CSWA Central Stanislaus Watershed Analysis

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General Description

The Central Stanislaus Watershed Analysis (CSWA) is a large-scale ecosystem analysis document that provides recommendations to help guide future resource management in the center portion of the Stanislaus National Forest. CSWA addresses the biological, physical and social-cultural dimensions of the ecosystem across approximately 300,000 national forest acres consisting of five major watersheds. These watersheds have been subdivided into nine landscapes to comply with management direction in the Sierra Nevada Forest Plan Amendment (2001).

The CSWA watersheds and landscapes are as follows:

Watershed (5th field Hydrologic Unit Code)	Landscape(s)
Upper Middle Fork Stanislaus River (118,810 acres)	Sonora Pass (75,067 acres)
	Clark Fork (43,743 acres)
Lower Middle Fork Stanislaus River (107,204 acres)	Beardsley-Donnells (77,691 acres)
	Sand Bar (29,513 acres)
South Fork Stanislaus River (68,520 acres)	Pinecrest (28,346 acres)
	Lyons (40,174 acres)
Stanislaus River (31,143 acres)	Rose Creek (31,143 acres)
North Fork Tuolumne River (63,558 acres)	Dodge Ridge (29,742 acres)
	Duckwall (33,816 acres)

These watersheds and landscapes are in the center of the forest, trending east west along the State Highway 108 corridor, and include national forest and private lands from the western to the eastern boundaries of the Stanislaus National Forest. CSWA ranges in elevation from about 1,200 feet to almost 12,000 feet on the Sierra Nevada crest. The CSWA area includes all major vegetation types in the Sierra Nevada, represents the principal recreation and tourism corridor of the forest, contains substantial hydroelectric power generation and is complemented by a wide band of land managed as wilderness or near-natural along the crest of the Sierra.

Hydroelectric power projects licensed by the Federal Energy Regulatory Commission (FERC) that are found within the boundaries of CSWA include (1) the Spring Gap-Stanislaus Project in the Middle and South Forks of the Stanislaus River, owned by Pacific Gas and Electric Company (FERC #2130), (2) the Beardsley-Donnells Project on the Middle Fork Stanislaus River, owned by the Oakdale and South San Joaquin Irrigation Districts (FERC # 2005), and the Donnells-Curtis Transmission Line Project (#2118). The existing licenses for both projects expire at the end of 2004.

Purposes of CSWA

There are two principal purposes for the Central Stanislaus Watershed Analysis:

1. Ecosystem Management—To follow the intent of Forest Service policy regarding ecosystem sustainability, the Stanislaus National Forest established a program to delineate and prioritize forest watersheds for conducting ecosystem analyses. CSWA represents the first such analysis aimed at providing recommendations for future management at an appropriate ecosystem scale.

2. Hydroelectric Power Generation Relicensing—The CSWA boundaries were drawn to include watersheds that contain the three hydropower projects on the Stanislaus National Forest that were to begin the FERC relicensing process shortly after the start of the watershed analysis. Thus, CSWA was intended to provide a landscape-scale view of relevant ecosystem conditions and opportunities in advance of hydropower relicensing. The CSWA document provides the existing information analysis and supporting rationale for the Stanislaus National Forest 4(e) conditions for the Beardsley-Donnells, Spring Gap-Stanislaus hydropower projects and the Donnells-Curtis Transmission Line projects. The Stanislaus National Forest is also a participating member of the Stanislaus River relicensing process, a cooperative process between Pacific, Gas and Electric and Tri-Dam Project (more information can be obtained from the relicensing website: www.stanrelicensing.com).

CSWA Background

The Central Stanislaus Watershed Analysis grew out of the initial forest-wide effort at conducting ecosystem analyses begun in 1995. Analysis watersheds were delineated and prioritized and a schedule was established for completion of watershed analysis. Funding for analysis was provided in part by the national hydropower relicensing initiative that began in 1997. Forest funds supplemented the national effort and CSWA was initiated in late 1998.

The CSWA interdisciplinary team worked on the analysis while conducting other work priorities and attending to high priority emergencies such as wildfire. Public involvement was included during the analysis and helped frame the context for many of the CSWA recommendations.

At the time CSWA was initiated, the analysis scale was 5th field watersheds, or watersheds of approximately 40,000 to 250,000 acres. CSWA proceeded at that scale for the bulk of the analysis. However, the Sierra Nevada Forest Plan Amendment (SNFPA) of January 2001 provided additional direction for large-scale analyses. It set a hierarchy for analysis that included, in descending order of size, river basin, watershed and landscape scales. Since CSWA had begun at the watershed scale, it was complementary to subdivide it into landscapes. That step was done and formed the scale of the final analysis. Although CSWA began as a watershed analysis, it conforms to the scale recommendations for landscape analysis in the SNFPA. Thus, CSWA is both a watershed and landscape analysis.

The CSWA Document

Methods

The CSWA team adopted the Region 5 ecosystem management guide, *Sustaining Ecosystems, A Conceptual Framework* (Manley et el. 1995), for conducting this landscape analysis.

The strength of this methodology is that it is based on an ecosystem model that provides consideration for all dimensions of ecosystems—the physical, biological and social-cultural. The latter was a major consideration in the CSWA project due to the extensive tourism and commerce in the area. *Sustaining Ecosystems* provides an ecological base for producing the outcome of the analysis; that is, addressing ecosystem processes, components and structures and integrating their interrelationships into analysis recommendations.

The Central Stanislaus Watershed Analysis consisted of identifying key ecosystem elements, determining desired and existing conditions, developing management opportunities (from the difference or similarity between desired and existing conditions) and providing recommendations for achieving desired condition.

The CSWA team found the logic path in the *Sustaining Ecosystems* methodology clear and useful for integration of elements among resource management functions.

Products and Uses

The product of CSWA, as with other ecosystem analyses, is a set of recommendations to help guide future management by analyzing spatial and temporal scales appropriate for managing ecosystems. Watersheds and landscapes provide essential context to both smaller and larger scales. For example, ecosystem analysis can form the rationale for Forest Plan amendments as well as helping to determine important projects and priorities among them.

CSWA is not a decision document. It provides recommendations that may be used to guide later decisions. It is a plan-to-project effort, meaning that it complements the Forest Plan by providing additional information to help determine applicable resource management actions.

CSWA recommendations are provided for each of the nine landscapes.

The recommendations are divided into four principal categories: Potential Projects; Inventories and Monitoring; Plans, Analyses and Guides; and Forest Plan Amendments. Potential Projects are organized by seven resource subheadings: landscape scale vegetation management, patch/site scale vegetation management, soil productivity, aquatic/riparian, and recreation sites/activities, trails and roads and land acquisition.

The CSWA recommendations can be used to develop a program of work integrated across resource functions over a multi-year period. This includes project planning and amending or revising the Forest Plan.

User Guide

There are six chapters in the CSWA document. The first two set the stage for the remainder of the document. The succession of Chapters III, IV and V form the logic path leading toward the product of the document in Chapter VI. Chapter III describes the 30 desired conditions established for the CSWA area. Chapter IV describes the existing conditions across CSWA. Chapter V, the analysis of each of the nine CSWA landscapes, compares desired and existing conditions and provides management opportunities resulting from the comparison. The outcome of these three chapters is Chapter VI, Recommendations, presented by landscape and by category and subheading for each landscape.

Chapter VI may be read alone first if desired. However, to understand the rationale for the recommendations the preceding three chapters should be reviewed.

There is also an appendix section that houses reference information or refers the reader to its location. Due to the large volume of information used in CSWA much of it has been assigned to files, a substantial portion of which can be obtained via the forest's GIS data dictionary.

Relationship to Other Documents

The CSWA document is related to existing forest planning documents such as the Forest Plan, as amended, and future planning efforts at the project and Forest Plan scale. Specific documents wholly or partially in CSWA that bear a relationship include the Emigrant Wilderness Plan, the North District Ecosystem Management Analysis, the Motor Vehicle Plan Amendment and the Forest Service Roads Analysis Process.

Tasks Remaining

Ecosystem analyses should be considered living documents in that there is a continuous learning process about ecosystems. It is a certainty that more will be known in five or ten years than is now known. In that context, feedback from recommendations implemented should be used to update this analysis as time goes on. In addition, there are key tasks that remain to be done that were not completed due to time and funding considerations.

They do not substantively affect the utility of CSWA but are items that should be conducted in the near future.

1. **Continue to integrate Chapter VI recommendations.** The recommendations developed by synthesis of the CSWA team can still benefit by further integration. This should be done during annual District and/or Forest program of work planning. The most local management level is likely the best for such efforts.

2. **Establish priorities.** Priorities for projects, inventories and other further CSWA-related work are also best addressed at the most local level, and should follow further integration of CSWA recommendations among resource functions.

3. **Complete Roads Analysis.** The Forest Service Road Analysis Process should be completed. This process was established after CSWA was partially completed and it was determined at that time that fully conducting Roads Analysis would lead to substantial delays in completing CSWA. The framework for Roads Analysis has been established for CSWA, however, since the road inventory completed for CSWA includes all levels of classified roads plus all unclassified roads. In addition, substantial analysis of the roads inventory has been incorporated into CSWA at this time. In addition, a model process for conducting Roads Analysis was tested on two subwatersheds during the CSWA process.

Summary of Key Findings

The most common finding of CSWA is that none of the ecosystem elements analyzed meet desired conditions. Many elements are at desired condition in the portions of the CSWA area (i.e., wilderness and near-natural) while others are at desired condition in a portion of the area. *The overarching theme for the future of the CSWA landscapes is ecosystem restoration.*

The key findings described below are organized by the categories that appear in Chapter VI, Recommendations. A consolidated summary follows to provide perspective on the most important ecosystem features that should be addressed in the future.

Landscape Scale Vegetation Management

Landscape scale vegetation refers to the dominant forest vegetation across the landscape, often known as matrix lands, and includes both near-stream and upland areas. In CSWA, it largely means conifer forests, though oak and oak-grassland and sub alpine areas are present at the lowest and highest elevations.

With the combination of long-term fire suppression, restricted vegetation management across broad landscapes and historic emphasis on harvest of large trees, the existing condition of vegetation in much of the CSWA area below about 7,000 feet represents a substantial departure from desired condition.

Stand density exceeds thresholds of concern in a substantive portion of CSWA, especially at low and mid elevations. This creates a strong threat to forest health from insect and disease mortality as well as fire. Seral stage distribution is currently not at a condition favorable to restoration of Old Forest characteristics; there are too many stands with small trees that are growing minimally due to overstocking. Species composition is not at potential natural vegetation—there is too much white fir and not enough sugar pine, ponderosa pine and black oak.

These vegetative conditions have led to severe fire hazard potential in much of the CSWA area. The nine CSWA landscapes can be categorized into three groups of three each to illustrate the condition. Three adjacent low to mid elevation landscapes—Duckwall, Lyons and Dodge Ridge—have a combined high and very high fire hazard rating over about 80% of their land area. The Rose Creek, Sand Bar and Beardsley-Donnells landscapes have a high/very rating over about 50% of their combined area. Only the three high country landscapes—Pinecrest, Clark Fork and Sonora Pass—have a fire hazard rating that is at or near desired condition, with about 10% at a high/very high rating. Thus, two thirds of the CSWA landscapes have a high potential for large and severe wildfire.

This analysis involved looking beyond static fire hazard characteristics, to examining the current condition of the ecosystem with respect to potential natural vegetation and fire regime characteristics. Analyzing the landscape in this manner provides not only a "snapshot" of current fire hazard relative to other areas, but also provides a method to assess conditions relative to what is believed to have been the natural state of a particular area. As a result, desired condition and the departure from it can be determined more site-specifically, based on indicator values that are appropriate for a given area.

As a result of the CSWA vegetative conditions and fire hazard, wildlife habitat for Old Forest dependent species is not at desired condition and is at a high risk of loss by fire. Small and medium trees (less than 24" dbh) dominate the landscape; many in overstocked stands that are not growing at a normal rate toward the large tree size that constitutes desired habitat components. Many overstocked stands that are within spotted owl Protected Activity Centers (PAC's) have a very high fire hazard due to ladder fuels. Until trees are managed to allow accelerated growth and the fire hazard is reduced, old forest conditions will not suitably progress from existing toward desired conditions.

The condition of landscape scale vegetation, though poor from the tree stand, fire management and wildlife standpoint, represents an opportunity to integrate planning efforts among these resource programs to improve conditions. This will benefit the physical, biological as well as the social-cultural parts of the ecosystem, the latter by contributions to the local economy from conducting vegetative treatments that help move forest vegetation toward desired condition to benefit other resource values.

Patch/Site Scale Vegetation Management

Patches and sites are relatively small areas within the matrix lands; in CSWA these are typically meadows, aspen stands, springs, sites containing noxious weeds, etc.

There is a moderate to high frequency of meadows in the upper elevations of the CSWA area. Of the small percentage of meadows that have been assessed using current vegetative methods, less than 15% are at desired condition (high ecological status). Based on observations, it is estimated that many of the unmeasured meadows will rate at a moderate ecological status. While only a small percentage of meadows are at desired condition, there remains a good opportunity for improving the moderate status sites toward high in reasonable time.

Based on observation and limited inventory, the quaking aspen plant community is declining. It is a high priority to complete the inventory and restore degraded aspen stands.

True riparian plant species along some stream corridors have been suppressed over time as conifer cover has increased. This interrelationship with landscape scale vegetation presents an opportunity to improve both in the future.

Noxious weeds are increasing across the CSWA area and there is limited ability to control their spread. CSWA provides recommendations for intervention to minimize or prevent spread of existing populations and eradicate new populations upon discovery.

Soil Productivity

At the landscape level, soil productivity remains good but there are problem areas. The Wrights Creek subwatershed in the Dodge Ridge landscape, for example, remains noticeably degraded as a result of past fire and reforestation site preparation. Other sites with reduced soil porosity occur and numerous areas have roads constructed on sensitive soils that are severely eroding.

Aquatic/Riparian

Dams and diversions on large perennial streams have affected the streamflow regime across much of CSWA below about 7,000 feet by increasing vegetative density in tributary watersheds.

Streams with dams and diversions have dewatered some stream reaches while augmenting seasonal flow in other reaches. Any departure from natural flow regime has consequences, and the CSWA area is no exception. Alteration of stream channel morphology and riparian vegetation has occurred in gravel bed river reaches, and flow/temperature changes have altered habitat for sensitive native aquatic species.

The flow regime in watersheds without dams but with overstocked vegetation is changed especially in summer, as a result of increased plant transpiration reducing water available for streamflow. Modest decreases in flow reduce the opportunity for desired aquatic habitat and riparian vegetation to be achieved.

Stream channel morphology is altered in nearly all low-gradient stream reaches with fine-grained streambanks in CSWA. These reaches, mostly in meadows, are the most sensitive of any type of stream reach to disturbance. They have been directly impacted by grazing and recreation, and indirectly by other land uses such as roads, timber harvest and reforestation.

There are native aquatic species at risk throughout CSWA. In the lower elevations, the foothill yellow legged frog, western pond turtle and hardhead (a native warm water fish) have seen habitat reduced. In the high elevations, populations of the Yosemite toad and mountain yellow legged frog have been substantially reduced, the latter largely a result of fish stocking. Desired non-native fish are at or near desired condition due to stocking programs.

Water quality is excellent over the CSWA area with certain localized exceptions. CSWA provides recommendations for monitoring to determine current status of “hot-spot” areas with past or potential problems.

Recreation Sites and Activities

While recreation is an extremely important aspect of the social-cultural dimension of the CSWA area, there are numerous management problems in maintaining a desired user experience and providing for future demand.

Facility conditions are not at desired condition at many developed sites due to age and deferred maintenance from lack of funds. Forest Service presence at developed sites is a problem—many visitors report that they would like to know that a Ranger is present in the area for safety and forest information. Again, due to limited resources, presence of uniformed employees has decreased over time.

There are two principal developed recreation areas that are in demand of improvements—Pinecrest and the Herring Creek Reservoir area. Existing conditions and future demands for the Pinecrest Basin are being addressed in the Pinecrest Plan NEPA analysis at this time. The Herring Creek Reservoir area remains a legacy problem of overcrowding, inadequate camping and sanitation facilities, poor roads, and a small, unmanaged reservoir that is badly silted in.

Dispersed recreation sites were identified as part of the CSWA road inventory. The data reveal a wide variation in the number, clustering and condition of sites across CSWA. Improvements in the management of dispersed recreation are warranted.

Trails and Roads

The non-motorized trail network in CSWA is generally good and the analysis developed ways to improve the non-wilderness portion of it. One opportunity is the construction of the Old Mono Road trail between Pinecrest and Kennedy Meadows near the present Highway 108 alignment. A motorized trail network is present and CSWA has provided recommendations for improvements.

The road system in CSWA is excessive in many areas. Road density and stream crossings are too high relative to desired conditions in six of the nine landscapes. Some roads are built on highly erodible soils. Some road design standards acceptable when roads were built are now understood to be problems in many areas. Much of the road system is "hydrologically connected"; that is, road drainage is directly connected to streams. There are many opportunities to reduce road problems and at the same time lessen the backlog of maintenance that is currently under funded.

Animal and Plant Species

There is a need for more baseline information for certain animal and plant species of concern, particularly Forest Service Sensitive species. The CSWA team recommends inventory for forest carnivore, bats, amphibians and sensitive plants. Of particular concern is the increase in the number of occurrences of noxious weeds. A number of landscapes (primarily low elevation areas where wildfire has occurred in the past) are in unsatisfactory condition related to noxious weeds.

Land Acquisition

The CSWA team established a desired condition to acquire available non-federal lands that are of high ecological or recreational value. There are several small in-holdings that have been identified that will provide the opportunity for the forest to meet its mission of improving conditions for wildlife, scenic and recreational values.

Plans, Analyses and Guides

The CSWA team identified that the Forest fire management plan needs to be completed, that Roads Analysis for CSWA should follow this document, that road design guides and sensitive plant species guides should be developed, and that an interpretive/public information plan should be prepared and annually updated.

Land and Resource Management Plan Amendments

As a result of the CSWA team integrating ecosystem elements as a step in this analysis, it became apparent that some key plan amendments are necessary to achieve important desired conditions. The CSWA team recommends the following plan amendments:

1. Establish streambank stability standards and guidelines.
2. Establish large woody debris (LWD) standards and guidelines for streams.

Conclusion

The CSWA team developed 30 desired conditions for the physical, biological and social-cultural aspects of the analysis area. Comparing those with the existing conditions for each revealed that improvement opportunities are present in nearly all cases in some locations within CSWA. Moving the landscape toward desired condition is fundamental to ecosystem sustainability. In that context, paramount considerations include:

1. Landscape Scale Vegetation Management—It is essential to actively manage vegetation across the landscape to achieve a broad spectrum of desired conditions in all dimensions of the ecosystem.
2. Dams and Diversions—Adjustment of streamflow as an outcome of the hydropower relicensing process is necessary to maintain or restore conditions of favorable water flows for channel maintenance, riparian vegetation and native aquatic species.
3. Meadows and Aspens—Less than about 15% of meadows in CSWA are at desired condition when the combination of vegetative status and stream channel morphology is considered. Aspens are at risk. Management attention is needed in both these unique and valuable components of the CSWA ecosystem.
4. Roads—The excessive number of roads and road design problems that create resource damage need to be addressed as soon as practical.
5. Recreation—A projected increase in demand and aging facilities indicates that increased attention to developed and dispersed recreation management is highly warranted.
6. Forest Plan Amendments—Key vegetation management amendments are essential in order to progress toward watershed, wildlife, vegetative and fire management desired conditions.

Chapter I: Introduction

In 1995 the Stanislaus National Forest adopted the use of ecosystem management principles for planning purposes. The Forest chartered a team to (1) delineate landscapes forest wide, (2) propose a methodology for conducting landscape assessments, (3) develop criteria for prioritizing landscape assessments over time, and (4) estimate costs for conducting two landscape assessments in fiscal year 1996. Eleven watersheds were delineated as landscapes within the forest boundary. The Region 5 ecosystem management guide, *Sustaining Ecosystems, A Conceptual Framework* (Manley et el. 1995) was adopted as the preferred methodology to use when conducting landscape assessments. The team further identified the South Fork Stanislaus and North Fork Tuolumne as #1 priority and Lower North Fork Stanislaus and Lower Middle Fork Stanislaus as #2 priority for assessment for the following reasons:

South Fork Stanislaus and North Fork Tuolumne—These two watersheds are adjacent to each other and share significant issues such as dense vegetation, wildlife and watershed concerns, and fire, recreation and economic issues along the Highway 108 corridor. Other preliminary ecosystem management work had been done in these watersheds (North District and Herring Creek Ecosystem Management Analyses). The Wrights Creek plantation work and Westside/Lower Hull/Upper Hull range allotments were within the North Fork Tuolumne watershed.

Lower North Fork Stanislaus and Lower Middle Fork Stanislaus—Including the urban interface along Highway 4, the Lower North Fork Stanislaus was chosen for economic and safety reasons. Both watersheds contain dense vegetation and a high wildfire risk.

In 1998, the Stanislaus National Forest initiated its first large-scale landscape analysis—the Central Stanislaus Watershed Analysis (CSWA). Some changes were made to the preliminary landscape schedule described above. Three watersheds were included in the CSWA landscape area: The South Fork Stanislaus and North Fork Tuolumne and the entire Middle Fork of the Stanislaus River (for planning purposes divided into the Lower and Upper Middle Fork Stanislaus River). The Lower North Fork Stanislaus River was dropped in favor of the Upper Middle Fork Stanislaus River because of upcoming relicensing of three hydroelectric projects. Within the Stanislaus River watershed, two hydroelectric projects would be renewing their Federal Energy Regulatory Commission (FERC) license in 2005: Beardsley-Donnells and Spring Gap-Stanislaus (which includes Pinecrest Lake, Relief Reservoir and the Philadelphia Ditch). A third project, the Donnells-Curtis Transmission Line was also being relicensed. The Forest Leadership Team saw an opportunity to address the hydropower relicensing in a holistic manner, using ecosystem management principles.

Location and Size

The Central Stanislaus Watershed Analysis (CSWA) area is located in the center of the Stanislaus National Forest. In turn, the Stanislaus National Forest is located in the Sierra Nevada Mountains in central California, due east of the San Francisco Bay area (Refer to Map 1 at the end of this chapter). The analysis area includes the watersheds of the Middle Fork Stanislaus River, South Fork Stanislaus River, a portion of the Stanislaus River and the North Fork Tuolumne River. The watershed area is bounded geographically by the following features: to the north by the watershed divide that separates the North and Middle Forks of the Stanislaus River; to the west by the National Forest boundary; to the south by Dodge Ridge; and to the east by the crest of the Sierra Nevada. The analysis area is approximately 389,000 acres in size. Elevations range from 2,000 to 12,500 feet. Portions of the Carson-Iceberg and Emigrant Wilderness areas are also located in the CSWA area.

Spatial Subdivisions

The CSWA area is further divided into nine landscapes: Beardsley-Donnells, Clark Fork, Dodge Ridge, Duckwall, Lyons, Pinecrest, Rose Creek, Sand Bar, and Sonora Pass. Map 2 (at the end of this chapter) shows the outlines of these landscapes within the Central Stanislaus Watershed Analysis area boundary. Landscapes range in size from approximately 28,000 to 78,000 acres (see land use allocation section below for more accurate acreages).

These landscapes provide the boundary for landscape analysis, as described in the Sierra Nevada Forest Plan Amendment (2001). The objectives of landscape analysis are to:

- Establish a consistent, landscape-wide context for maintaining or restoring ecological conditions that provide the desired levels of resources, such as clean water, clean air, plant and animal community diversity, and species viability, consistent with regulatory requirements and ongoing policies;
- Identify opportunities in a watershed landscape context for site-specific environmental analysis;
- Identify opportunities for reducing risks and hazards, such as those associated with catastrophic wildland fires in the Sierra Nevada; and
- Facilitate program and budget development by identifying priorities for cultural, social, economic, and ecological needs in watersheds.

Land Ownership

Eighty-six percent of the analysis area is public land managed by the Forest Service. Of the 14% private, 5% is owned by Sierra Pacific Industries. Table 1 below shows the distribution land ownership.

Table 1. Land Ownership

Landscape	Land Ownership (Acres)			Total Acres
	National Forest	SPI	Other Private	
Beardsley-Donnells	74,317	3,268	103	77,688
Clark Fork	43,713	0	31	43,744
Dodge Ridge	22,240	129	7,374	29,743
Duckwall	20,052	5,712	8,054	33,818
Lyons	27,490	3,385	9,300	40,175
Pinecrest	28,345	0	0	28,345
Rose Creek	22,815	1,584	6,843	31,242
Sand Bar	22,006	6,991	513	29,510
Sonora Pass	73,835	0	1,230	75,065
Total	334,813	21,069	33,448	389,330
Percent	86%	5%	9%	100%

Land Use Allocations

Land use allocations were identified and acreages calculated for the Central Stanislaus Watershed Analysis area. Table 2 lists applicable land allocations for the CSWA area landscapes with corresponding acreages, from the Forest Plan (1991, 2001). Map 3 (at the end of this chapter) displays the land allocations. (Acreages are subject to change when project planning occurs.)

Table 2. Land Use Allocations

Landscape	Old Forest Emphasis (Acres)	Urban Intermix		Spotted Owl PACs (Acres)	Goshawk PACs (Acres)	Great Grey Owl PACs (Acres)
		Threat Zone (Acres)	Defense Zone (Acres)			
Beardsley-Donnells	46,642	1,801	1,170	7,021	1,621	0
Clark Fork	25,176	0	487	909	126	0
Dodge Ridge	9,262	12,881	7,168	3,217	465	0
Duckwall	9,294	11,691	1,940	2,092	263	0
Lyons	14,246	18,655	5,766	4,876	444	75
Pinecrest	15,697	600	530	633	206	221
Rose Creek	3,774	14,768	3,377	3,467	282	0
Sand Bar	6,859	7,753	600	4,008	866	0
Sonora Pass	25,140	0	2,704	910	830	99
Totals	156,090	68,149	23,742	27,133	5,103	395

Chapter II: Watershed Analysis Process

Ecosystem Analysis Process

The Forest Service Region 5 ecosystem analysis process described in *Sustaining Ecosystems: A Conceptual Framework* (Manley et. al. 1995) was used for the Central Stanislaus Watershed Analysis.

The process described in this guidebook involves the steps listed below. The chapter where each of these steps is documented is also shown.

Step		Chapter
1	Select a Landscape to Analyze	I
2	Select Key Ecosystem Elements and Environmental Indicators	II
3	Define Desired Condition	III
4	Determine Existing Condition	IV
5	Compare Desired Condition to Existing Condition	V
6	Identify Opportunities to Approach Desired Condition	V
7	List Potential Projects	VI

An extensive public involvement process occurred between October 1998 and July 1999. (A summary of the public involvement process is shown in Appendix C.) The first step was to identify those people interested in being involved. A letter was mailed to all homeowners and permit holders within the CSWA boundary and others who had previously expressed an interest in Stanislaus National Forest land management. A series of public meetings (in Sonora, Modesto and San Ramon) and field trips were held; a CSWA website was established and periodic updates were sent to those on the mailing list. Altogether the mailing list included 745 people; over 300 people attended public meetings; and over 120 people attended field trips. Hundreds of comments were received. Approximately half (duplicates are not included) of the comments are included in Appendix C to give the reader an idea of the range of interests and positions expressed by those who attended our public meetings. The CSWA team incorporated public desires as much as possible while also following the law and agency policy.

Ecosystem Elements

Using the *Conceptual Framework* (Manley et al. 1995) as a guide, the Central Stanislaus Watershed Analysis Team identified the key ecosystem elements for the CSWA area. Ecosystems can be described in terms of their components, structures, and processes that can be broken down into ecological elements. Key ecological elements are the elements over which management and society have an influence. Those elements affected by humans are candidates for analysis and monitoring. These form the basis for evaluating the effects of management on ecosystem sustainability.

Environmental indicators are the various ways to measure each key ecological element. The same environmental indicators will be used and tracked throughout ecosystem analysis and project planning to:

- Provide the basis for reference variability,
- To quantify desired condition,
- To assess the impacts of proposed projects in the NEPA process,
- Test the validity of selected key ecological elements in reflecting ecosystem processes and links, and
- See if an area is moving toward desired condition.

Table 3 lists the key ecosystem elements for the Central Stanislaus Watershed Analysis area.

Table 3. List of Key Ecosystem Elements

Ecological Hierarchy	Key Ecosystem Element
Hydrologic	▪ Aquatic Animals ▪ Large Woody Debris in Streams ▪ Sediment ▪ Stream Channel Morphology ▪ Water Quality ▪ Water Quantity
Terrestrial	▪ Fire ▪ Plant Species ▪ Soil Productivity ▪ Terrestrial Animal Species ▪ Vegetation Mosaic
Social-Cultural	▪ Economics ▪ Information and Education ▪ Land Use

Definitions of Key Ecosystem Elements

Hydrologic Hierarchy

Aquatic Animals	The presence, abundance, distribution and population demography of aquatic animal species (if available) are described here. Aquatic species of interest to the CSWA area include amphibians (Yosemite toad, mountain yellow-legged frog, foothill yellow-legged frog, red-legged frog) and fish (Lahontan cutthroat trout, rainbow trout and hardhead).
Large Woody Debris in Stream (LWD)	This is the amount and size (diameter, length or volume) of large wood within a stream channel introduced from the surrounding vegetation, for example, root wads, logjams and logs.
Sediment	Sediment is the product of soil erosion that makes its way into water.
Stream Channel Morphology	Land management activities and natural events can change the structure (i.e. morphology) of the channel. The channel structure influences water movement and habitat structure. It is also influenced by erosion and flooding.
Water Quality	Water quality includes the physical, biological and chemical properties of the water.
Water Quantity	Refers to the distribution, flow and quality of water across the landscape. The focus for the CSWA area is flow of water, especially as it relates to the operation of the hydroelectric facilities.

Terrestrial Hierarchy

Fire	Fire, whether ignited by man or nature, can alter many components, structures and processes of ecosystems. The influence of fire is estimated by measuring its distribution, frequency, return interval, predictability, area and magnitude over time.
Plant Species	The defining attributes of this element include species, plant communities, seral stage development, life form, density and cover. Species of interest in the CSWA area are listed in Appendix E.
Soil Productivity	Soil productivity is important in establishment and maintenance of sustainable plant and animal communities. It includes soil stability and erosion.

Terrestrial Animal Species Mammals, birds, amphibians, reptiles and insects are examples of animal species evaluated in this element. Species of interest within the CSWA area are: great gray owl, northern goshawk, spotted owl, peregrine falcon, bald eagle, American marten, fisher, wolverine, red fox, and mule deer.

Vegetation Mosaic The pattern of vegetation on the landscape over time. Vegetation mosaic is a key ecosystem element when determining habitat suitability for animal species. Plant communities can be used as indirect measures of biological diversity and habitat suitability.

Social/Cultural Hierarchy

Economics For the purposes of this watershed analysis, economics is the process by which people use resources to make a living. Examples specific to the CSWA area include: harvest of forest products (timber, mushrooms, lady bugs); hunting and fishing; tourism; outfitting/guiding; organized camps and resorts; mineral extraction; and ski areas.

Information & Education This element includes the flow of information and corollary process of education.

Land Use This element can best be described by looking at the pattern/structure of human communities across a landscape. Within the CSWA area, note the settlement pattern of communities along the Highway 108 corridor or the recreation use patterns within the area.

