poles are less susceptible to warping than sawn lumber; however, there is a lack of information on structural use and how to fasten and secure round pieces of wood in traditional structures (USDA Forest Service 2000b).

Large Logs

Fuel reduction treatments in the Lake Tahoe Basin will emphasize removal of small, suppressed, and intermediate trees through prescriptions that thin from below. These prescriptions will include removal of trees greater than 10 inches dbh to be sold as large logs. It is currently estimated that approximately 2,000 acres of mechanical thinning will occur annually in the Lake Tahoe Basin during the next 10 years (Holl 2007). Assuming trees greater than 10 inches dbh yield 4,000 to 8,000 board feet per acre (Young, D., LTBMU; Adams, R., CA Parks), an estimated 8 million board feet of timber will be harvested annually. This is similar to the 7.2 million board feet estimated in the Coordinated Resource Offering Protocol study (Mater Engineering 2007). Although these estimates appear to be large, they represent 5 percent of the volume projected from public lands during the next 5 years in the Coordinated Resource Offering Protocol study area (Mater Engineering 2007).

Section 6: Values at Risk

The Lake Tahoe Basin is a special place. With the spectacular lake as its centerpiece framed by the forested and alpine peaks of the Crystal and Carson Ranges, the area is considered a national treasure. These natural and scenic wonders provide diverse summer and winter recreation experiences that support a strong local economy. The Basin is also home to permanent and seasonal residents whose homes have been assessed at \$14 to \$15 billion. As a result of the recent Angora Fire, it is commonly acknowledged that the very attributes that make the Basin a special place are at an unacceptably high risk of loss from catastrophic wildfires and declining forest health, and that something urgently needs to be done to reduce the risks and scale of these types of potential losses. In addition to the homes and businesses that operate in the Basin, some of the key values at risk from a catastrophic wildfire are described below.

Communities and Safety

Within the 208,800-acre Lake Tahoe Basin, 70,390 acres (34 percent) are within the WUI. Based on the assessment of values at risk in TRPA's "Fuel Reduction and Forest Restoration Plan for the Lake Tahoe Basin Wildland Urban Interface," the highest ranked communities at risk are Brockway and portions of Kings Beach and Crystal Bay in the north; Heavenly Valley, Meyers, Christmas Valley, and North Upper Truckee in the south; Gold Coast in the west; and Talmont, Tahoe City, Highlands, Dollar Point, and Cedar Flat in the northwest.

Human health is also at risk. Exposure to air pollutants from wildfire smoke is associated with numerous effects on human health, including increased respiratory symptoms or decreased lung function, hospitalization for heart or lung diseases, or premature death. Children and the elderly are more susceptible than adults to air pollutants (SNFPA FEIS 2004, p. 327). In addition, fire fighter safety is at risk as wildfires continue to burn with increased intensity and uncharacteristic fire behavior.

Socioeconomic Considerations

The goals and policies of the Tahoe Regional Plan (TRPA 1986: II-2) states, "The economic health of the Region depends on a viable tourist and recreation-oriented environment..." (USDA Forest Service 2000a [hereafter referred to as Watershed Assessment], p. 633). Although the Basin's population has remained relatively stable over the past decade, growing numbers of residents in the adjoining counties create additional pressures on Tahoe's environment and economy (Watershed Assessment, p. 85). The economy in the Lake Tahoe Basin is based primarily on tourism, recreation, and vacation home ownership. Daily car visitors, skiers, business meetings, seminars, organized summer camp activities, camping, hiking, mountain biking, fishing, and summer water sports bring thousands of tourists from all over the world to the area each year. Like other resort areas, such as Park City, Utah or Sun Valley, Idaho, winter

sports are a significant driver of the regional economy. For example, in the North Lake Tahoe Area, winter sports recreation spending contributed nearly \$355 million to the local economy (Dean Runyan, 2003). A devastating wildfire could have a direct effect on the tourism industry (ski areas, campgrounds, associated businesses) that would drive repair and rehabilitation costs higher, or possibly lead to closures.

The Lake Tahoe Basin also includes some very high property value homes and businesses where assessed real estate values average \$625,000 per acre. The greatest concern with large fires in the Basin is the high property and natural resource values that they threaten (including lake clarity and limited old-growth forests). Even a small wildfire in the Basin is potentially significant because of the juxtaposition of high ignition potential, high density and value of human developments, and high fuel hazard (Watershed Assessment, p. 15). High-intensity wildfires could result in extensive property damage or loss.

Recreation and Scenic Resources

Lake Tahoe is a nationally and internationally renowned icon. The dramatic beauty and ecological uniqueness of the region's landscape defines it more than any fact or figure. Wildfire has the potential to affect large-scale landscape character and scenic integrity. The Land Use Element of the Goals and Policies of the Tahoe Regional Plan's (TRPA 1986: II-2) state,

“The primary function of the region shall be as a mountain recreation area with outstanding scenic and natural values . . .” (Watershed Assessment, pp. 632-633).

Recreation opportunities here are some of the best in the country including California and Nevada State Parks, National Forests, and the activities centered on Lake Tahoe. Recreation and related tourism shapes social, economic, and ecological conditions, and influences policies in the region. Winter sports and water sports related recreation and resorts are a primary attraction for recreationists and drive local tourism and jobs. In North Lake Tahoe, nearly 5,000 jobs are directly related to these activities (Dean Runyan, 2003). In all, the local economy relies on recreation and tourism, which is a more important economic activity than commodity production (Duane 1996; SNFPA FEIS 2004, p. 475).

Water Quality, Watersheds and Riparian Zones

The clarity of Lake Tahoe is world renowned and the loss of that clarity is of concern to many. After steadily declining for 30 years, the lake's clarity hit an all time low in 1997 and has been steadily improving since. High-intensity wildfires could cause large amounts of erosion and sedimentation that would adversely affect water quality (Holl 2007, p. 2-12). Allowing hazardous fuels capable of supporting a crown fire to build up in stream environment zones could have significant effects on water quality in the Lake Tahoe Basin. The loss of vegetation from wildfire would result in erosion and sedimentation, decreasing water quality (Holl 2007, p. 2-11).

Fires can have extraordinary effects on watershed processes and can significantly influence aquatic organisms and the quality of aquatic habitats in many ways (Benda et al. 2003; Rieman et al. 2003; Wondzell and King 2003). Substantial reductions in riparian shading and altered stream flows can increase stream temperatures to extreme levels (Rieman et al. 2003; McMahon and DeCalista 1990). Flooding, surface erosion, and mass wasting (landslides) may increase due to vegetation loss and the creation of hydrophobic (water-repellant) soils. In turn, dramatic increases in sedimentation, debris flows, and wood inputs to streams may occur (SNFPA FEIS 2004, pp. 203-204).

Wildlife Habitat and Forest Vegetation

Wildfire has the potential to damage or destroy suitable habitat for general wildlife, as well as critical threatened, endangered, proposed and other special status species, such as the mountain yellow-legged frog, California spotted owl, northern goshawk, and the osprey.

High-intensity wildfires will directly result in high tree mortality in forest stands, especially within moderate- and high-density forests having increased canopy cover. Tree mortality (representing severity of fire effects on vegetation) likely will be high in most fires, given current surface and ladder fuel conditions (Watershed Assessment, p. 15).

Native flora is also at risk as noxious weeds and invasive species tend to spread rapidly following wildfires. Wildfire areas are especially vulnerable to weed infestation because: (1) equipment used in wildfire suppression and burned area emergency rehabilitation bring weed seeds into an area; and (2) burned areas provide ideal conditions for weed germination. Weed populations can easily gain a foothold before native vegetation has a chance to recover from the fire.

Air Quality

Many factors contribute to Lake Tahoe Basin's air pollution, including pollution from urban areas to the west of Lake Tahoe, dust from roads, automobile emissions, and smoke from wood burning stoves. Wildfires also emit large amounts of particulate matter (PM10 and PM2.5) and carbon monoxide, as well as nitrogen oxides (NOx) and volatile organic compounds (VOCs), which are precursors to ozone. Historically, almost all wildfires have exceeded the national and state standards for particulate matter (SNFP FEIS 2004, p. 348). Other constituents of smoke (gases and chemicals) may also enter the lungs. Some components, such as Benzo-a-pyrene and aldehydes, can be carcinogenic.

Wildfires result in greater emissions per acre when compared to prescribed burns, commonly exceeding ambient air quality standards. They also often occur under conditions of high temperature and low humidity, when high concentrations of ozone are most likely (SNFP FEIS 2004, p. 326). Although there is currently no quantitative way to fully display the emissions from wildfire as compared to a prescribed burn, the intent of fuels reduction activities is to reduce the size of, and hence the emissions, from wildfire (SNFP FEIS 2004, p. 343).

Section 7: Proposed Project Predicted Outcomes

To determine the efficacy of this plan and its associated proposed projects, it is important to first establish the current wildland fuel conditions, then determine a desired wildland fuel condition for the Basin, and finally determine whether the proposed projects will meet that desired condition.

Current Condition

Background

The number of acres burned by wildfires in the Basin has increased in each decade since 1956 (Figure 14). Although few of those fires have been large, two recent fires—the Gondola and Showers Fires (673 and 294 acres, respectively)—occurred under less-than-extreme fire weather conditions. The 2007 Angora Fire, which burned 3,100 acres and destroyed or damaged more than 340 buildings, was the largest fire ever recorded in the Lake Tahoe Basin and burned at elevated fire weather conditions. Even with highly effective suppression resources, the crown fires and sizes of these fires provide additional evidence that fuel hazards in the Basin have increased substantially and will continue to increase in the years ahead (Holl 2007, p. 1-3).

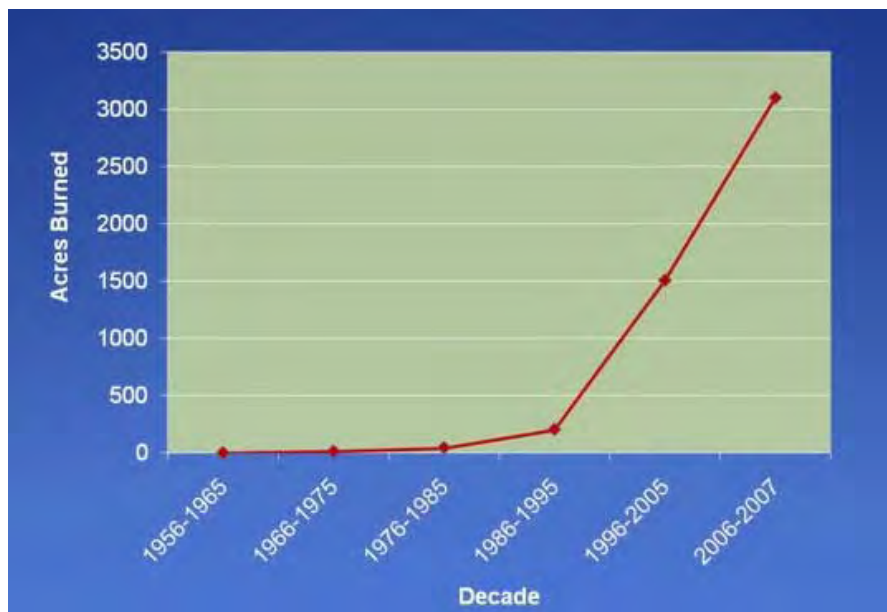


Figure 14. Wildfire acres burned in the Lake Tahoe Basin by decade (Holl 2007)

The long history of fire suppression combined with incidences of drought and insect-induced mortality has resulted in stands with a high concentration of hazardous fuels. This condition has increased the threat of large catastrophic fire and is indicative of a forest where many natural processes have been excluded.

Current Vegetative Conditions and Fire Regimes

Recent estimates indicate that lower elevation forests in the Lake Tahoe Basin have four times the density of trees and higher elevation forests have twice the density of trees when compared to forest conditions prior to 1870 (USDA Forest Service 2000a) (see photo, left). High densities of trees increase competition for nutrients resulting in higher tree mortality rates. Current forest stands exhibit a 70 percent higher disease incidence and 5 percent greater tree mortality than remnant old-growth stands in the Basin (USDA Forest Service 2000a) (see photo below). High rates of tree mortality, particularly white fir (*Abies concolor*), have increased the number of standing dead trees and downed logs. Smaller mid-story trees create fuel ladders that allow fires



Dense forests in Lake Tahoe

to readily move into dense crowns. The lack of frequent, low-intensity fires has resulted in accumulations of dead fuels, increased understory shrubs, and dense young trees. As a result, flame lengths and rates of fire spread lead to higher intensity fires (Holl 2007, p. 1-2).

Residential, commercial, and infrastructure construction have also influenced today's vegetation patterns. Not only have large areas of vegetative cover been removed, but the composition of remaining vegetation has been changed through landscaping key to their sustainability.

Historic Fire Regime

Prior to European settlement, fires in the Basin were ignited by lightning or members of the Washoe Tribe, who inhabited the Tahoe Basin during the summer months. The fire return interval varied from 5 to 128 years throughout the entire Basin (Taylor 2004), but fire return intervals were shortest (5 to 18 years) at the lowest elevations around the lake and south to approximately Meyers. Based on historic fire return intervals, it is estimated 2,100 to 8,000 acres burned annually in the Lake Tahoe Basin,



Forest mortality in Lake Tahoe

with approximately 50 percent of that at the lower elevations (USDA Forest Service 2000a). Because frequent fires reduced surface and ladder fuels, fire intensities were low and there was little mortality of mature trees.

As Europeans settled in the Basin, several factors contributed to changes in the fire regime and fuel hazards. The frequent seasonal fires set by the Washoe Tribe were eliminated as the Native Americans left the Basin. Between 1875 and 1895, large-scale clearcutting removed most of the old growth forests in the Basin (Lindstrom et al. 2000). By 1900, the Basin's forests were dominated by seedlings (less than 1 inch diameter dbh), saplings (between 1 and 6 inches dbh), and pole-sized trees (between 6 and 12 inches dbh), with remnant old-growth forests. In conclusion, disturbance by fire was a frequent and normal part of the historic vegetative condition.

Current Fire Regime

Previous management direction that focused on protection of natural resources by suppressing wildfires removed a natural source of vegetation disturbance. Simulated fire behavior in the Basin and observed fire behavior in the Angora, Gondola, Showers, and Pioneer Fires demonstrates current fire behavior is characterized by high-intensity fires. Thus, the fire regime has changed from frequent, low-intensity fires to infrequent, high-intensity fires. High-intensity wildfires will result in high tree mortality in forest stands, could result in extensive property loss, and could cause large amounts of erosion and sedimentation that would adversely affect water quality.

Fire Regime Condition Class

Fire regime condition class is a national landscape classification scheme describing the degree of departure in the current fire regime from the historic fire regime. The classification scheme is based on changes in vegetative characteristics, fuel composition, and fire frequency and intensity and described as low (I), moderate (II), or high (III) departure.

- **Low (I)** condition class is where vegetative characteristics and fire behavior are considered to be within the historic range of variability.
- **Moderate (II)** condition class means vegetative characteristics and fire behavior are moderately altered from historic conditions.
- **High (III)** condition class means vegetative characteristics and fire behavior are highly altered and there is a risk of losing key ecosystem functions.

Fire regime condition classes have been mapped in the Lake Tahoe Basin (Figure 15). Twenty nine percent of the Basin is classified in a Low (I) condition class, 33 percent is classified in a Moderate (II) condition class, and 38 percent is classified in a High (III) condition class. The majority of the WUI in the Lake Tahoe Basin is in condition class III. These are areas where fire behavior has been substantially altered and an intense fire could have significant

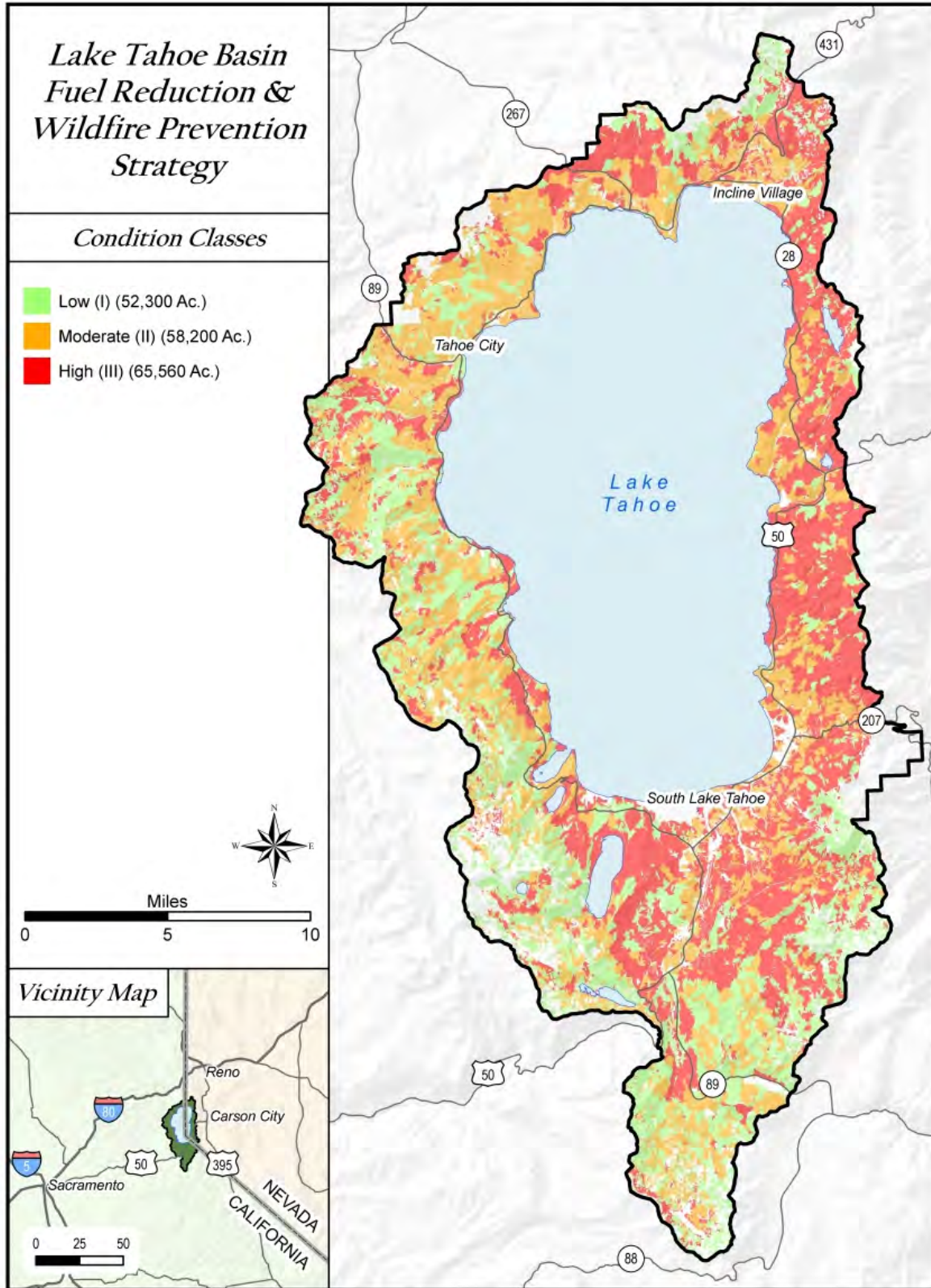


Figure 15. Fire regime condition class map

impacts on the local ecosystem. Areas in condition class II are upper montane forests and alpine areas where historic fire return intervals were much longer than those in the lower montane forest.

Current Wildfire Potential

The Lake Tahoe Basin Watershed Assessment (USDA Forest Service 2000a), SFA, and TRPA Plan quantified and assessed the wildfire threats in the Tahoe Basin. Fuels analyses, ignition history (Figure 16) and fire behavior modeling were used to predict fire susceptibility in the Basin. Wildfire potential based on modeling (FARSITE [Version 4.1.05, 2006], FLAMMAP [Version 3, 2006]), predicted fire behavior characteristics such as flame lengths and fire type. Both models use spatial information on topography and fuels along with weather and wind data. They incorporate existing models for surface fire, crown fire, spotting, post-frontal combustion, and fire acceleration into a two-dimensional fire growth model. Predicted flame lengths were determined for the Basin using local weather conditions (Figure 17). This analysis found that approximately 42 percent of fuels conditions in the Basin would have flame lengths greater than 4 feet. Predicted fire types under normal weather conditions determined approximately 41 percent of the area would be considered to have low-moderate fire behavior (surface fire). Fire suppression crews can use direct attack strategies on these types of fires. Forty-eight percent is in the high fire behavior class (passive crown fire). Under these conditions, fire crews cannot use direct attack strategies and must rely on mechanized equipment and aerial support to suppress these fires. Approximately 11 percent received an extreme fire behavior rating (active crown fire). Under these conditions, additional resources such as retardant aircraft may be needed to suppress these fires (Figure 18).

In 2004, field surveys were conducted to evaluate fuel hazards, conduct structural assessments in communities, and identify and prioritize fuel reduction projects for Community Wildfire Protection Plans (Resource Concepts, Inc. 2004a, 2000b; C.G. Celio & Sons et al. 2004). When fire behavior was simulated in 60 sample plots in and near communities, 76 percent of the plots would result in a crown fire. These results were similar to fire behavior modeling conducted by the LTBMU (Holl 2007).