Environmental Indicators

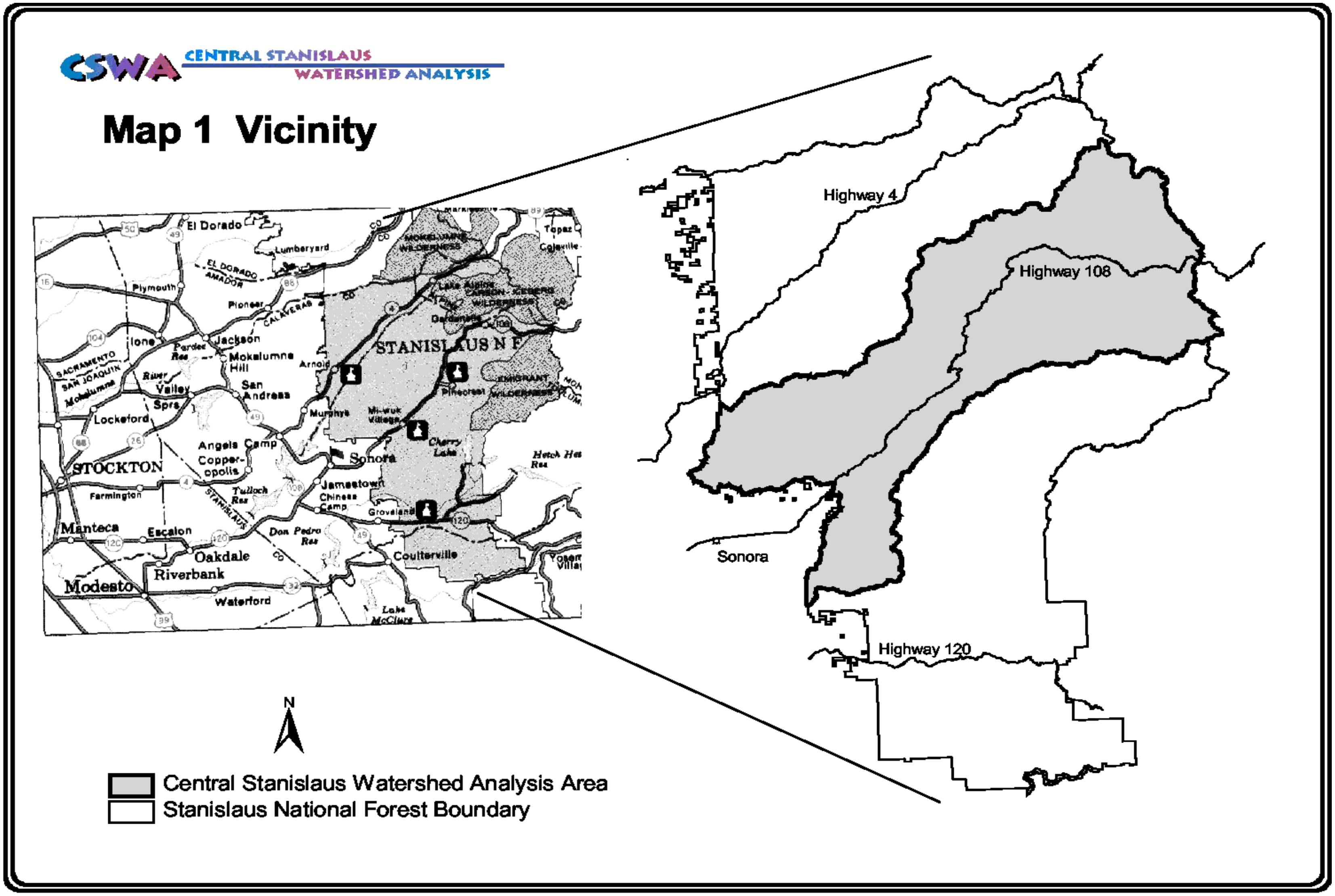
As stated previously, environmental indicators are measurable. The environmental indicator is dependent on the scale of the analysis and the questions to be answered. Listed below in Table 4 are the environmental indicators chosen to represent the key ecosystem elements.

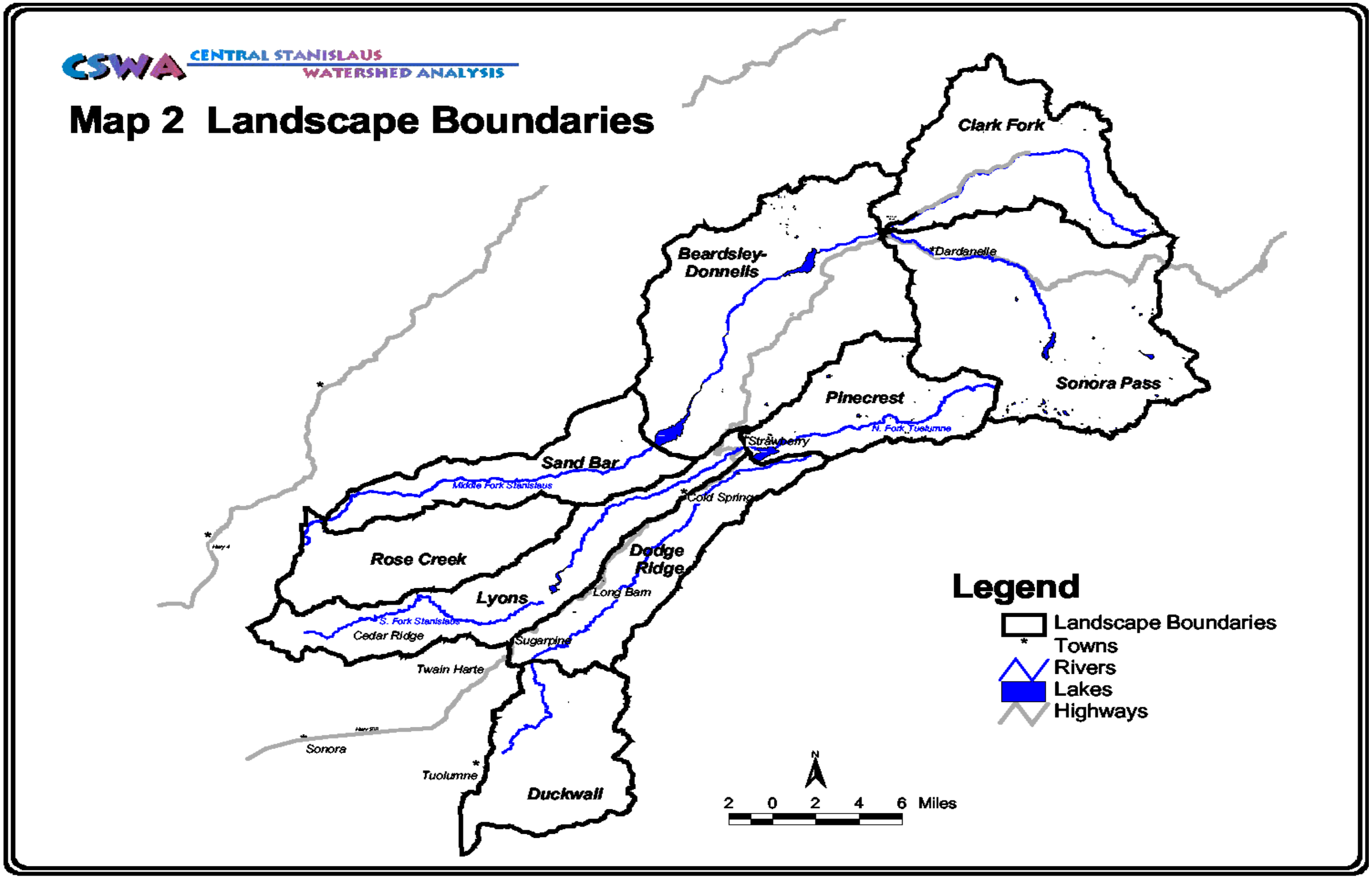
Table 4. Key Ecosystem Elements and Environmental Indicators

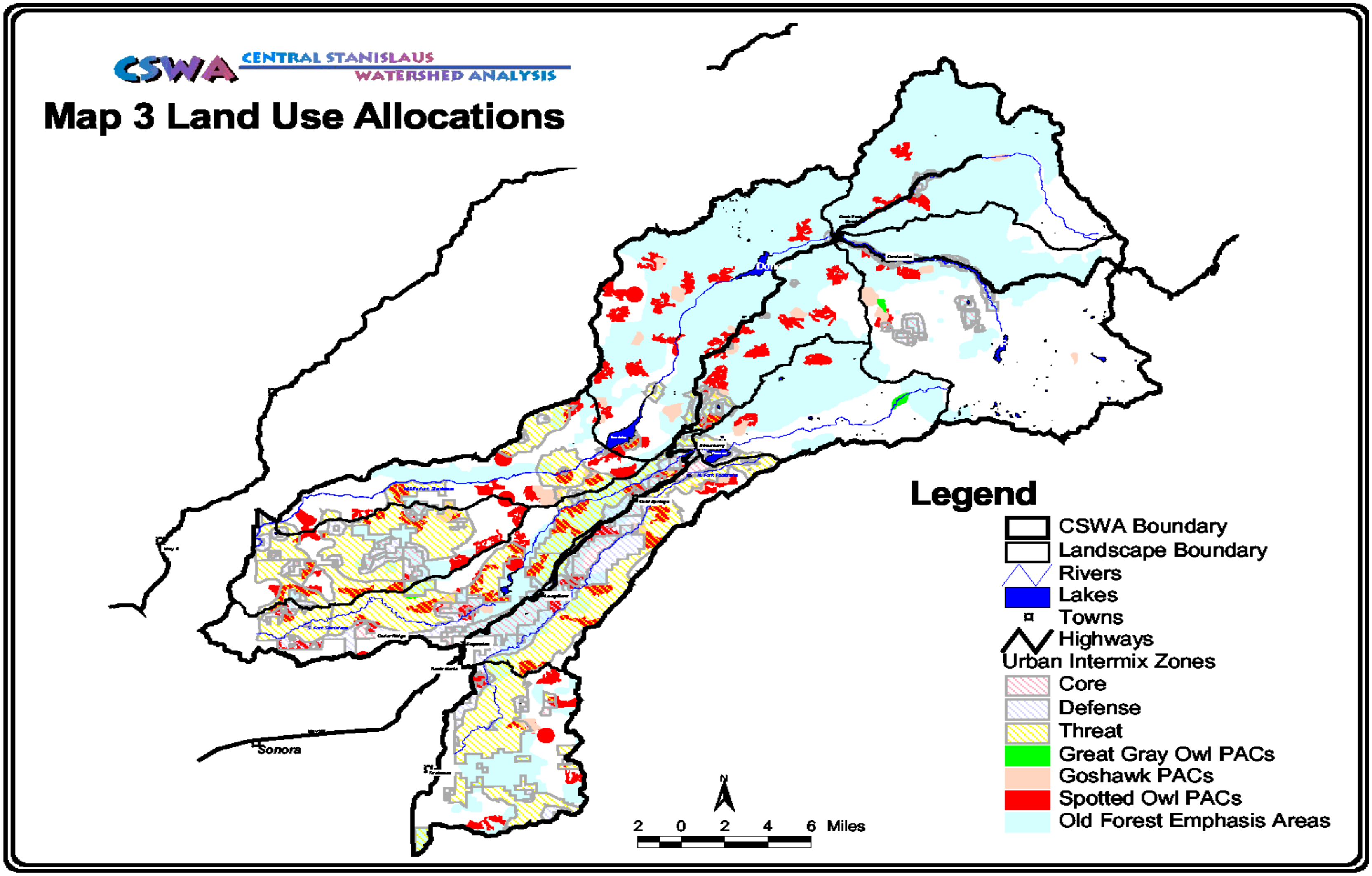
Key Ecosystem Element	Environmental Indicators
Aquatic Animals	▪ Native aquatic species: mountain yellow-legged frog, foothill yellow-legged frog, western pond turtle, Yosemite toad, limestone salamander, relictual slender salamander, hardhead, and rainbow trout ▪ Waterfowl (wood duck, merganser, and mallard) and

Key Ecosystem Element	Environmental Indicators
	raptors (osprey) ▪ Aquatic macro invertebrates ▪ Lahontan cutthroat trout ▪ California red-legged frog
Economics	▪ Recreation Use (Recreation Visitor Days) ▪ Employment Related to Ecosystem Management Activities ▪ Sierra Business Council Natural Capital Quality of Life Indicators
Fire	▪ Fire Regime Condition Class ▪ Potential Fire Effects ▪ Fire Hazard ▪ Suppression Effectiveness ▪ Crown Fire Potential
Information and Education	▪ User Preferences ▪ Interpretive Services Offered ▪ Interpretive Program Implementation ▪ Written and Oral Information ▪ Visitation Standards ▪ Conservation Education
Land Use	▪ Identified Properties ▪ Level 1, Level 2 or Unclassified Roads Retained ▪ Level 1, Level 2 or Unclassified Roads Decommissioned. ▪ Roads Maintained ▪ Community-linked Trails ▪ Motorized and Non-motorized Trails Outside Wilderness ▪ Motorized and Non-motorized Trails Maintained ▪ User Preferences ▪ Population Demographics ▪ Facility Occupancy ▪ Facility Condition ▪ Facilities and Activities Financed
Large Woody Debris in Stream	▪ Large Woody Debris
Plant Species	▪ Noxious Weeds and Undesired Invasive Plants ▪ Established Noxious Weeds and Undesired Invasive Plant Populations ▪ Traditional Plant Populations ▪ Traditional Plant Populations Restored ▪ Traditional Plant Populations Maintained ▪ TES Plant Species

Key Ecosystem Element	Environmental Indicators
Sediment	▪ Particle Size Distribution ▪ Pool Depth ▪ Roads ▪ Wildfire
Soil Productivity	▪ Soil Porosity ▪ Large Downed Woody Material ▪ Evidence of Soil Organisms ▪ Topsoil ▪ Surface Organic Matter ▪ Surface Cover—Hillslopes ▪ Surface Cover—Riparian Conservation Areas
Stream Channel Morphology	▪ Channel Classification ▪ Width-to-Depth Ratio ▪ Streambank Stability ▪ Streambank Angle
Terrestrial Animal Species	▪ Peregrine falcon, great gray owl, willow flycatcher, old Forest associated species (California spotted owl, northern goshawk, Pacific fisher, American marten, Sierra Nevada red fox, wolverine), mule deer, bats ▪ Habitat for species listed above ▪ Bald eagle ▪ Valley elderberry longhorn beetle
Vegetation Mosaic	▪ Potential Natural Vegetation (PNV) ▪ Species Composition ▪ California Wildlife Habitat Relationship (CWHR) Size Class ▪ Stand Density Index ▪ Meadow Vegetation ▪ Streamside and upland true riparian trees and shrubs
Water Quality	▪ California Central Valley Regional Water Quality Control Board Regulations ▪ Acid Neutralizing Capacity ▪ Municipal Water Supplies
Water Quantity	▪ Streamflow ▪ Aquatic Species Habitat ▪ Infiltration ▪ Evapotranspiration


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map 1 Vicinity
Highway 4
Highway 108
Highway 120
Sonora
STOCKTON
Modesto
Manteca
Oakdale
Riverbank
STANISLAUS N F
Central Stanislaus Watershed Analysis Area
Stanislaus National Forest Boundary


CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map 2 Landscape Boundaries
Clark Fork
Beardsley-Donnells
Dardanelle
Sonora Pass
Pinecrest
N. Fork Tuolumne
Strawberry
Sand Bar
Middle Fork Stanislaus
Cold Springs
Rose Creek
Dodge Ridge
Lyons
Long Barn
S. Fork Stanislaus
Cedar Ridge
Sugarpine
Twain Harte
Sonora
Tuolumne
Duckwall
Legend
Landscape Boundaries
Towns
Rivers
Lakes
Highways
N
2 0 2 4 6 Miles


CSWA CENTRAL STANISLAUS WATERSHED ANALYSIS
Map 3 Land Use Allocations
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Urban Intermix Zones
Core
Defense
Threat
Great Gray Owl PACs
Goshawk PACs
Spotted Owl PACs
Old Forest Emphasis Areas
2 0 2 4 6 Miles
N
Sonora

Chapter III: Desired Condition

Introduction

This chapter lists the desired condition statements for the key ecosystem elements for the Central Stanislaus Watershed Analysis area as a whole. Indicators and measures further define and add detail to the desired condition statements. Throughout the document we organize the desired condition statements by hierarchy (Hydrologic, Terrestrial, Social-Cultural) followed by an alphabetical listing of key ecosystem elements.

Desired Condition Statements

Hydrologic Hierarchy

Aquatic Animals

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Indicator:	Measures:
Native aquatic species: mountain yellow-legged frog, foothill yellow-legged frog, western pond turtle, Yosemite toad, Mt. Lyell salamander, relictual slender salamander species complex, hardhead, and rainbow trout	▪ Presence/successful breeding *[animals per unit area of stream surveyed (frequency), # animals in different size classes]*. ▪ Historically occupied amphibian habitat is currently occupied.
Waterfowl (wood duck, merganser, and mallard) and raptors (osprey)	▪ Nest sites are occupied and successfully fledge young (% nest sites).
Aquatic macro invertebrates	▪ Populations are healthy *(≥80% of Biotic Condition Index (BCI) attained for all streams, ≥ 90% BCI attained for streams within designated wilderness).*

Rationale for Desired Condition, Indicators and Measures

Under the National Forest Management Act of 1976 (16 U.S.C. 1604) and 36 CFR 219.19 the Forest Service is required "to maintain viable populations of existing native and desired non-native vertebrate species". Forest Service Manual (FSM) 2672.1 provides specific direction for Forest Service Sensitive species. These species "must receive special management emphasis to ensure their viability". Code 36 CFR 219.19 goes further to state that " a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed". In addition, the Sierra Nevada Forest Plan Amendment (USDA 2001) includes an aquatic management strategy to "retain, restore, and protect the processes and landforms that provide habitat for aquatic and riparian dependent organisms." This is identified under Aquatic Management Strategy goals 2, 3, and 4 and Riparian Conservation Objectives 1 to 6.

The species chosen as indicators are either Forest Service Sensitive species, which require special management emphasis, or species that are affected negatively by management actions. As part of maintaining viable populations, any adverse species interaction with non-native species (as measured by native species presence and successful breeding) will be minimized.

Native aquatic species—For native amphibian and fish species, we will measure our progress in reaching this desired condition by (1) surveying and monitoring for species presence and successful breeding, and (2) comparing areas of historically occupied habitat with currently occupied habitat. Current survey protocols do not allow establishment of absence, however the data obtained (numbers per unit area, numbers by size class) can be compared to numbers from other similar streams in which the species is found. These other streams may be reference streams (streams which lack certain activities found within the stream of interest), or streams with similar activities and attributes. At this time some of these comparison areas have been surveyed, and many have not been surveyed. Therefore there is a data gap of survey information for streams within CSWA, as well as comparison streams outside CSWA. The overall landscape distribution pattern for each species, as required by 36 CFR 219.19, is shown by the comparison between currently and historically occupied habitats. Historically occupied habitat is found in Jennings and Hayes (1994), who completed an extensive search of museum records and literature to develop a database of historic occupancy for amphibian and reptile species of concern in California.

Waterfowl and Raptors—Waterfowl and osprey are native species directly tied to aquatic habitats. Viability of these species has not been identified as an issue, and the species are not currently designated as Forest Service Sensitive species. These species can be affected by operations of the hydropower projects on the Middle Fork and South Fork of the Stanislaus River. The unit of measure is known nest sites (from historical records) occupied and successfully fledging young.

Aquatic macro invertebrates—Aquatic macro invertebrates are indicators of the health of a stream, including habitability and strength of the aquatic food chain.

The Stanislaus National Forest Land and Resource Management Plan (USDA 1991) lists monitoring of aquatic macro invertebrates as a monitoring activity to determine the status and trend of stream ecosystems. In the past, the Forest Service has used the concept of Biotic Condition Index (BCI) to rank each stream sampled. The BCI is determined using physical factors of the stream. This index is composed of values that the macro invertebrates can obtain in an un-degraded condition. The results of the survey are then compared to the BCI. The range of variability or reference variability for this measure is not currently known. We will therefore use a management variability of greater than or equal to 80% BCI for all streams outside wilderness areas, and greater than or equal to 90% BCI for all streams within designated wilderness. The management variability will be adjusted as more information becomes available. In addition, Region 5 is currently developing a new technique for aquatic macro invertebrate monitoring. This method will be adopted when it is finalized.

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Indicators:	Measures:
Lahontan cutthroat trout	▪ Habitat is high quality as described in the habitat capability model and populations are maintained.
California red-legged frog	▪ Habitat is suitable and recovery plan objectives are followed.

Rationale for Desired Condition, Indicators and Measures

For threatened and endangered species the Forest must meet the requirements of the Endangered Species Act (16 U.S.C. 1531 – 1544). Under the Endangered Species Act the Forest Service is required to "insure that any action authorized, funded, or carried out…is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined…to be critical." Lahontan cutthroat trout and California red-legged frog are both listed by the United States Fish and Wildlife Service as Threatened, therefore they were chosen as indicators.

The Stanislaus National Forest Land and Resource Management Plan (USDA 1991) direction is to maintain high quality habitat for Lahontan cutthroat trout according to the habitat capability model. The Recovery Plan for the Lahontan Cutthroat Trout (USDI 1994) identifies all existing populations as essential to recovery. Under the recovery plan we are required to manage and monitor populations in locations that occur outside the normal range of the species, such as the population at Disaster Creek.

California red-legged frog was listed in 1996. The Recovery Plan is not finalized at this time. The Forest will continue to survey for the species and will protect suitable habitat by following the recovery plan when it is issued. Portions of the analysis area are within designated critical habitat (USDI 2001) for this species.

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Indicator:	Measures:
Large Woody Debris (LWD)	▪ Minimum No. LWD pieces per 100 meters:

	Rosgen Bankfull Width		
Channel Type	<6m (20 ft)	6-12m (20-40 ft)	>12m (>40ft)
A	4-6	N/A	N/A
B	7-9	5-7	3-5
C	4-6	2-4	1-2

Rationale for Desired Condition, Indicator and Measures

Large Woody Debris (LWD) is an important component of stream ecosystems. It influences the morphology of many streams and provides aquatic and riparian habitat complexity. It is valuable for distribution of bed load and formation of pools in some streams. It provides cover for fish and habitat for amphibians and insects.

The Sierra Nevada Forest Plan Amendment (USDA 2001) provides direction to manage LWD as described in Aquatic Management Strategy goals 2 and 3, and Riparian Conservation Objective 3. (Note: the Sierra Nevada Forest Plan Amendment refers to LWD as Coarse Woody Debris). The Sierra Nevada Forest Plan Amendment supersedes direction in the Stanislaus National Forest Land and Resource Management Plan related to Large Woody Debris.

Although there is often a wide size class distribution of wood in streams, coarse woody debris (LWD) is used as the indicator. It is relatively stable, easily measured and provides substantial diversity of materials in stream systems. LWD is downed wood that is at least ½ bankfull width with any portion in or above the bankfull dimensions of the channel.

The quantity of LWD in streams usually varies by stream type and width. Steep streams generally transport wood to moderate gradient streams where it tends to accumulate. As stream width increases the number of pieces decreases because wood cannot anchor as frequently as in narrow streams. LWD is also highly variable along streams, accumulating in places where it is most easily deposited such as constrictions and bends. It is unusual to find large wood evenly distributed along streams. Rather it often accumulates in groups, or aggregates.

The desired frequency of wood in streams is usually described in number of LWD pieces per 100 meters. Because LWD distribution is highly variable along streams, obtaining a representative sample is best done over long reaches or by sub-watershed; whichever is deemed most appropriate to the setting. And because of the variability of LWD, the values recommended here should be considered for revision over time as more data are collected. Measures for wide A-type channels are not given, since these widths infrequently occur.

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Indicators:	Measures:
Roads	▪ At the sub-watershed scale, hydrologically connected road segments are less than .25 miles per square mile; road density is less than 2.5 miles per square mile; and there is less than 1 stream crossing per mile of stream.
Wildfire	▪ Fire hazard rating is low over >50% of the landscape with <25% high and very high.
Particle Size Distribution	▪ In streams with dams and diversions, the particle size distribution is similar to comparable unimpaired flow streams. In streams without dams and diversions, the particle size distribution has a high similarity to comparable streams that show minimal or no effects of management activities.

Indicators:	Measures:
Pool Depth	▪ In streams with dams and diversions, residual pool depth is similar to comparable unimpaired flow streams. In streams without dams and diversions, residual pool depth should be highly similar to comparable streams that show minimal or no effects of management activities.

Rationale for Desired Condition, Indicators and Measures

Sediment is a component of stream channels resulting from erosion and streamflow processes. The delivery, transport and deposition of stream sediment affect stream morphology and consequently aquatic habitat and species, riparian vegetation and floodplain condition. While stream sediment deposition and transport varies annually, the sediment regime should remain generally balanced across decades. Streams with moderate sediment loads are usually preferred over those with excessive or suppressed quantities. Excessive sediment loading aggrades streambeds, creating an undesirable particle size distribution and streamflow stress on streambanks that often leads to bank instability. Sediment-limited streamflow carries more energy, scouring streambeds, streambanks and altering particle size distribution.

The Organic Administration Act of 1897 authorizes the Forest Service to manage conditions of water flows for channel maintenance, of which sediment regime is a component. The Sierra Nevada Forest Plan Amendment (2001) provides direction to manage sediment regimes as described in Aquatic Management Strategy goals 1, 8 and 9, and Riparian Conservation Objectives 1and 4. California water quality objectives require sediment to be adequately managed. The Federal Energy Regulatory Commission considers the effect of hydroelectric projects on sediment regime. National Roads Analysis policy recommends improved road management to decrease road effects on watershed values. Public participation during the development of CSWA generated numerous comments related to reducing sediment from roads, fire and related activities.

The principal sources of sediment delivery to streams at the landscape scale are roads, wildfires and their connected management features and activities. Roads increase watershed drainage density and thus provide additional conduits for sediment delivery. Wildfires result in immediately reduced ground cover and water repellent soil, both of which contribute to increased erosion and sediment delivery until vegetative recovery occurs.

Sediment from roads can originate from unclassified as well as classified roads. Features associated with roads that can accelerate sediment delivery include landings, skid trails, dispersed recreation sites and roads with inside ditches or improperly engineered culverts. Wildfires usually result in subsequent salvage harvest and reforestation, which can result in prolonged sediment delivery to streams. Other management related sediment sources, such as from past timber harvest and grazing, are more localized in effect and can be addressed at the project scale.

Roads and wildfire also affect streamflow regime, but are considered in this desired condition because of their importance related to sediment. The increase in drainage density resulting from roads and water repellency of soils following wildfire can increase peak flows by rapid routing of water.

Sediment delivery by roads and connected features is indicated by their frequency and connection with watercourses. Hydrologically connected road segments (i.e., roads with inside ditches and roads near streams) present the most problems because they directly divert water to streams during rainfall events. Road density should be minimized since it serves as a measure of the variety of conditions of roads in a watershed. The number of road stream crossings is an indicator of the amount of near-stream road segments and should be minimized since most roads near streams are hydrologically connected.

Wildfire as a sediment source is indicated in a preventative manner. A fire hazard rating system is used to describe existing fuel conditions. It is best to prevent large and severe fires because of their substantial immediate and subsequent effects on sediment delivery. Prevention at the spatial and temporal landscape scale is best achieved by reducing existing fire hazards so that in the future the natural fire regime can be used to maintain low fire hazard.

Particle size distribution (PSD) is usually measured across a composite of streambed features in a stream reach (pools, riffles, runs, etc.). PSD in streams of interest can be compared in several ways to gain inferences as to where they lie relative to desired condition. Comparison can be made on an intra-reach basis to detect change up and downstream caused by sediment trapping effects of impoundments. Comparisons can also be made with reference streams (streams having similar characteristics such as size, geomorphic setting and climate but with minimal effects of disturbance) to infer sediment regime effects caused by management activities. Streams showing a high similarity with reference or intra-reach conditions exhibit attainment of desired condition.

Pools are a key habitat component of aquatic ecosystems since they provide diversity from the dominant faster water areas of streams. They function as primary breeding and rearing areas for fish and other aquatic species. Measuring sediment in stream pools is a useful way of determining status and change of sediment regime. Pools are principal sediment deposition sites within stream reaches since these slow water areas act as small reservoirs. Residual pool depth indicates the amount of sediment accumulation in pools.

Stream Channel Morphology

Desired Condition #5: Stream channels have floodplain connectivity, small cross sections and stable streambanks.

Indicators:

Morphology Condition Index:
1. Entrenchment ratio: >2.2 in low gradient reaches with fine-grained streambanks and 1.4 to 2.2 in moderate gradient reaches with coarse-grained streambanks, over 90% of the reach.
2. Width/Depth Ratio: <30 in low and moderate gradient reaches over 90% of the reach.
3. Streambank Stability: >85% in low gradient stream reaches with fine-grained streambanks and >75% in moderate gradient reaches.
4. Channel Incision in High Gradient Streams: None or minor evidence of accelerated downcutting as a result of disturbance outside the range of natural variability.

Measures:

- In low gradient reaches with fine-grained streambanks desired condition is achieved when indicators 1-3 are met or nearly met.
- In moderate gradient reaches with coarse-grained streambanks desired condition is achieved when indicators 1-3 are met or nearly met.
- In high gradient streams desired condition is achieved when indicator 4 is met.

Rationale for Desired Condition, Indicators and Measures:

Stream channels are a key structure within ecosystems. They occupy a small portion of the landscape, but their ecological influence is substantial. The pattern, profile and dimensions of stream channels affects many ecosystem components and processes including water quality, quantity and timing, aquatic and riparian vegetation, and habitat for aquatic as well as many terrestrial animals.

Stream channel morphology directly affects the timing of ground water storage released to streamflow. Stream reaches that are over widened or downcut release groundwater more rapidly in the summer season compared to streams that are in good condition. A slow release benefits riparian vegetation and aquatic species habitat.

Key applicable laws include the Organic Administration Act of 1897, relative to favorable conditions of water flows; the National Forest Management Act of 1976, relative to animal species viability; and the Endangered Species Act of 1973, relative to threatened, endangered and sensitive species. Principal policy includes the Sierra Nevada Forest Plan Amendment (2001), relative to Aquatic Management Strategy goals 2, 3, 6 and 9, and Riparian Conservation Objective 2. Public participation during the development of CSWA generated numerous comments related to streams, especially streambank condition.

A stream channel Morphology Condition Index (MCI) has been developed to evaluate stream channel structure within the landscapes in this analysis. The MCI uses four key indicators of channel shape to compare existing and desired condition. Three indicators are used in combination to assess existing condition of low and moderate gradient streams. One indicator is used to evaluate high gradient streams. While several additional stream channel attributes are available for evaluating stream habitat, the MCI indicators are designed to view important aspects of channel morphology at the landscape scale. Other attributes, such as bank angle or fast-slow water ratio, may be added to channel assessment at the finer scale such as during application of the Region 5 Stream Channel Inventory protocols.

MCI indicators must be met in a stream reach for achievement of desired condition. For example, a low or moderate gradient reach is considered at desired condition when all three applicable indicators meet the measurable criteria. Two or one indicator meeting the criteria reflect either a progressive decline from or recovery toward desired condition. If none of the criteria are met the morphology of the reach may be considered fully degraded.

While the indicators are nearly all quantifiable they are granted some variation in evaluation. That is, for a reach to be considered at desired condition all applicable indicators, if not fully met, may be nearly met, and in the case of indicators one and two they do not need to be met in the entire reach. Judgment as to achievement of desired condition may be used when indicator values are close to the measurable criteria.

Indicator one relates to floodplain connectivity. This term means the ability of streamflow to access the floodplain or flood prone area above the bankfull level of the stream channel. Low gradient streams usually have a broad, nearly flat floodplain area such as a meadow. Moderate gradient streams have a narrower flood zone, often referred to as the flood prone area that is still important for proper functioning of morphological and biological processes. The depth a stream channel is incised into its valley, known as entrenchment (and, alternatively, confinement), dictates the frequency at which flooding occurs. Streams in good morphological condition flood out of their channels fairly often and in doing so provide a valuable ecological function. Streams in poor condition that is, enlarged by being either over widened or downcut infrequently or rarely flood and instead confine the stream energy that in turn further degrades the active channel. Entrenchment ratio is the measurable value of entrenchment (Rosgen 1996).

Indicator two, width-to-depth ratio, relates to the size of the stream cross section and compliments the entrenchment ratio. That is, the smaller the active channel, the more opportunity for flooding process to occur. Width-to-depth is measured as the ratio of the bankfull width to the mean bankfull depth (Harrelson 1994).

Indicator three relates to the ability of a stream channel to maintain its lateral structure against the erosive forces of streamflow. Streambank stability is comprised principally of vegetation, rock and wood. In low gradient channels herbaceous vegetation is often the main stabilizing agent while in moderate and high gradient streams a combination of vegetation, large wood and rocks provide stability. Streambank stability is measured by sampling the amount of stabilizing material in a reach (USDA 1998).

The fourth indicator usually relates to accelerated incision in small, steep headwater stream channels. It is difficult to evaluate condition of these intermittent or ephemeral channels using quantitative indicators. These channels are usually high energy and can be quite variable in form. The condition of these channels can be judged by determining if they are excessively incised and enlarged. This indicator, while qualitative, is useful because it allows for completion of the evaluation of all gradient classes of channels in a landscape. The principal judgment criteria applied is whether an enlarged high gradient channel resulted from natural or human caused events. For example, a steep channel in wilderness area may appear large for its watershed size but may be so due to periodic thunderstorm runoff. It is likely this channel is responding to natural processes. Conversely, a deeply incised steep channel in a heavily roaded watershed may be a result of management activity.

The indicators and measures in the MCI apply to stream reaches of varying lengths, gradients and particle sizes. A reach is a continuous segment of the same stream type, usually between 100 and 1500 meters in length, although reaches can be longer. Low gradient reaches with fine-grained streambanks are usually less than 2% but may be up to about 3%, and have streambanks dominated by clay, silt, sand and gravel particles (these are most commonly meadow reaches). Moderate gradient reaches are usually 2-4% but may be as low as about 1%, and are dominated by cobble, boulder and/or bedrock streambanks. High gradient streams are greater than about 4% and may have a full range of streambank particle sizes.

Water Quality

Desired Condition #6: Water quality is excellent in streams and special aquatic features such as meadows, lakes, ponds and springs so that all beneficial uses of water are achieved.

Indicators:	Measures:
California Central Valley Regional Water Quality Control Board Regulations	▪ Meet CVRWQCB Basin Plan Water Quality Objectives.
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	▪ ANC is equal to or greater than baseline in lakes sensitive to acid deposition (ANC < 50)
Municipal Water Supplies	▪ Identify important municipal watersheds and enter into municipal watershed management agreements with the water supplier(s) for the protection or improvement of water supplies.

Rationale for Desired Condition, Indicators and Measures

Water quality responds to natural ecosystem processes and components (i.e., erosion, sedimentation, geology, fire, streamflow, vegetation) as well as management activities that alter natural processes. Good water quality is essential for a healthy aquatic environment and domestic use.

State and federal laws, policies and regulations well define water quality management. Regulations from the California Central Valley Regional Water Quality Control Board guides water quality management in the CSWA area. Federal and state anti-degradation policies require waters currently exceeding standards to remain so. Forest Service policy includes water quality management via Best Management Practices. The federal Clean Air Act amendments of 1977 provide regulation to protect water quality from air pollution effects in Class 1 Wilderness, which includes the Emigrant Wilderness. The Sierra Nevada Forest Plan Amendment of 2001 provides direction to maintain or restore water quality as described in Aquatic Management Strategy Goal 1 and Riparian Conservation Objective 1. The Forest Service Manual has policy guidance for cooperatively managing water quality in municipal watersheds. Numerous comments were received during the CSWA public participation process, especially related to sediment and herbicides.

Indicators of water quality are regulatory and policy direction. Measures of in-stream water include a wide variety of water quality parameters. Key stream parameters applicable to CSWA include temperature, sediment, pesticides and bacteria. Water quality parameters in lakes include acid neutralizing capacity (ANC), nutrients, metals and bacteria. Measurement of stream and lake water quality will help understand if water quality is at or moving toward desired condition.

Municipal watersheds are those areas that serve as a water supply for population centers. Land management practices are designed to protect water quality within those watersheds through cooperative agreements between the Forest Service and the municipality or its authorized water purveyor.

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Indicator:	Measures:
Streamflow	▪ In gravel bed stream reaches, streamflow is within 10% of the unimpaired daily flow hydrograph from June through October, and is within an average of 20% the remainder of the year.
Aquatic Species Habitat	▪ In gravel bed and bedrock controlled stream reaches, flow regime provides suitable habitat for each life stage of native and desired non-native species.

Rationale for Desired Condition, Indicators and Measures

Streamflow regime is a key watershed process, fundamental to the health of the physical, biological and social-cultural dimensions ecosystems. Stream channels, aquatic and stream corridor vegetation, and habitat for aquatic, riparian and many terrestrial animals respond to the annual pattern of stream flows. Flow regime is important for other water uses such as hydropower generation, irrigation or domestic supplies.

Streamflow regime on streams with dams and diversions is managed in response to various laws, regulations and policies. The Organic Administration Act of 1897 is the principal authority for the Forest Service to claim in-stream flows to the extent that favorable conditions of water flows are provided to maintain proper stream channel structure and healthy riparian vegetation. The Federal Power Act of 1920 allows for operation of hydropower generating facilities on national forest lands subject to Forest Service conditioning authority. The Multiple Use Sustained Yield Act of 1960 requires the Forest Service to manage for a range of activities. The National Forest Management Act of 1976 requires maintenance of viable populations of vertebrate species. The Sierra Nevada Forest Plan Amendment (USDA 2001) provides direction for management of flow regimes under the Aquatic Management Strategy goals 2, 3 and 8, and Riparian Conservation Objective 2.

The rate of streamflow indicates the temporal pattern, or regime, of water flows in streams with dams and diversions. Flow releases from reservoirs largely control the annual, seasonal, daily and intra-daily patterns, altering the natural flow regime to meet the purposes for which reservoirs are intended.

Stream channels respond differently to altered flow regimes based largely on stream morphology. In CSWA, there are two broad morphological categories of stream channels in streams with dams and diversions. Gravel bed channels have low gradients and fine-grained streambeds and streambanks (dominated by clay, silt, sand and gravel particles). Gravel bed channels are extremely sensitive to disturbance by altered flow regimes because of their highly mobile streambeds and easily eroded streambanks. Bedrock controlled channels are usually moderate to steep and are dominated by bedrock and boulder streambed materials. Bedrock channels usually exhibit only minor morphological changes due to flow regime alteration, such as streambed sediment transport and deposition.

The Relief Reach on the Middle Fork Stanislaus River, as defined by the Stanislaus Planning Action Team for the current hydropower-relicensing project, is the only project reach containing a substantial amount of the gravel bed stream type. The remaining reaches on the Middle and South Fork Stanislaus River are bedrock controlled. These reaches are nearly all comprised of substantial segments of continual or intermittent bedrock substrate.

The measures for this desired condition are intended to reflect both the interests of power generation of the Beardsley-Donnells and Spring Gap-Stanislaus projects and Forest Service legal and policy requirements to maintain or restore the physical and biological components of stream and riparian areas. Some requirements for managing streamflow regime are new since these projects were last subject to FERC licensing procedures.

In gravel bed river reaches, flow regime alteration can trigger substantial adverse consequences to stream channel morphology, riparian vegetation and aquatic habitat. To provide proper channel morphology, healthy riparian vegetation and good aquatic habitat, flow regime in the Relief Reach should closely mimic the unimpaired hydrograph from approximately June through October. A near-natural flow regime during this period is essential to sustain processes that help maintain proper channel morphology and regenerate riparian vegetation. The natural recession limb of the annual hydrograph allows distribution of riparian plant seeds, and as flow declines the emergence of gravel bars provides sites for plant germination and establishment. If flows this time of the year are managed to provide proper channel form and streamside vegetation, the stream should be sufficiently resilient to accommodate flows moderately outside the range of natural variability during other times of the year. Annual flow rates can be managed relative to annual precipitation (i.e., average, wet, dry years).

In bedrock-controlled reaches (all other project reaches), effects of streamflow alteration for hydropower purposes are usually minor. Physical changes in channel structure generally do not occur although streambed sediment transport and deposition may be affected. The amount of sediment available to the stream is usually altered. Reservoirs trap sediment and reduced flows can leave sediment from tributaries deposited where they arrive at the impaired flow reach. Flow releases should provide adequate distribution of available sediment. (See Desired Condition #4 for Sediment for additional information.)

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Indicators:	Measures:
Infiltration	▪ Infiltration occurs at the natural rate over more than 90% of the land area.
Evapotranspiration	▪ Vegetation Stand Density Index (SDI) is less than the threshold value for each applicable species.

Rationale for Desired Condition, Indicators and Measures

Streamflow regime has a substantial effect on the condition of the physical, biological and human dimensions of ecosystems. Land and water use management practices alter the annual pattern of surface flow by affecting hydrologic cycle processes - infiltration, evapotranspiration, surface and ground water storage, and ground water flow. Streamflow patterns directly affect stream morphology and the health of aquatic and riparian plants and animals.

The Sierra Nevada Forest Plan Amendment (USDA 2001) provides direction to maintain or restore proper functioning condition of water flows and riparian areas as described in Aquatic Management Strategy goals 2, 3, 7 and 8 and Riparian Conservation Objectives 1, 2, and 4. Region 5 Soil Quality Standards have provisions to maintain soil porosity and thus infiltration. Forest Service National

Fire Plan policy requires reduction of dense stands of vegetation to reduce wildfire hazard.

A suite of environmental indicators of watershed processes, condition and hazards can affect streamflow regime. The two watershed process indicators, infiltration and evapotranspiration, are used in this desired condition because they are broad landscape features of the hydrologic cycle. They play a large role in the amount and timing of precipitation and ground water that becomes available for streamflow.

Two watershed condition indicators, roads and stream condition, and wildfire hazard also affect streamflow regime. However, they are addressed in other desired conditions because of relative importance to landscape processes and ecological functions. Roads and wildfire hazard are considered in the Sediment desired condition due to their importance as a major sediment source at the landscape level. Stream condition is addressed in the desired condition for Channel Morphology.

Infiltration—The infiltration rate of water at the soil surface, as measured by sampling soil porosity, indicates whether precipitation (rain or snow) becomes surface runoff or recharges the ground water supply. Substantially reduced infiltration can increase peak flows and decrease summertime base flows.

Evapotranspiration—Can be estimated at the landscape scale using the Stand Density Index (SDI), a measure of the quantity of vegetative mosaic at the landscape scale. If SDI values are above threshold values, excessive evaporation of water from plant surfaces and transpiration of ground water via plant roots is likely to result in reduced summertime base flows. While evapotranspiration is difficult to measure, a vegetative mosaic that is at a natural density represents the best condition for vegetation's contribution to optimizing a natural streamflow regime.

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering effects on people, property, and natural resources.

Indicators:	Measures:
Fire Regime Condition Class	▪ Condition Class 1: "Fire regimes are within an historical range and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within historical range." (USDA 2000)
Potential Fire Effects	▪ Impacts to people, property, and natural resources are within acceptable limits as determined by the Wildland Fire Implementation Plan.

Rationale for Desired Condition, Indicator and Measures

Fire is a natural disturbance and a key process in a healthy, functioning ecosystem. It has been an important ecological force in the Sierra Nevada for thousands of years. The characteristics of fire occurring naturally over time and land area are described by the fire regime. A fire regime is a representation of historic fire frequency, rotation, spatial extent, magnitude (intensity and severity), and seasonality (Skinner and Chang 1996). Each fire regime has a characteristic range of frequency and severity which influences, and is influenced by, the vegetation within it (Appendix D). The characteristics of the fire regime help define the mosaic of vegetation types, age classes, and succession stages on the landscape (Turner et al. 1993).

Changes to the historic fire regime can have significant effects on landscape patterns of vegetation and fuels and as a result, fire behavior. As throughout the Sierra Nevada, fire return intervals in the CSWA area have been altered through fire suppression over the past 100 years. This has had a greater effect on areas that historically had frequent fires that maintained lower fuel loads and reduced continuity of fuels, both horizontally and vertically. Over the century several fire return intervals may have been missed, leading to dramatic increases in surface, ladder, and crown fuels. The result is an increased potential for insect infestation, disease outbreaks, and uncharacteristically severe wildfires. These large, severe fires affect the vegetation differently than the frequent lower severity fires, changing the pattern over the landscape and, in turn, further affecting the cycles of fuel accumulation and fire.

Properly functioning historic fire regimes represent a desired condition of the CSWA area. The indicators for this desired condition relate to the effects of fire on ecosystem functions and processes, people, property, and natural resources. Condition Class is an indicator for the condition of the fire regime. Condition

Classes describe the current state of fire regime characteristics and their degree of departure from the historic regime (Appendix D). The higher the Condition Class, the more potential there is for effects of fire on ecosystem components and vegetation to be uncharacteristically severe. In some cases, restoration of vegetative conditions and re-establishing more characteristic fire regimes will be necessary. In areas currently in Condition Class 1, maintenance of the historic characteristics and components is important. Condition Class 1 represents the reference variability for a given fire regime. Fire frequency, size, rotation, magnitude, and seasonality fall within ranges that are characteristic of the fire regime type.

Protection of people, property, and natural resources from the undesirable effects of fire needs to be considered in determining the management variability for the desired condition. The forest is home to many people and provides habitat for animals including threatened, endangered, and sensitive species. Their presence may not directly affect the historic fire regime of an area, however it can influence what is considered "desirable" fire. While fire frequency and severity may fall within the reference variability for the historic fire regime (Condition Class 1), the effects on people, property, or natural resources may be unacceptable in some areas. What is considered unacceptable depends on what is being protected, the degree to which it needs protection, and amount of protection available. In an Old Forest Emphasis area, a crown fire may have undesirable effects, while a low intensity, slow-spreading fire does not. In an area adjacent to houses, even a low intensity fire may have unacceptable effects.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfire is low, allowing for the safe and effective protection of people, property, and natural resources.

Indicators:	Measures:
Fire Hazard	▪ In Defense Zones: Fire hazard rating is low over at least 90% of the area.
	▪ Outside of Defense Zones: Fire hazard rating is low over at least 40% of the area, arranged in large blocks that break up areas of moderate, high, and very high fire hazard.
Suppression Effectiveness	▪ In and around areas of high value, fire behavior characteristics are generally within limits that allow suppression by hand crews.

Indicators:	Measures:
Crown Fire Potential	▪ Wildland fire burns as a surface fire with only incidental torching of individual trees or patches of trees.

Rationale for Desired Condition, Indicators and Measures

The Forest Service Cohesive Strategy report (USDA 2000) outlines a strategy to reduce wildland fire threats and restore ecosystem health. It is built on the premise that "within fire adapted ecosystems, reducing fuel levels and using fire at appropriate intensities, frequencies, and time of year are key to: restoring healthy, resilient conditions, sustaining natural resources, and protecting people." The priorities for treatment under this strategy are the wildland-urban intermix, municipal watersheds, habitat for threatened and endangered species, and maintenance of areas that are currently in a desirable condition. The fire management objectives and priorities for fuel treatment in the Sierra Nevada Forest Plan Amendment (USDA 2001) follow those of the Cohesive Strategy. The desired conditions for the fire element in the CSWA area are designed to achieve these same goals of restoring more characteristic fire regimes and reducing wildfire threats to people, property, and natural resources.

As noted previously, fire is a recurring, inevitable event in fire-dependant ecosystems. Once ignited, fire behavior varies with topography, weather, and available fuels. The first two factors (topography and weather) are not manageable, however, the amount and arrangement of fuels available for combustion are controllable. Under the historic fire regimes, the availability of fuel in the CSWA area was determined by cycles of fire and other natural disturbances, climate, and vegetative response. In the past century, humans have modified the amount and arrangement of fuels through fire suppression, logging, and other management activities. As people move into the woods, houses and other structures have also become part of the fuel arrangement. Fires still occur as they always have; however, the effects due to more hazardous fuel conditions may be unacceptable in many places. In some areas where fires once burned naturally every several years, it may now be unacceptable to have fire or it may be necessary to manage its extent through modification of the available fuels or through fire suppression. As more people settle into the forest, the role of fire and the behavior of fire in those areas become increasingly important issues.

Over the past few decades, human habitation in the wildland has increased to the point where the term wildland-urban intermix (WUI) now represents a managed land allocation for state and federal agencies. It is defined as the zone where residences and community infrastructure features intermingle with vegetative fuels. The entire zone is designed to provide a defensible buffer between developed areas and the wildland. The management objective within the wildland-urban intermix is to enhance fire suppression capabilities and provide a safe anchor point for management of fire. Reducing surface, ladder, and crown fuels in the urban-wildland intermix zone modifies fire behavior, enhancing fire suppression capabilities and protecting people and property from wildfire. The Defense Zone immediately adjacent to structures is an intensively treated area designed to prevent loss of life and property. Treatments in the wider Threat Zone surrounding the Defense Zone are designed to reduce the spread and intensity of wildland fire approaching the defense zone.

The indicators for this desired condition are all related to fire behavior characteristics. Fire behavior is dependant on fuels, weather, and topography and can be estimated with fire behavior prediction models for a given set of these conditions. Potential fire behavior characteristics over the terrain were determined for the CSWA area under average worst fire weather conditions (90^{th} percentile). The characteristics were rated and combined to determine a coarse-scale relative fire hazard across the landscape (Appendix D).

A low fire hazard is associated with relatively low flame length, rate of spread, and heat output. Fire effects are generally milder, hand crews can usually be effective in fire suppression, and crown fires are less likely to be initiated or perpetuated. It is desirable to have areas of low fire hazard around communities and other areas of high value to enhance fire suppression capabilities and minimize damage from fire. It is also desirable to break up larger continuous areas of higher fire hazard, where rates of spread and flame lengths may be high enough to initiate and perpetuate crown fire. Strategically treating areas sufficient to interrupt the spread and intensity of fire reduces the likelihood of uncharacteristically severe wildfire spreading over large areas.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Indicators:	Measures:
Noxious Weeds and Undesired Invasive Plants	▪ No New Occurrences
Established Noxious Weed and Undesired Invasive Plant Populations	▪ Acres occupied, controlled, contained or eliminated ▪ All new occurrences eliminated

Rationale for Desired Condition, Indicators and Measures

The Federal Noxious Weed Act of 1974, as amended, directs the Secretary of Agriculture to control undesirable plants, which are noxious, harmful, injurious, and poisonous, or toxic on Federal lands under the Department's jurisdiction. It also directs the Secretary to complete and implement cooperative agreements or memorandums of understanding regarding the management of noxious weeds on Federal lands under the Department's jurisdiction. The President signed an Executive Order in February 1999, mandating that Federal agencies prevent, detect and control populations of invasive species.

The Forest Service Manual states that the objective of Forest Service weed management program is to use an integrated management approach to control and contain the spread of noxious weeds on National Forest System lands, including suppression of existing noxious weed infestations (FSM 2080.2). In September 1998, the Forest Service Washington Office released the USDA Forest Service Strategy for Noxious Weeds and Nonnative Invasive Plants entitled "Stemming the Invasive Tide". In 2000, Region 5 completed its own Noxious Weed Strategy. Both these documents, and the Sierra Nevada Forest Plan Amendment (USDA 2001), highlight the use of an Integrated Pest Management approach to deal with the noxious weed problem on National Forest System lands, provide management direction and stress the use of cooperative partnerships.

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Indicator:	Measure:
TES Plant Species	▪ Populations of TES species are identified protected and contribute to the maintenance of species viability.
TES Plan Habitat: Lava Caps	▪ Special habitat conservation plan is completed ▪ No new incursions of motor vehicles on lava caps (no increase in area impacted on lava caps, travel routes and turnouts are clearly defined, older skid roads are abandoned)

Rationale for Desired Condition, Indicators and Measures

Under the National Forest Management Act of 1976 (16 U.S.C. 1604) and 36 CFR 219.19 the Forest Service is required "to maintain viable populations of existing native and desired non-native vertebrate species". Forest Service Manual (FSM) 2672.1 provides direction for management of Forest Service Sensitive species. These species "must receive special management emphasis to ensure their viability". Code 36 CFR 219.19 goes further to state that " a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed". In addition, direction within Stanislaus National Forest Land and Resource Management Plan is to "[p]rotect sensitive plant plants from activities which might cause them to become Federally listed as Threatened or Endangered; [to I]dentify populations of sensitive plants which occur in areas planned for timber sales or other projects, [and to m]odify planned projects to avoid or minimize adverse impacts to sensitive plants. Where projects may jeopardize a sensitive plant species perform a Biological Evaluation, botanical investigation and develop management guidelines, as necessary for the species involved" (USDA 2002, Page 51).

Currently there are no threatened or endangered plants with the Forest boundaries (and therefore none occur within the CSWA area). Most of the sensitive species that occur or could occur within the CSWA area grow in open, often very specialized habitats. Five species (*Clarkia australis*, *C. biloba* ssp*. australis*, *Erythronium tuolumnense*, *Hulsea brevifolia*, and *Mimulus gracilipes*) have been observed to expand (in area and numbers of colonies) when canopy is removed or decreased, usually by fire. For these species, known population sites are actively maintained in a state suited to their survival. Seven of the species (*Bruchia bolanderi*, *Epilobium howellii*, *Hydrothyria venosa*, *Mimulus filicaulis*, *M. pulchellis*, *Meesia triquetra*, and *M. uliginosa*) occur in meadows, seeps, and streams. These habitats are covered under DC #21. Four of the eighteen species grow in forested areas and only one of these, *Cypripedium montanum*, occurs primarily under dense canopies of large trees that would indicate late seral conditions.

Lava caps are habitat for four of the sensitive plant species including two of the three sensitive plant species that are centered in the CSWA analysis. Lava caps do not have any specific protection status. They are relatively open and have been used for roads, OHV trails, campsites, fuel breaks, timber landings, and a Helitach base. Most of the occurrences of *Allium tribracteatum* that were visited in a recent monitoring project had roads through them. Most are also included in planned or existing fuelbreaks and could receive vehicular traffic, bulldozers, and/or retardant during a wildfire. A habitat conservation plan could establish practices that would minimize or prevent impacts for these species.

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Indicators:	Measures:
Traditional Plant Populations	▪ Important populations are recorded, protected and available for use.
Populations Restored	▪ Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.
Traditional Plant Populations Maintained	▪ 90% of known important populations are determined to be in a usable state.

Rationale for Desired Condition, Indicators and Measures

The Forest Service cooperates with Native American tribes in making natural resources available that are important for cultural and religious uses. Laws and policy involved includes: Executive Order 13175—directing agencies to consult with tribes to the greatest extent, with a government to government relationship; the National Historic Preservation Act—directing agencies to provide Native Americans and tribes the opportunity to consult if actions my affect properties of historic value to them; the American Indian Religious Freedom Act—directing agencies to seek and consider Native American input on projects during decision-making; as well as the National Environmental Policy Act, Federal Land Policy and Management Act, National Forest Management Act and Forest and Rangeland Renewable Resources Act, all of which call on the Forest Service to seek public and tribal input on land management planning and activities. More specifically, direction in the Stanislaus National Forest Land and Resource Management Plan (USDA 1991) is to consult with local tribes regarding specific issues (USDA 2002, Page 30).

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% of a sub-watershed.

Indicators:	Measures:
Soil Porosity	▪ Soil porosity is at least 90% of the natural porosity. Absence of platy, massive, or clod structure.

Indicators:	Measures:
Large Downed Woody Material	▪ In general, five well distributed logs per acre, representing the range of decomposition classes. Desired logs are at least 20 inches in diameter and 10 feet long.
Evidence of Soil Organisms	▪ Presence of bio-indicators (biopores and casts, soil aggregates, mychorrizal fungi).
Topsoil	▪ Soil organic matter in the upper 12 inches of soil is at least 85% of the natural condition.
Surface Organic Matter	▪ Litter, duff, and woody material up to three inches diameter is approximately 50% of natural and covers at least 50% of the soil surface.

Rationale for Desired Condition, Indicators and Measures

The National Forest Management Act of 1976 (P.L 94-588, 90 Stat.2494, as amended) requires the management of public lands in a manner that will not "impair the long-term soil productivity of the land." The Region 5 *Sustaining Ecosystems—A Conceptual Framework* (Manley et al. 1995) lists soil productivity as a fundamental element to consider when doing landscape assessments. Properly functioning soils (a) provide "natural capital" for plant growth and sustainable forests, (b) store and release clean water to streams, springs, and meadows, and (c) grow a diversity of habitat for animals. Public participation identified soil erosion and soil productivity as important for the CSWA landscape assessment.

The Sierra Nevada Forest Plan Amendment (USDA 2001) emphasizes soil quality standards to assess potential changes in soil quality. The desired conditions and environmental indicators of soil productivity are based on the soil quality standards in Powers et al. (1998). Powers believes that indices must reflect physical, nutritional, and biological soil processes important to productivity. The rationale for choosing key components follows:

- *Soil porosity* is a key indicator of physical processes. How well the soil will function as a sponge to hold and release water is an important physical process. Soil with good porosity will support optimum root growth and biological activity.

- *Organic matter* is a key indicator of soil fertility. Three pools of organic matter are recognized as important organic matter reserves: topsoil organic matter (humus); surface fine organic matter (needles and small woody material); and large woody material (rotten downed logs). Large woody material is a source of organic matter that remains in the soil environment for hundreds of years and functions as refugia habitat for soil organisms, particularly after disturbance or during drought conditions.

- *Soil organisms* are a practical indicator of the biological health of a soil. The significance of soil fauna (specifically, invertebrates) to forest ecosystem processes is acknowledged widely in Europe (Shaw et al., 1991). Soil fauna affect essentially all of the soil properties and processes related to soil quality. Therefore, they must be considered as a basic indicator of desired condition for soil.

Note: Riparian Conservation Areas (RCAs) were established in the Sierra Nevada Forest Plan Amendment (USDA 2001) and are defined as 300- and 150-foot corridors on each side of perennial and seasonal streams, respectively. Hillslopes are all remaining land areas outside of RCAs.

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate by Ecological Unit.

Indicators:	Measures:
Surface Cover—Hillslopes	▪ At least 50% effective surface cover. Adjust where necessary to avoid high Erosion Hazard Rating.
Surface Cover—Riparian Conservation Areas	▪ At least 75% effective surface cover

Rationale for Desired Condition, Indicators and Measures

The National Forest Management Act of 1976 (P.L 94-588, 90 Stat.2494, as amended) requires the management of public lands in a manner that will not "impair the long-term soil productivity of the land." The Region 5 *Sustaining Ecosystems—A Conceptual Framework* (Manley et al. 1995) lists soil erosion as a key ecosystem element and process to consider when doing landscape assessments. Erosion is a natural process occurring on landscapes at different rates and scales, depending on geology, topography, vegetation, soil and climate. Ecological units mapped in the CSWA area group units of land according to these factors. Natural erosion rates and the Erosion Hazard will vary by Ecological unit. Rates have not been determined by ecological unit but can be estimated. Erosion on hillslopes and Riparian Conservation Areas (RCA) should not exceed the long-term natural erosion rates for the ecological unit. In other words, accelerated erosion should be prevented at the hillslope, RCA and sub-watershed scale.

Accelerated erosion by sheetwash, rilling, or gullying can remove valuable topsoil, and extensive gullying can lower the water table. The potential for surface erosion is directly related to the amount of bare soil exposed to rainfall and runoff. The Region 5 Erosion Hazard Rating System guides the amount of surface cover needed to prevent accelerated erosion.

Terrestrial Animal Species

Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Indicators:	Measures:
Peregrine falcon, great gray owl, willow flycatcher, old forest associated species, mule deer, bats	▪ Presence/successful breeding across the landscape.
Peregrine Falcon Habitat	▪ All active sites are protected from disturbance.
Great Gray Owl Habitat	▪ Adequate prey base (pocket gophers and voles). ▪ Presence of mid- or late-succession conifer forests associated with meadow or herbaceous species.
Willow Flycatcher Habitat	▪ Presence of meadows with woody shrub species, primarily willow.
Old Forest Associated Species Habitat (California spotted owl, northern goshawk, Pacific fisher, American marten, Sierra Nevada red fox, wolverine)	▪ Presence of late succession forest across the landscape.
Mule Deer Habitat	▪ Presence of early succession habitat which includes forage, hiding and thermal cover
Bat Habitat (western red bat, Townsend's big eared-bat, pallid bat)	▪ Identified occupied habitat is described.

Rationale for Desired Condition, Indicators and Measures

The National Forest Management Act of 1976 (16 U.S.C. 1604) and 36 CFR 219.19 requires the Forest Service "to maintain viable populations of existing native and desired non-native vertebrate species". Forest Service Manual 2672.1 provides specific direction for "Sensitive Species", i.e. species that "must receive special management emphasis to ensure their viability". The Code of Federal Regulations (36 CFR 219.19) goes further to state that " a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed". The species chosen as indicators within this analysis are either Forest Service-designated Sensitive Species, which require special management emphasis, or species that are responsive to management actions. (Note: for the remainder of this document Sensitive Species will be used in place of "Forest Service-designated Sensitive Species"). As part of maintaining viable populations, any adverse species interaction with non-native species (as measured by native species presence and successful breeding) will be minimized.

The Sierra Nevada Forest Plan Amendment (2001) provides current direction to manage Forest Service Lands to provide habitat for late-succession dependent species. This includes California spotted owl, northern goshawk, wolverine, Pacific fisher, American marten and Sierra Nevada red fox. Riparian and riparian associate dependent species such as the willow flycatcher and great gray owl are also included. Desired habitat condition descriptions for these species are provided in more detail in Appendix H. These species are indicators due to the current direction and their status as Sensitive species.

For California spotted owl, the SNFPA requires the Forest to protect 300 acres of habitat in a protected activity center in as compact a unit as possible around each owl activity center, and to designate a home range core area designed to encompass the best available spotted owl habitat in the closest proximity to the owl protected activity center (700 acres within 1.5 miles).

Northern goshawk protected activity centers will encompass the best available 200-acres of forested habitat in the largest contiguous patches around them.

For great gray owl, the Sierra Nevada Forest Plan Amendment requires the Forest to protect 50 acres of the highest quality nesting habitat (CWHR types 6, 5D and 5M) and the meadow area that supports the prey base.

The willow flycatcher conservation strategy seeks to maintain the current flycatcher population and allows for its recovery over time.

The Forest carnivore conservation strategy (USDA 2001) includes direction for management of Pacific fisher, American marten, Sierra Nevada red fox and wolverine. Fisher management direction is to provide (a) habitat linkages between southern and northern Sierra Nevada populations, (b) protect den sites, and (c) suitable habitat for future reintroductions. For marten, wolverine and red fox, management direction is to (a) recover and protect populations, (b) minimize fragmentation, and (c) protect den sites. For the three bat species, little is known about their location or preferred habitat on the Stanislaus National Forest. This data gap will be filled by collecting information on presence and the habitat they are located in.