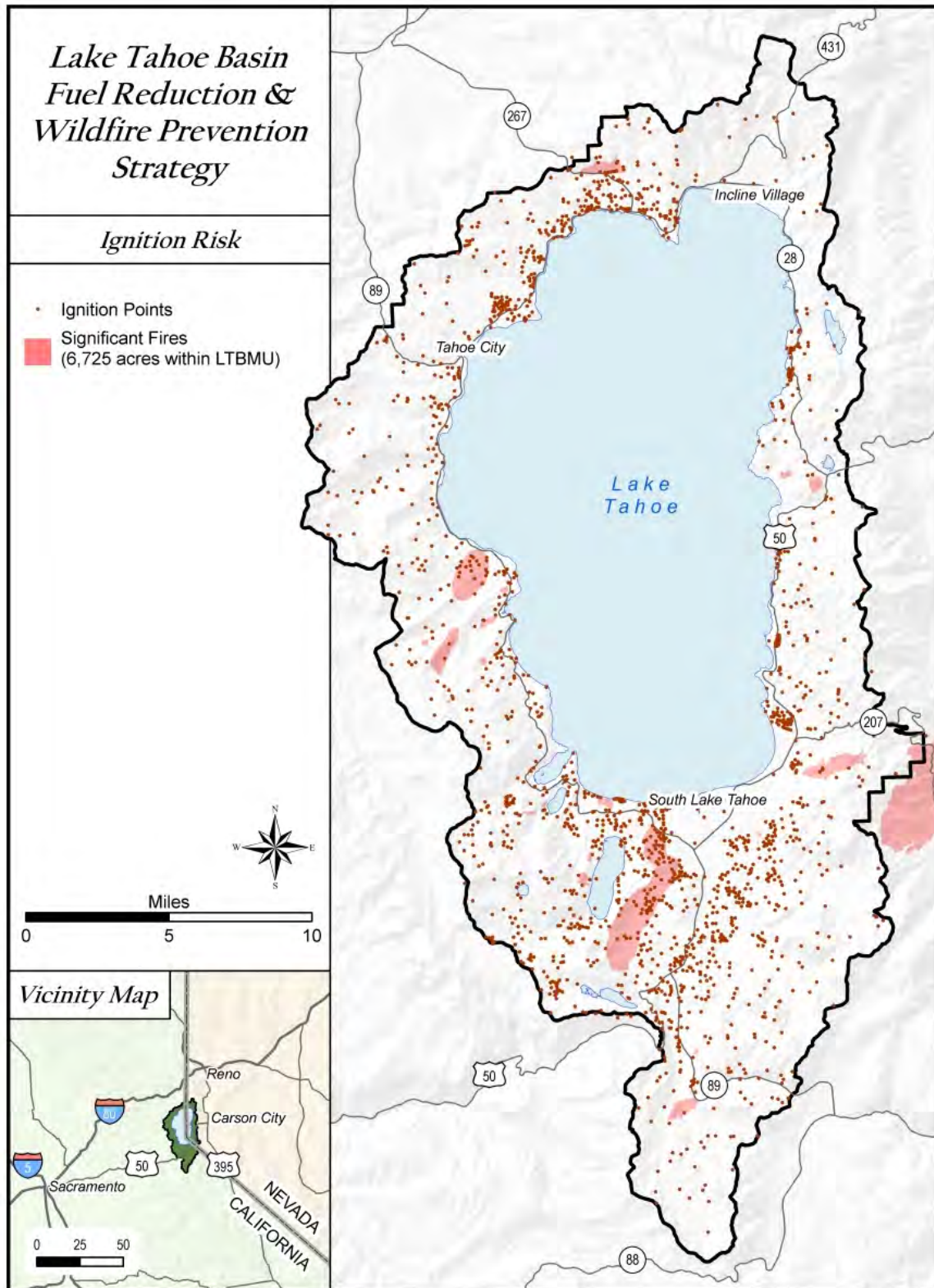
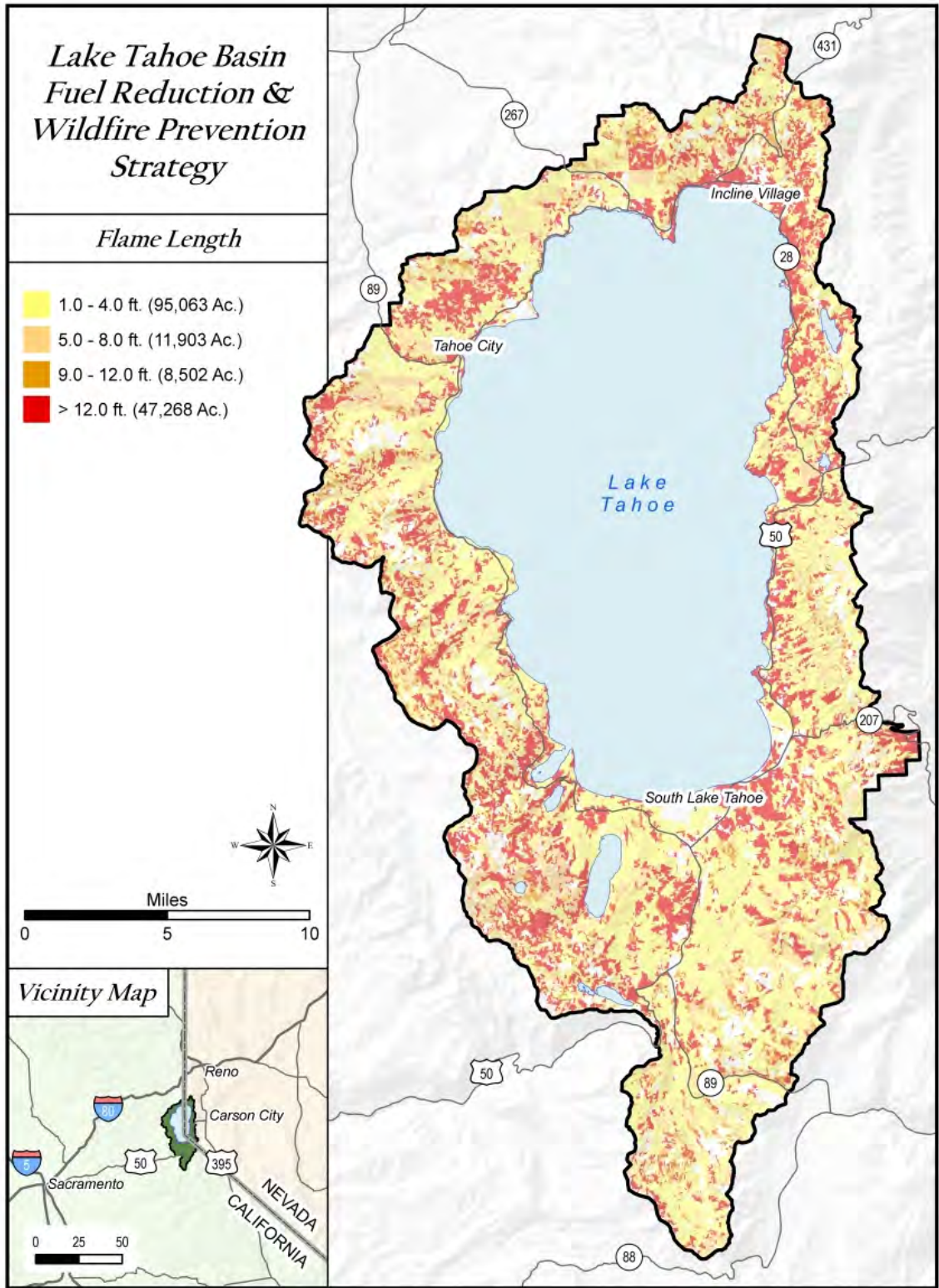


Figure 16. Ignition risk map



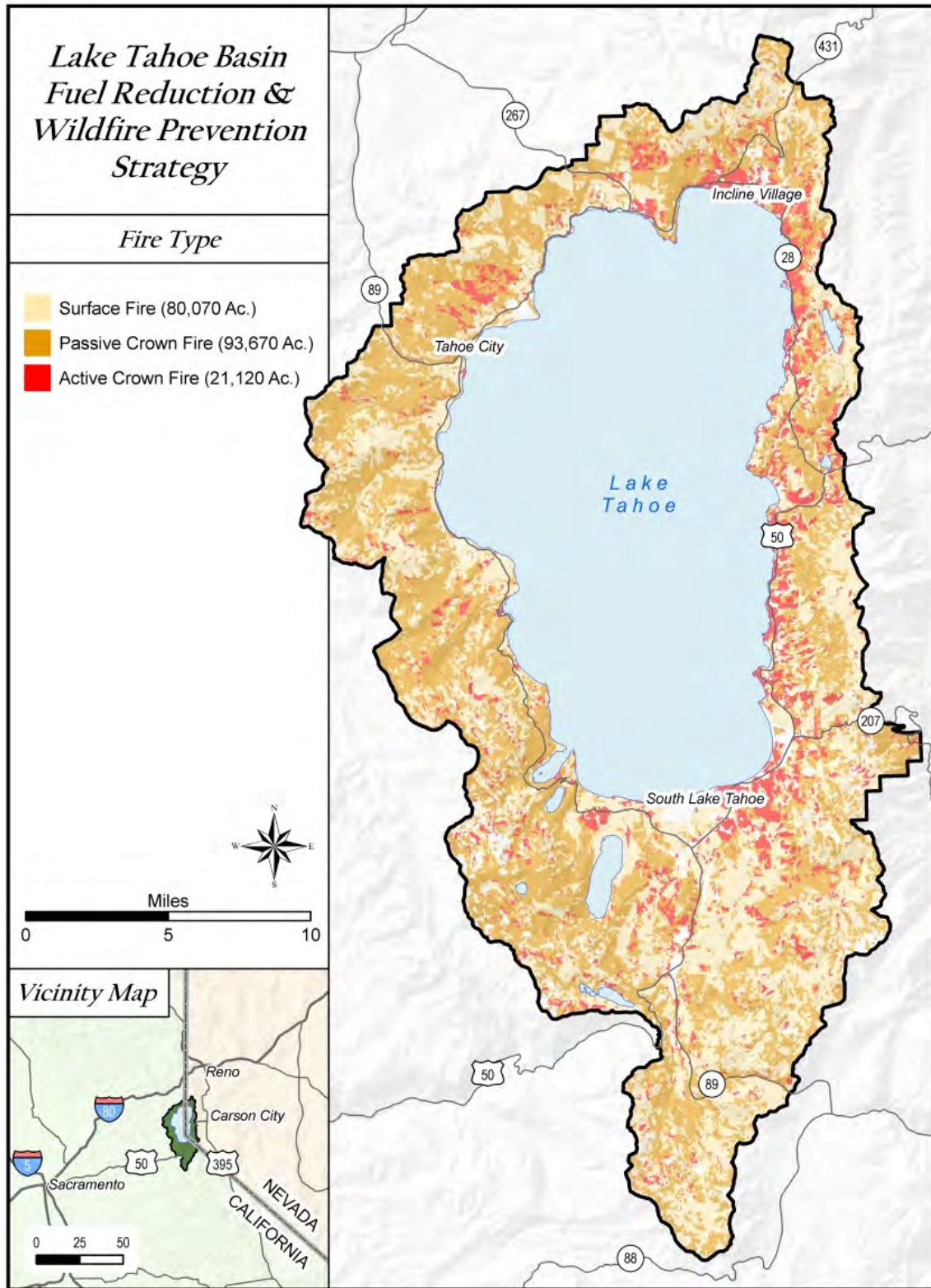


Figure 18. Predicted Fire Behavior: Crown Fire Potential

The majority of homes throughout the Basin lack defensible space (Table 7). The design and type of materials used in the construction of homes and the defensible space around those homes also influence fire behavior. Fire behavior becomes more extreme and uncontrollable in communities or neighborhoods that do not create defensible space, have unenclosed structures such as decks, and are built with flammable materials such as shake roofs. The majority of homes in the Basin have unenclosed structures such as decks, and flammable siding or roofs (Table 7). Estimates provided in Table 7 are from 2004 and considerable work has been accomplished since that time and therefore current estimates of structural hazards may be lower. More detailed evaluations are available in the individual Community Wildfire Protection Plans (Resource Concepts, Inc. 2004a, 2000b; C.G. Celio & Sons et al. 2004).

Table 7. Summary of structural hazards in the Lake Tahoe Basin (2004)

Fire District	Average Percentage of Lots or Homes			Structural Rating*
	Without Defensible Space	With Flammable Unenclosed Structures	With Flammable Roof/Siding*	
North Lake Tahoe FPD ¹	100	84.1	28 / 5.4	
Tahoe-Douglas FPD ²	40.1	54.7	37.8 / 9.8	
Lake Valley FPD ³	58.3	66.4		Moderate
South Lake Tahoe FD ⁴	53	67	31 / 96	
Fallen Leaf FD ³	71.3	76.6		Extreme
Meeks Bay FPD ³	75.2	86.2		High
North Tahoe FPD ³	87.8	59.4		High

*Note: different methods were used to report data in the CWPPs.

Source: 1- Resource Concepts, Inc. (2004a); 2- Resource Concepts, Inc. (2004b); 3-C.G. Celio & Sons et al. (2004); 4- de Jong (2003)

Desired Conditions

The desired condition statements are goals that, when implemented, will trend current fire regime condition classes toward their historic norm and reduce fire behavior towards conditions where safe and effective fire suppression can be employed. Generally, this means reducing vegetation in proposed project areas toward historic levels (Low [I] condition class) resulting in fire behavior characteristics associated with surface fires (Table 8).

Table 8. Desired wildland fuel conditions

	Current Trend	Desired Trend
Fire Regime Condition Class	Moderate (II) to High (III)	Moderate (II) to Low (I)
Fire Behavior	Passive to Active Crown Fires with Flame Lengths that exceed 4 feet	Surface Fires with Flame Lengths less than 4 feet

Desired conditions for the planning area are derived from the Sierra Nevada Framework (Framework) (SNFPA SEIS 2004) and the Fuel Reduction and Forest Restoration Plan prepared for TRPA (Holl 2007). Fuel treatments on all federal lands will be consistent with the standards and guidelines identified in the Sierra Nevada Framework (SNFPA SEIS 2004). On all other land ownerships, fuel treatments will be consistent with the regulations, standards, and guidelines of the appropriate regulatory agencies. Desired vegetative conditions are described for the WUI and general forest where management direction and outcomes are clearly different.

Wildland Urban Interface

The WUI consists of three areas: the urban core, where the communities occur; the defense zone, which is the area generally 0.25 mile beyond the urban core; and the threat zone, which is the area up to 1.25 mile beyond the defense zone. The boundary of these areas can be adjusted based on specific site conditions or as determined at the project level (SNFPA SEIS 2004).

Urban Core

The urban core includes developed and undeveloped lots. The desired condition in the urban core is to reduce fire behavior characteristics to a surface fire. In California, defensible space shall be maintained on all non-federal parcels having a structure as required by Public Resource Code 4291. In Nevada, defensible space on developed lots will be established and maintained consistent with “Living with Fire in the Tahoe Basin” (Smith 2004). The desired condition of the undeveloped urban lots managed by the LTBMU and state agencies will be similar to the defense zone, described below.

Defense Zone

The management objective in this zone is to protect communities. In conifer forest types, predicted flame lengths will be less than 4 feet and preferably less than 2 feet, under 90th-percentile weather conditions. Crown base heights (the top portion of trees) will be managed to avoid all crown fires. Crown cover of forest stands will average 40 to 60 percent to allow for adequate spacing between crowns and to reduce surface wind speeds and drying of surface fuels. In shrub types, predicted rates of spread will be reduced 50 percent of pre-treatment simulated estimates. In shrub types with excessive dead material, predicted rates of spread will be reduced by 75 percent of pre-treatment simulated estimates.