Mule deer, a management indicator species in the Stanislaus National Forest Land and Resource Management Plan (USDA 1991), is an indicator for species dependent on early succession stages. The management variability for shrub forage species is outlined in the Stanislaus Land and Resource Management Plan (1991).

Desired Condition #17: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Indicators:	Measures:
Bald Eagle	▪ Suitable habitat conditions exist to support three nesting territories in the general vicinity of Beardsley Afterbay, Upper Beardsley, Hell's Half-Acre, Canyon and Lower Donnell Bald Eagle Management Areas.
Valley Elderberry longhorn beetle	▪ Habitat is provided and protected (# large elderberry plants per unit area).

Rationale for Desired Condition, Indicators and Measures

The Endangered Species Act (16 U.S.C. 1531 – 1544) requires the Forest Service to "insure that any action authorized, funded, or carried out…is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined…to be critical." Bald eagle and valley elderberry longhorn beetle are both listed by the United States Fish and Wildlife Service as Threatened, therefore they were chosen as indicators.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Environmental Indicator	Measures
PNV	▪ Acreage meeting PNV by Order 4 Ecological Unit Inventory.
Species Composition	▪ Canopy cover of sugar pine between 10-25% in Ponderosa Pine, Ponderosa Pine-Douglas Fir, Mixed Conifer, White Fir, Jeffrey Pine, and Red Fir Series Mapping Units.
	▪ Canopy cover of ponderosa pine µ 30% in Ponderosa Pine and Ponderosa Pine–Douglas Fir Series Mapping Units.
	▪ Basal area of white fir [30% of total in Ponderosa Pine and Jeffrey Pine Series Mapping Units.
	▪ Basal area of white fir [50% of total in Mixed Conifer Series Mapping Unit.

Rationale for Desired Condition, Indicators and Measures

Vegetation has changed as a result of both purposeful intervention and by neglect. In part, the combined effects of human use of trees for survival and development, the significant success of fire suppression efforts in the 20th century, grazing animal impacts, and insects and disease impacts, have caused significant alterations in species composition compared to that found historically.

Within and adjacent to the CSWA area, the use of trees to support people’s needs, especially after the discovery of gold in the foothills, resulted in the reduction of pine species in the lower elevations. When this removal resulted in the local loss of seed-producing peers, the remaining vegetation colonized the now vacant growing space. Events such as high-intensity wildfire caused further reductions of younger pines, being less capable of surviving the fire’s impact. Insect/drought-related mortality often resulted in the loss of the last pine from remnant populations. When fire suppression efforts became increasingly effective, the soil disturbance provided by low-intensity ground fires, needed to provide a favorable seedbed for colonization by pines, became rare.

White Pine Blister Rust, an introduced disease, has also resulted in widespread mortality of sugar pine throughout California. Resistance, both by genetic mechanisms and by favorable microsite, provides today’s remnant populations. Historical evidence indicates that the species was distributed fairly consistently throughout the Sierra Nevada forests, typically occupying 10-25% of the canopy. In small areas, it has been present at even higher levels, occasionally claiming up to 50% of the canopy.

Mid-elevation, mixed conifer forests, without periodic fire to restrict successful establishment of shade-tolerant trees such as white fir and incense cedar, now have significant numbers of these species. Establishing high densities, they are readily susceptible to successful bark beetle attack. Likewise, as they often provide canopy linkages from saplings to the upper canopy, they pose stand-replacing wildfire hazards over extensive acreages.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Indicators:	Measures:
California Wildlife Habitat Relationship (CWHR) Size Class	▪ 5% Size Class 1, Seedling (< 1 inch) ▪ 5% Size Class 2, Saplings (1-6 inches) ▪ 15% Size Class 3, Pole Tree (6-11 inches) ▪ 20% Size Class 4, Small Tree (11-24 inches) ▪ 55% Size Class 5, Medium/Large Tree (>24 inches)

Rationale for Desired Condition, Indicators and Measures

Vegetation development is a dynamic process, often interrupted by natural events. Fire, drought/insect-related tree mortality, lightening, wind-throw, root disease, and other forces often kill or severely damage developing vegetation, leading to new seedling germination and/or re-sprouting. Historical evidence seems to indicate that later seral stages, or, at least, larger trees, were common over large areas. As described in multiple documents, periodic surface fires would consume dead plant material and kill or damage living plants by the heat or flames of the fire. In addition, areas with sufficient surface fuel, perhaps in an area with bark beetle mortality, would burn hotter and would damage or kill larger trees. These events, while oversimplified in this discussion, provide the basis for a distribution of age classes over large areas. There are no research results that can describe a specific distribution over large periods of time. A desired distribution of seral stages can be developed only after defining overall management objectives. For example, if the key objectives revolve around wildlife species that appear to need older, larger trees, the balance between seral stages would shift toward that end of the continuum. Conversely, if the key objectives aimed to provide habitat for a large set of animals, that required all seral stages, a more evenly balanced distribution would be desired.

The Stanislaus National Forest Land and Resource Management Plan (1991) describes Forest-wide Standards and Guidelines for seral stages on page IV-39. In brief, it states that, in areas where the needs of spotted owls and furbearers are emphasized, the quantity of mature and older seral stages will be based on their habitat needs. In all other areas, seral stage 1, 2, 3, 4, and 5 will be no lower than 5%.

The Sierra Nevada Forest Plan Amendment (USDA 2001) does not offer specific distribution guidelines. By default, with the described limitations on harvesting of larger trees, the average landscape would be well represented by larger trees. However, additional requirements emphasize heterogeneity, which would dictate some emphasis on the earlier stages. Creating and maintaining a balanced distribution of seral stages, as measured by size class, can provide for a wide array of habitats for featured wildlife and plant species.

Desired Condition #20: Stand density is below identified thresholds to minimize insect/drought-related mortality.

<u>Environmental Indicators</u>	<u>Measures</u>
Stand Density Index (SDI) by CALVEG type	▪ Ponderosa Pine SDI [230 ▪ Douglas-fir - Pine SDI [301 ▪ Mixed Conifer (Pine) SDI [333 ▪ White Fir SDI [375 ▪ Jeffrey Pine SDI [230 ▪ Mixed Conifer (Fir) SDI [300 ▪ Red Fir SDI [440 ▪ Lodgepole Pine SDI [205

<u>Rationale for Desired Condition, Indicators and Measures</u>

Conifer stand density affects stand development. In general, higher stand densities predispose trees to damage and/or mortality. Higher densities also limit diameter growth. Stand Density Index (SDI) is a measure of density. It is a species-specific; age and site productivity-independent measure that can be used to readily describe “how dense” the forest vegetation is within a mapped area. Research has shown that densities below 55% of the maximum SDI level provides for reduced density-related mortality and relatively high vigor.

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Indicators:	Measures:
Meadow Vegetation	▪ High ecological status (as defined in the R5 Range Analysis protocol) is achieved in wet and moist areas of meadows and is approaching high status in dry areas. (Ecological status is based on species composition, seral stage, root density and bare soil).
Fens and Bogs	▪ Fens and bogs have been inventoried and are managed to maintain the full range of species.
Streamside and Upland True Riparian Trees and Shrubs	▪ Species composition is highly similar to PNV. All seral stages are present in proportions that demonstrate reproduction, establishment, growth and decadence. (True riparian species include cottonwoods, aspens, alders, maples, dogwoods, willows, etc.).

Rationale for Desired Condition, Indicators and Measures

The National Forest Management Act of 1976, requiring the Forest Service to maintain viable populations of animal species, is especially applicable in CSWA because several sensitive species require riparian habitat. The Organic Administration Act of 1897 authorizes the Forest Service to claim in-stream water rights to the extent that supports healthy stream conditions, including riparian vegetation. The Sierra Nevada Forest Plan Amendment (USDA 2001) provides direction applicable to meadows in Aquatic Management Strategy goals 2, 3, 4, 5 and 6 and Riparian Conservation Objective 5. Numerous comments received during the public participation process for CSWA showed strong interest in healthy riparian areas.

Riparian areas exist in locations where soil is wet for long periods during the year. These include streamside corridors and other sites such as meadows, aspen stands, lake and pond margins, springs and special features such as fens and bogs. Meadows are a rare and unique component of the vegetation mosaic in CSWA. These areas comprise only about 1.5% of the landscape and perhaps 5% of the length of riparian corridors along streams.

Fens and bogs are even more limited in area, comprising a small proportion of meadow areas. These habitats are addressed in the Sierra Nevada Forest Plan Amendment (USDA 2001) Riparian Conservation Objective 5. "Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas." A standard and guideline further states, "During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles."

Riparian vegetation in stream corridors and other moist sites around or outside of meadows largely consists of tree communities dominated by conifers and true riparian trees and shrubs. True riparian species are those that need wet or saturated soil for long periods during the year. The principal true riparian species in CSWA are cottonwoods, aspens, willows, alders, maples and dogwoods. True riparian species are a unique component of riparian vegetation communities because they provide diversity and special habitat attributes. True riparian species composition should be complex within each riparian area and/or provide complexity to the vegetation mosaic at the landscape scale. In stream corridor areas, a variety of conifer and hardwood trees, riparian shrubs and herbaceous plants are desired for optimal habitat. Cottonwood trees and willows are a significant component of PNV in low gradient stream reaches with fine-grained streambanks.

All size classes of true riparian species should be present in proportions that indicate a favorable cycle of reproduction, growth and decadence. There should be no significant gaps in size classes.

The natural distribution of aspen is very limited and their cloning habit is unlike other species. Some stands are isolated and there is concern among vegetation ecologists as to the status of aspens in the Sierra Nevada. Long term exclusion of fire has favored conifer encroachment, stream downcutting in meadows has lowered water tables and effects of livestock grazing of aspen suckers has affected seral stage development. Intra-stand diversity, while desirable in other riparian areas, is not preferred in aspens since they are healthiest in single species occurrences. Aspens, however, contribute to landscape variety by providing inter-stand diversity within the larger vegetative community complex.

Social/Cultural Hierarchy

Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Indicators:	Measures:
Recreation Use	▪ Recreation Visitor Days (RVDs) increase at a level commensurate with service area demographics.

Indicators:	Measures:
Employment related to ecosystem management (EM) activities	▪ EM-generated economic contributions keep pace with the overall employment earnings.

Rationale for Desired Condition, Indicators and Measures:

General direction for economic activities related to National Forest management can be found in the Stanislaus National Forest Land and Resource Management Plan (USDA 1991). (Note: In 2002, management direction for the Stanislaus National Forest was combined into one document titled *Forest Plan Direction—Stanislaus National Forest*. This document will be the source for page number references given below.) A forest goal is to "[m]anage the Forest in an economically efficient and cost-effective manner while responding to economic and social needs of the public and local communities" (USDA 2002, Page 4).

Forest goals for recreation are to "[p]rovide a wide range of recreation opportunities directed at various experience levels to meet current and projected demand, including campgrounds, hiking trails, picnic areas, OHV trails, etc." Specific recreation standards and guidelines are described for various land allocations found within the CSWA area, as listed below:

Land Allocation/Management Area:	Reference:
Forest-wide Standards and Guidelines	Pages 29-55 (USDA 2002)
1—Wilderness and Proposed Wilderness	Pages 63-72 (USDA 2002)
2—Wildlife and Scenic Rivers	Pages 97-102 (USDA 2002)
3—Near Natural	Pages 103-105 (USDA 2002)
5—Special Interest Areas	Pages 107-111 (USDA 2002)
6—Research Natural Areas	Pages IV-151 to IV-152 (USDA 1991)
7—Experimental Forest	Pages IV-157 to IV-158 (USDA 1991 as amended)
10—Developed Recreation Sites	Pages IV-186-192 (USDA 1991) to be amended by the Pinecrest Basin Management Direction (when signed)
11—Winter Sports Sites	Pages IV-194 to IV-195 (USDA 1991 as amended)
12—Developed (non-recreation) Sites	Pages IV-197 to IV-198 (USDA 1991 as amended)

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Indicators:	Measures:
User Preferences	▪ User preferences for information and interpretation are the baseline data from which Programs, Media and Sites offered are measured. This "baseline" will be reevaluated every 5 years.
Interpretive Program Implementation	▪ The Stanislaus National Forest Interpretive Plan will be updated every 5 years to include user preference information.
Interpretive Services Offered	▪ Programs, media and sites offered (refer to Forest Service BFIS outputs) increase from baseline at a rate commensurate with user population demographics and adjusted every 5 years through user preferences surveys.
Written and Oral Information	▪ Information provided at Forest Service sites is $\geq$ 90% accurate.
Conservation Education	▪ Information and education result in improved public behaviors and increased participation in resource protection activities and methods with messages focused on fire use and prevention, Leave-No-Trace and Tread Lightly, and weed-free hay use in wilderness areas.

Rationale for Desired Condition, Indicators and Measures:

General direction for recreation (with interpretive services and visitor information as a subset) activities within the Stanislaus National Forest can be found in the Stanislaus National Forest Land and Resource Management Plan (1991). Forest goals for recreation are to "[p]rovide a wide range of recreation opportunities directed at various experience levels to meet current and projected demand, including campgrounds, hiking trails, picnic areas, OHV trails, etc." In general, the LRMP provides for and encourages the interpretation of forest activities and forest areas. Specific standards and guidelines for interpretive services for various land allocations found within the CSWA area can be found in the LRMP sections referenced above in DC #22.

Desired Condition #24: A Forest Service presence is provided at all developed and concentrated dispersed recreation sites.

Indicator:	Measure:
Visitation Standards	▪ All developed recreation facilities are visited at the frequency determined in Meaningful Measures.

Rationale for Desired Condition, Indicator and Measure:

INFRA (short for Infrastructure) is a database of all Forest Service real property (i.e. facilities) valued over $5,000. Meaningful Measures is an internal substructure of INFRA, designated to set minimum standards for cleanliness, maintenance and visitation. These standards are used to identify and report accomplishments, relative to budgetary constraints.

This desired condition statement is answering to the public's desire (Refer to Appendix C) for uniformed presence in the field, especially in high-use recreation areas, where decreases in the budget and a higher reliance on concession-operated facilities has drastically reduced the personal contact between the Forest Service and public.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into National Forest lands.

Indicator:	Measure:
Weed Management Areas	▪ Participation in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas.

Rationale for Desired Condition, Indicator and Measure

Refer to the discussion for DC #11 above for more detailed rationale for this desired condition. In general, in order to reduce the spread of weeds from nearby private and other agency lands, the Forest Service works to lessen the threats through public education and by participating in Weed Management Areas.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Indicator:	Measure:
Identified Properties	▪ All lands acquired.

Rationale for Desired Condition, Indicators and Measures:

The Forest Service Manual provides the following direction on the acquisition of land:

1. Complete land-for-land exchanges to consolidate National Forest System and non-Federal land patterns, to permit needed urban or industrial expansion, or to make other adjustments in landownership clearly in the public interest and consistent with land management planning objectives.
2. Give priority to the acquisition and the disposal of lands and interests identified in land management plans.
3. Emphasize exchanges that reduce administrative costs or increase the output of goods and services.
4. Avoid exchanges that do not enhance Forest Service programs.
5. Acquire non-Federal land without reservations by the grantor or outstanding rights, if possible. Reservations and outstanding rights that do not unduly interfere with use of the lands for National Forest purposes are acceptable. Limit the duration, extent, and method of exercise of the reserved right. Reservations by the non-Federal owner must be subject to the appropriate rules and regulations of the Secretary of Agriculture, except upon special finding by the Chief, in the case of States (FSM 5470). Discourage speculative

mineral reservations and separation of surface and subsurface rights unless it is clearly in the public interest.

The Stanislaus National Forest Land and Resource Management Plan provides direction related to land acquisition (USDA 2002, Page 39). General direction is to “[a]djust land ownership patterns through acquisition and disposal to improve administration of the Forest and enhance public values…”. There is a specific standard and guideline to “inventory and acquire private land parcels that compromise National Forest administration and programs”. Following this direction, CSWA identified several isolated private land parcels surrounded by National Forest Land. These are identified in Chapter VI.

Desired Condition #27: Appropriate recreation opportunities are identified and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Indicators:	Measures:
User Preferences	▪ All existing and proposed recreation opportunities and facilities meet present and future user preference needs.
Population Demographics	▪ Participation in recreation activities reflects demographics of the service area.
Facility Occupancy	▪ Recreation facilities are constructed within 3 years of determining that occupancy/use (as measured by Recreation Visitor Days or Persons At One Time—which ever is appropriate) has exceeded 90% seasonally adjusted capacity for two consecutive years.
Facility Condition	▪ Meet Forest Service Meaningful Measures Standards/INFRA Accessibility Design Guidelines.

Rationale for Desired Condition, Indicators and Measures:

Forest goals, as outlined in the LRMP, for recreation are to “[p]rovide a wide range of recreation opportunities directed at various experience levels to meet current and projected demand, including campgrounds, hiking trails, picnic areas, OHV trails, etc.” Specific recreation standards and guidelines are described for various land allocations found within the CSWA area and are listed above in DC #22.

In addition, Title VI of the Civil Rights Act requires the Forest Service to take into account the needs of underrepresented people within a service area (identified specifically for each Forest). Within the service area (the Central Valley and Bay Area) for the Stanislaus National Forest, population demographic shifts are occurring. The preferences, amount and location of the recreation experiences desired by this rapidly expanding population has not been established for the CSWA area.

However, several themes have evolved throughout the CSWA effort that deserve special attention and can serve as indicators for success in meeting the Desired Condition:

User Preferences—It is important to ensure that the right facilities are in the right locations. Expectations change with our culture. What was built 20 or 40 years ago may or may not fit the users desires or needs for a particular type of experience. Keeping the basic assumption that our rural, natural setting is the primary attraction around which user preferences develop their wishes, it is appropriate to find out what they want, where they want it and how many want it. Because change is inevitable and the fact that modifications of infrastructure take time and money, it is wise to plan for the future as well as the present. Moving forward in a rational and cost-effective way requires much more data on present use and future trends.

Population Demographics—It is vital to ensure that opportunities offered do not unnecessarily inhibit (or exclude) participation by people of all ethnic, socioeconomic and age groups. Understanding the cultural norms of the present and future population base in the service area (i.e. population centers most likely to frequent the CSWA area) is an important component in meeting demand in a socially responsible way. Some general data exists as a starting point, but it must be tracked over time to ensure continued accuracy.

Facility Occupancy—Where demand forces are evident, facilities should be developed, within reasonable timeframes, and meeting all applicable standards and guidelines.

Facility Condition—To serve their intended use and capacity in a fiscally responsible way, most people agree publicly owned facilities should be properly maintained. New standards have been developed for frequency and quality of maintenance for recreation facilities and programs (Meaningful Measures), which are tied to the Forest Service budget system, which can be used to measure maintenance accomplishment.

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Indicator:	Measure:
Facilities and Activities Financed	▪ 100% financing of recreation facilities and activities attributable to present and projected public demand generated by the FERC project.

Rationale for Desired Condition, Indicator and Measure:

The Stanislaus National Forest Land and Resource Management Plan (LRMP) provides direction for FERC project that occur within the Forest. Within the CSWA area, four FERC projects exist: Phoenix—includes Lyons Reservoir; Beardsley-Donnells—includes Beardsley and Donnells Reservoirs and related facilities; Spring Gap-Stanislaus—includes Relief, Pinecrest and Stanislaus Forebay Reservoirs and related facilities; and the Donnells-Curtis Transmission Line. The licenses for three of these projects (all excluding Phoenix) are currently in the FERC relicensing process. Specific management direction for FERC projects found within CSWA are (USDA 2002):

- Establish protection, mitigation, compensation and enhancement measures in project licenses related to project-induced impacts on other Forest Resources.
- Conduct interdisciplinary consultation with the proponent, state and local agencies and the FERC to assure compliance with applicable laws, regulations, policy and management plans associated with proposed project areas.
- Execute appropriate agreements and authorizations with project proponents upon acceptance of the license application by the FERC to assure timely participation by the Forest Service in project related studies and consultation processes and to authorize study by the proponent on National Forest land related to the project.
- Seek flows below new projects that maintain fishery resources near naturally occurring (pre-project) conditions.
- Complete the 4E report to the FERC with necessary license conditions to assure project compliance with National Forest management objectives and mitigation requirements.
- Authorize special use permits for all phases of construction and operation necessary to protect National Forest values and to assure compliance with National Forest law, regulation and policy.
- Execute appropriate agreements to provide for reimbursement of costs associated with consultation concerning proposed projects, to recover

costs associated with mitigation of project induced impacts and to develop, operate and maintain improvements as mutually agreed between the proponent and the Forest Service.

- Request the FERC to designate the Forest as a cooperating agency for the environmental review process concerning each proposed project in accordance with the National Environmental Policy Act.
- Note: The following factors shall be considered in conjunction with relicensing of certain hydroelectric facilities. This Standard and Guideline is related only to existing and expired license projects through the year 2005. This is not a complete list of all requirements related to these projects. Additional mitigation may be required as a result of the FERC consultation process.

  Beardsley-Donnell #2005: Recreation use near Beardsley Dam and on adjacent Hartley Lake has exceeded the capacity of the limited developed facilities for a number of years. During relicensing of this project, the Forest Service will seek inclusion of provisions for installation by the licensee of a family campground, upgrading of the present day-use facilities, including the access road, extension of the existing boat launch ramp and other related work to meet projected and existing recreation demand at this popular recreation area. The Forest Service seeks to maintain Donnell Lake as a primitive recreation experience and will seek only to improve parking as a condition of relicensing on this project.

  Spring Gap-Stanislaus #2130: Project facilities include Relief Reservoir, Pinecrest Lake and the Philadelphia Ditch that divert water into the Middle Fork of the Stanislaus River through the Spring Gap power house. The highest concentration of public use on the Forest occurs within the Pinecrest Herring Creek composite planning area. The project-induced recreational impacts are well documented. During the re-licensing consultation process, the Forest Service will consider requirements for maintenance of Pinecrest Lake at as high a level as possible through July and August to optimize public use. Additionally, following guidance within the Pinecrest-Herring Creek composite plan, the licensee will be required to share in the development and improvement of public recreation facilities within the project area. The removal of improvements at Relief Reservoir will also be sought, including the caretaker's cabin that is of limited use and compatibility with the recreational and scenic qualities of the area. Diversion of water from the South Fork to the Middle Fork of the Stanislaus River that has significantly altered the character of the South Fork will also be evaluated. The current 7 CFS flow below the Philadelphia Ditch diversion appears to be inadequate and will require study as a part of the relicensing process. Minimum flows to meet habitat requirements associated with the Phoenix Project (#1061) will also be required as shown in the Phoenix Project #1061 4E requirements. Any possible increase in flows would require a balance between fisheries improvement and lake levels for recreation at Pinecrest Lake.

Phoenix #1061: The Forest has been working with the licensee to provide for limited public access to Lyons Lake as well as development of the Rails-to-Trails proposal along the old railroad grade from Sonora to Strawberry. No substantial recreational development is contemplated as part of the relicensing. The Forest is concerned with the low flow releases below Lyons Dam, but recognizes the potentially serious conflict between domestic water demands and fisheries needs in setting minimum fish flows. The problems associated with unrestricted OHV use at and near the reservoir, which are contributing to significant and detrimental pollution of the water supply, are also being addressed in the relicensing consultations.

Desired Condition #29: The road system provides adequate access for public and administrative use.

Indicators:	Measures:
Level 1, Level 2 or Unclassified Roads Retained.	▪ Miles of road retained.
Level 1, Level 2 or Unclassified Roads Decommissioned.	▪ Miles of road decommissioned. (Note: Decommissioned roads converted to trails are addressed in DC #30.)
Roads Maintained	▪ Miles of road maintained to standard.

Rationale for Desired Condition, Indicators and Measures:

As identified in the LRMP, the Forest goals related to roads is to provide transportation systems needed to efficiently and safely manage the forest (USDA 2002, Page 23). However, with dwindling resources to maintain the existing infrastructure and continued demand for recreation and administrative access, decisions must be made regarding which roads must be left open and to what standard they will be maintained. In such a climate, applicable management direction is to "[o]bliterate roads not needed for continuing management so as to protect resources and restore resource productivity" (Page 54). Forest-wide standards and guidelines are also listed in this section. Standards and guidelines for specific land allocations are also provided.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Indicators:	Measures:
Community-linked Trail Opportunities	▪ Miles of non-motorized Community-linking trail constructed.
Motorized and Non-motorized Trails Outside Wilderness	▪ Miles of trail constructed, and ▪ Miles of non-wilderness trails designated motorized & non-motorized (can be roads decommissioned following roads analysis).
Motorized and Non-motorized Trails Maintained	▪ Miles of trail maintained to standard.

Rationale for Desired Condition, Indicators and Measures:

Trails use and development generated as much interest from public meetings and interest groups as did roads, with two major themes emerging. The first theme involves creating a non-motorized trail network, linking communities with each other and with recreation destinations and creating loops. The intent was to enable people to move throughout the forest near their communities without having to use motorized transportation. There was a particular desire to assist with dispersal of visitors away from heavily used recreation centers such as Pinecrest. The second theme focused on relieving pressure on wilderness areas for foot and equestrian users while creating more trail opportunities closer to population centers. Such opportunities include foot, equestrian, bicycle and motorized trails.

Forest-wide management direction for trails can be found on page 50 of *Forest Plan Direction—Stanislaus National Forest* (USDA 2002). In general, the LRMP recommends maintaining trails for their intended use (depending on user group (i.e. hiking, biking, off highway vehicle, horses) while reducing the effect such use has on natural resources. There are also specific standards for trail management, construction and reconstruction that are described in Forest Service INFRA and Meaningful Measures policy.

Chapter IV: Existing Condition

Introduction

This chapter describes the existing conditions within the Central Stanislaus Watershed Analysis area as a whole. Again, organization is: hierarchy first; key ecosystem element second; and desired condition statement third. Existing condition descriptions are broad, as appropriate for a watershed scale. Specific locations are not described. More often, a summary of conditions is given for the entire watershed area or sometimes for landscapes (if a comparison helps describe the existing condition). More specific existing conditions are described in Chapter V for each landscape.

Description of Existing Condition

Hydrologic Hierarchy

Aquatic Animals

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: *Mountain yellow-legged frog, foothill yellow-legged frog, western pond turtle, Yosemite toad, Mount Lyell salamander, relictual slender salamander species complex, hardhead, and rainbow trout*—Ninety-five miles of stream and 822 acres of lake and meadow within the analysis area were surveyed for amphibian species. Six streams contain foothill yellow-legged frog populations. Individual western pond turtle were located in three streams, with no breeding observed. Mountain yellow-legged frogs were found in one stream and eight lakes, and 15 Yosemite toad populations are known in the CSWA area. In addition, 38 streams, lakes or meadows contained Pacific chorus frogs, western toads were found in six locations, bullfrogs occupy one stream, and one population of long-toed salamander was located.

Mount Lyell salamander is located within the Sonora Pass landscape. Habitat for this species may also be found within the Clark Fork landscape. Recent taxonomic work has split the relictual slender salamander species complex into four species, which all occur south of the Stanislaus National Forest. The species were previously known as the Pacific slender salamander. There is habitat for salamanders, and it is possible that surveys will find a slender salamander endemic to the area. There are no surveys completed specifically for the salamander species within CSWA.

There are historic records of hardhead at the lower elevations of the analysis area. Current status of this species is unknown. Rainbow trout historically occurred up to approximately the location of Beardsley Reservoir. Due to stocking by the California Department of Fish and Game, this species now occurs in all the landscapes. Some of the CSWA area was surveyed for fish species and habitat. The California Department of Fish and Game surveys portions of the area.

Amphibian Habitat—There are approximately 657 miles of intermittent and 649 miles of perennial stream within the CSWA area. A portion provides suitable habitat for amphibians. Range-wide, mountain yellow-legged frogs are now found in less than 10 to 30% of their historical habitat (Jennings 1996, USFWS 2000). Foothill yellow-legged frogs occupy 34% of their historical habitat, while Yosemite toads are found in 50% of their historic habitat (Jennings 1996). Jennings and Hayes (1994) recommended that the western pond turtle receive endangered status from the Mokelumne River south due to their low populations numbers. This includes the CSWA area. Mount Lyell salamander is restricted to alpine and sub alpine vegetation associations, from 4,100 to 12,000 feet in elevation (Jennings and Hayes 1994). They are found in outcrops of rocks and scattered boulders, near free water (ibid.).

Wood duck, merganser, mallard and osprey nest sites—There is little information regarding nesting of these species within the analysis area. There are incidental sightings in some landscapes for the waterfowl species. Nesting ospreys are known to occur within the Pinecrest landscape.

Macro-invertebrate Populations—Macro invertebrate sampling was conducted in two landscapes (Clark Fork and Rose Creek) within the analysis area. The health of populations throughout the analysis is unknown.

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: *Lahontan cutthroat trout*—Lahontan cutthroat trout are not native to the western Sierra Nevada. They do however occur in the Clark Fork landscape within the Central Sierra Watershed Analysis area. The population is important to the recovery of the species and will be managed according to the Recovery Plan.

California red-legged frog—There are no historic observations of California red-legged frog within the CSWA watersheds. There may be suitable habitat within the area, although site assessments have not been completed to locate these areas.

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The frequency and distribution of large woody debris (LWD) in streams in CSWA is highly variable. Principal factors affecting the amount of LWD in streams are natural disturbances, vegetation management practices and in-stream management of LWD.

Natural disturbances include recruitment of individual pieces and aggregates of LWD from tree mortality by age, windthrow, lightning, wildfire, streambank erosion, flooding and, at higher elevations, avalanches. All of these occurrences have deposited and transported LWD in CSWA area streams.

Vegetation management practices include timber harvest, prescribed fire and fire suppression. Harvest practices have resulted in both deposition of trees or tree portions as well as removal of trees from streams. Prescribed fire has created snags that have later fallen to become LWD. Due to long term fire suppression and harvest exclusion in streamside corridor areas, LWD recruitment has been unevenly distributed over time. In some areas LWD recruitment has been delayed. In other areas, such as streamside zones with a heavy fir component, accelerated decay has resulted in LWD that may be considered excessive.

In-stream management of wood in streams has resulted in deficient amounts of LWD. Such management actions include removal of large logjams and removal of LWD at dam sites. In the latter case, wood is extracted from reservoirs, piled and disposed of by burning or transporting off site.

Across CSWA, LWD distribution can be considered in three broad areas—wilderness and wilderness like areas, streams with dams and diversions and non-wilderness streams without dams and diversions.

Streams in wilderness and near-natural non-wilderness areas of CSWA generally have sufficient amounts of LWD. Long-term field observations have confirmed that natural processes affecting LWD have not been substantially altered. The Clark Fork of the Stanislaus River is a good example of nearly intact LWD recruitment, transport and deposition processes. Exceptions to sufficient LWD are found in certain meadow sites where altered stream channel conditions have affected retention of LWD.

Streams with dams and diversions have deficient amounts of LWD due to annual removal of some or all wood entrained between impoundments. The recent FERC relicensing LWD study found LWD levels in the Middle and South Forks of the Stanislaus River substantially below desired condition.

Non-wilderness streams without dams and diversions have a variable frequency and distribution of LWD relative to desired condition. Based on long-term field observations and data from some selected stream reaches, LWD removal as well as excessive deposition has occurred. Quantitative information about LWD is limited in these areas, and a substantial data gaps exists.

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: The stream sediment regime in CSWA area streams has been altered where human disturbances and severe wildfire have affected natural erosion rates and sediment transport processes. Human disturbances include dams and diversions, roads, compacted areas, grazing and timber management activities.