Threat Zone

The management objective in this zone is to establish and maintain a pattern of treatments that are effective in modifying fire behavior and trending forests toward Low (I) and Moderate (II) fire regime condition classes. In conifer forest types, predicted flame lengths will generally be less than 4 to 6 feet; however, they may be higher in some locations. Crown base heights will be managed to avoid crown fires. Crown cover will vary and in some areas be less than 40 percent.

Grasses and patches of shrubs will be abundant in conifer stands where flame lengths are currently 6 feet or greater. In shrub types, predicted rates of spread will be reduced to 50 percent of pre-treatment simulated estimates. In shrub types with excessive dead material, rates of spread will be reduced by 90 percent of pre-treatment simulated estimates. Maintenance treatments will keep these areas within the desired conditions.

General Forest

The general forest includes all other lands beyond the WUI and below the alpine zone. The management objective in this zone is to establish a mosaic of treatments that are effective in modifying fire behavior and trending forests toward Low (I) and Moderate (II) fire regime condition classes. No planned treatments will occur in designated wilderness areas or research natural areas. Many planned treatments will be adjacent to existing roads where crews and machines have ready access; therefore, changes in the current forest structure and fuel hazards will be in a mosaic, based primarily on access. Crown cover will vary and in some areas will be less than 40 percent. Grasses and patches of shrubs will be abundant in stands with less than 40 percent canopy cover. In conifer forest types, predicted flame lengths will be less than 4 feet immediately after treatment and crown base heights will be managed initially to avoid the threat of a passive crown fire. In shrub types, predicted rates of spread will be reduced to 50 percent of pre-treatment simulated estimates. In shrub types with excessive dead material, predicted rates of spread will be reduced up to 90 percent of pretreatment simulated estimates. However, flame lengths will gradually increase in treated areas because little or no maintenance will occur in the general forest. Snags and coarse woody debris will continue to accumulate because of the lack of disturbance in most of this zone.

Predicted Outcomes

The existing fuel condition of the Lake Tahoe Basin is in a state of high departure from historical/desired conditions. This condition dramatically increases the potential of a surface fire transitioning into a crown fire. Each of the representative plans, on which this comprehensive plan is built, identify key values that are at risk and the vegetative stands that do not meet the desired conditions that put those values at risk. Proposed projects included in this plan are or will be designed with prescriptions to meet the desired conditions.

General prescriptions are designed to reduce fire behavior to the extent defined in each of the zones defined in this plan. These prescriptions are based upon proven strategies, science, and principles such as those detailed in “Living with Fire” (Smith 2004). The design and priority of the treatments are focused on the WUI and associated egress and transportation routes in the Basin. Approximately 25 percent of the forested acres in the Basin will be treated. Of this approximately 95 percent of the defense zone and 67 percent of the WUI will be treated creating adequate community defensible space (Figure 19).

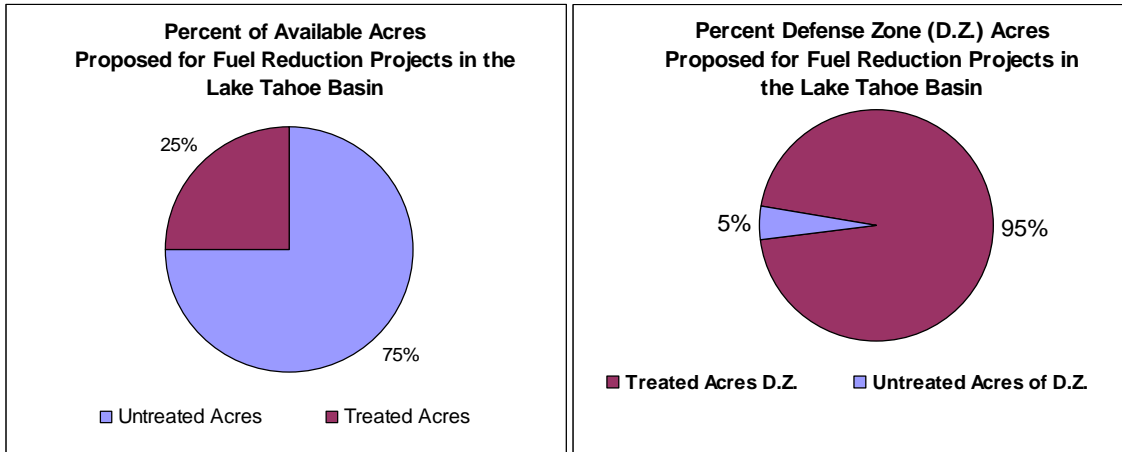


Figure 19. Percent of Basin-wide and defense zone acres proposed for fuel reduction projects

Based on review by wildland fire managers, the projects contained in the plan are expected to move wildland fuel conditions toward their desired fire regime condition class and fire behavior goals. Site-specific modeling of some project areas has confirmed this determination. Fire growth and fire behavior was modeled utilizing FARSITE and FLAMMAP fire simulation programs for multi-jurisdictional projects in the Kingsbury area. Results showed 1) approximately a 42 percent decrease in acres burned, 2) flame lengths were reduced by 27 percent, 3) crown fire potential was reduced by 8 percent, and 4) fireline intensity was reduced by 76 percent (Figure 20). Under this scenario, the outcomes of these combined treatments would meet the desired condition of reducing fire behavior and trending the area towards a lower fire regime condition class.

Treatment Acre Differences Kingsbury Scenarios

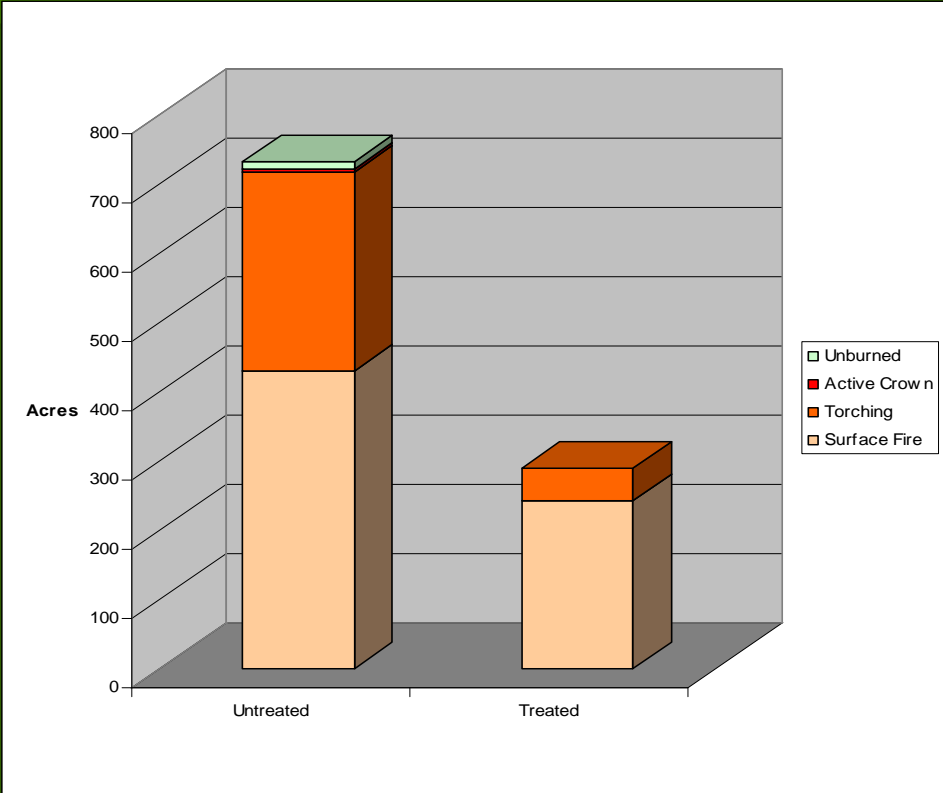


Figure 20. Post treatment outcomes for sample projects in the Kingsbury area

Section 8: Environmental Regulations and Compliance

All individual projects designed to reduce fuel hazards that are proposed by public agencies, funded by public agencies, or that require federal, state, local, or local discretionary approval will be subject to federal, state, or regional environmental regulations. These regulations shape the scope, location, methodologies, timing, and cost of proposed fuel reduction treatments in the Basin.

Environmental regulations (such as the Clean Water Act, Clean Air Act, and Endangered Species Act) are designed to protect or reduce impacts on the environment, and allow the public to participate in agency decision-making processes that may affect the environment (e.g., National Environmental Policy Act and California Environmental Quality Act). Because of the unique values at risk in the Lake Tahoe Basin and complex land ownership, there are numerous regulations governing all activities in the Basin. Unlike other areas in the United States, in addition to federal and state laws, the Bi-state governing TRPA has a comprehensive Code of Ordinances that affects all agencies, organizations, and individuals. The extent of environmental compliance is determined by the land ownership where the project is occurring, the funding agency, the complexity of the project, and the number of regulations that govern a project (Figure 21).

National Policies and Regulations

Several national policies and regulations guide wildland fire management. They include the National Fire Plan, 10-Year Comprehensive Strategy (USDI and USDA 2001); National Fire Plan 10-Year Comprehensive Strategy Implementation Plan (USDI and USDA 2002); Federal Wildland Fire Policy (USDI et al. 1995 [updated 2001]); Healthy Forests Initiative (2002); Healthy Forests Restoration Act (2003); and Protecting People and Natural Resources: A Cohesive Fuels Treatment Strategy (USDI and USDA 2006). This plan is consistent with all of these policies and regulations, which are described below.

The National Fire Plan and 10-Year Comprehensive Strategy

The National Fire Plan was developed by the U.S. Department of the Interior and U.S. Department of Agriculture in 2000 to actively respond to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. It provided direction for the identification of “communities at risk”, which are located in the vicinity of federal lands where wildland fires have the potential to threaten adjacent private lands. Identifying communities at risk has assisted planning for fuel reduction projects on federal lands and increased awareness of wildfire threats in those communities. Communities at risk in the Lake Tahoe Basin are Incline Village, Crystal Bay, Sand Harbor, Glenbrook, Kingsbury, South Lake Tahoe, City of South Lake Tahoe, Homewood, Tahoe Pines, Sunnyside, Tahoe City, Dollar Point, Carnelian Bay, Tahoe Vista, and Kings Beach (*Federal Register*, 66(160): 43384-43435).

Lake Tahoe Basin Regulatory Environment

Proposed projects must meet a series of regulatory or guidance requirements depending upon its location and scope. This chart illustrates the series regulations or guidance a fuel reduction treatment must comply with before implementation.