In wilderness and near-natural non-wilderness areas, long-term field observations indicate sediment transport and deposition processes remain nearly intact since natural watershed processes have not been substantially altered. Observations and field data at selected sites show that exceptions to this are found in low gradient stream reaches with fine-grained streambanks (i.e. meadows) where channel morphology has been altered by grazing or recreation activities. In places where floodplain connectivity has been lost, streamflow erosion along streambanks has created over widened and/or down cut stream reaches. As a result, stream sediment cannot rebuild floodplains and streambed aggradation or degradation has occurred which has altered particle size distribution, pool depth and frequency, etc.

In streams with dams and diversions, sediment transport has been interrupted by the trapping effect of reservoirs. This has occurred in the Middle Fork Stanislaus River below Relief Reservoir and in the South Fork Stanislaus River below Pinecrest Reservoir. The magnitude of alteration of the sediment regime varies by the size of the reservoir and the erosion processes in its watershed. Study is currently underway in the FERC relicensing projects in CSWA to determine the extent of alteration of the sediment regime in these streams.

Stream sediment regime alteration in un-dammed streams outside wilderness and near-natural areas varies from minor to substantial throughout CSWA. Roads and severe wildfire are the most significant factors. Roads have increased the drainage density in mid and low elevation watersheds within CSWA, routing more water and sediment to stream channels. In these watersheds, road density and the location and design features of many roads are not at desired condition. The frequency of road stream crossings alters the sediment transport and deposition process in many streams. Severe wildfire over the past 40 years, especially during the past 15 years, has increased sediment loading in streams in the lower elevations of CSWA. Erosion from denuded, water repellent soil following fires and post-fire reforestation activities has resulted in sediment accumulations in streams that are still affecting channel morphology and aquatic habitat.

Stream Channel Morphology

Desired Condition #5: Stream channels have floodplain connectivity, small cross sections and stable streambanks.

Existing Condition: Stream channel morphology has been altered in many of the stream reaches in CSWA that are sensitive to disturbance from human activities. Stream reaches sensitive to such disturbances are characteristically low gradient with fine-grained streambanks, such as meadows and glacial deposition valleys. These reaches are sensitive to change due to easily eroded streambanks and highly mobile streambed materials. Stream channels that have coarse-grained streambanks and streambeds of boulder and/or bedrock are generally not sensitive to channel form alteration. Steep channels with fine-grained streambanks are sensitive to change, and some move occasionally from natural processes while others become altered by human disturbance. Factors affecting channel morphology in sensitive reaches include natural processes such as mass wasting, flooding, high natural erosion rates and wildfire. Human disturbances that can affect sensitive reaches include flow regime alteration by dams and diversions, grazing, roads, recreation and reforestation activities.

The sensitive stream reaches in CSWA are well distributed, but most occur in mid to high elevations. Some reaches are as short as a few hundred meters and some are more than a mile long.

In wilderness and non-wilderness near-natural areas, long-term observations and Stream Condition Inventory (SCI) data indicate that altered channel morphology exists in nearly all meadow streams where historic grazing has occurred. These low gradient reaches with fine-grained streambanks are the most sensitive of any channel type to disturbance. Densely vegetated streambanks are the structural control that keeps these streams within a relatively narrow single thread channel. Once streambanks are destabilized, these sensitive reaches begin to enlarge. When a stream widens and/or downcuts, floods infrequently reach the floodplain and instead continue to erode the channel. While erosion in a meadow stream channel is a natural process, it is usually minor and the reach retains a high degree of streambank stability. Some recovery has occurred in meadows within CSWA where grazing has been reduced or no longer exists. But even though meadow streams have a good potential for regrowth of streambank vegetation, recovery of channel shape takes decades to achieve. Most meadow streams currently remain at less than desired condition, with some substantially less and some not significantly less.

In streams with dams and diversions, channel morphology has been substantially altered in the Relief Reach (as defined in the hydroelectric relicensing projects). This reach, on the Middle Fork of the Stanislaus River between Relief Reservoir and the confluence with the Clark Fork, has several miles of low gradient stream channel with fine-grained streambanks. The remaining project reaches downstream of dams on the Middle and South Fork Stanislaus are essentially all bedrock controlled. There are minor exceptions on the South Fork of the Stanislaus River, such as at Fraser Flat and above Rushing Meadow, but these areas show minor alteration.

In mid to low elevation streams, boulder/bedrock channels dominate the fluvial landscape. However, of the low gradient reaches along these streams nearly all exhibit some degree of altered stream morphology.

In summary, where sensitive stream reaches exist in CSWA most all have been altered by some form of land management. Some alteration has been severe and long lasting while some has been minor and has recovered or can recover if the disturbance is reduced or removed.

Water Quality

Desired Condition #6: Water quality is excellent in streams and special aquatic features such as meadows, lakes, ponds and springs so that all beneficial uses of water are achieved.

Existing Condition: Water quality in CSWA area streams meets nearly all state water quality objectives most of the time. Exceptions exist and are included in the water quality descriptions of streams, lakes and special aquatic features that follow. Information about CSWA area water quality is from a variety of monitoring efforts by numerous agencies as well as long-term observations by Forest Service watershed specialists.

A water quality study plan conducted in 2000 for streams with dams and diversions revealed that all Basin Plan Objectives of the Central Valley Regional Water Quality Control Board are met with the possible exception of temperature related to amphibian habitat requirements. Additional data are currently being collected to answer this question. This study plan is a component of the hydropower-relicensing project on the Middle and South Forks of the Stanislaus River. Water quality data were collected in the river reaches under study as well as the four reservoirs on these rivers associated with the relicensing. With respect to amphibian water temperature requirements, cold water release from the bottom of reservoirs may be adversely affecting temperatures during the breeding and rearing period of the year. Water temperature downstream of Lyons Reservoir on the North Fork Tuolumne River, on the other hand, may be elevated beyond state objectives due to very low streamflow releases in the summer and fall. (Lyons Reservoir is not part of the current relicensing project).

Water quality in streams without dams and diversions is believed to meet state objectives with a few documented and suspected exceptions. Water is usually clear and clean in all streams outside of the period of runoff from storm events during which natural erosion and sedimentation occurs. However, elevated levels of nutrients and bacteria in streams within or downstream of locations of concentrated management activities have been documented. The North Fork of the Tuolumne River downstream from Pinecrest has received numerous wastewater discharges from the Pinecrest wastewater treatment plan. Locations where highly concentrated recreation or livestock grazing occur are of water quality concern but there is a data gap of knowledge. Herbicides used in reforestation in certain CSWA landscapes have been detected in water, though not to the extent that compromises water quality objectives. Chronic stream sedimentation remains a concern where road density and condition is not favorable. Long-term observations indicate accelerated sedimentation occurs during most storm events.

The concerns about and data gaps in water quality knowledge indicate a need for a focused monitoring program to determine if water quality resulting from certain land uses is meeting state objectives. Water quality parameters including nutrients, bacteria, temperature and herbicides may form the basis for developing a focused water quality-monitoring program in CSWA over the next several years. Locations of these concerns are presented in landscape descriptions, and in CSWA recommendations. Sediment from roads is very costly and difficult to monitor, and is thus best addressed by another approach. The most appropriate response to the road sedimentation problem is to move directly to implementing improvements in the road system so that road sediment can be minimized to the extent practicable. Locations and recommendations for road improvements are described in Chapters V and VI.

Water quality in lakes within CSWA is excellent relative to water quality objectives. However, many of these high mountain lakes, occurring mostly in the Sonora Pass landscape, are very dilute and susceptible to acidification from atmospheric pollutants. Several of these lakes are some of the most sensitive in the Sierra Nevada. Long-term monitoring of representative lakes is planned.

The South Fork of the Stanislaus River serves as the domestic water source for about 80% of water customers in Tuolumne County. It is the principal municipal water supply on the Stanislaus National Forest and is eligible to be managed as a municipal watershed. Management in municipal watersheds is conducted by agreements between the water purveyor and the Forest Service to provide the highest protection of water quality. Management activities are designed to mitigate or prevent unwanted disturbances that might affect water quality. For example, fire prevention via vegetation management would be a primary focus.

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Existing Condition: Streams in six of the nine CSWA landscapes have an altered flow regime as a result of the existence of dams and diversions. The magnitude and consequences of streamflow regime modifications varies by location.

Streamflow in the Middle Fork Stanislaus River has had an impaired regime since Relief Reservoir at its headwaters began regulating flow in 1910. Further alteration of the streamflow regime in this 41 mile long river has occurred since the addition of Beardsley and Donnells Reservoirs in the late 1950's and the Sand Bar diversion project in the early 1980's. This combination of hydropower projects occurs within the Sonora Pass, Beardsley-Donnells and Sand Bar landscapes. The Clark Fork of the Stanislaus River, a large tributary of the Middle Fork, remains un-dammed throughout the Clark Fork landscape.

There is a wide variation in flow regulation in the Middle Fork Stanislaus River. The upper most reach, identified as the Relief Reach in the current hydropower-relicensing project, has increased summer and fall flows. The design of the project utilizes the river as an open conduit to move water stored in Relief Reservoir during the peak power period of June through October. From Donnells Reservoir downstream, water is diverted from the river throughout the year and thus reduces natural river flows.

The Relief Reach is the only project reach with a substantial amount low gradient gravel bed river. Stream channel morphology as well as riparian vegetation in this sensitive reach has become altered. Floodplain connectivity is reduced, width-to-depth ratios have increased and streambank stability is less than desired. An alteration in the seral stage distribution and species composition of true riparian indicator species has occurred, especially in cottonwood trees and willow shrubs.

The reaches downstream from Donnells Reservoir are bedrock controlled and are resistant to substantive changes in channel morphology or riparian vegetation. Channel shape has not changed noticeably.

The South Fork of the Stanislaus River has an impaired regime for the lower 26 of its 39 miles. Regulated streamflow begins at the inlet to Pinecrest Lake in the Pinecrest landscape and continues to the mouth of the South Fork at New Melones Reservoir. Additional flow regulation occurs downstream in the Lyons landscape as water is diverted from the South Fork to the Middle Fork at the Philadelphia ditch, and dammed and diverted once again at Lyons Reservoir.

South Fork reaches below Pinecrest Reservoir are largely bedrock controlled and have not have substantive adverse change in channel morphology or riparian vegetation. The few short reaches of low gradient channel have experienced minor to moderate change in channel morphology.

The Rose Creek landscape includes a 2.5-mile regulated reach of the main channel of the Stanislaus River in its extreme northwest corner. This reach is not being considered in the above desired condition since includes flow regulation from the North Fork of the Stanislaus River. The North Fork flow alteration renders management outside the objectives of CSWA since hydro projects on that fork are not being relicensed at this time.

The North Fork of the Tuolumne River does not have dams or diversions. This watershed includes the Dodge Ridge and Duckwall landscapes.

Habitat conditions for aquatic species within the Sonora Pass, Beardsley-Donnells, Sand Bar, and Lyons landscapes are changed from natural due to the altered flow regime in these landscapes (See discussion under Desired Condition # 7). It is unknown what effect this alteration has on species and their habitat in this area. Lind et al. (1996), found that water releases in the Trinity River for fish resulted in the loss of an entire age class of foothill yellow-legged frogs in two of four study years. They also found significant reductions in breeding habitat and increased habitat for bullfrogs, a potential predator. Jennings and Hayes (1994) recommend that management of this species include flow regimes that maintain breeding habitat.

Water Quantity

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: The quantity and timing of streamflow in streams that have no dams or diversions is dependent on the condition of ecosystem processes and structures that control flow regime. Key processes include infiltration, evapotranspiration and fire, and a key ecosystem structure is channel morphology. Factors affecting the performances of these processes are usually associated with management activities or disturbances outside the natural range of variability. This includes forest harvest and reforestation practices, roads, fire management policies that have prevented fire from occurring at or near natural return intervals, and grazing and recreation on and near streambanks.

Peak streamflow is increased by factors that speed water delivery to streams, such as reduced soil porosity from management practices that compact the ground, from roads that increase stream density in a watershed, and from water repellent soils following large and severe wildfire. Soil porosity reduction most often results from heavy equipment use that decreases the infiltration capacity of soil and from water repellency following severe wildfire. While both produce similar results, the former is long lived and the latter relatively short, usually one to three years. The road network in watersheds increases the drainage system since many roads are direct conduits of surface water to streams during storms.

Streamflow during the dry summer and fall period, known as baseflow, is reduced by the above factors since less water remains available for soil moisture storage, as well as two other key factors. Evapotranspiration is the combined effect of water vaporizing directly off plant surfaces and soil moisture being pumped into the atmosphere by transpiring plants. This key process is in equilibrium when the natural fire cycle is maintained since under such conditions vegetation is also maintained at or near a natural density. In addition, in fire-adapted landscapes such as in CSWA, natural return intervals help maintain stand densities that can minimize fire size and severity. This optimizes conditions favoring natural peak and base flows. When stand density increases, evapotranspiration does likewise, reducing soil moisture available for summer baseflow. Reduced baseflow decreases water availability that provides favorable conditions of aquatic and riparian habitat and vegetation. Baseflow is also affected by change in channel morphology in low gradient streams such as usually occur in meadows. Channel enlargement – overwidening and/or downcutting – causes accelerated drainage of soil moisture in the summer and premature seasonal drying of the meadow. This in turn reduces plant vigor and can result in change in species composition to dry site plants. Channel enlargement in low gradient streams, highly sensitive to disturbance due to fine-grained soils, is often initiated by destabilization of streambanks. Principal factors affecting streambank stability are the direct effects of livestock grazing and streamside recreation, and the cumulative effects of upstream activities that increase peak flows.

In each of the nine CSWA landscapes, infiltration, evapotranspiration and channel morphology have been altered to some degree. Infiltration has been reduced from negligible to substantial amounts by roads and decades of ground disturbance by heavy equipment used for timber harvest and reforestation. Evapotranspiration has increased to a substantive extent in mid and low elevations as the success of long-term fire suppression policies has resulted in increased vegetation density. Channel morphology has been adversely altered in nearly all low gradient streams in each landscape, the extent of which varies from minimal to extensive.

The nine CSWA landscapes fit into three groups relative to indicators of streamflow regime. The first group is substantially distant from desired condition, the second group exhibits a large departure from desired condition but less than group one, and the third group is relatively close to desired condition.

The Dodge Ridge, Duckwall and Lyons landscapes are the group farthest from desired condition. These contiguous landscapes have the highest stand densities, fire hazard and road densities of any landscapes in the CSWA area. In addition, they have the only landscape where infiltration is reduced beyond the desired level at the sub-watershed scale. And while these landscapes do not have a large number of low gradient stream reaches, the morphology of many are substantially altered.

The second group includes the Rose Creek, Sand Bar and Beardsley-Donnells landscapes. Although there is more variability in conditions within this landscape than in the first group, stand density; fire hazard and road density remains high in many locations. Infiltration reduction is not substantial although many older clear cuts are believed to have excessive soil compaction. Low gradient stream channel morphology alteration ranges from slight to severe.

The Sonora Pass, Clark Fork and Pinecrest landscapes are at or near desired condition at the broad scale. Stand density, though exceeding desired condition in limited areas, it is substantially less than in the other six landscapes and occurs where very low fire hazard dominates. Road density and soil compaction is very low since these landscapes are largely wilderness or roadless. The most noticeable problem with this group of landscapes is in the low gradient stream condition. These three landscapes have the majority of sensitive low gradient stream reaches in CSWA. Over 80% of these meadow reaches have altered channel morphology.

In summary, the existing condition in six of the nine CSWA landscapes is unfavorable for producing a streamflow regime highly similar to natural potential. Decades of very successful fire suppression coupled with more recent reductions in vegetation management have caused a significant increase in stand densities and fire hazard. Reductions in summer and fall baseflow from increased evapotranspiration, and the increasing threat of large and severe wildfire, portend continuation of poor conditions relative to a desired flow regime. Roads, and soil porosity reduction in some areas, and effects of past wildfire continue to affect flow regime. Channel morphology is altering favorable soil moisture storage in meadow areas. Restoration of favorable vegetative, road and channel conditions is indicated in order to allow proper functioning of processes that move flow regime closer to its natural potential.

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering effects on people, property, and natural resources.

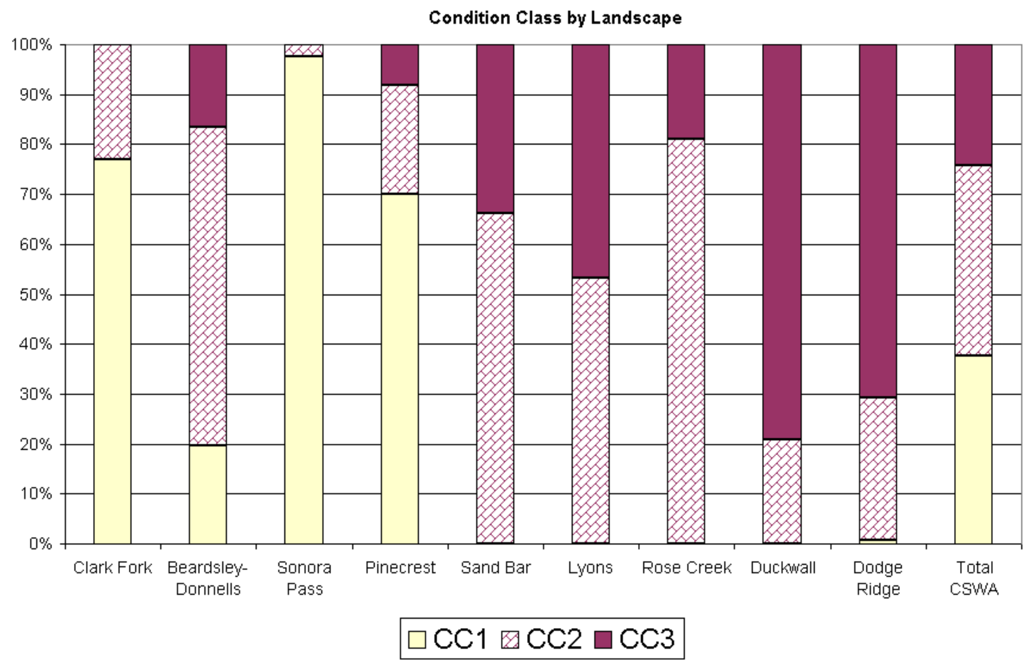
Existing Condition: The Cohesive Strategy (USDA 2000) describes five fire regimes in terms of historic fire frequency and severity (Appendix D). Fire history studies of tree ring chronologies and fire scars can aid in determining the historic fire regime of an area over several centuries. The Sierra Nevada Ecosystem Project contains an extensive review of fire history studies conducted in vegetation types found in the Sierra Nevada. Based on fire history studies of Sierra Nevada vegetation types and information on potential natural vegetation, historic fire regimes were estimated for the CSWA area and described by Ecological Land Unit in Appendix D.

Four fire regimes are represented in the CSWA area. The historic regime for most of the elevations below 6,000 feet was one of frequent, low severity surface fire (Fire Regime I). The potential natural vegetation (PNV) of the area is a mixture of mixed conifer, ponderosa pine, and oak woodland. Frequent fire served to thin stands and keep the forest floor relatively clear, occasionally creating openings in patches where more fuel may have accumulated. Low intensity fires favored the more fire-tolerant species such as pine and oak and naturally thinned less tolerant species such as white fir and incense cedar. A small amount of the CSWA area is characterized by frequent, stand-replacing fire. In the west and southwest edge of the CSWA area where the PNV is primarily chaparral, frequent fires of stand-replacement severity (Fire Regime II) burned patches of brush, stimulating seed germination and sprouting in these fire-adapted species.

Higher elevations of the CSWA area are represented by historic fire regimes with fairly long return intervals (35-100 years). In most of the forested upper elevation areas, infrequent fire burned with mixed severity depending on site and climatic conditions (Fire Regime III). Longer return intervals allowed more shade-tolerant species to grow larger, creating a different combination of species and underlying fuel bed in the mixed conifer at high elevations than in mixed conifer at lower elevations. On the south-facing slopes of the upper elevation canyons, the PNV is montane shrub, which is characterized by infrequent, stand-replacement fire (Fire Regime IV). As in lower elevation shrub types, fire created openings in the brush, stimulating new growth.

These four fire regimes are the approximation of the desired condition for the fire element over the CSWA area. Condition class describes the current state of fire regime characteristics and their degree of departure from the historic regime. Condition classes for the CSWA area were determined through analysis of each landscape and vegetation group and are summarized in the chart below. Maps, tables and related information for fire regime and condition class are located in Appendix D. Figure 1 compares condition classes for each landscape within the CSWA area.

Figure 1. Condition Class (CC) by Landscape.



A predominate factor in the current condition of the CSWA area is the absence of fire over much of the area during the last century. As throughout the Sierra Nevada, fire suppression in the past 100 years has altered fire return intervals and potential fire severity in the CSWA area. Formalized fire suppression in this area began soon after the establishment of the Stanislaus Forest Reserve in 1897. Fire management direction for most of the time since then has been to keep fire size to a minimum through swift and aggressive fire suppression.

This has had a greater effect on areas that historically had frequent fires (35 years or less between fires). Fire regimes have been at least moderately altered from their historic characteristics in all of the lower elevations of the analysis area (fire regimes I and II) simply by the fact that fires have been put out at the smallest possible size for the past 100 years. Where fires may have naturally burned at low intensities over large areas (as noted in anecdotal reports from the late 1800's), several return intervals may have been missed in these fire-adapted vegetation types. Where fire is suppressed for a long period of time, epidemics of bark beetles, defoliating insects, and diseases can cause a heavy accumulation of fuel. When fire does occur, it may result in uncharacteristically severe effects. Where recent fires have burned with high severity, such as the Stanislaus Complex in

1987, the vegetation over large areas has been changed so dramatically, it is far removed from its potential natural vegetation and fire regime characteristics.

In the absence of fire, species composition in the mixed conifer forests of California shifts toward white fir, fuel loadings increase, and the area becomes subject to a higher probability of intense fire (Agee 1974). This condition is especially evident in the CSWA area in the lower mixed conifer and ponderosa pine vegetation types, and in the lower elevations of the upper mixed conifer vegetation type. The potential natural vegetation in these areas would include a greater amount of pine than what is found today. Frequent fires favor the fire-tolerant ponderosa and Jeffrey pine. Where there were probably once open, pine-dominated stands of large trees maintained by frequent surface fire, white fir and incense cedar have crowded out much of the pine component. The result is a dense forest of fire-intolerant species with ladder fuels reaching from the surface to the crowns. Efforts have begun in recent years to change conditions in these areas through the use of prescribed fire and other hazard fuels reduction techniques such as mechanical thinning.

In contrast, most of the upper elevation vegetation groups of the CSWA area are in Condition Class 1. That is, the fire regime characteristics are similar to those of the historic regime. Fire return intervals are historically longer at these elevations, so fewer have been missed over the past century. Also, less management activity occurred in these more remote areas, which can influence vegetation and fuel accumulation.

Actual fire history for the CSWA area is depicted as recorded fires of ten acres and larger from approximately 1900 to 2000. The information prior to 1970 is incomplete, limited to only to fires actually reported and mapped. Since 1900, there have been 106 fires of ten acres and larger recorded in the CSWA area. Some of the larger fires occurred in 1949 (Flora, Wrights Creek), 1987 (Stanislaus Complex), 1990 (Cottonwood), and 1992 (Ruby). Recent fires in the past 30 years have totaled 1,558 fires, with 51% human-caused and 49% lightning-caused. Human-caused fires are most prevalent in the Dodge Ridge and Lyons landscapes, originating primarily around the developed areas of Pinecrest, Strawberry, Sierra Village, and Mi-Wuk Village. Lightning-caused fires occur more often near the higher elevation peaks in the Beardsley-Donnells, Clark Fork, and Sonora Pass landscapes. Maps, tables, and related information on fire history and fire occurrence are in Appendix D.

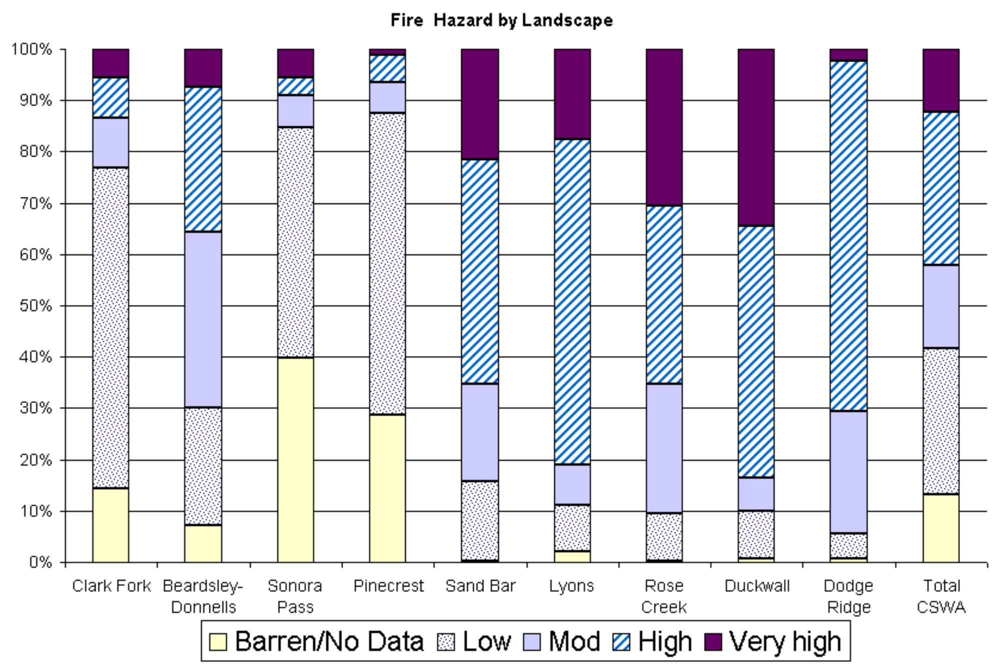
Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfire is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Changes to the historic fire regime can have significant effects on landscape patterns of vegetation and fuels and as a result, fire behavior. The term fire hazard describes the potential fire behavior characteristics of an area based on fuels, weather, and topography. The process for determining fire hazard for this analysis is found in Appendix D. A measure of the desired condition for the CSWA area is to have a low fire hazard over most of the defense zone to enhance protection of people and structures from wildfire. Outside of the defense zone, blocks of low fire hazard break up areas of higher hazard over at least 40% of the area to modify fire behavior.

Fuel loadings and arrangement pose a high or very high fire hazard over approximately 40% of the CSWA topography under 90th percentile weather conditions. In the lower elevation landscapes this figure averages over 70% of the area. Potentially high flame lengths, rates of spread, and heat output would be expected in these higher hazard areas when a fire does occur. The fuels in many places have accumulated to levels much higher than would have existed under the historic fire regime. This combined with dense vegetation above the surface fuel bed create conditions conducive to high intensity fire that can spread rapidly through the continuous fuels and into the crowns of trees.

Figure 2 summarizes the current condition of each landscape in terms of fire hazard rating.

Figure 2. Fire Hazard by Landscape.



Existing conditions in the wildland urban intermix (WUI) are estimated based on the preliminary boundaries currently being developed at the landscape scale. The actual boundaries of the WUI zones will be determined as needed at the project level after site-specific analysis. The greatest percentage of the WUI falls in the Dodge Ridge, Lyons, and Rose Creek landscapes, where almost 75% of the area is in the intermix. In these landscapes, approximately 65% of the defense zone and 70% of the threat zone has high or very high fire hazard characteristics. Suppression effectiveness could be compromised in these areas by potentially high flame lengths and rates of spread and increased potential for spotting and crown fire development.

Outside of the defense zone, the condition of the CSWA area also varies by landscape. Clark Fork, Sonora Pass and Pinecrest landscapes have low fire hazard conditions or barren land over approximately 80% of the area. Rock outcroppings, sparse vegetation, and/or low fuels loads exist on most of the high elevation acres, effectively confining fires to relatively small sizes. In contrast, the Duckwall, Dodge Ridge, Rose Creek, and Lyons landscapes have low fire hazard conditions on less than 10% of the land outside of defense zones. There are no major barriers to fire spread other than lakes, rivers and hazard fuel treatments. Appendix D summarizes the current condition of each landscape in terms of fire hazard rating inside and outside of the defense zones.

One factor contributing to wildland fire suppression effectiveness is fire line intensity, which is directly related to flame length. Fires with flame lengths of less than four feet are generally favorable to direct attack with hand crews or engines. In the CSWA area, most of the potential for flame lengths over four feet exists in areas with brush or grass cover or in lower elevation areas that have heavier fuel loads. This condition is most common in the Duckwall landscape, where the southern two thirds of the area are covered in grass or brush. The Lyons, Rose Creek, and Sand Bar landscapes also have higher flame length potential. At the project level, site-specific determination of flame length potential and other factors that contribute to suppression effectiveness will delineate areas that may need special attention.

The potential for crown fire development at any given foliar moisture content depends on surface fire intensity and the distance from the surface fuels to the base of the crowns (VanWagner 1977). The perpetuation of fire in the crowns of trees (active crown fire) depends on rate of spread and crown bulk density (crown fuel loading) (Agee et al. 2000). These factors are most conducive to crown fire development in the Dodge Ridge, Lyons, and Sand Bar landscapes, where approximately 50% of the acres have conditions contributing to passive or active crown fire. These conditions exist in parts of other landscapes as well, but in smaller, less continuous areas. Recent developments in crown fire modeling and on-going research in this area may provide better tools for measuring potential in the near future.

In summary, the existing condition of the Dodge Ridge, Lyons, and Duckwall landscapes is poor in respect to the desired condition for the fire element. These three landscapes pose the highest fire hazard and have the largest amount of area in Condition Class 3. A large amount of successive hazard fuel treatment is needed in these landscapes to gradually restore conditions to those of the historic fire regime and lower the potential for large, uncharacteristically severe wildfire. The existing condition of the Sand Bar, Rose Creek, and Beardsley-Donnells landscapes could be improved with respect to the fire element. These three landscapes have moderate to high fire hazard over a large portion the area and most of it is in Condition Class 2, with some in Condition Class 3. Recent hazard fuel treatments, such as those implemented in Beardsley Canyon, have been successful at improving conditions. These treatments need to be maintained and expanded to other areas. The Clark Fork, Sonora Pass, and Pinecrest landscapes are in generally good condition relative to the fire element, with small areas of higher fire hazard and/or Condition Class 2. These landscapes can benefit from some selected hazard fuel reduction and from maintenance of the desired condition with naturally occurring fire.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: Invasive, mostly non-native plant species are spreading through the Sierra Nevada region as well as the rest of the western United States. These species, reproducing without the control exerted by their predators in their place of origin, push out native species of plants, insects and animals, severely reducing the ecological health and economic value of wildland. The University of California Cooperative Extension reports that yellow starthistle alone costs Californians $20 million per year for lost forage and control efforts.

Certain weeds are categorized as "noxious" by both the federal government and the State of California, because of their threat to agriculture or other values. The State Department of Food and Agriculture has three categories of pest ratings, used to prioritize funding of control activities. The ratings are based on how common the species is currently, and other factors. An "A" rating mandates eradication or other holding action at the state or county level. A rating of "B" calls for control or other holding action at the discretion of the county agricultural commissioner. A "C" rating called for State action only in nurseries, and local action at the discretion of the agricultural commissioner.