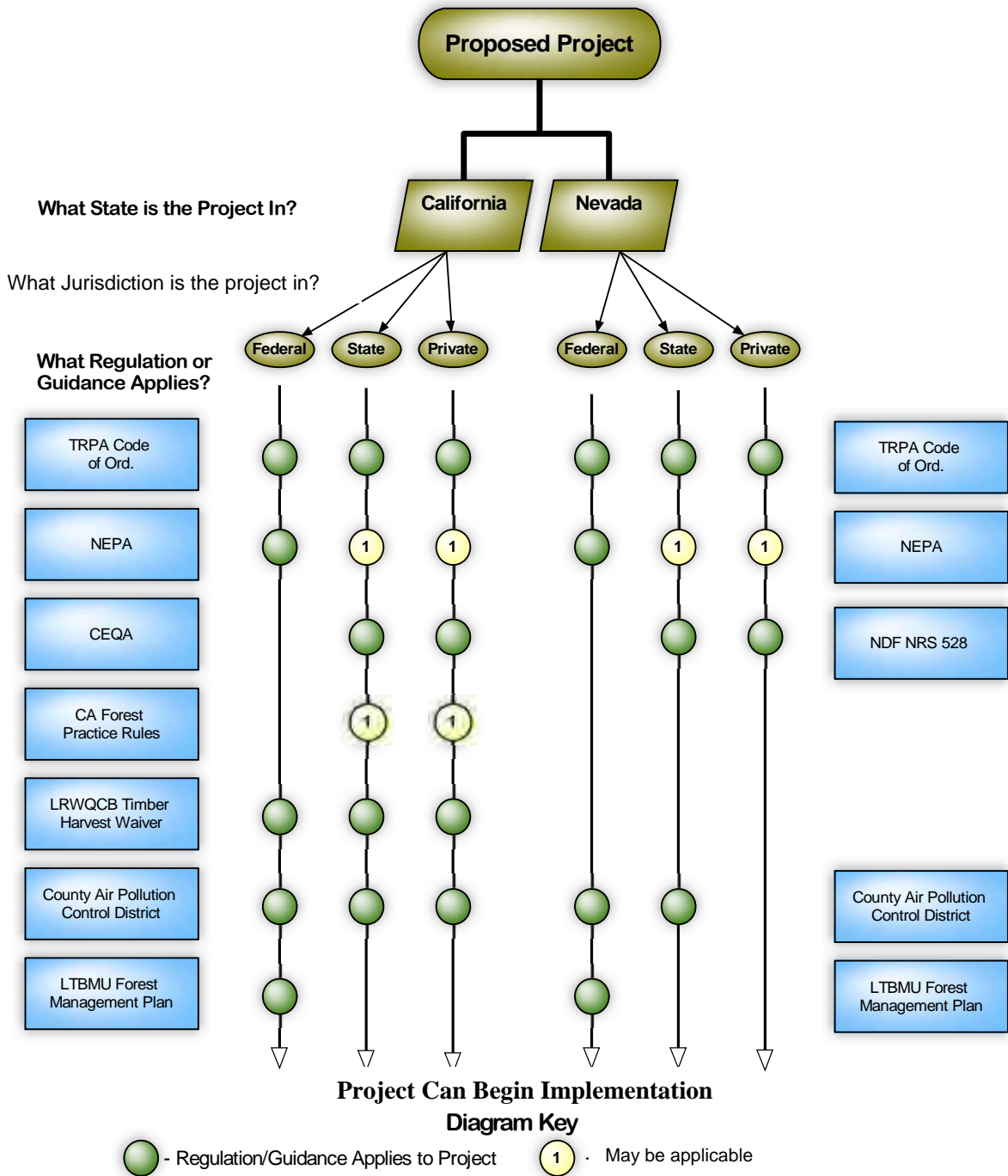


Figure 21. Diagram of the regulatory influences on fire and fuels management in the Lake Tahoe Basin

National Environmental Policy Act

All fuel reduction projects funded by the Federal Government that occur on federal land (such as LTBMU), or require a federal agency to issue a permit, must comply with the National Environmental Policy Act (NEPA). The Act requires agencies to prepare environmental impact statements (EISs), environmental assessments (EAs), or categorical exclusions (CEs) to evaluate potential impacts of proposed projects on the quality of the human environment. These analyses may be used to satisfy other requirements as required by TRPA or the California Environmental Quality Act.

The Healthy Forest Restoration Act (H.R. 1904, December 2003)

The Healthy Forest Restoration Act (HFRA) simplifies the NEPA process by limiting the range of alternatives that are required to be considered in an environmental document that involves fuel reduction or forest health projects designed to protect communities, watersheds, or endangered or threatened species from wildfire. HFRA also changed the USDA Forest Service administrative appeal process for NEPA decisions to a simpler objection process.

HFRA allows communities to designate their WUI; authorizes fuel reduction projects on federal lands in the WUI; requires federal agencies to consider recommendations made by communities at risk that have developed Community Wildfire Protection Plans, and gives funding priority to communities that have adopted Community Wildfire Protection Plans. At the Lake Tahoe Basin HFRA/Wildfire Prevention Summit on March 13, 2004, fire officials from Lake Tahoe accepted the challenge to develop Community Wildfire Protection Plans for its communities. Community Wildfire Protection Plans were prepared for and approved by the state fire and forestry agencies, the fire protection districts and fire departments in the Basin (Resource Concepts, Inc. 2004a, 2004b; C.G. Celio & Sons et al. 2004). EAs and EISs documenting HFRA authorized projects may consider only one action alternative if that alternative meets certain WUI criteria and implements the general actions of an applicable Community Wildfire Protection Plan.

Regional Policies and Regulations

TRPA Regional Plan Thresholds and Carrying Capacities

TRPA's Threshold Carrying Capacities are standards of environmental quality targets to be achieved in the Tahoe Region. The standards identify the level of human impact the Lake Tahoe environment can take before irreparable damage occurs. The thresholds and carrying capacities identify common vegetation, uncommon plant communities, sensitive plants, and late seral-old growth ecosystems.

TRPA Code of Ordinances

TRPA primarily regulates tree removal through Chapter 71 of its Code of Ordinances. Removal of all trees greater than 6 inches in diameter requires a tree permit; however, TRPA has delegated authority to issue tree removal permits to most local fire agencies for defensible space treatments. A tree removal permit must be approved for all projects that require substantial removal of trees, which is defined as removing more than 100 trees greater than 10 inches in diameter in an area greater than 20 acres or on land capabilities 1a, 1b, 1c, 2, or 3 (Bailey 1974), which consist of a wetlands or other sensitive lands.

LTBMU Land Management Plan/Sierra Nevada Framework

All management activities conducted by the LTBMU are governed by the Lake Tahoe Basin Management Unit Land and Resource Management Plan (USDA Forest Service 1988, as amended by the Sierra Nevada Forests Plan Amendment [SNFPA SEIS 2004]). The plan recognized the excessive buildup of fuel hazards in the Sierra Nevada Mountains surrounding the lake and established that the highest priority for fuels treatments would be in the WUI areas.

California Environmental Quality Act (CEQA)

Fuel reduction projects on private lands and state lands that require approval by a local or state agency must comply with CEQA or a functionally equivalent program (e.g., the California Forest Practice Rules). The documentary requirements for CEQA are very similar to those for NEPA. Most projects in the Basin will require an initial study and negative declaration to comply with CEQA. Projects involving hand thinning only require a categorical exemption. In some cases, if a CAL FIRE-required harvesting document is prepared in lieu of a traditional CEQA document (such as Timber Harvest Plan) when harvested material has a commercial purpose, it must be signed and prepared by a California Registered Professional Forester. Also, timber operations must be conducted by a California Licensed Timber Operator. Some small projects, such as defense zone clearing, are generally exempt from CEQA or a functionally equivalent program. In addition, opportunities exist to complete CEQA and NEPA documents using a joint analysis.

California Timber Harvest Plans

The cutting and removing of trees for a commercial purpose as per Public Resource Code 4527 require the preparation and submittal of a CAL FIRE harvesting document. Most of these documents, such as timber harvest plans, conversion exemptions, fuels reduction exemptions, etc, are required to be prepared and signed by a California Registered Professional Forester as per Public Resource Code 4581.

California PRC 4291

PRC 4291 applies to everyone that owns or maintains a structure on lands covered with flammable vegetation. It requires homeowners to create defensible space around their structures where firefighters can provide protection during a wildfire. However, it should be noted that

enforcement of these provisions can only be accomplished to the extent that funding and manpower of responsible agencies allow.

Lahontan Regional Water Quality Control Board Basin Plan

The California Water Quality state board sets statewide policy for the implementation of state and federal laws and regulations. The Lahontan Regional Water Quality Control Board is responsible for protecting water quality and enforcing the California Water Code and the Clean Water Act. It enforces its Water Quality Control Plan that includes implementation plans and policies.

Nevada Division of Forestry NRS 528

NRS 528 regulates forest practices and reforestation on private and state lands in Nevada.

Nevada NRS 472.041

NRS 472.041 is the enforcement of certain provisions of Uniform Fire Code regarding clearance of vegetation around structures. It should be noted that enforcement of these provisions can only be accomplished to the extent that funding and manpower of responsible agencies allow.

Agency Regulatory Responsibility

Several land management and regulatory agencies are responsible for complying with and enforcing regulations in the Lake Tahoe Basin. They include the USDA Forest Service, Tahoe Regional Planning Agency (TRPA), Lahontan Regional Water Quality Control Board, California Department of Forestry and Fire Protection, Nevada Division of Forestry, California Tahoe Conservancy, California State Parks, local Fire Protection Districts, and the Tahoe Regional office of the Nevada Fire Safe Council.

Land Management Agencies

USDA Forest Service Lake Tahoe Basin Management Unit

The USDA Forest Service Lake Tahoe Basin Management Unit (LTBMU) is responsible for managing approximately 80 percent of the land base and its resources in the Lake Tahoe Basin. All management activities conducted by the LTBMU are governed by the Lake Tahoe Basin Management Unit Land and Resource Management Plan (USDA Forest Service 1988, as amended by the Sierra Nevada Forests Plan Amendment [SNFPA SEIS 2004]).

California Department of Forestry and Fire Protection (CAL FIRE)

CAL FIRE is responsible for enforcing the California Forest Practices Act on state and private timberland in California. CAL FIRE is also responsible for providing input or enforcing, depending on local situation, pre-development fire protection stands (PRC 4290), defensible space law (PRC 4291), and the Wildland Urban Interface Building Code.

In addition, CAL FIRE works with other internal programs, such as the California Office of the State Fire Marshal, California State Board of Forestry and Fire Protection, and CAL FIRE's Fire and Resource Assessment Program (FRAP). The California Office of the State Fire Marshal is also part of CAL FIRE. The mission of the State Fire Marshal is to protect life and property through the development and application of fire prevention engineering (such as the Wildland Urban Interface Building Standards), education, and enforcement. The California State Board of Forestry and Fire Protection's ("Board") mission is to provide policy leadership and to generate public interest and support in those matters key to the future of the state's forest and rangelands, including but not limited to PRC 4291, the California Forest Practice Act, and PRC 4290. The California Department of Forestry and Fire Protection's Fire and Resource Assessment Program (FRAP) assesses the amount and extent of California's forests and rangelands, analyzes their conditions and identifies alternative management and policy guidelines..

California State Parks

There are six State Parks within the Basin: Burton Creek State Park, Ward Creek State Park, Sugar Pine State Park, D.L. Bliss State Park, Emerald Bay State Park, and Washoe Meadows State Park. The mission of California State Parks is to provide for the health, inspiration, and education of the people of California by helping to preserve the state's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation. Their role is also to manage the natural resources on lands they administer.

California Tahoe Conservancy

The California Tahoe Conservancy (CTC) is an agency within the Resources Agency of the State of California. Its jurisdiction extends only to the California side of the Lake Tahoe Basin. It was established to develop and implement programs through acquisitions and site improvements to improve water quality in Lake Tahoe, preserve the scenic beauty and recreational opportunities of the region, provide public access, preserve wildlife habitat areas, and manage and restore lands to protect the natural environment.

The properties managed by CTC within the Basin consist of about 4,800 parcels; of which the average size is one-third acre or less. Most of these parcels are within the WUI. The CTC is also responsible for planning and implementing projects on their respective lands that restore ecosystem health by reducing fuel hazards. They are responsible for ensuring their plans are consistent with federal, state, and local laws, regulations, and policies.

Nevada Division of Forestry

The Nevada Division of Forestry manages all forestry, nursery, endangered plant species, and watershed resource activities on certain public and private lands within the Basin. The Division also provides fire protection of structural and natural resources through fire suppression and prevention programs and other emergency services. The Nevada Division of Forestry is responsible for enforcing Nevada Revised Statutes (NRS) 528.

The Nevada Tahoe Resource Team, an interagency team within the Department of Conservation and Natural Resources, is responsible for implementing forest health and fuel reduction projects on State of Nevada property in the Lake Tahoe Basin.

Nevada State Parks

The Nevada Division of State Parks administers and manages the Lake Tahoe State Park, which includes beaches, fishing, and camping, and over 13,000 acres of backcountry recreation. The Carson Range State Parks in conjunction with the Nevada Tahoe Resource Team has prepared a plan to reduce fuel hazards and restore forest health in the park.

Nevada Division of State Lands

Nevada Division of State Lands manages 485 urban parcels in the Lake Tahoe Basin from Crystal Bay to Kingsbury, Nevada. These are managed by Nevada Tahoe Resource Team (see above). The urban parcels are managed by the State Lands forester and a seasonal forester; there are 140 urban parcels (106 acres) in Douglas County and 345 urban parcels (108 acres) in Washoe County. These parcels are managed in accordance to a MOU with the TRPA as well as Nevada Laws on Forestry and Fire, Nevada Revised Statutes 472, 527 & 528, which pertain to establishing a healthy forest and watershed protection of trees and flora by recognizing implemented forest practices.