Several species of noxious weeds are invading private land adjacent to the Stanislaus National Forest at alarming rates. In Tuolumne County alone, 346,270 acres of private land are infested with one or more State-listed noxious weed species (Chambers 2000). State-listed species found in Tuolumne County include (Chambers 1999):

A rated:	Spotted knapweed, skeleton weed, Iberian starthistle, Hydrilla, Dalmatian toadflax and plumeless thistle
B rated:	Smooth distaff thistle, Barbed goatgrass, jointed goatgrass, ovate goatgrass, Dyer’s woad, oblong spurge, purple starthistle and Canada thistle
C rated:	Yellow starthistle, Klamath weed, Johnson grass, puncture vine, Italian thistle, Russian thistle, French broom, Scotch broom and medusahead grass

Noxious weeds have generally invaded in lower elevations in the Sierra Nevada first, then expanded uphill to higher elevations. All the species listed above have the potential to invade into the CSWA area. Yellow starthistle, Canada thistle, Scotch broom and spotted knapweed are capable of successfully invading sunny openings at all elevations in the CSWA area. Some of the others may also have that potential. Yellow starthistle is known to bloom at Mill Creek at 6,300 feet elevation and has been found in a non-blooming state at the top of Sonora Pass. Several species have been found in the CSWA area (Chambers, 1999 and 2002), as listed below in Table 4 and shown in Map 4 at the end of this chapter.

Table 4. Invasive Non-native Plant (Noxious Weed) Occurrences.

Common Name	CDFA Pest Rating[1]	CalEPPC Pest Rating[2]	Acres (Approximate)
Jointed goatgrass	B		<1
Tree of heaven		B	<1
Cheatgrass		A-1	Undetermined >500
Italian thistle	C	B	1
Spotted knapweed	A	<1	
Tocalote		B	5
Yellow starthistle	C	A-1	1,000
Canada thistle	B	B	1
Bull thistle		B	Undetermined >500
Scotch broom	D	A-1	25
French broom	C	A-1	<1
Klamath weed	C		Undetermined >50
Ox-eye daisy		NMI	10
Himalayan blackberry		A-1	Undetermined >30
Medusahead	C	A-1	2
Wooly mullein		B	500
Puncture vine	C		Undetermined Small

There are seven weed species in Table 4 that do not have state ratings. These are weeds that were included in the Sierra Nevada Forest Plan Amendment (2001, Table 3.6a, Part 3.6, FEIS Volume 2, Chapter 3, part 3.6, Page 310). Two of these have been proposed for State List C. Cheatgrass, bull thistle, and wooly mullein are widespread and are primarily of concern on lava caps, in meadows and at the limits of their ranges. Himilayan blackberry occurs at lower elevations and can dominate riparian areas. Ox-eye daisy occurs along roads and in the

[1] California State Department of Agriculture: Pest Ratings of Noxious Weeds (CSFA, 2000):
A-rated pests: Weeds of known economic significance, subject to action by CDFA including eradication, quarantine, containment, rejection of shipments, or other holding action at the state-county level. Quarantine interceptions are to be rejected or treated at any point in the state.
B-rated pests: Weeds subject to action by CDFA only when found in a nursery, and otherwise subject to eradication, containment, control, or other holding action at the discretion of the local county agricultural commissioner.
C-rated pests: Not subject to state action except to provide for general pest cleanliness in nurseries; reject by CDFA only when found in a crop seed for planting or at the discretion of the commissioner, action to retard spread outside of nurseries at the discretion of the county agricultural commissioner.

[2] CalEPPS (California Exotic Pest Plan Council, 1999): List A-1: Most Invasive Wildland Pest Plants: Widespread. List A-2: Most Invasive Wildland Pest Plants: Regional. List B: Wildland Pest Plants of Lesser Invasiveness than Lists A-1 and A-2. Red Alert: species with Potential to spread explosively: Infestation currently restricted in size. NMI: Need more information. AG: Annual grasses that pose significant threats to wildlands in California. CBNL: Considered but not listed.

Dodge Ridge area. It can spread along streams and in meadows. Tocalote mainly occurs in small areas, often with yellow starthistle. Tree of heaven is widespread just west of the Forest, and has been found in small areas at several locations in the CSWA area. The CalEPPC rating is also included in Table 4 because it is an indication of the ability of noxious weeds and other non-native plants to spread in wild lands.

The Stanislaus National Forest is a founding member of the interagency weed management area for Tuolumne and Calaveras Counties, the Central Sierra Partnership Against Weeds. The goal of the Weed Management Area (WMA) is to control noxious weed infestations within the two-county area, through public education and facilitation efforts. The Stanislaus National Forest supports the WMA with administrative services and strengthens its position in competing for grants. The WMA educates the public with brochures, field days and other education efforts. It uses funds it gathers to help landowners control weeds on their properties. Stanislaus National Forest conservation education and range management staff also conduct public education efforts, providing educational materials at campgrounds, trail heads and in public contacts on and off the Forest.

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: No Threatened or Endangered plants occur within the Central Stanislaus Watershed Area. However, certain plants have been designated as Sensitive due to their limited distributions and possible threats to their existence. There are 18 Sensitive plant species that could occur in the CSWA area—one lichen species, four mosses, and 13 vascular plant species. Three of these, *Allium tribracteatum, Erythronium tuolumnense,* and *Lomatium stebbinsii*, are endemic to this area and are centered within the CSWA analysis area. *Bruchia bolanderi, Clarkia australis, Clarkia biloba* ssp. *australis, Cypripedium montanum*, and *Mimulus pulchellus* have also been reported in the CSWA analysis area, but are centered in other areas. *Allium jepsonii, Epilobium howellii, Horkelia parryi, Hulsea brevifolia, Hydrothyria venosa, Meesia triquetra, M. uliginosa, Mimulus filicaulis, M. gracilipes,* and *Orthotrichum spjutii* have not yet been found in the CSWA area and have varying degrees of likelihood of occurrence. Surveys for these latter species have only been made since 1998. More detailed information for each species is included in Appendix E.

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Over 100 species of trees, shrubs, grasses and herbaceous plants that grown within the CSWA area are known to have traditional uses.

Examples include the acorns of black oaks, bulbs of soaproot and wild onions, rhizomes of sedges and flowering stems of deer grass. Appendix G lists and describes some of the more important local plants used by Native Americans—plants we should be aware of in our daily management activities.

Within the Stanislaus National Forest boundaries, traditional plant gathering by the Sierran Me-Wuk and Washoe tribes has been static or slowly increasing in recent years. When gathering and maintenance activities involve ground disturbance, the Forest Service has been conducting environmental analyses and issuing special use permits. Forest staff and tribal members meet annually to coordinate Forest projects and discover potential impacts on Native American traditional activities.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: Existing conditions related to soil productivity (DC #15) and soil erosion (DC #16), vary widely across the CSWA area. At this watershed scale, existing conditions for soil can be described and related to disturbance history and to the patterns of soil-vegetation-geology present on the landscape. Ecological Unit Inventory (Appendix B) is a map that shows patterns found in CSWA. For example, within the Ecological Unit known as “Canyons and Steep Slopes” there are finer scale land units known as Landtype Associations (LTAs). LTA 101 is a low elevation, canyon unit dominated by chaparral vegetation and thin, rocky soils. These land units are important because they help characterize the biophysical landscape. The following describes the general status of soil productivity and soil erosion by Ecological Unit (Refer to Appendix B for more information regarding ecological units):

Canyons and Steep Slopes (Units 101, 201, 206, 212 and 216)—An altered fire regime is creating higher potential for mass wasting erosion, particularly in units 201, 206, and 212. These units are Landtype Associations (LTAs) that are found in the larger Ecological Unit, Canyons and Steep Slopes.

Low Elevation Fire Influenced Uplands (Units 202, 204, and 211)—Much of this Ecological unit is located at low elevations on south-facing slopes and basins, which makes the landscape particularly affected by fire. A number of changes have occurred in this Ecological unit that have altered microclimate, fire regimes, and vegetation patterns. Soil erosion, soil water storage, and possibly nutrient cycles have changed. Brush fields are more common. Crown density in hardwood and hardwood-pine types has increased. Fuel loading has increased with lack of fire. Much of the Stanislaus Complex burn occurred in this Ecological Unit. On the other hand natural fire typically thins the understory leaving fewer but larger trees. Natural fire also plays an important role in recycling nutrients. Early mining and timbering activities have also altered vegetation patterns at the stand and landscape scale. Much of the large ponderosa pine and black oak trees once found in unit 211 have been removed. Drought has claimed large pine throughout the Ecological Unit. Other factors such as roads have affected this land unit. Roads on certain soil types and slope conditions are chronic sources of erosion. Past disturbances related to wildfire and management may have reduced soil productivity, particularly on soils with thin topsoil layers and soils prone to compaction.

Open Lava Cap (Units 203 and 402)—The primary change in this unit took place in the mid-1800's when perennial grasses were replaced with annual grasses, particularly in the low to mid elevation lava cap unit 203. Early sheep grazing is sometimes noted as a factor where thin eroded lava cap soils are found at higher elevations of unit 402. Thin eroded soils are also found in the Wrights-Flora burn associated with 1960s reforestation efforts on lava cap soils.

Ponderosa Pine (Units 205 and 208)—Early timbering activities cut out much of the large ponderosa pine in these units. The altered fire regime (larger, less frequent, high severity fire), has created larger areas of early serial vegetation, more white fir in second growth stands, and much less old growth pine and old growth hardwoods. This has probably changed erosion and nutrient cycles at the landscape scale. Some soils are compacted where equipment has entered multiply times. Roads on certain soil types and slope conditions are chronic sources of erosion.

Lower Mixed Conifer (Units 217, 227, 219, 307)—Most of this lower mixed conifer forest has been converted to second growth.

Terrestrial Animal Species

Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Willow flycatcher, western red bat, Townsend's big eared bat, pallid bat, peregrine falcon, great gray owl, wolverine and old forest associated species such as fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl and goshawk are Forest Service sensitive species. Mule deer is a management indicator species for early succession habitat (USDA 1991).

Known information for these species—related to the management indicators—is summarized below.

Willow flycatcher—There are four known historic nesting areas for willow flycatcher within the CSWA area, one within the Pinecrest landscape and three within the Sonora Pass Landscape. There is potentially suitable habitat across the CSWA area. Some of these areas have been surveyed, but not to the current protocol.

Western red, Townsend's big eared and pallid bat—These bats were added to the Forest Service sensitive species list in 1998. Very few surveys have been conducted on Forest, and these species have not been confirmed within the analysis area. There is suitable habitat.

Peregrine falcon—There is one peregrine falcon eyrie within the CSWA area, in the Beardsley-Donnells landscape. There is a Forest Order prohibiting recreational shooting at the site. A peregrine falcon eyrie plan, which addresses management of disturbance in the area, is drafted, but has not been completed.

Great gray owl—There are three pairs of nesting great gray owl within CSWA. Two protected activity centers within the analysis area are on Forestlands, the third PAC is currently located on private land. The Forest Service is in the process of acquiring this land through a land exchange. There will be no recommendations for the PAC on private land until it comes under Federal ownership. The three PACs encompass 220 acres. PAC boundaries will be finalized at the project level. Nine percent of the acres in these PACs have large trees greater than 24 inches in diameter. Twenty percent of the acres are oak habitat. Forty-nine percent of the acres include trees 12-24 inches in diameter with moderate to poor canopy closure. Twenty-two percent of the acres are in meadow, plantation or other habitat. The Forest has not monitored prey populations where great gray owls are nesting. It is assumed that if there is successful nesting, then there is sufficient prey. Past Forest Plan direction (USDA 1991) protected meadow habitat from grazing to allow for an adequate prey base.

Old forest associated species—Old forest habitat has decreased across the Sierra Nevada range due to management activities (USDA 2001). Because of the decrease in habitat, and trends of decreasing population size and productivity of old forest associated species, the Sierra Nevada Forest Plan Amendment contains direction to maintain, protect and enhance late succession habitat and establishes Old Forest Emphasis Areas (OFEA). The purpose of Old Forest Emphasis Areas is to provide habitat for forest carnivores (fisher, marten, wolverine and Sierra Nevada red fox). Both fisher and marten have been sighted in the analysis area. There are no known den sites for fisher, marten, wolverine and Sierra Nevada red fox.

Within CSWA the OFEA is 156,088 acres, or 40 percent of the CSWA area. Based on the most recent vegetation inventory[3], and the vegetation strata as determined by the inventory, 20% of the OFEA exhibits old forest conditions. Sixteen percent of the designated OFEA is not capable of growing trees. Therefore, 64% of the remaining OFEA do not meet desired conditions.

In addition to the OFEA, the Forest is directed to establish Protected Activity Centers (PACs) around California spotted owl, northern goshawk, and great gray owl activity centers.

There are 86 spotted owl PACs located completely in the Analysis area, and one PAC partially within the area. The PACs include 27,131 acres[4]. According to the

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[3] For the purpose of this watershed analysis, the Forest's 1997 vegetation layer was used. This vegetation layer is determined by satellite imagery and rule curves. Although this is currently our best source of information at the analysis scale, there are some inherent problems with the data. These problems include poor resolution at the landscape level, limited field verification of the vegetation typing, and vegetation categories skewed toward timber applications.

The vegetation layer data is required to provide estimates of timber volume at the Regional scale. At the landscape scale, resolution errors are observed. For example, Thompson Meadow is typed as a conifer stand with greater than 24" dbh trees and greater than 70% canopy closure. The correct typing would be either meadow or grass. Due to the poor resolution, the analysis of acres of habitat available and suitable is incorrect. This affects the reliability of the data at a project scale.

Field verification of the vegetation typing was done with a limited number of plots. These plots verified that the canopy closure estimates were fairly accurate, followed closely by the diameter classes (J. Sherlock, pers. comm.). Analysis of the vegetation data in the PACs disagrees with this observation. The PACs were delineated using current aerial photo interpretation. No stands with less than 50% canopy closure were included within the PACs. A printout of the vegetation data by PAC shows several PACs with the majority of acres in stands with less than 40% canopy closure. This verifies that the vegetation typing is inaccurate and further field verification of stands is needed.

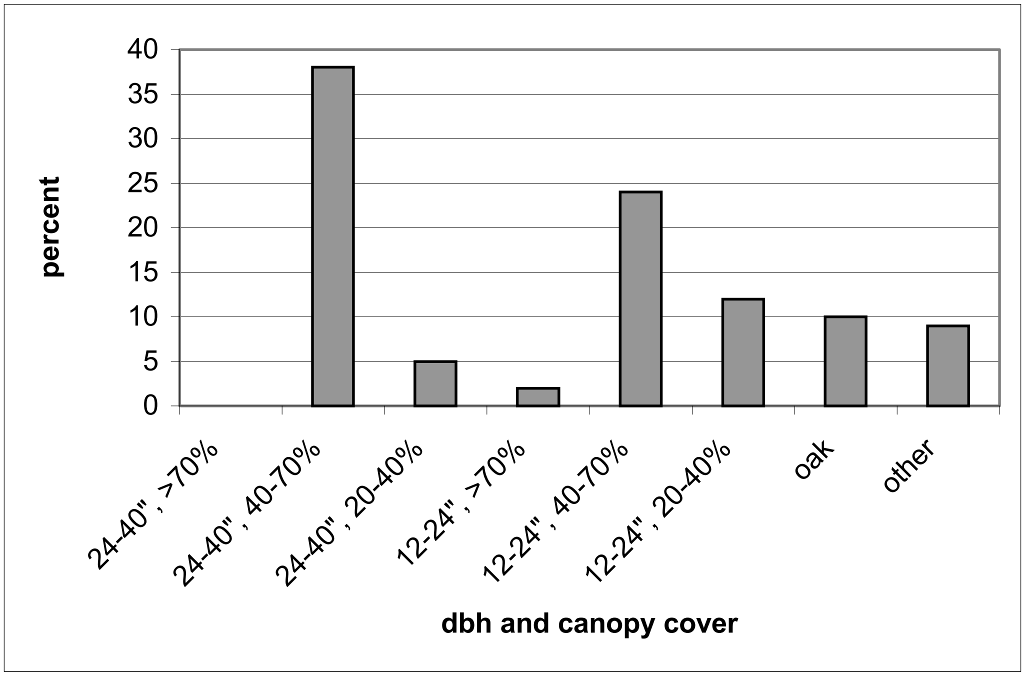
The initial application of the vegetation layer was for timber. Because of this, many vegetation types important for wildlife are lumped into single categories, rather than broken up into several categories as the timber types. For example, tree size and canopy closure are important attributes of wildlife habitat in oak stands. The vegetation layer lumps oak stands into species types (black oak, live oak), but does not classify other attributes. In meadow and grass types, although seral stage is important to assess wildlife habitat conditions, it is not provided by the vegetation data. Because of this it is difficult to assess habitat conditions in non-timber types.

Because of the limitations of the vegetation layer, all analysis at the landscape level should be verified at the project level prior to implementing any actions.

[4] PACs were delineated around all owl activity centers found since 1986 where territoriality was established. Both the Forest Service and California Department of Fish and Game databases were reviewed to determine the most current activity center locations. A minimum of 300 acres of the most suitable habitat was included in the PAC using the 200 aerial photographs. These PAC delineations are draft, and will be verified and finalized at the project level.

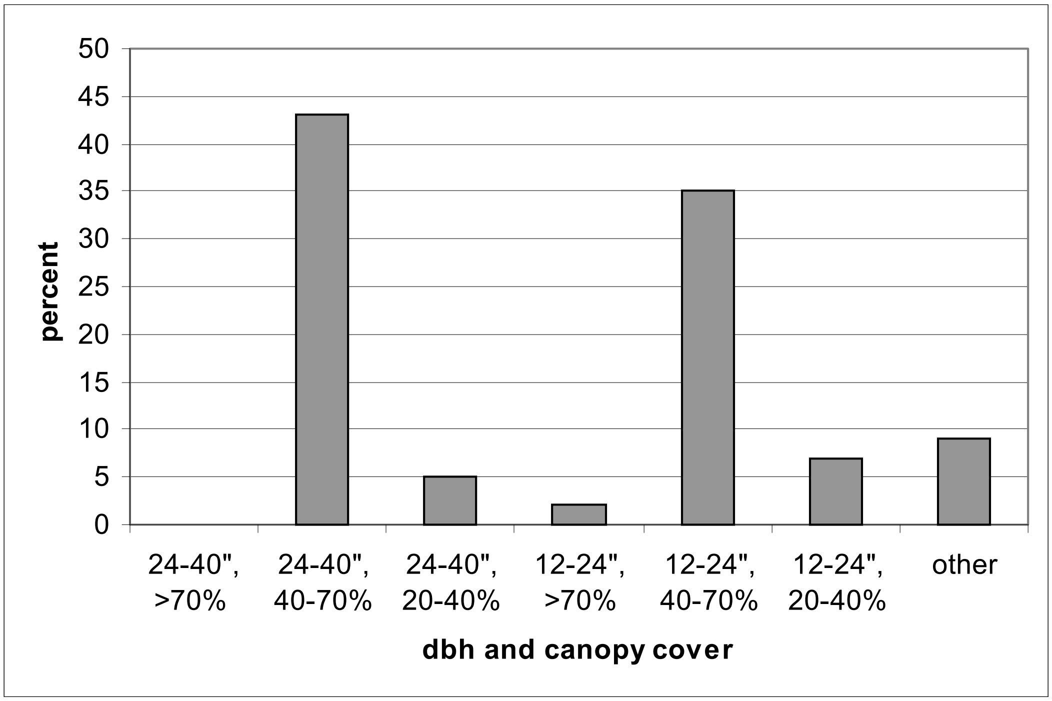
vegetation database, less than one percent of the designated PAC area is currently suitable. Figure 3 displays the percentage of the PACs by vegetation size and canopy closure. The acres shown in oak vegetation may provide suitable habitat. Our current vegetation data does not show tree sizes or canopy closure within the oak type.

Figure 3: Vegetation Data for Spotted Owl Protected Activity Centers.



There are 27 goshawk activity centers within CSWA. Preliminary PACs have been designated. Ten of these are 200 acres or larger, as required by the SNFPA (2001). The remaining 17 vary in size from 56 to 188 acres. As with the spotted owl PACs, the goshawk PACs will be reviewed and finalized at the project level. Within the currently designated 5094 acres of goshawk PAC, there are no acres of suitable habitat. Figure 4 displays the percentage of the PACs by vegetation size and canopy closure.

Figure 4. Vegetation Data (dbh and canopy cover) for Northern Goshawk Protected Activity Centers.



Mule deer—Two migratory deer herds, the Tuolumne and Stanislaus, are found within the analysis area. The number of deer within these two deer herds has been declining at a fairly steady rate over the past 50 years. Factors affecting and/or causing this decline include: (a) habitat condition of winter, transition and summer ranges (related to the exclusion of fire in particular); (b) weather; (c) predation by mountain lion, black bear, coyote and bobcat; (d) poaching, particularly on the winter ranges behind Twain Harte and Tuolumne; and (e) land development with its associated disturbances related to roads and increased human activity. Refer to Appendix H for a more in depth report on the status of the Stanislaus Deer Herd.

Deer will use most habitats within the area, although foraging habitat is usually the most limiting. Foraging habitat is generally provided by acres of early succession trees, oak/hardwood, grass, chaparral and sagebrush. According to the vegetation data, 21% of the area is within these types. The value of the vegetation type as forage varies with conditions in the type. For example, chaparral provides forage when it is young, and provides cover as it matures. Oaks provide forage as they mature and produce larger acorn crops.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements are met.

Existing Condition: Bald eagle and valley elderberry long-horned beetle are Federally listed as Threatened. Three bald eagle management areas have been established between Beardsley and Donnells Reservoirs. One or two bald eagles regularly winter around Beardsley Reservoir. Individual eagles have recently been sighted in the summer, leading to conjecture that bald eagles may nest in the area. In 2002, a bald eagle nest was discovered at Beardsley Reservoir, the most recent nest sighting since the 1960's.

Very little is known about the valley elderberry longhorn beetle, except that it lives in elderberry plants, generally below 3,000-foot elevation. Within the CSWA area, potential habitat for the valley elderberry beetle may be found in the Rose Creek and Lyons landscape areas. Management for this species involves avoiding removal of elderberry plants within the species elevation range. If removal of elderberry is necessary, the United States Fish and Wildlife Service require mitigation by transplanting the elderberry and planting additional elderberry near the site.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Human-caused disturbance has been significant within this area, especially in the lower and middle elevations. These impacts have caused changes in vegetation species composition, structure, and density on many acres. In particular, the number of pine trees (both ponderosa, Jeffrey and sugar pines) has been significantly reduced.

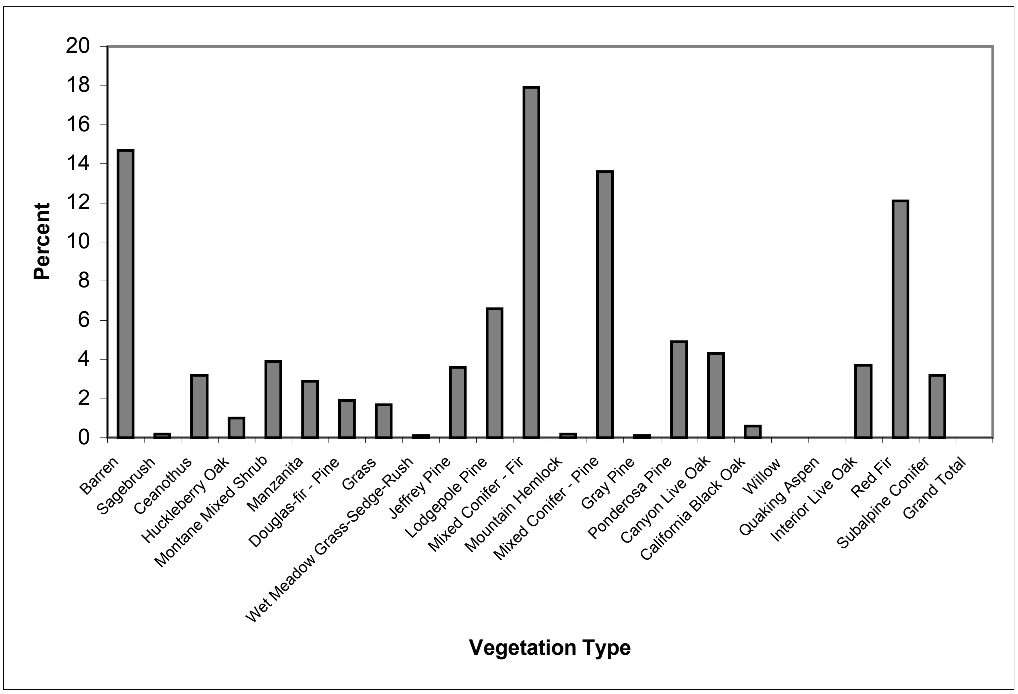
When gold was discovered in Columbia and Sonora, most of the low elevation pine was harvested to support gold mining and other settlement needs. Wildfires caused further reductions in young pines, less capable of surviving the fire's impact. Additional losses from insect and drought-related mortality often resulted in the loss of the last pine from remnant populations. When fire suppression efforts became increasingly effective, the disturbances needed to provide a favorable seedbed for colonization became increasingly rare.

White pine blister rust (*Cronartium ribocola*), an introduced disease has resulted in widespread mortality of sugar pine. Resistance, both by genetic mechanisms and by favorable microsite, provides today's remnant populations. Historical evidence indicates that the species was distributed fairly consistently throughout the Sierra Nevada forests, typically occupying 5-25% of the mixed conifer canopy. In small areas, it has been present at even higher levels, occasionally claiming up to 50% of the canopy.

Mid-elevation, mixed conifer forests, without periodic fire to restrict successful establishment of shade-tolerant trees such as white fir and incense cedar, now have significant numbers of these species. Establishing high densities, incense cedar and white fire are readily susceptible to bark beetles. Likewise, as they often provide canopy linkages from saplings to the upper canopy, they pose stand-replacing wildfire hazards over extensive acreages.

Forest inventory plots were established in 1999 and, in combination with the strata mapping effort completed in 1997, characterize the existing vegetation in the analysis area. Figure 5 shows the existing vegetation types and relative amounts of these types within the area (on National Forest System lands).

Figure 5. Vegetation Types found within the CSWA area.



Source: USDA Forest Service Vegetation Inventories

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: The following table reveals the seral stage distribution (using tree size as proxy) for NFS land only. It should also be noted that a map accuracy assessment is currently underway and that specific claims regarding this aspect of the inventory are not yet available. This dataset indicates that about 75% of the forested area is dominated by trees over 12 inches in diameter. Trees greater than 5 inches in diameter dominate more than 90%. On the other end of the continuum, mapped polygons with trees less than 5 inches in diameter occupy less than 5% of the area. Table 6 lists the seral stage distribution (tree size classes and acreages of each) for the CSWA area as a whole. Table 7 describes the seral stage distribution for each landscape.

Table 6. Seral Stage Distribution for the CSWA area.

R5 Size Class (DBH)	Acres	Percent
0 Seedling (<1 inch)	7,144	2.9
1 Saplings (1-4.9 inches)	2,970	1.2
2 Pole Tree (5-12 inches)	41,842	17.3
3 Small Tree (12-24 inches)	130,373	53.8
4 Medium Tree (24-40 inches)	51,017	21.1
5 Large Tree (>40 inches)	1,022	0.4
N (Non-stocked)	7,878	3.3
Total:	242,246	

Source: Stanislaus National Forest Forest Inventory

Table 7. Seral Stage Distribution for Landscapes.

Size Class	Beardsley-Donnell	Clark Fork	Dodge Ridge	Duckwall	Lyons	Pinecrest	Rose Creek	Sand Bar	Sonora Pass
0 Seedlings (<1 inch)	1%		2%	24%	0%	1%	8%	1%	0%
1 Sapling (1-12 inch)	2%	0%	1%	1%	1%	1%	1%	2%	0%
2 Poles (<12 inches)	9%	11%	8%	22%	27%	11%	46%	40%	10%
3 Small Tree (12-24 inches)	62%	70%	45%	15%	36%	72%	30%	33%	77%
4 Medium Tree (24-40 inches)	24%	19%	39%	9%	30%	14%	11%	23%	13%
5 Large Tree (>40 inches)	1%		2%	0%	0%	1%	3%	1%	
N Non-stocked	0%		3%	29%	5%				

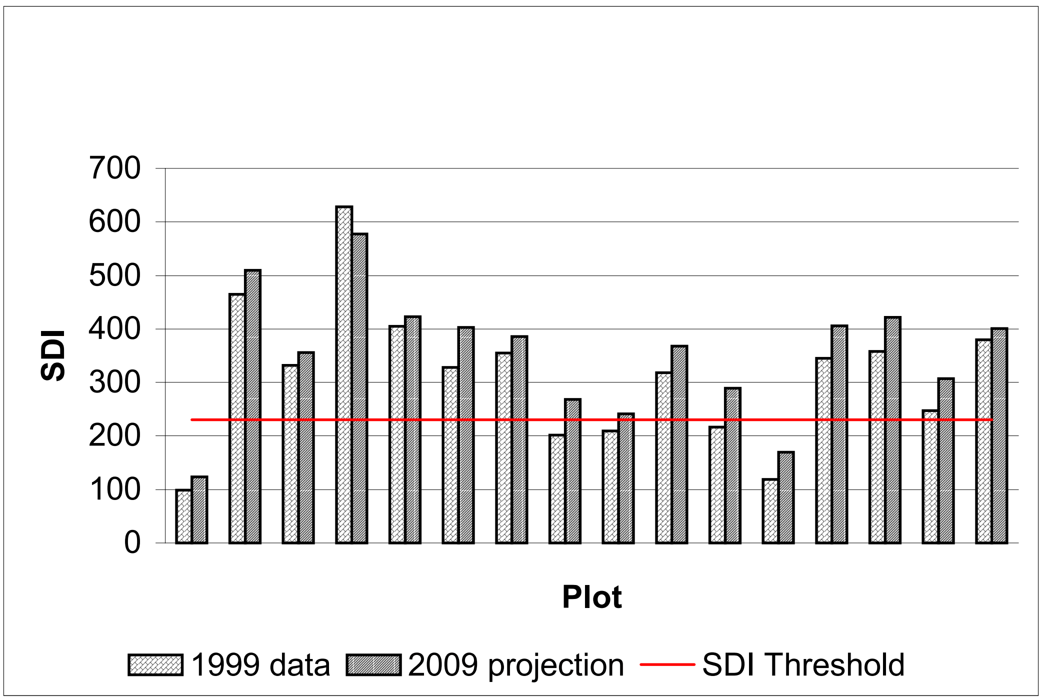
Desired Condition #20: Stand density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Conifer stand density affects stand development. In general, higher stand densities predispose trees to damage and/or mortality. Bark beetles and disease agents are often more damaging at high densities. Higher densities also limit diameter growth. Stand Density Index (SDI) is a measure of density. It is a species-specific age and site productivity-independent measure that can be used to readily describe "how dense" the forest vegetation is within a mapped area. Research indicates that densities below 55% of the maximum SDI level provides for reduced density-related mortality and relatively high vigor (Oliver 1995).

Using the most current forest inventories, the average SDI values by selected strata, were calculated for the 1999 inventory and the 2009 projected value. As these are average values, variations in density within a mapped strata polygon occur. (Refer to Map J-2 in Appendix J.) Site-specific field exams would be needed to provide finer resolution within these polygons.