Regulatory Agencies

Tahoe Regional Planning Agency

The Tahoe Regional Planning Agency (TRPA) is a bi-state agency created by the states of Nevada and California to lead a cooperative effort to preserve, restore, and enhance the unique natural and human environment of the Lake Tahoe Basin. TRPA enforces the TRPA Regional Plan.

Lahontan Regional Water Quality Control Board

The Lahontan Regional Water Quality Control Board is responsible for water quality and enforcing California State Water Code. It regulates forest management practices and activities on stream environment zones.

California Air Resources Board

The Lake Tahoe Basin is its own air basin, shared by California and Nevada. Air quality in the Tahoe Basin is managed by two state agencies, the California Air Resources Board of the California Environmental Protection Agency and Nevada Bureau of Air Pollution Control; and three county agencies, Placer County Air Pollution Control District (APCD), El Dorado County APCD, and Washoe County District Board of Health. The state agencies determine if burning is allowed on a daily basis. The individual county agencies are responsible for issuing burn permits and enforcing state regulations.

Nevada Department of Environmental Protection

Nevada Department of Environmental Protection plays a role in air and water quality in the Lake Tahoe Basin for the Nevada Division of State Lands and their urban parcels. Nevada Division of State Lands is required to apply for a burn permit when burning in Douglas County of the Lake Tahoe Basin. In addition, the Washoe County District Health Department is involved with the burn permit process in the Washoe County portion of the Lake Tahoe Basin. MOUs with these agencies require Nevada land management agencies to follow their guidelines and regulations in smoke management.

Section 9: Public Education and Wildfire Prevention Plans

Key to the success of the proposed community defense and general forest-based treatments in this plan is continued public outreach to facilitate private landowners in the Basin to develop defensible space around individual homes and buildings. Surveys conducted in 2003 and 2004 determined 70 percent of the residences did not have adequate defensible space to protect them from a wildfire (Resource Concepts, Inc. 2004a, 2004b; C.G. Celio & Sons et al. 2004). While defensible-space clearing around rural residences has been the law for a long time in California, it is only recently being enforced.

Intertwined with these physical facts are social issues. Most of the Basin's residents elected to live in Lake Tahoe to take advantage of the rural setting or the diverse recreation opportunities. Previous experiences undoubtedly forged many of their concepts of what forests provided and how they should be managed. federal and state policies strongly advocated fire suppression. Media attention of extensive clearcut logging on public lands in the 1970s and 1980s initiated a common belief that all logging sacrificed irreplaceable natural resources.

Faced with these challenges, federal, state, and local agencies and organizations have made substantial progress to reduce fuel hazards and educate the public. Currently, all of the federal and state land management agencies and local fire agencies develop and provide information in various formats to educate the public.

Under the Cooperative Fire Agreement between CAL FIRE and the LTBMU, the LTBMU is responsible for wildland fire suppression on all SRA lands in California within the Basin. CAL FIRE does not have fire suppression resources stationed in Lake Tahoe. Nevada Division of Forestry provides fire protection for state lands on the Nevada side of the lake. Seven fire protection districts provide municipal fire protection in Lake Tahoe: South Lake Tahoe FD, Lake Valley FPD (Meyers), Fallen Leaf VFD, Meeks Bay FPD, North Tahoe FPD (Tahoe City), North Lake Tahoe FPD (Incline Village), and Tahoe Douglas FD (south of Incline to Stateline, Nevada). LTBMU works cooperatively with every fire department on mutual aid, public education, and Basin-wide community fire planning, including hazard fuel reduction.

Current Efforts

Fire Prevention Plans: To various extents, each cooperating agency has developed a wildfire prevention plan. For example, the USDA Forest Service has developed a comprehensive prevention plan that focuses on education, detection, engineering, and enforcement. This plan details patrolling, media outreach, public education, and annual public events that the LTBMU actively supports. The plan is implemented by a dedicated prevention staff that includes three fire prevention technicians and a fire prevention officer.

One-on-One Contacts: All of the local fire agencies and the Nevada Fire Safe Council provide staff that meets with individual residents during defensible space inspections and during subsequent clearing operations. While these contacts are time consuming and inefficient, they may be the most effective because they are focused and result in the desired effect. Additionally, these organizations also provide free literature to residents, with the most common being “Living with Fire – A Guide for the Homeowner.” This handout was developed by the University of Nevada Cooperative Extension, with over two million copies printed, including a customized version for the Lake Tahoe Region. The Nevada Division of State Lands also distributes a programmatic brochure prior to fuel related projects as part of its community outreach.

Community Events: All of the federal, state, and local agencies participate in demonstrations and community events, including several sponsored by the Nevada Fire Safe Council, which developed and nurtured 21 Fire Safe Chapters in individual communities throughout the Lake Tahoe Basin. These chapters are instrumental in encouraging individuals in those communities to actively participate in defensible space clearing and establishing fuelbreaks adjacent to communities. They are also sponsoring free barbeques in a few communities to encourage residents to participate in and learn how defensible space should be developed. The Nevada Fire Safe Council also developed and mailed over 7,000 flyers announcing three regional demonstrations in 2007. These demonstrations have occurred in a selected neighborhood on the north shore, south shore, and in Incline Village, where hands-on demonstrations of defensible-space clearing have been discussed and performed by staff.

Websites and Public Service Announcements: The majority of the local fire agencies and Nevada Fire Safe Council host websites that offer extensive information on defensible space inspections, defensible space requirements, free chipping services to dispose of hazardous fuels, and links to other sources of information. The most common link is to <http://www.livingwithfire.info>, a multi-agency sponsored website that provides extensive information on what residents should do before, during, and after a wildland fire. All of the agencies also support and participate in public service announcements that focus on defensible space requirements and public safety.

Future Efforts

The current efforts have resulted in substantially more residents complying with the defensible space requirements. Additional efforts will be required in the future to obtain defensible space compliance from the large number of absentee residents whose periodic visits focus on

recreation. Efforts should also be focused on educating residents and regulatory agencies about changing the current forest conditions to restore the health of those forest stands and encouraging residents to develop defensible space around their homes. Therefore, an effective education program will be continued that addresses the following two paradigms:

- It is the responsibility of landowners to create and maintain defensible space around their structures (required in California per PRC 4291); and
- Lake Tahoe's forest ecosystems and watersheds will thrive under a managed disturbance regime.

Section 10: Conclusions

The key values of the Lake Tahoe Basin are at risk to catastrophic wildfire due to dense and overstocked forests. Implementation of this plan will help protect the people, property, and natural values of the Basin by changing fire behavior in prioritized stands in the Basin into a less volatile state. Across many jurisdictions, this plan will treat approximately 68,000 acres over the next 10 to 15 years. These treatments were proposed by the 17 participating agencies and were designed to meet the local and Basin-wide needs of their particular jurisdictions. The treatments range from small urban lots to large strategically placed general forest treatments (discussed previously as SPLATs). Collectively, treatments are predicted to reduce potential fire behavior and trend treated forests towards desired fire regime condition classes. Implementation of this plan is predicted to cost from \$206,000,000 to 244,000,000 over 10 years with annual predicted expenditures of \$18,500,000 to \$25,500,000.

While this plan proposes fuel reduction treatments in and around communities and the general forest throughout the Basin, one key to its success is the simultaneous development of defensible space around private residences, buildings, and the general infrastructure of the area. Participating agencies and organizations will facilitate this through an active education and enforcement campaign.

The partners to this plan and the Planning Cadre recognize that collaboration on several key focus areas should continue to ensure this plan's success. These focus areas include:

- Identifying pathways for regulatory collaboration in areas such as air quality, stream environment zones, limited operating periods, and watershed protection;
- Strategies to reduce planning and implementation costs associated with access issues and the use of innovative treatment techniques;
- Facilitating partnerships with potential biomass end users;
- Developing and maintaining an adequate staff and contractor resource pool to implement the proposed projects; and
- Identifying efficient mechanisms to implement projects over multiple jurisdictions.

Finally, this plan will only be as successful as the continued commitment that each participating agency has to coordinate, communicate, and collaborate with each other and the people they serve. This continuing commitment will result in responsive and cost-effective wildfire prevention that ultimately will protect the people and values at risk treasured in the Lake Tahoe Basin.

The federal, state and local land managers, Lake Tahoe Fire Agencies and Nevada Fire Safe Council will meet annually to review the results of the prior year fuels reduction efforts and identify fuels reduction projects and priorities, within the scope of this Strategy, for the upcoming year. Future projects identified by this group will meet the intent of this Strategy and meet the intent of all the underlying Implementation Plans including the Community Wildfire Protection Plans for the Lake Tahoe Basin. Projects will be prioritized for funding submission consistent with this Strategy and current direction and intent. Where projects cross jurisdictional boundaries, the group will collaborate on implementing the project with the goal of reducing environmental compliance, permitting and contracting costs.

Preparers

USDA Forest Service TEAMS Planning Enterprise Unit; WO-Enterprise Program	Chris French / Environmental Coordinator Wade Graham / IDT Leader Randy Hall / Fire & Fuels Specialist Sue Howle / Environmental Coordinator Kristen Whisennand, Judy York, Maple Taylor / Writer-Editors	(518) 731-1124
Steve Holl Consulting 7049 Pine View Drive Folsom, CA 95630	Steve Holl/Consultant	(916) 988-8043
USDA Forest Service Lake Tahoe Basin Management Unit	Kurt Teuber/GIS Program Manager	(530) 543-2693

Planning Cadre Members

Agency/Group	Address	Representative(s) / Title(s)	Telephone
United States Department of Agriculture Forest Service	Lake Tahoe Basin Management Unit 35 College Drive South Lake Tahoe, CA 96150	Dave Marlow / Vegetation, Fire, & Fuels Staff Officer	(530) 543-2652
		Dan Young / Assistant Vegetation, Fire, & Fuels Staff Officer	(530) 543-2669
		Duncan Leao / Forester-Vegetation Planner	(530) 543-2660
		Kurt Teuber / GIS Specialist	(530) 543-2726
	Humboldt-Toiyabe NF, Carson Ranger District	Mandy Brinnand / Forester	(775) 884-8142
Tahoe Regional Planning Agency	128 Market Street PO Box 5310 Stateline, NV 89449	Steve Chilton / Branch Chief	(775) 588-4547
		Mike Vollmer / Vegetation Program Manager	(775) 588-4547
		Brian Hirt / Forester	(775) 589-5244
Nevada Division of Forestry	2478 Fairview Drive Carson City, Nevada 89701	Bob Ashworth / Deputy State Forester	(775) 684-2503
		Roland Shaw / Forester	(775) 684-2741
		Kacey KC / Grants Coordinator	(775) 684-2511
		John Copeland / Forester	(775) 849-2500
Nevada Fire Safe Councils	P.O. Box 2724 Carson City, NV 89702	Andrew List / Executive Director	(775) 884-4455
	1009 Boulder Mountain Court P.O. Box 17517 South Lake Tahoe, CA 96151	Jason Arnold / Nevada Coordinator, Tahoe Region	(775) 220-6000
		John Pickett / California Coordinator, Tahoe Region	(775) 220-7675
California Department of Forestry and Fire Protection (Cal Fire)	Amador-El Dorado Unit 2092 Lake Tahoe Blvd. Suite 600 South Lake Tahoe, CA 96150	Mary Huggins / Division Chief	(530) 541-1989
California Tahoe Conservancy	1061 Third Street South Lake Tahoe, CA 96150	Rick Robinson / Resources Program Manager	(530) 543-6064
		Judy Clot / Forestry Program Coordinator	(530) 543-6067
California State Parks	Sierra District 7360 West Lake Blvd. PO Box 266 Tahoma, CA 96142	Rich Adams / Forester	(530) 581-5746
North Lake Tahoe Fire Protection District representing Nevada Fire Departments	866 Oriole Way Incline Village, NV 89451	Greg McKay / Assistant Chief	(775) 833-8101
Meeks Bay Fire Protection District representing California Fire Departments	P.O. Box 189 Tahoma, California 96142	John Pang / Chief	(530) 525-7548

References

- Asher, J.; Spurrier, C. 1998. The Spread of Invasive Weeds in Western Wildlands: A State of Biological Emergency. The Governor's Idaho Weeds Summit; May 19; Boise, ID. pp. 1-12.
- Benavides-Solorio, J.D.; MacDonald, L. H. 2001. Post-fire Runoff and Erosion from Simulated Rainfall on Small Plots, Colorado Front Range. *Hydrological Processes* 15(15): 2931-2952.
- Benda, L.E. 2003. The Role of Fire and Punctuated Sediment and Wood Supplies on Channel and Valley Morphologies and Aquatic Habitats. *Forest Ecology and Management* 178(2003): 183-196.
- Benda, L.E.; Miller, D.; Bigelow, P.; Andras, K. 2003. Fires, Erosion, and Floods: The Role of Disturbance in Forest Ecosystems. *Forest Ecology and Management* 178(1-2): 105-120.
- Beschta, [X]. 1990. [add reference].
- Bisson, P.; Rieman, B.E.; Luce, C.; Hessburg, P.; Lee, D.; Kershner, J.; Reeves, G. 2003. Fire and Aquatic Ecosystems: A Synthesis. *Forest Ecology and Management* 178(2003): 183-196.
- California Air Resources Board (CARB) <http://www.arb.ca.gov/homepage.htm>
- California Department of Forestry and Fire Protection (CAL FIRE) <http://www.fire.ca.gov/>
- California State Parks <http://www.parks.ca.gov/>
- California Tahoe Conservancy <http://www.tahoicons.ca.gov/>
- Cannon, S.H.; Kirkham, R.M.; Parise, M. 2001. Wildfire-related debris-flow Initiation Processes: Storm King Mountain, Colorado. *Geomorphology* 39: 171-188.
- C.G. Celio & Sons; Steve Holl Consulting; Wildland Rx. 2004. Community Wildfire Protection Plans for the California Portion of the Lake Tahoe Basin. *Prepared for the Tahoe Basin Fire Safe Council*; South Lake Tahoe, CA.
- de Jong, L. 2003. Fire Hazard Assessment of South Lake Tahoe. *Fire Management Today* 63(2)
- Duane, T.P. 1996. Human Settlement, 1850-2040. Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II, Assessments and Scientific Basis for Management Options. University of California, Davis.
- Dunham J.B.; Young, M.K.; Gresswell, R.E.; Rieman, B.E. 2003. Effects of Fire on Fish Populations: Landscape Perspective on Persistence of Native Fishes and Nonnative Fish Invasions. *Forest Ecology and Management* 178(2003): 183-196.
- Environmental Improvement Program (EIP) <http://www.trpa.org/>
- Graham, R.T.; Harvey, A.E.; Jain, T.B.; Tonn, J.R. 1999. The Effects of Thinning and Similar Stand Treatments on Fire Behavior in Western Forests. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-463, Portland, OR.
- Gruell, G.E. 2001. Fire in Sierra Nevada Forests: A Photographic Interpretation of Ecological Change Since 1849. Mountain Press, Missoula, MT.
- Healthy Forest Initiative. 2002. Available at: <http://www.fs.fed.us/projects/hfi/background.shtml>
- Healthy Forests Restoration Act. 2003. Available at: <http://www.fs.fed.us/projects/hfi/background.shtml>

- Holl, S. 2007. Fuel Reduction and Forest Restoration Plan for the Lake Tahoe Basin Wildland Urban Interface. Steve Holl Consulting, Folsom, CA. <http://www.trpa.org/>
- Jones, [X] et al. 1999. [add reference].
- League to Save Lake Tahoe <http://www.keeptahoeblue.org/about/index.php>
- Lindstrom, [X] et al. 2000. [add reference].
- Mater Engineering. 2007. Tahoe Region Coordinated Resource Offering Protocol. Prepared for the USDA Forest Service, Corvallis, OR.
- MacDonald, L.H.; Stednick, J.D. 2003. Forests and Water: A State-of-the-art Review for Colorado. Completion Report No. 196, Colorado Water Resources Research Institute, Fort Collins.
- McMahon, T.E.; DeCalesta, D.S. 1990. Effects of Fire on Fish and Wildlife. *In*: Walstad, S.R. [and others], eds., Natural and Prescribed Fire in Pacific Northwest Forests. Oregon State University Press, Corvallis, OR.
- McNeil Technologies. 2003. Biomass Energy Opportunities In and Around the Lake Tahoe Basin: Final Report. *Prepared for the Nevada Tahoe Conservation District, Stateline, NV; Lakewood, CO.*
- Meyer, G.A.; Pierce, J.L.; Wood, S.H.; Jull, A.J.T. 2001. Fires, Storms, and Sediment Yield in the Idaho Batholith. *Hydrological Processes* 15: 3025–3038.
- Moody J.A.; Martin, D.A. 2001. Hydrologic and Sedimentologic Response of Two Burned Watersheds in Colorado. U.S. Geological Survey Water-Resources Investigations Report 01-4122.
- Nevada Division of Forestry <http://www.forestry.nv.gov/>
- PATHWAY <http://www.trpa.org/>
- Peterson, D.L.; Johnson, M.C.; Agee, J.K.; Jain, T.B.; McKenzie, D.; Reinhart, E.D. 2005. Forest Structure and Fire Hazard in Dry Forests of the Western United States. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-628, Portland, OR. 30 p.
- Placer County Air Pollution Control District. 2007. [add reference].
- Reeves, G.H.; Benda, L.E.; Burnett, K.M.; Bisson, P.A.; Sedell, J.R. 1995. A Disturbance-Based Ecosystem Approach to Maintaining and Restoring Freshwater Habitats of Evolutionarily Significant Units of Anadromous Salmonids in The Pacific Northwest. *Proceedings, American Fisheries Society Symposium on Evolution and the Aquatic Ecosystem*, Vol. 17. Bethesda, MD. pp. 334–349.
- Rieman B.E.; Clayton, J. 1997. Fire and Fish: Issues of Forest Health and Conservation of Native Fishes. *Fisheries*. 22(11): 6–15.
- Rieman, B.E.; Lee, D.; Burns, D.; Gresswell, R.; Young, M.; Stowell, R.; Howell, P. 2003. Status of Native Fishes in the Western United States and Issues for Fire and Fuels Management. *Forest Ecology and Management* 178(1-2): 19-212.
- Resource Concepts, Inc. 2004a. North Tahoe Community Wildfire Risk/Hazard Assessment. *Prepared for the Nevada Fire Safe Council; Carson City, NV.*
- Resource Concepts, Inc. 2004b. Tahoe-Douglas Community Wildfire Risk/Hazard Assessment. *Prepared for the Nevada Fire Safe Council; Carson City, NV.*

- Robichaud, P.R. 2000. Fire and Erosion: Evaluating the Effectiveness of a Post-fire Rehabilitation Treatment, Contoured-felled Logs. Proceedings, Watershed Management & Operations Management Conference; June 20-24; Fort Collins, CO.
- Robichaud, P.R.; Brown, R.E. 1999. What Happened After the Smoke Cleared: Onsite Erosion Rates After a Wildfire in Eastern Oregon. Revised (November 2000) Proceedings, AWRA Specialty Conference: Wildland Hydrology; Bozeman, MT. pp. 419-426.
- Sierra Business Council 1999 <http://www.sbcouncil.org/wiki/Publications>
- Skinner, C.N.; Chang, C. 1996. Fire Regimes, Past and Present. *In*: Sierra Nevada Ecosystem Project: Final Report to Congress, Vol. II. Assessments and Scientific Basis for Management Options. Water Resources Center Report No. 37; Centers for Water and Wildland Resources, University of California, ; Davis. pp. 1041-1069.
- Smith, E. 2004. Living with Fire: In the Tahoe Basin. University of Nevada Cooperative Extension, Minden, NV.
- Tahoe Regional Planning Agency. 1986. [add reference].
- Tahoe Regional Planning Agency. 1987. TRPA Plan available at: <http://www.trpa.org/>
- Tahoe Regional Planning Agency. 2006. Draft Threshold Evaluation Report, Chapter 5. Stateline, NV.
- Tahoe Regional Planning Agency. 2007. [add 'Fire 2007' reference].
- Taylor, [X]. 2004. [add reference].
- USDA Forest Service. 1988. Land and Resource Management Plan. Lake Tahoe Basin Management Unit, South Lake Tahoe, CA.
- USDA Forest Service. 2000a. Lake Tahoe Basin Watershed Assessment: Vol. I. USDA Forest Service, Pacific Southwest Station, General Technical Report PSW-GTR-175, Albany, CA.
- USDA Forest Service. 2000b. Forest Products Laboratory Research Program on Small-Diameter Material. USDA Forest Service, Forest Products Laboratory, General Technical Report FPL-GTR-110(rev), Madison, WI. 31 p.
- USDA Forest Service. 2001. Sierra Nevada Forest Plan Amendment, Final Environmental Impact Statement. Pacific Southwest Region, Vallejo, CA.
- USDA Forest Service. 2004. Sierra Nevada Forest Plan Amendment, Final Supplemental Environmental Impact Statement. Pacific Southwest Region, Vallejo, CA.
- USDA Forest Service. 2006. Protecting People and Natural Resources: A Cohesive Fuels Treatment Strategy. Healthy Forests Initiative, Washington, D.C.
- USDI [and others]. 1995. Federal Wildland Fire Policy (and 2001 updates). Available at: http://www.nifc.gov/fire_policy/history/index.htm
- USDI and USDA. 2000. Managing the Impacts of Wildland Fires on Communities and the Environment—A Report to the President (*aka* National Fire Plan) http://www.fireplan.gov/resources/annual_report.html
- USDI and USDA 2001. A Collaborative Approach for Reducing Wildland Fire Risk to Communities and the Environment 10-Year Comprehensive Strategy. Available at: <http://www.fireplan.gov/resources/policies.html>

- USDI and USDA 2002. A Collaborative Approach for Reducing Wildland Fire Risk to Communities and the Environment 10-Year Comprehensive Strategy: Implementation Plan. Available at: <http://www.fireplan.gov/resources/policies.html>
- Wondzell, S.M.; King, J. 2003. Postfire Erosional Processes in the Pacific Northwest and Rocky Mountain Regions. *Forest Ecology and Management* 178: 75–87.

Appendix A – Biomass Federal/State Policies

The following federal and state policies and resolutions have been developed to support the development of a biomass facility(s) in or near the Lake Tahoe Basin.

- The Healthy Forest Restoration Act of 2003 (H.R. 1904) encourages the accelerated adoption of technologies that use biomass and the establishment of small-scale business enterprises that make use of biomass (Title 3, Section 202).
- The Federal Energy Act of 2005 (P.L. 109-190) authorized the appropriation of federal subsidies for biomass development for a 10-year period (2006-2016). Specifically, it provides grants not to exceed \$20 per green ton (GT) of biomass to current operators of biomass facilities and grants for developing or researching biomass opportunities.
- The Western Governor’s Association adopted a resolution, the Clean and Diversified Energy Initiative, to develop 30,000 megawatts (MW) of clean and diverse energy by 2015 and accepted a set of recommendations to implement that recommendation in June 2006.
- California and Nevada passed renewable portfolio standards requiring energy producers and suppliers to include 20 percent and 15 percent, respectively, of renewable energy in the mix of available energy provided in those states.
- The Nevada Legislature's Task Force on Renewable Energy approved a resolution encouraging the beneficial use of biomass, which will be forwarded for adoption during the 2007 legislative session.
- In April 2006, Governor Schwarzenegger signed an Executive order reaffirming the 20 percent target for energy production and directed the Resources Agency and Energy Commission to coordinate efforts among state agencies to promote the use of biomass.
- In February 2007, Governor Gibbons signed an executive order supporting development of renewable energy and focusing on streamlining the permitting process.
- The USDA Forest Service recently drafted a woody biomass utilization strategy that focuses on providing sustainable supplies of materials, empowering entrepreneurial partnerships, using the best science and technology, and effective marketing (USDA Forest Service, January 9, 2007).

Appendix B – Cooperating Agency Letters of Support

California Tahoe Conservancy

California State Parks

Nevada Division of Forestry

Nevada Division of State Lands

Nevada Division of State Parks

Nevada Fire Safe Council

USDA Forest Service

Tahoe Regional Planning Agency

Tahoe Basin Fire Chiefs

 Fallen Leaf Fire Department

 Lake Valley Fire Protection District

 Meeks Bay Fire Protection District

 North Lake Tahoe Fire Protection District

 North Tahoe Fire Protection District

 South Lake Tahoe Fire Department

 Tahoe-Douglas Fire Protection District

CALIFORNIA TAHOE CONSERVANCY

1061 Third Street
SOUTH LAKE TAHOE, CA 96150
(530) 542-5580



September 24, 2007

To Whom It May Concern:

The California Tahoe Conservancy very much appreciates the efforts of the USDA Forest Service, Lake Tahoe Management Unit in leading the effort to develop the 10 Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan. The plan provides a solid framework for the coordinate effort to address fuels issues in the Tahoe Basin.