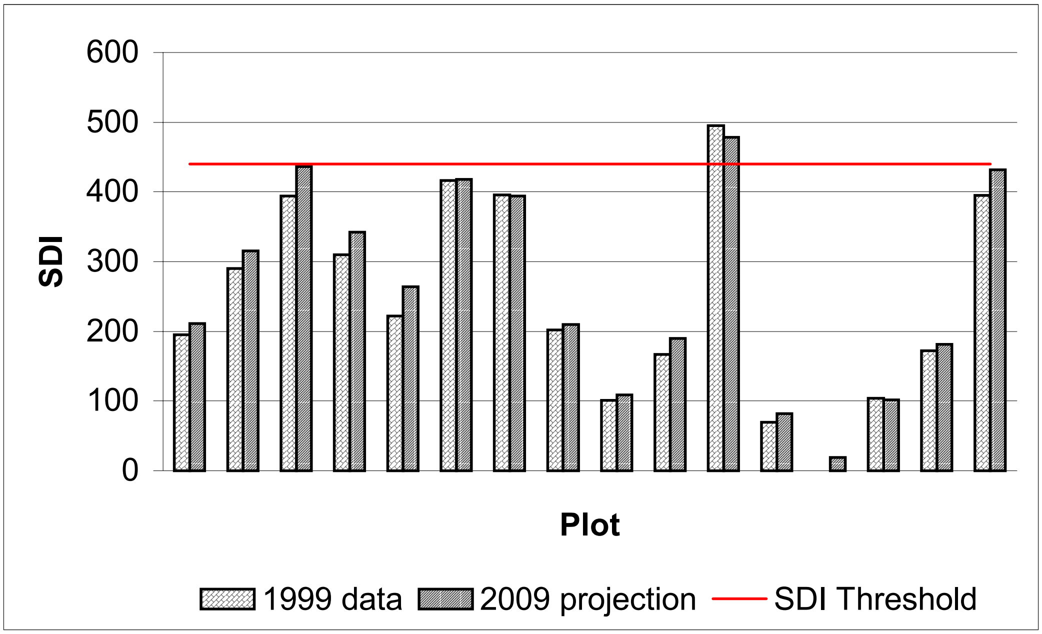
As an example of SDI variation within a mapped polygon, the data representing the two largest individual strata are shown in Figures 6 and 7. The Red Fir Size Class 3N (R3N) and White Fire Size Class 4N (F4N) strata account for nearly 53,000 acres within the analysis area. Approximately 20,000 acres of the CSWA area is R3N strata. Again, note the variation between the plot values. Also, note that this forest type, red fir, while capable of very high stocking values, is revealing a much-reduced current status.

Figure 6. Stand Density Index (SDI) for White Fir Size Class 4N (F4N).



Source: Stanislaus National Forest Inventory Data

Figure 7. Stand Density Index (SDI) for Red Fir Size Class 3N (R3N).



Source: Stanislaus National Forest Inventory Data

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: In mid and low elevation stream corridors, warm temperatures and productive soil favor relatively rapid conifer growth rates. Where true riparian species are a component of streamside potential natural vegetation, conifers can out compete them where natural processes affecting vegetation establishment, growth and mortality are interrupted. This has occurred in many CSWA landscapes. Long-term fire suppression has resulted in missed fire cycles, and restrictions in vegetation management in stream corridors for the past 25 years has favored conifer species. True riparian species such as aspens, cottonwoods, maples, dogwoods, alders and willows have limited opportunity to attain the light and space needed to successfully achieve their potential in the streamside environment. The ability of true riparian plant species to increase over current status in CSWA is evident. True riparian trees and shrubs are often the first to reappear where stream corridor disturbances occur, such as at road crossings, blow-down sites or in wildfire areas. Although conifer dominance in CSWA stream corridors is variable at the stream reach scale, it remains a landscape scale issue. The stand density increases seen across much of CSWA are present in streamside corridors as well as upland sites.

There are approximately 705 (4,650 acres) meadows within the Central Stanislaus Watershed Area. Of 4,650 acres, about 202 acres are known to be in high ecological status, about 540 in moderate status, and about 445 acres in low ecological status. At least 3,463 acres do not have a current determination of range condition class or ecological status[5]. Based on professional judgment of un-rated meadows compared to rated ones, most of the undetermined acres are in moderate ecological status. Inventories of fens and bogs began in 2001 and have covered approximately twenty-five of these meadows.

Aspen stands are present in CSWA above about 5000 feet in elevation although the density is greatest between about 6,000 to 9,000 feet. The stand locations and conditions of this rare riparian plant species is not fully known since only a partial inventory has been completed to date. However, in inventoried aspen stands condition ranges from highly similar to natural potential to become endangered. Two principal factors affect the condition of aspen stands—fire regime and livestock grazing. Where fire cycles have been missed due to long-term fire suppression, conifers often encroach into aspen stands and out compete them for light and moisture. A natural fire regime keeps conifer seedlings minimized and allows aspen suckers to reach heights exceeding flame lengths in intervals between fires. Grazing of aspen suckers alters the seral stage development of aspen clones. Long-term annual grazing in CSWA has resulted in some aspen stands exhibiting limited structural diversity, a condition seldom occurring in stands not subject to livestock grazing. Many un-grazed aspen stands at high elevations in CSWA are at desired condition. The aspen inventory data gap is an important one to fill since this is a rare riparian species.

Among the CSWA streams that have dams and diversions, the Relief Reach of the Middle Fork of the Stanislaus River is the only one with a high density of true riparian species. Such species exist along the gravel bed segments of this reach. However, structural diversity and species composition is not at desired condition. The cottonwood forest in this reach lacks a size class distribution that indicates a natural cycle of reproduction, establishment, growth and decadence. At present, there are many old cottonwoods that predate the flow regime alteration while smaller size classes are not robust. There has been a decrease in willows along this reach and a corresponding increase in mountain alder. These changes in cottonwood and willow are evident when comparing them to the adjacent Clark Fork of the Stanislaus River, an unimpaired flow stream, which has a greater balance of age classes of cottonwoods and frequency of willows compared with alder. More may be understood as a result of the riparian vegetation study being conducted as parts of the current hydropower relicense study.

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[5] Regional scorecards for rating moist and wet meadows by seral stage were developed in 1999. Such a scorecard for Sierra Nevada dry meadows does not yet exist. The best approximations available are the older range condition ratings from 1989 through 1998. That system rated vegetation composition separately from soil cover and apparent erosion and characterized the area using the lower of the two scores. It is assumed that meadows classed as excellent or good are in high ecological status, that fair-rated meadows are in moderate status, and that meadows rated as poor or very poor are in low status.

In regulated stream reaches with bedrock-controlled channels, riparian vegetation density is much less than on the Relief Reach. The characterization of the plant communities in these reaches, especially the inaccessible ones, remains a data gap pending completion of the riparian vegetation study being conducted as part of the current hydropower relicense project.

Riparian vegetation surrounding lakes and ponds in CSWA landscapes is estimated to be at or near natural potential. Nearly all lakes and ponds are in designated wilderness areas without substantive management disturbances. The condition of smaller aquatic/riparian sites such as springs, fens and bogs, is largely unknown since a systematic inventory has not been undertaken.

Social/Cultural Hierarchy

Economics

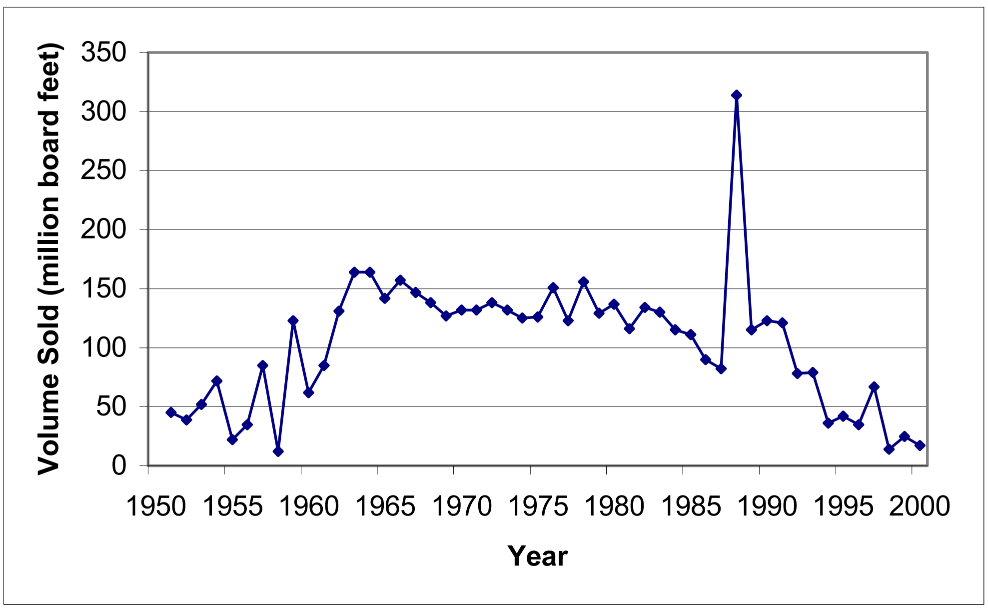
Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: The contributions to the economic viability of the local communities from national forest land within the CSWA area and Tuolumne County are complex and interwoven into the economic fabric of the area. Direct contributions were primarily consumptive in nature and have historically been tied to commodities such as timber, minerals, grazing and recreation. Indirect contributions are more difficult to quantify yet contribute significantly to the perception of quality of life, which is a widely accepted factor in community economic health.

There are some large-scale indicators showing the relative importance of natural resource based income in the overall community economic picture. Part of the economic contribution from the national forest is reflected in payments to the county for roads and schools. This payment, mandated by the Act of May 23, 1908 (better known as the “25% Fund Act”), was designed as a replacement for tax revenues presumed “lost” because national forests could not be taxed, as can private lands. The primary source for these revenues was timber receipts. Post WWII development the birth of the “Baby Boomers” fueled demands for wood and wood fiber at a steadily increasing pace. This leveled off and remained reasonably steady between 1986 and 1995. After 1995, they began falling, paralleling the drop in timber volume sold. In 1999, 25% payments to counties reached a low of $427,986. However, HR 2389, known as the Secure Rural Schools and Community Self-Determination Act of 2000 was passed, which, for the years 2001 through 2006, effectively removes the correlation between Forest Service receipts and payments to counties for roads and schools. Tuolumne County will receive an annual payment based on 80 to 85% of the average of the highest 3 years of payments received within the past 15 years.

Changes in legislation, demographics and politics of California and the nation are having a dramatic effect on the direct, consumptive economic contributions from the national forests. While the economic and social themes remained relatively consistent for many years (timber, grazing, mining), social changes, as well as greater knowledge of human influences on the forest environment has created a shift from a multiple use theme, which was the original intent in the creation of the National Forests, to a forest health theme, where "use" or commodity production is more commonly viewed as a byproduct of forest health maintenance and improvement. Nowhere is this more clearly illustrated than in the timber sold from national forest land. Timber production from the Stanislaus National Forest has fallen steadily (Figure 8), from an annual average timber harvest of 149 million board feet (1963 to 1972) to 18 million board feet in 2000.

Figure 8. Timber Sold from 1951 to 2000.



Source: Stanislaus National Forest Cut and Sold Reports. The 300 MMBF spike in 1988 was due to fire salvage form the Stanislaus Complex fire in 1987.

This drop in timber sold began in the 1980's. Preparing and harvesting sales of predominantly large trees, using regeneration prescriptions has been replaced with sales of smaller trees, using thinning and biomass removal as prescriptions. The Sierra Nevada Forest Plan Amendment continues this type of management strategy, aimed at fuel hazard reduction and improving wildlife habitat.

Tuolumne County's direct dependency on lumber and wood products for wage earnings, while an important part of the economy, has remained relatively constant in recent years. Between 1984 and 1997, the percent contribution to personal earnings for the lumber and wood products industry has varied between 2% and 4% of the total for all industries.

During this same period, the amount of timber sold off the national forest has varied from 35 to 315 million board feet (Source: Stanislaus National Forest Cut and Sold Report). The fact that public timber sold does not have a large relative effect on earnings is not surprising, as much of the timber sold goes to mills and manufacturers outside the county and there is a relatively large timber base on private land. Perhaps the most important reason timber outputs from public land have such little influence is that Tuolumne County enjoys a relatively diverse economy (USDA 1996).

While much of the ecosystem restoration effort will continue to support the forest and wood products industries, other efforts will involve stream restoration, brush removal, road rehabilitation and recreation facility enhancement. A suitable measure has not been developed to accurately track the total contribution of all ecosystem-related projects from national forest lands. Because there is no longer a timber “target” where specific commodity goals are prescribed, all timber sale offerings fall into the category of ecosystem management activities. Projects not involving timber or biomass sales are just beginning to receive the funding for implementation. Other funding sources from national earmarks, collections from FERC licensees, cooperators and others are beginning to materialize. Funding to implement the National Fire Plan initiative is expected to be approximately $3,000,000 per year on the Stanislaus National Forest. Sixty to seventy percent of this total is expected to go towards mechanical treatment contracts. Specific opportunities for projects will be identified in this and subsequent watershed analyses that will take advantage of these alternate funding sources. Most projects involve contracting with the private sector, providing some replacement for opportunities lost with the reduction in timber sales and helping create more highly skilled, higher paying jobs.

One constant over the years has been the influx of people to the mountains to enjoy nature, hunt, fish, get out of the valley heat and generally escape the trappings of the ever-increasing urban environment. Recreational opportunities have been a large component of the Tuolumne County economy, contributing 12.5% to the overall employment income and providing 20.5% of the jobs (USDA 2001).

There is currently a large data gap, not only in tracking recreation use (by activity and location) but also clear knowledge of preferences from the public and other users who live in the general service area. Many factors contribute to recreation use such as social/cultural preferences, socio-economic status, fuel prices, leisure time and year-round schools, to mention a few. Notwithstanding factors which cannot be locally controlled, the forest service and local community should strive to support growth in recreation opportunities and facilities at a level that keeps pace with the overall service area population and preferences, as long as it is compatible with the goals of maintaining healthy ecosystems. It is important to note that recreation-related jobs are historically lower-paying service-sector wages. As such, they should be treated as an important part of a diverse economy but not the primary focus for National Forest-related income contributions.

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: Interpretive services, public education and public information have been slowly improving over the past few years, as functional funding sources have slowly changed and the value and demand for such services has become more apparent. More Forest Service programs are being offered to a larger audience across the Forest than ever before. Information venues, such as the Internet and video are making Forest Information more available to the public. Unfortunately these types of opportunities as well as integrated public information services are still limited. The Forest does not have a completed Interpretive Services Plan to help integrate all types of services and needs. There is little integration between public information about what the Forest Service does and interpretation of the natural systems.

Interpretive facilities are generally in poor condition. Many kiosks, signs and sites are not maintained, interpretive program information (scripts, slides, etc.) is old and out-of-date and equipment is old or lacking.

Desired Condition #24: A Forest Service presence is provided at all developed and concentrated dispersed recreation sites.

Existing Condition: Comments received during CSWA public meetings, input from the Pinecrest Pathways community group and general feedback from many visitors indicates the desire to improve civil behavior among forest visitors. To many this translated to an increase in Forest Service presence in recreation areas. The reasons most often cited are security and resource protection. This parallels a 1998 California Parks and Recreation visitor survey in which 64% of the respondents wanted "…better regulation of behavior, rules and laws in parks and outdoor recreation areas… which would make my experience…more safe". The majority of respondents (64%) do not want operations of parks and recreation areas turned over to private enterprise (although maintenance and other activities are acceptable). The same survey found 94% of the respondents felt "The quality of the natural setting is an important factor in my enjoyment of outdoor recreation" and 76% felt "Wetlands… are of substantial ecological and recreational importance and should be protected…" (California Department of Parks and Recreation 1998).

Declining Forest Service budgets, a lack of long-term financial support for facilities and activities generated by FERC licensed facilities, increased private management of recreation areas and (until 2000), and the inability to return receipts to local Forest Service facilities where they were collected, have led to a reduction in Forest Service presence at many public recreation facilities. This condition is prevalent throughout the CSWA area but is most noticeable in areas of high recreation use.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into National Forest lands.

Existing Condition: The Stanislaus National Forest is a founding member of the interagency weed management area for Tuolumne and Calaveras Counties, the Central Sierra Partnership Against Weeds. The goal of this week management area (WMA) is to control noxious weed infestations within the two county areas, through public education and facilitation efforts. We support the WMA with administrative services and strengthen its position in competing for grants. The WMA provides education information to the public—brochures, field days and other efforts. It uses funds it gathers to help landowners to control weeds on their properties. The Stanislaus National Forest interpretive and range staff provides public information at campgrounds, trailheads and in public contacts on and off the Forest.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: Land acquisition activities are on going, Forest Service wide. The level of activity is generally funding or project driven. The Stanislaus LRMP identified a goal of 1,100 acres per year for land exchange or purchase with emphasis on optimizing ownership patterns and acquiring isolated parcels. Public interest may better help the Forest prioritize the opportunities available. The CSWA area has several parcels identified as strong candidates for acquisition. These are listed in Chapter VI within the applicable landscape.

Desired Condition #27: Appropriate recreation opportunities are identified and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: The CSWA area contains the majority of the developed recreation opportunities on the Stanislaus. It is a complex and diverse array of public and privately owned facilities, estimated to serve over two million visitors each year (see Recreation Opportunities Map in Appendix J). The area contains high recreation values such as concentrated recreation facilities and use, important scenic corridors and potential Wild and Scenic designation. Within the high use area are the Pinecrest Basin/Dodge Ridge, the Clark Fork recreation area; the Brightman-Dardanelles recreation area, Beardsley and the Middle Fork Stanislaus River (below Sand Bar). Medium recreation values contain popular OHV areas, concentrations of dispersed camping opportunities and scenic corridors along popular forest road routes. The remainder of the forest is categorized as having low values, only because general concentration of use is lower relative to the rest of the forest. Low and medium value areas may contain specific popular destinations. The Emigrant and Carson Iceberg Wilderness areas are not analyzed in this document, as they already have current or pending management direction. Trails (motorized and non-motorized) access all recreation value areas and are shown on a separate map.

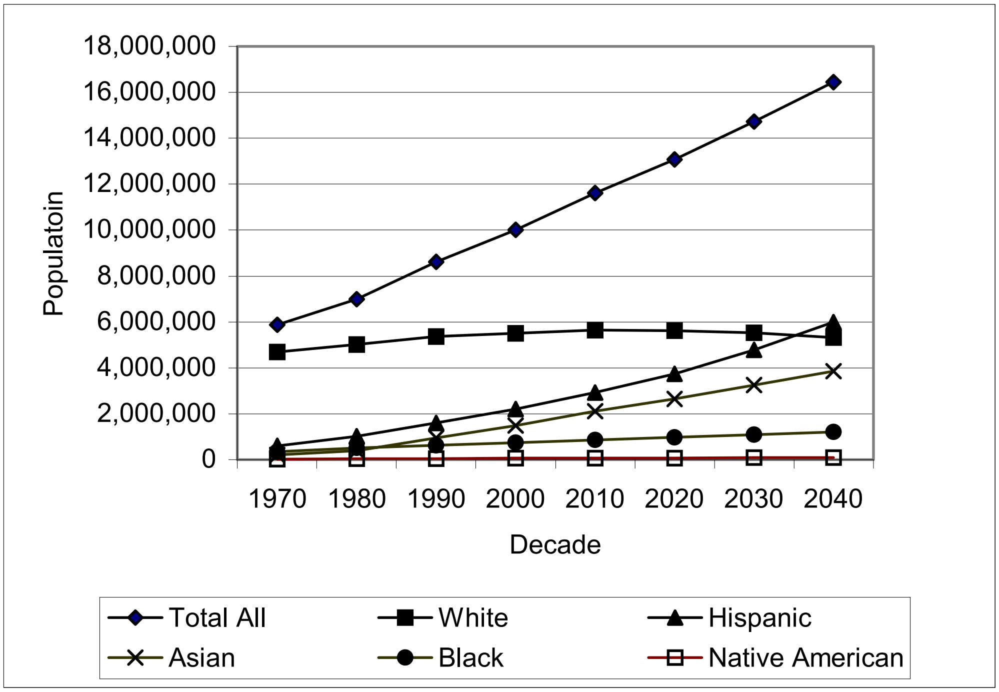
Most recreation facilities have been developed near rivers, streams and lakes. Private facilities, built on public land and operating under permit to the Forest Service, provide many of the less primitive opportunities not offered in Forest Service facilities such as cabins, group uses, boat rentals and other services. Most of the private recreation facilities have been in place for many years. There are 639 recreation residences located in Pinecrest and along or near Highway 108. The majority of the publicly owned developed recreation facilities were constructed between 1965 and 1980. Many were constructed in an attempt to "harden" popular dispersed sites to enable more visitors to enjoy activities, while minimizing damage to surrounding areas. Examples of such practices are seen in Pinecrest, along Highway 108, along the Clark Fork Road and in the Brightman, Dardanelles and Kennedy Meadows area. Some were developed as a result of FERC-related projects (Beardsley Reservoir and Sand Bar).

Depending on the construction methods and location, most publicly owned facilities are reaching the end of their designed life, which is 20-30 years. Additionally, most do not meet current standard for health and safety, energy efficiency or accessibility. Several campgrounds still have pit/vault toilets, which have clearly exceeded their designed life and are very unpopular with most visitors. The total recreation facility maintenance backlog is estimated at $3,000,000. Full replacement of facilities over 25 years of age would most certainly exceed $10,000,000 (Source: Stanislaus National Forest INFRA Database and Accessibility Action Plan, 1999). The Forest trail maintenance backlog is estimated at $6.5mm (Source: Stanislaus National Forest Meaningful Measures/INFRA Database, 2000). The inability to do regular maintenance is causing substantial resource degradation and sedimentation problems, especially on heavily used trails in the Emigrant Wilderness.

Day-to-day facility maintenance, care and policing of the grounds are performed by a variety of public and private entities including concessionaires, Forest Service personnel and volunteers, with variable results. Concession operated facilities typically receive the best maintenance, due to the fact that most receipts are retained by the concessionaire and these facilities have the highest occupancy rate, maximizing dollar returns. Forest Service managed campgrounds have suffered most from decreased budgets, leading to a backlog of maintenance and upkeep. Some of this backlog may be reduced for those sites under the Fee Demonstration program, which began in 1999. This program provides for return funds to the location where they were generated. Prior to this program, all revenue generated from the fee campgrounds was returned to the Treasury. This program will have the greatest effect on reducing the health and safety concerns and replacement of aging infrastructure items such as picnic tales and stoves. It will have minimal effect on major facility upgrades. Non-fee generating sites such as picnic areas and trailheads, which are relatively new facilities, have little funding available for maintenance and upgrading. These facilities are important components of the recreation attractiveness of the area and provide indirect economic benefit. Examples include the Pinecrest Day Use area, Beardsley Day Use/boat launching facilities, developed picnic sites and Donnell Vista Point. Declining budgets have reduced the personnel available to maintain and manage these sites.

Future demand and impacts to developed and dispersed recreation sites will most certainly increase. The population within counties that are typically represented in existing recreation use figures is expected to increase from approximately 10 million in 2000 to 16 million by the year 2040. Possibly even more significant are the expected demographic shifts expected within this population increase. While the white population is expected to remain somewhat stable (and may even decline), the Hispanic population is projected to triple (from 2.2 million in 2000 to 6 million in 2040) and the Asian population is expected to almost quadruple from 1 million in 2000 to 3.8 million in 2040). Figure 9 below graphically displays this demographic shift.

Figure 9. Population Projections for Counties found within the Service Area of the Stanislaus National Forest.



Source: 1990 US Census Bureau Statistics

How these population increases and demographic shifts will affect an already overburdened and under-funded infrastructure is unclear and certainly requires additional study. Other factors with the potential to affect recreation demand may include prices for fuel, economic prosperity and shifts in vacation/leisure habits caused by changing age demographics, year-around schools, technological inventions, commercial trends, evolving social values and a variety of other, as yet, undiscovered factors. These also require additional study. It is safe to say, however, that such a population increase cannot be ignored and most certainly will translate to increased demand.

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced activities and facilities.

Existing Condition: Some of the most heavily used recreation facilities on the Stanislaus National Forest are associated with hydropower projects, which currently do not bear the primary financial responsibility for the attractions they create. The entire Pinecrest Basin owes its widespread popularity and development to the existence of Pinecrest Reservoir. It is estimated that nearly 1 million visitors annually take advantage of the Pinecrest Basin and its flat-water recreation opportunities. For all of the use generated by the lake, the associated recreation facilities and trails are financially disconnected from the hydropower licensee. Many of the facilities, including the day use area and Pinecrest Campground have a deferred maintenance backlog of nearly $3,000,000. Most of this comes from the need to upgrade for accessibility and replace due to designed life. However, facilities are generally very serviceable. Although the campground is operated under a concession permit, the day use, including picnic areas, restrooms, amphitheatre, parking and a National Recreation Trail are managed by the Forest Service, which is understaffed and under financed to properly manage this very heavy workload. With the exception of newly constructed trails and restrooms recently renovated under the Forest Service Capital Improvement program, most public facilities have reached the end of their designed life. It is imperative that the maintenance, replacement and operation of the project-induced opportunities in Pinecrest be included in 4E condition for the upcoming re-licensing in 2005. Further analysis is needed to determine the scope of this responsibility.

Tri-Dam, the licensee for Beardsley/Donnell project, paid for the construction of the Beardsley Day Use Area (toilets, parking, picnic sites), launch ramp, boat dock, Beardsley Point Interpretive Trail, a vault toilet on the north side of Beardsley Reservoir and the Donnell Vista overlook. They were built at varying times from 1970 through 1986. The restroom is not accessible and the spring dries up annually, necessitating the use of portable restrooms. A primitive campground adjacent to the north-side vault toilet has slowly evolved in an attempt to partially manage uncontrolled use. The Forest Service financed the campground as well as all maintenance and management of all these facilities.

The newest facilities, financed by Tri-Dam and built in 1990 as part of the Sand Bar project, are located at Sand Bar Flat and China Flat on the middle fork of the Stanislaus River, below Beardsley Reservoir. The campground is operated by the Forest Service under the Fee Demonstration authority, which allows the Forest Service to retain camping fees for the purpose of operation and maintenance of the facility. Upstream at the Beardsley Afterbay is the China Flat picnic area. Under a separate agreement for the Sand Bar project, Tri-Dam contributes approximately $27,000 annually toward maintenance of the China Flat picnic area the Sand Bar Flat Campground.

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: Field reconnaissance was performed to compile a near 100% inventory of the unclassified roads in the CSWA area and to evaluate the condition and access needs of these roads. A total of 1,068 roads with a total length of 308 miles were inventoried. Most of the system roads were also reviewed in the field. In many cases, erosion and sedimentation was observed. Compared to the Stanislaus National Forest as a whole, the condition of the roads was average to below average.

Numerous roads are closed with barriers at the entrance, but have water draining down the roads causing erosion. These closed roads are not being maintained. Many of these roads do not have water bars and have culverts that are plugging. The failed culverts are diverting water out of natural drainage courses, down the roads and into other drainage courses, sometimes causing washouts in roads downslope. Some ERFO flood damage sites have resulted from failed drainage upslope on improperly closed roads.

OHV users and other traffic have reopened many roads, which were blocked to protect the road and adjacent resources from traffic effects.

In the past decade or more, there has ~~not~~ been insufficient road maintenance funding to maintain the system roads to the desired condition. Maintenance funds have been spent on the roads providing critical access and roads receiving most traffic. These are maintenance level 3, 4 and 5 Forest Service Roads. Most maintenance level 1 and 2 roads and unclassified roads have been largely unmaintained. Timber purchasers, in general, maintained the level 1 and 2 roads, during timber sales every 5 to 10 years. Since the implementation of the California spotted owl guidelines and the resulting decrease in timber sales, the frequency of maintenance has been reduced to 10 to 20 or more years. Numerous system roads are now brushing in and becoming closed, but are not prepared to be self-maintaining. Erosion is beginning to appear on these roads due to lack of maintenance of the drainage features.

Unneeded Roads: The Summit Ranger District Road Project Environmental Analysis (currently a draft), which includes the roaded portions of the Beardsley, Pinecrest, Clark Fork and Sonora Pass Landscapes, is a comprehensive analysis of the level 1, level 2 and unclassified roads. This analysis indicates that some existing roads are unneeded and could be decommissioned and some open roads are not needed for immediate access and could be closed between periods of use. Other roads could be converted to trails. This analysis (when final) will provide a thorough list of recommendations for these areas.

Additional roads in the remainder of the CSWA area are shown on the Road Condition map. The 308 miles of unclassified road identified during field reconnaissance were mapped and entered into a database. Overall, thirty-three miles were recommended for decommissioning.

Many of the following conditions are occurring in most or all landscapes. Some are site specific. Road density, crossings per mile, hydrologically connected road segments and dispersed campsites (as extensions of the road system) will be addressed, where appropriate, in the landscape discussions in Chapter V. All other conditions will be addressed in individual Roads Assessments, which are not a part of this document.

- Some landings are located near drainages and surface erosion is adding sediment to streams.
- There are roads which are needed for future access but have gully erosion due to improper drainage.
- Roadside ditches, found mainly on some insloped arterial and collector roads, are eroding and adding sediment to streams.
- On many roads, 18-inch culverts plug frequently, often causing washout of the fill at the stream crossing or gully erosion in the road.
- Erosion of road fills and slopes below roads is occurring below shot gunned culverts.
- Small culverts on level 1 and 2 roads are tending to become plugged due to lack of maintenance and are causing erosion and sedimentation.
- Certain areas, such as the area near Dry Meadows, have much more road-related erosion than average due to erosive soil conditions.
- Numerous roads are closed with barriers at the entrance, but have water draining down the roads causing erosion. These closed roads are not being maintained. Many of these roads do not have water bars and have culverts that are plugging. The failed culverts are diverting water out of natural drainage courses, down the roads and into other drainage courses, sometimes causing washouts in roads downslope. Some flood damage sites have resulted from failed drainage upslope on improperly closed roads.
- Commonly, roads which are planned to be closed after timber sales are left open for tree planting, burning, etc., with the intent of closing them after use, but are instead left open indefinitely. Roads that are closed are often improperly waterbarred and/or culverts are left in place rather than being removed
- OHV users and other traffic have reopened many roads that were blocked to protect the road and adjacent resources from traffic effects.
- Some steep OHV routes are eroding due to OHV traffic and flow of water down the roads.
- Some OHV routes pass through wetlands.
- Several Forest Service Roads intersecting Highway 108 have poor intersection sight distance due to brush encroachment.
- Several open roads (system and unclassified) are not being maintained because we have not acquired rights-of-way.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: Trails are a very important component of the recreation experiences on the forest. The inventoried trail system totals approximately 1,400 miles forest-wide. (Refer to Recreation Map in Appendix J). Most trails in the CSWA area are long time user-created routes that have been formalized as part of a transportation system. Generally, non-motorized trails tend to be concentrated in areas that have fewer roads. The overall trail system is poorly maintained, with an estimated maintenance backlog of $3–6 million, forest wide. The current mix of trail-related funding is 20% for maintenance and 80% for capitalization (trail construction). Except for about 2 miles of accessible trail constructed in the Pinecrest basin, all trail construction funds have been used to reconstruct trails that have deteriorated beyond normal maintenance capabilities. A more appropriate mix would be 80% for maintenance. Even with a better, more consistent mix, trail maintenance will still be under funded.

Historically, trails evolved as a transportation system and still serve the primary purpose of linking destinations. However, there is increasing popularity with the use of trails and the method of travel as the primary activities, with an emphasis on loops and "trips" of varying lengths. Another trail opportunity becoming more desirable (and one that does not currently exist) is the creation of trails that link communities. Specific proposals for linking communities involve linking Pinecrest with Strawberry, and Cold Springs and a network of trails that is part of the old Sugar Pine railroad system. (Refer to Recreation Map in Appendix J). Most of these are only conceptual and some (the Sugar Pine railroad link) needs the completion of the McCormick land exchange to become a reality.