The California Tahoe Conservancy has been actively engaged in the development of the plan, which incorporates the Conservancy's Fuels Management efforts into the comprehensive plan.

The Conservancy fully support and endorse the goals and objectives of this Plan. We believe this will serve as a comprehensive framework from which all agencies involved in hazardous fuels reduction in the Lake Tahoe Basin can work together and coordinate their activities.

We look forward to participating in the implementation of this Plan and reducing the risk of wildfire in the Lake Tahoe Basin.

Sincerely,

A handwritten signature in cursive script that reads "Richard J. Robinson".

Richard J. Robinson
Natural Resources Program Manager



DEPARTMENT OF PARKS AND RECREATION

Ruth Coleman, Director

Sierra District
PO Box 266
Tahoma, CA 96142

August 15, 2007

To Whom It May Concern:

Over the past six months, the Sierra District of California State Parks has been actively engaged in the preparation, assemblage, and review of the 10 Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan. Prior to that, we developed plans for our jurisdiction which have now been incorporated into this Plan.

We fully support and endorse the goals and objectives of this Plan. We believe this will serve as a comprehensive framework from which all agencies involved in hazardous fuels reduction in the Lake Tahoe Basin can work together from and coordinate their activities. This Plan is an excellent example of the collaborative manner in which long range planning and work is proposed and carried out in the Lake Tahoe Basin.

We look forward to participating in the implementation of this Plan and reducing the risk of wildfire in the Lake Tahoe Basin.

Sincerely,

For Pam Armas

Pam Armas
Sierra District Superintendent
California State Parks

ALLEN BIAGGI, *Director*
Department of Conservation
And Natural Resources

JIM GIBBONS
Governor

PETE ANDERSON
State Forester Firewarden



STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
NEVADA DIVISION OF FORESTRY

2478 Fairview Drive
Carson City, Nevada 89701
Phone (775) 684-2500 Fax (775) 684-2570

8/23/2007

To Whom It May Concern:

Over the past six months, the Nevada Division of Forestry has been actively engaged in the preparation, assemblage, and review of the 10 Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan. Prior to that, we developed a separate plan for our jurisdiction which has now been incorporated into this Plan.

We fully support and endorse the goals and objectives of this Plan. We believe this will serve as a comprehensive framework from which all agencies involved in hazardous fuels reduction in the Lake Tahoe Basin can work together from and coordinate their activities. This Plan is an excellent example of the collaborative manner in which long range planning and work is proposed and carried out in the Lake Tahoe Basin.

We look forward to participating in the implementation of this Plan and reducing the risk of wildfire in the Lake Tahoe Basin.

A handwritten signature in black ink, appearing to read "Pete Anderson", written over a horizontal line.

Pete Anderson
State Forester Firewarden

ALLEN BIAGGI
Director

JIM GIBBONS
Governor

State Land Office
State Land Use Planning Agency
Nevada Tahoe Resource Team
Conservation Bond Program -Q1

Department of Conservation
and Natural Resources

PAMELA B. WILCOX
Administrator



Address Reply to

Division of State Lands
901 S. Stewart St. Suite 5003
Carson City, Nevada 89701-5246
Phone (775) 684-2720
Fax (775) 684-2721
Web www.lands.nv.gov

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Division of State Lands

8/22/2007

To Whom It May Concern:

Over the past six months, the Nevada Division of State Lands has been actively engaged in the preparation, assemblage, and review of the 10 Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan. Prior to that, we developed a separate plan for our jurisdiction which has now been incorporated into this Plan.

We fully support and endorse the goals and objectives of this Plan. We believe this will serve as a comprehensive framework from which all agencies involved in hazardous fuels reduction in the Lake Tahoe Basin can work together from and coordinate their activities. This Plan is an excellent example of the collaborative manner in which long range planning and work is proposed and carried out in the Lake Tahoe Basin.

We look forward to participating in the implementation of this Plan and reducing the risk of wildfire in the Lake Tahoe Basin.

A handwritten signature in blue ink, appearing to read "P. Wilcox", written over a horizontal line.

Pamela Wilcox
Nevada Division of State Lands Administrator

ALLEN BIAGGI
Director

Department of Conservation and
Natural Resources

JIM GIBBONS
Governor

Address Reply to:

901 S. Stewart Street, Suite 5005
Carson City, Nevada 89701-5248

Phone: (775) 684-2770
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stparks@parks.nv.gov
<http://parks.nv.gov>

STATE OF NEVADA



DAVID K. MORROW
Administrator

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF STATE PARKS

August 23, 2007

To Whom It May Concern:

Subject: Letter of Support

Over the past six months, the **Nevada Division of State Parks** has been actively engaged in the preparation, assemblage, and review of the 10-Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan. Prior to that, we developed a separate plan for our jurisdiction which has been incorporated into this Plan.

We fully support and endorse the goals and objectives of this Plan. We believe this will serve as a comprehensive framework from which all agencies involved in hazardous fuels reduction in the Lake Tahoe Basin can work together from and coordinate their activities. This Plan is an excellent example of the collaborative manner in which long range planning and work is proposed and carried out in the Lake Tahoe Basin.

We look forward to participating in the implementation of the 10-Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan and reducing the risk of wildfire in the Lake Tahoe Basin.

Sincerely,

A handwritten signature in black ink that reads "David K. Morrow".

David K. Morrow,
Administrator



Andrew List, Executive Director (775) 884-4455 nvfiresafe@charter.net
Terry Sumner, Executive Assistant (775)-884-4455 firesafeoffice@yahoo.com
Pat Murphy, Sierra Front (775) 267-2123 papamurph1110@charter.net
John Pickett, Tahoe Basin, California (775) 220-7675 firesafechapters@yahoo.com
Jason Arnold, Tahoe Basin, Nevada (775) 220-6000 nvfctahoebasin@yahoo.com
Jessica Mahnken, Tahoe Basin, Lake Valley(775) 577-3739 tahoesafe@sbcglobal.net
Mike McCarty, Northeastern Nevada (775) 744-2526 mmnfsc@hotmail.com
Kim Otero, Southern Nevada (702) 496-4114 nvfscsouth@mvdsl.com

Post Office Box 2724 Carson City, Nevada 89702
*Phone (775) 884-4455 * fax (775) 884-4457 * www.nvfsc.org*

December 3, 2007

Terri Marceron, Forest Supervisor
Lake Tahoe Basin Management Unit
35 College Drive
South Lake Tahoe, CA 96150

The Nevada Fire Safe Council, working with 30+ grass roots communities throughout the Lake Tahoe Basin, supports the *Lake Tahoe Basin Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy*. We believe that the plan and processes set forth in the strategy represent a multi-jurisdictional and unified approach to reducing the risk of catastrophic loss due to wildfires in the Lake Tahoe Basin.

As part of this strategy, the Nevada Fire Safe Council is dedicated to working with private landowners, fire protection districts and fire departments, and governmental entities to reduce fuels that increase the wildfire risk throughout the Basin and also educate the general public about the importance of fire prevention and creating defensible space within and around neighborhoods.

We look forward to the implementation phase of this plan and working with our private and public partners to fire safe the Lake Tahoe Basin.

Sincerely,

A handwritten signature in blue ink, appearing to read "A. List", is positioned above the typed name of the sender.

Andrew List, Executive Director
The Nevada Fire Safe Council



United States
Department of
Agriculture

Forest
Service

Lake Tahoe Basin Management
Unit

35 College Drive
South Lake Tahoe, CA 96150
(530) 543-2600

File Code: 5150-1

Date: August 14, 2007

To Whom It May Concern:

Over the past six months, Lake Tahoe Basin Management Unit of the U.S. Forest Service has been actively engaged in the preparation, assemblage, and review of the 10 Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan (Plan). Prior to that, we developed a Stewardship Fireshed Assessment (SFA) that lays out our 10 year strategy and program of treating hazardous fuels and improving forest health on the National Forest. This SFA has now been incorporated into this Plan.

We fully support and endorse the goals and objectives of this Plan. We believe this will serve as a comprehensive framework from which all agencies involved in hazardous fuels reduction in the Lake Tahoe Basin can work together from and coordinate their activities. This Plan is an excellent example of the collaborative manner in which long range planning and work is proposed and carried out in the Lake Tahoe Basin.

We look forward to participating in the implementation of this Plan and reducing the risk of wildfire in the Lake Tahoe Basin.

Sincerely,

TERRI MARCERON
Forest Supervisor



TAHOE REGIONAL PLANNING AGENCY

128 Market Street
Stateline, Nevada
www.trpa.org

P.O. Box 5310
Stateline, Nevada 89449

(775) 588-4547
Fax (775) 588-4527
Email: trpa@trpa.org

To Whom It May Concern:

Over the past six months, the Tahoe Regional Planning Agency (TRPA) has been actively engaged in the preparation, assemblage, and review of the 10 Year Lake Tahoe Basin Multi-Jurisdictional Comprehensive Fuels Plan. In 2004, the TRPA helped developed Community Wildfire Protection Plans with the Tahoe Basin Fire Protection Districts and in 2007 the TRPA produced the *Fuel Reduction and Forest Restoration Plan for the Lake Tahoe Basin Wildland Urban Interface*. These planning efforts have been incorporated into this Plan.

We fully support and endorse the goals and objectives of this Plan. We believe this will serve as a comprehensive framework from which all agencies involved in hazardous fuels reduction in the Lake Tahoe Basin can work together from and coordinate their activities. This Plan is an excellent example of the collaborative manner in which long range planning and work is proposed and carried out in the Lake Tahoe Basin.

We look forward to participating in the implementation of this Plan and reducing the risk of wildfire in the Lake Tahoe Basin

Sincerely,

A handwritten signature in black ink, appearing to read "John Singlaub", with a large, sweeping flourish at the end.

John Singlaub
Executive Director

Tahoe Basin Fire Chiefs

September 20, 2007

Ms. Terry Marceron
Forest Supervisor
Lake Tahoe Basin Management Unit
35 College Drive
South Lake Tahoe, Ca 96150

Subject: Letter of Support for the Lake Tahoe Basin Multi- Jurisdictional Fuels
Reduction and Wildfire Prevention Strategy.

Dear Supervisor Marceron,

Over the past eight months the Lake Tahoe Basin Fire Chiefs have been involved in the preparation, assemblage, and review process of the 10 Year Lake Tahoe Multi-Jurisdictional Comprehensive Fuels Plan. We support this plan with the following understandings.

The plan recognizes the importance of the Wildland-Urban Interface (WUI) as a priority. The Lake Tahoe Basin Chiefs believe the WUI around the urban areas of at least a quarter mile should be the priority for treatment and funding. These are the areas that would best protect lives, property, and where the highest densities of ignitions occur.

Secondly, the coordination with the CWPP's (Community Wildfire Protection Plan) is critical to the success of the plan for cost effective purposes.

Members:

Michael D. Brown, Fire Chief
North Lake Tahoe Fire PD
866 Oriole Way
Incline Village, NV 89451

Duane Whitelaw, Fire Chief
North Tahoe Fire PD
P.O. Box 5879
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Guy LeFever, Fire Chief
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Jeff Michael, Fire Chief
Lake Valley Fire PD
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Lorenzo Gigliotti, Fire Chief
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John Pang, Fire Chief
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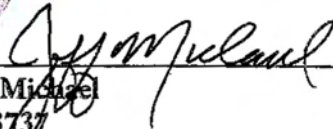
We suggest that all the cooperators sit down annually to discuss and prioritize fuels treatment project proposals to bring forward to the annual SNPLMA funding meetings for their funding application each year. The success of the plan will hinge on this cooperative approach.

Should you have any questions regarding this matter, please feel free to contact anyone of the following:


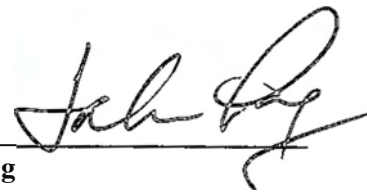




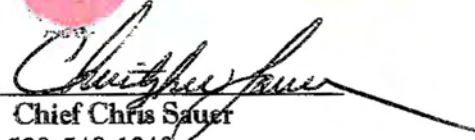
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