Motorized trail use within the CSWA area is substantial and contributes to the overall recreation opportunities offered. The Motor Vehicle Travel Management Plan Amendment (1998) designates many miles of trails (designated trails are established OHV trails and Level 2 roads). It also recommends other trails that that could be added to the designated network once site-specific analysis is conducted.

There are many non-system trails on the Forest. Further analysis is needed, similar to the Roads Analysis, to determine the best mix of type and location so reasoned choices can be made on which should be retained as part of our "system" and which should be closed.

Chapter V.1: Beardsley-Donnells Landscape

Introduction

The Beardsley-Donnells Landscape occurs in the north central portion of the Central Stanislaus Watershed Analysis (CSWA) area. A significant stretch of the Middle Fork Stanislaus River flows through this landscape. Beardsley and Donnells Reservoirs, and Hell's Half Acre Powerhouse (with associated infrastructure) occur on this stretch of river. Elevations range from 3,400 feet at Beardsley Dam to 8,500 feet on Dardanelle's Cone. Scattered recreation facilities are found, including: Cascade Creek, Mill Creek, Niagara Creek and Niagara OHV Campgrounds; Donnell Vista Overlook; and Wheat's and County Line Trailheads (access into the Carson-Iceberg Wilderness. Refer to Map 4 for specific areas.

Historical Context

In the 1850's, the Columbia & Stanislaus River Water Company (C&SRWC) upper ditch and flume was constructed to supply water to the Columbia mines. The water source for the ditch was a small waterfall of the Middle Fork Stanislaus, just above Donnell Flat. The flume traversed the north-facing slope of the river near the location of the present Donnell Dam and continued along the Middle Fork Stanislaus River making its way to the Columbia mines.

During construction of the C&SRWC's upper ditch and flume, workers came in conflict with Native Americans, probably Piute. San Francisco and local newspapers reported:

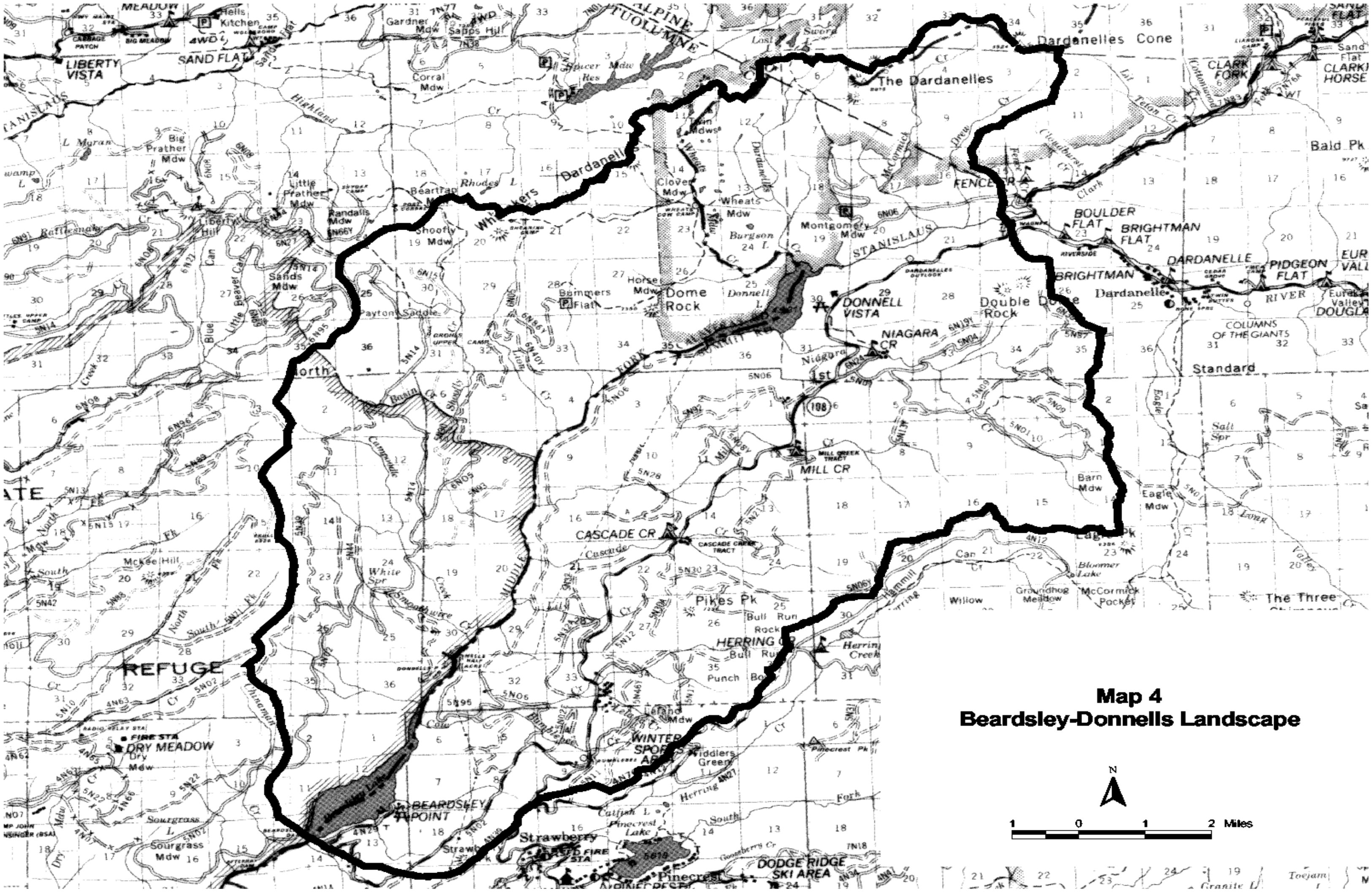
> "A party of Indians numbering about fifty, supposed to belong to the Walker River tribes, attacked four men at Donnell's Flat, forty miles from here, at the head of the Stanislaus River and Columbia Ditch Company's works yesterday. Fifteen or twenty of them were armed with muskets and the balance with bows and arrows. A simultaneous attack was made by them, instantly killing two men …. [A]nother of the party was seriously wounded [while] the fourth man… [was] slightly wounded by an arrow piercing through his clothes … Heldurth and Waldron fired on the Indians and as they fell they were supposed to have been killed or mortally wounded. They then retreated, leaving the Indians in possession of the ground and arrived at King's Ferry Camp, seven miles below, from which place the news was immediately conveyed to this city. Intense excitement was immediately created and a party is now organized to proceed to the scene of the action …"

The ditch and flume system engendered construction of a number of small, portable sawmills. These were strategically located along the course of the approximately 72-

mile long system in order to supply the builders with the enormous volume of lumber needed for the project. Donnell and Parsons, merchants and entrepreneurs from Columbia, built a sawmill at Donnell Flat in about 1857 having the C&SRWC as its only customer.

For many years Donnell Flat was eyed for its water storage and hydroelectric potential. There were a variety of proposals over the years, none of which were built until in 1957, when Oakdale and South San Joaquin Irrigation Districts completed the Beardsley Dam. Also operating Donnell Reservoir, about eight miles upstream, the power generated at Beardsley and Donnell powerhouses was purchased by PG&E who exercised considerable control over water releases.

In the early 1950s, with the licensing to the Oakdale and South San Joaquin Irrigation Districts for construction of Beardsley and Donnells power projects, the Stanislaus National Forest was successful in securing water releases for the purpose of benefiting downstream fishing. "In the case of the Donnells and Beardsley Flat projects provisions were made for water releases which have been accepted by the licensee. Arrangements were also made with the PG&E Company to release uniform flows from the Relief Reservoir when the Donnells project is constructed. This will greatly improve fishing along the stream." (USDA 1952).



Map 4
Beardsley-Donnells Landscape

Landscape Analysis

Hydrologic Hierarchy

Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Beardsley-Donnells landscape. One population of Yosemite toad was found on Niagra Creek. Pacific chorus frogs were found in Mill Creek and Niagra Creek. This landscape is within the range of California red-legged frog, foothill yellow-legged frog, western pond turtle, Yosemite toad, mountain yellow-legged frog, hardhead, rainbow trout, Mt. Lyell salamander, and slender salamanders.

Beardsley and Donnells Reservoirs inundated meadow habitat when the dams were built. The exact amount of meadow inundated is unknown. Topographic maps of the areas indicate that the inundated habitat was likely suitable for western pond turtle and foothill yellow-legged frog. Because these habitats remain inundated, we will not be able to return these native amphibian species to their historically occupied habitat in these specific areas.

There have been sightings of osprey, wood duck, merganser, mallard and various other waterfowl species in this landscape. There may be habitat for harlequin duck. Surveys have not been conducted specific to waterfowl or osprey. There is habitat for osprey at Beardsley Reservoir. There have been no macro invertebrate surveys within this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/ Successful breeding Occupied habitat	• 27.1 miles and 20 acres surveyed. • Yosemite toad and pacific chorus frog located. • Beardsley and Donnells Reservoirs inundated historic habitat.	• Survey un-surveyed areas • Reintroduce species in unoccupied historic habitat • Protect occupied Yosemite toad habitat • Mitigate loss of historic amphibian habitat during FERC relicensing process.
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting	• Gather incidental sightings of waterfowl and osprey • Survey suitable waterfowl habitat

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Status of population health is unknown	Conduct surveys

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: There are no historic records of California red-legged frog within the landscape. Although this landscape is within the range of the species, it is unlikely to provide suitable breeding habitat due to the topography of the river and surrounding land. Completion of site assessments would verify this assumption. Designated critical habitat does not occur within this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California red-legged frog	Suitable habitat Recovery plan objectives met	No areas with completed suitable habitat site assessments	Complete habitat site assessments for landscape

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: LWD in the Beardsley-Donnells Landscape is highly variable. The Middle Fork Stanislaus is deficient in LWD, most likely as a result of removal at dam sites. In tributaries to the Middle Fork long term observations indicate that LWD is probably at or near desired condition in most areas. There may be isolated areas where it is in deficit and some areas where it may be excessive. Long term exclusion of fire and vegetation management in stream corridors has resulted in many riparian areas exceeding Stand Density Index thresholds. As a result, a potential excessive amount of in-stream or recruitable LWD currently exists. The amount of LWD at the stream reach scale in tributaries of the Middle Fork Stanislaus is a data gap.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
LWD	Pieces/100m of stream, by Channel Type	• Amount of LWD in MFK Stanislaus River is deficient (3–SPLAT). • LWD ranges from < DC to DC at the sub-watershed scale (2). • LWD data gap at stream reach scale.	• Improve amount of LWD in Donnell's Reach of MFK Stanislaus River. • Increase knowledge of LWD at the sub-watershed scale.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: Of the 10 sub-watersheds wholly outside wilderness in this landscape, nine have road densities and stream crossings in excess of the desired condition. Many roads on the west side of the Middle Fork Stanislaus River between Beardsley and Donnells Reservoirs are in very poor condition. Many of these are among the highest in CSWA. The amount of hydrologically connected road segments is an important data gap to be filled.

Wildfire hazard in this landscape is excessive. The greatest threat of large and severe wildfire, and thus sedimentation, is in the portions of the landscape below about 6,000 feet.

Particle size distribution in streams is currently a data gap across the landscape. The hydropower projects currently undergoing relicensing are examining PSD in the stream reaches affected by dams and diversions. These data should be available and analyzed by the end of 2001. In streams without dams and diversions, sediment has not been quantitatively evaluated except at isolated locations where Stream Condition Inventory has been conducted. This data gap can be assessed along with road sediment measures; if road system improvements are implemented a quantitative sediment survey may not be necessary.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/mi of stream; HCS <. 0.25 mi/mi^2.	• Road density >2.5 in 9 of 10 sub-watersheds (3). • Crossings > 1 in 9 of 10 sub-watersheds (3). • HCS—data gap.	• Improve quality of road system where not at DC. • Increase HCS knowledge where road density and stream crossings not at DC.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	• 25% low hazard • 38% high/very high	Reduce wildfire hazard in portions of landscape where hazard is moderate, high and very high.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	• Streams with dams and diversions: intra-reach data gap pending SPLAT study; PSD data gap. • Unimpaired streams: Limited observations indicate PSD data gap.	Increase knowledge of stream sediment transport and deposition patterns.
Pool Depth	Residual pool depth is highly similar to reference streams.	• Pool depth ranges from <DC to DC (1, 3-SCI). Limited knowledge indicates data gap.	Increase knowledge of pool sediment.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: Nearly all low gradient stream reaches with fine-grained streambanks have altered channel morphology. While the extent of alteration varies by reach these streams not at desired condition are either over widened or down cut, have high width-to-depth ratios or exhibit degraded streambank stability. A list of the principal low gradient streams in this landscape is in the Appendix I.

Among moderate gradient stream reaches, the Middle Fork Stanislaus River—a bedrock controlled reach—is at or near desired condition. Although streamflow has been altered for over 40 years, channel morphology has remained stable since the river in this landscape is not sensitive to substantive change. Long term observations of moderate gradient reaches with coarse-grained streambanks tributary to the Middle Fork indicate that channel morphology is satisfactory. However, in places where reach morphology has not been observed an inventory would be useful to determine if undiscovered problems exist.

Steep gradient stream condition remains a data gap to a large extent. Inventory would be useful, prioritized to areas with past management on sensitive soils.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: Nearly all low gradient reaches do not meet all 3 indicators (2, 3-SCI). Moderate gradient reaches: MFK Stanislaus River (Donnells Reach) is bedrock controlled and likely meets all 3 criteria (1, 3-SPLAT); All 3 indicators are met in many stream reaches observed but a data gap remains (2). Steep Gradient streams: Indicator 4 is met in many streams observed but a data gap remains.	• Improve applicable stream reaches toward desired condition. • Increase knowledge of channel condition.

Information source: 1—Limited field observations; 2—Long-term field; observations; 3—Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: As a result of the hydropower relicensing water quality study it is apparent that all but perhaps one CVRWQCB Basin Plan Objective is met in the Middle Fork Stanislaus River. Water temperature in relation to amphibian habitat requirements remains a data gap until later in 2001 when data will be available.

In the tributaries of the Middle Fork, there is a quantitative data gap regarding BPO's. However, based on long-term observations the only parameter that may be at risk is sediment. The principal source is forest roads and with this problem identified in this analysis future actions are anticipated that will reduce this road sediment.

There are no principal municipal water supplies in this landscape that would constitute designation as municipal watersheds.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	MFK Stanislaus meets BPO except maybe temperature regarding amphibian habitat requirements. (3-SPLAT). Other streams likely meet BPO except maybe sediment from roads (2).	• Decrease sources of road sediment. • Increase knowledge of temperature during amphibian breeding and rearing periods.
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	Not applicable in this landscape	N/A

Information source: 1 – Limited field observations; 2 – Long term field observations; 3 – Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Existing Condition: Although the Middle Fork Stanislaus River has dams and diversions, it is a bedrock-controlled stream and the regulated streamflow has not substantively affected channel morphology. Future flow regime management will be based on the habitat requirements of native and desired non-native aquatic species. Key habitat features include flow velocity, volume, temperature and condition of aquatic and riparian vegetation for habitat quality.

There are brown and rainbow trout populations in the Middle Fork Stanislaus, although amphibian presence is unknown. The mean monthly-impaired flow is lower than the unimpaired (natural flow) in all twelve months of the year. On average, 60% of the natural flow is removed from this section of the Middle Fork Stanislaus. This results in changes to amount of habitat available for aquatic species. In addition, flow releases occur from the bottom of the dam, which results in water temperature lower than natural during the summer months.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Streamflow	N/A	N/A	N/A
Aquatic Species Habitat	Suitable habitat for each life stage of native and non-native species.	Introduced brown trout and rainbow trout present	▪ Provide favorable flows for trout habitat during re-licensing ▪ If amphibian populations are found, provide favorable flows for habitat and breeding

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: Infiltration at the sub-watershed scale in this landscape is satisfactory. There are, however, numerous tree plantations from past clear-cutting that may have limited soil porosity.

Evapotranspiration is likely excessive in this landscape since over half of it has a vegetative density exceeding Stand Density Index threshold values. From the watershed standpoint regarding vegetation as an indicator flow regime, the stand density problems are most pronounced where evaporation and transpiration are at their greatest. This is in the elevations of the landscape outside the snow zone, or below about 6,500-7,000 feet. Warmer temperatures below the snow zone produce more evaporative potential, and faster tree growth result in more plant transpiration.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub watershed.	>90% at the sub-watershed scale (3). Data gap exists in the numerous past clear cuts in the landscape (3).	• Determine infiltration status in tree plantations throughout landscape. • Maintain high level of infiltration in sub-watersheds.
Evapotranspiration	SDI is < threshold values.	56% of landscape exceeds the SDI threshold values (3)	• Reduce Stand Density in portions of landscape most affecting evapotranspiration.

Information source: 1—Limited field observations; 2—Long-term field observations; 3—Data supported observations

Terrestrial Hierarchy
Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Five fires over 10 acres have been recorded in this landscape over the past 100 years. A total of 423 fires have burned 209 acres between 1970 and 2000, 72% of them lightning-caused. Relative fire occurrence is low over most of the landscape and moderate along the highway corridor where human-caused fires tend to occur, and in the high elevation peaks prone to lightning fires.

The historic fire regime for the Beardsley-Donnells landscape is primarily fire regime I, frequent-occurring low severity fire. In the higher elevation conifers, fires were less frequent and were of mixed severity depending on fuel and weather conditions (fire regime III). In the montane chaparral north of Donnell Lake and in the McCormick Creek drainage, infrequent fires burned with stand replacement severity (fire regime IV).

The following table describes the existing condition of the Beardsley-Donnells landscape as it relates to the desired condition for the fire element.

Analysis:

<table>
<tr><th colspan="2">DESIRED CONDITION</th><th colspan="4" rowspan="2">EXISTING CONDITION</th><th rowspan="2">OPPORTUNITIES</th></tr>
<tr><th>Indicator</th><th>Measure</th></tr>
<tr><td rowspan="5">Condition Class (CC)</td><td rowspan="5">CC1</td><td colspan="4">Fire regime</td><td rowspan="5">• Move CC3 areas Move toward CC1 by reducing surface and ladder fuels, and removing excess crown fuels
• Move CC2 areas toward CC1 by reducing surface and ladder fuels
• Maintain CC1 areas in desired condition</td></tr>
<tr><td></td><td>I</td><td>III</td><td>IV</td></tr>
<tr><td>CC1</td><td>0%</td><td>40%</td><td>100%</td></tr>
<tr><td>CC2</td><td>70%</td><td>60%</td><td></td></tr>
<tr><td>CC3</td><td>30%</td><td></td><td></td></tr>
</table>

<table>
<tr><th colspan="2">DESIRED CONDITION</th><th colspan="2" rowspan="2">EXISTING CONDITION</th><th rowspan="2">OPPORTUNITIES</th></tr>
<tr><th>Indicator</th><th>Measure</th></tr>
<tr><td>Potential impacts of fire</td><td>No negative</td><td colspan="2">Some potential impacts to:
• Leland Meadows
• Summer home tracts
• Hwy 108 corridor
• 22 PACs, ½ with high fire hazard area
• >50% of landscape is Old Forest emphasis</td><td>• Identify potential impacts during preparation of the Fire Management Plan.
• Prioritize mitigation measures to reduce potential impacts</td></tr>
<tr><td>Fire hazard—Defense Zone</td><td>Low: 90%</td><td colspan="2">Low: 0%
Mod: 46%
High: 51%
Very high: 3%</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Fire hazard—Outside Defense Zone</td><td>Low: 40% (strategically placed to break up high hazard)</td><td><u>ALL OUTSIDE</u>
Low: 25%
Mod: 37%
High: 30%
VHigh: 8%</td><td><u>THREAT</u>
Low: 0%
Mod: 43%
High: 36%
VHigh: 21%</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Suppression effectiveness</td><td>Hand crews effective in high value areas (4’ flame length)</td><td colspan="2">Some areas of >4ft flame length around Hells Half Acre, Beardsley Day Use area, and PACs in the canyon</td><td>Reduce potential flame length where necessary by removing or rearranging surface fuels</td></tr>
<tr><td>Crown fire potential</td><td>Surface only</td><td colspan="2">Some passive crown fire potential in about 40% of landscape</td><td>Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height</td></tr>
</table>

In summary, the existing condition of the Beardsley-Donnells landscape as it relates to the fire element could be improved. Some hazard fuel treatment is needed to reduce fire hazard in the lower elevations of the landscape. Several prescribed fires and mechanical thinning projects have been implemented in the past 10 years on both sides of Beardsley Lake to begin this process. Maintenance of these efforts and expansion to other areas is necessary. In the higher elevations, some restorative treatment is needed, focused on efforts to allow naturally occurring fires to be managed for resource benefits. Maintenance of the existing condition may also involve some fuels management, primarily prescribed fire.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: In this landscape noxious weeds have mainly been found along roads and a trail. There is one list B noxious weed, a rapidly spreading infestation of Canada thistle (*Cirsium arvense*) found along the trail to Sword Lake, within the Carson-Iceberg Wilderness. Treatment actions for this rhyzomatous perennial weed are currently being analyzed. Three small infestations of yellow starthistle (*Centaurea solstitialis*) were found along Highway 108 in 1999 below Mill Creek Campground, near Cow Creek, and at the intersection with 5N32 (the Snow Park) (Chambers 1999). There is one known infestation of tree of heaven (*Ailanthus altisimus*) also along Highway 108l.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	• 1 Canada thistle occurrence • 3 yellow starthistle infestations • 1 tree of heaven infestation	• Eradicate existing populations of noxious weeds. • Monitor, map and record all new occurrences. • Implement preventative actions to minimize spread of weeds.
Established weed populations	All populations are treated and eradicated	• 0.5 acre Canada thistle • Less than 0.1 acre of yellow starthistle • 9 sq.ft. Tree of heaven	Eradicate the populations, monitor and re-treat as needed.

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: One sensitive plant species (*Lomatium stebbinsii*) is found in three locations in the Beardsley-Donnells landscape. There is still some unsurveyed habitat within the known elevation and range for this species. It is likely that there are more occurrences. Habitat for other sensitive plant species exists. They are: *Allium tribracteatum, Bruchia bolanderi, Clarkia biloba* ssp. *australis, Cypripedium montanum, Erythronium tuolumnense, Hulsea brevifolia, Hydrothyria venosa, Meesia triquetra, M. uliginosa, Mimulus gracilipes, Mimulus pulchellus,* and *Orthotrichum spjutii*.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	Three occurrences of *Lomatium stebbinsii* exist.	• Survey un-surveyed areas • Protect known populations of *Lomatium stebbinsii*

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Existing conditions related to soil productivity vary across the Beardsley-Donnell Landscape. At the landscape scale, soil conditions can be described and related to disturbance history and to the Ecological Unit Inventory.

More than 50 percent of the landscape is outside the natural range of variability relative to fire regime and stand density. This description fits much of the Lower Mixed Conifer, Upper Mixed Conifer, and Canyon Ecological Units. Soils in these units are subject to greater damage from wildfire because of the increased fire hazard. In contrast, fire regime, vegetation patterns, and soil conditions are generally within the natural range of variation in higher elevation Ecological Units such as Red Fir, Jeffery Pine-Rock Outcrop, etc.

Soil conditions in older plantations and in stands where multiply entry tractor logging occurred, may not be at desired condition. For example, nitrogen availability may be low in plantations located in red fir where tractor piling removed surface organics. Soil compaction may be at threshold in multiply entry stands. Also, logging under very dry conditions in the early 1980s trenched skid trails on non-cohesive soils found in Ecological Units 303 and 307.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Soil Porosity	>90% of natural porosity	Does not meet DC in older plantations. May not meet DC where multiply entry tractor logging has occurred.	Subsoil skid trails as stands are thinned
Large Downed Woody Material	Logs per acre >20 inch diameter	Meets DC in much of the landscape, including railroad logged second growth stands; May not meet DC where multiply entry tractor logging has occurred; Lack of LWM in plantations.	Create large woody material where needed for wildlife and soil productivity
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Mostly at DC; May not be at DC in plantations	• Survey for status of soil organisms in plantations • See opportunities for managing surface organic matter below
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Nitrogen availability may be low in plantations located in the red fir zone where tractor piling removed surface organics	Test for N availability. Thin stands and fertilize where N is low.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Topsoil	Organic matter content is 85% of natural	Generally meets DC. Skid trails trenched on non-cohesive soils found in units 303 and 307	Restore trenched skid trails

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: Existing conditions related to soil erosion vary across the Beardsley-Donnell Landscape. Soil conditions in older plantations and in stands where multiple entry tractor logging occurred, may not be at desired condition.

There are a number of soil types in combination with native road surfaces, lack of road maintenance, and rain on snow events contribute high levels of sediment. Soil types that are prone to wet season rutting, major inside ditch erosion, and general gully erosion are present in this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover (hillslopes)	At least 50% effective surface cover. Adjust where necessary to avoid high Erosion Hazard Rating.	Surface cover is generally at DC. Erosion is occurring on old skid trails, for example Upper Cow	• Improve surface cover where needed for erosion control • Stabilize eroding skid trails
Surface Cover (RCAs)	75% effective surface cover	. Generally meets DC; Some accelerated erosion in dispersed camping sites; gulley erosion in Wheat's Meadow	• Monitor surface cover and accelerated erosion in RCAs • Treat or relocate camp sites that are eroding Treat gullies in meadows
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads, skid trails, and trails, particularly on sensitive soils in Shoofly area.	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential.

Terrestrial Animal Species

Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

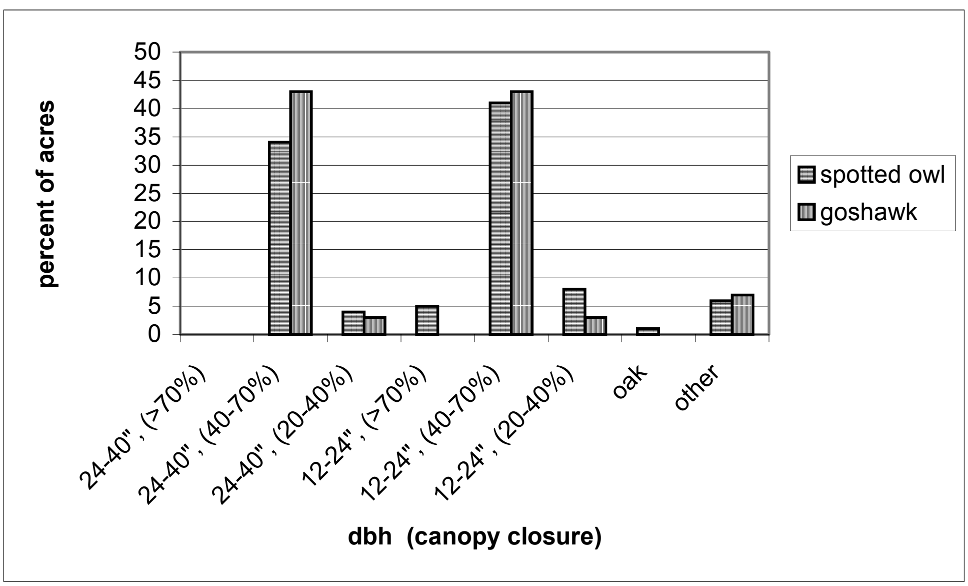
Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk, peregrine falcon and mule deer are known to occur or have the potential to occur in this landscape.

Peregrine falcon—This landscape contains the only known peregrine falcon eyrie in the CSWA area, at Donnells Reservoir. Some activities occurring at the reservoir may result in disturbance to the breeding pair. A draft eyrie management strategy addresses these issues, but needs to be finalized.

Old forest associated species—Within the Beardsley-Donnells landscape, 60% of the area is mapped as OFEA. Approximately 25% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Three percent of the OFEA is in oak and hardwood types, and may or may not exhibit old forest conditions. Eleven percent of the OFEA is not suitable for forest production. This leaves 61% of the OFEA acres to improve to meet old forest desired conditions.

There are 23 California spotted owl PACs within the Dodge Ridge landscape. Three of these are partially within other landscapes. There are 10 northern goshawk PACs within this landscape. Based on the 1997 vegetation data, there are no acres of habitat at desired condition within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that at least some of the acres in PACs are currently at desired condition. Figure 10 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 10: Beardsley-Donnells Protected Activity Centers Vegetation Data



Mule deer—This landscape provides migratory habitat for the Stanislaus Deer Herd in the lower elevations and summer/fawning habitat in the higher elevations. The 1984 herd management plan indicated that low fawn recruitment was the primary factor limiting recovery of the deer herd (Maddox 1984). One factor affecting low fawn recruitment is the decline in forage quality on summer, winter and transitional ranges. Approximately 18% of the landscape is found in oak/hardwood, early succession trees, and grass and chaparral types. The current condition of these areas as foraging habitat, as well as the availability and condition of cover and fawning habitat, is unknown, however some improvements—primarily prescribed burns— have occurred in the last decade, particularly around Beardsley Reservoir.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, mule deer, bats	Presence/ Successful breeding	Known presence and breeding for spotted owl over much of the area, some data for goshawk. There are 9 marten sightings, 5 fisher sightings and 4 red fox sightings. No information for bat species. Some information for mule deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat - OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 60% of landscape in OFEA; 25% of OFEA in CWHR types 5D/5M; 11% of OFEA not capable of growing old forest Twenty spotted owl PACs entirely within landscape; 3 partially within landscape; All PACs over 300 acres; 0 acres currently at desired condition Ten goshawk PACs within landscape; 7 PACs below 200 acres; 0 acres currently at desired condition	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of habitat that meet desired conditions within both spotted owl and goshawk PACs • Increase size of goshawk PACs to 200 acres
Mule Deer Habitat	Early succession habitat	18% of landscape in potential foraging habitat. Current condition unknown.	▪ Gather current data to assess habitat availability and condition. ▪ Continue prescribed fire program in grass and chaparral

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
			vegetation types. ▪ Increase amount of early seral vegetation in grassland, chaparral and timber vegetation types. ▪ Oak woodland enhancement activities. ▪ Improve montane meadows where needed to increase amount and height of meadow vegetation. ▪ Cooperate with annual CDF&G deer her counts. • Continue to monitor fawn recruitment.
Peregrine falcon	Nest sites protected from disturbance	Incomplete eyrie plan for known nest site	Complete eyrie plan and implement protection measures
Bat Habitat	Occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Existing Condition: This landscape contains three designated bald eagle nest territories in the vicinity of Beardsley Reservoir. The territories include some suitable nest trees. Current habitat condition in these territories is unknown**.** Wintering eagles have used the area for years. A nesting pair of bald eagles was discovered in 2002.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Bald Eagle	Suitable habitat conditions in three nesting territories.	Some suitable nest trees, other conditions unknown. Potential nest habitat outside established territories.	▪ Collect habitat data within designated territories. ▪ Continue habitat improvement activities within territories to favor large trees suitable for nesting. ▪ Implement mitigation actions to protect the nesting pair.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Vegetation types have been changed by timber harvest and by the absence of periodic fire. Over many decades, harvesting removed high-value pines, in advance of predicted mortality, over much of the landscape. More recently, in response to increasingly sophisticated management strategies, harvesting created openings where most of the existing vegetation was removed and replaced, largely, by planted conifer seedlings. Additionally, in the absence of periodic wildfire, shade-tolerant conifers, primarily white fir and incense cedar, established themselves within existing stands, sometimes becoming the dominant species. California black oak, whenever faced with increasing conifer density levels, especially among white fir, declines in vigor and dominance.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Despite the increasing availability of rust-resistant planting stock, significant efforts to reestablish the species have not occurred. Western white pine, also susceptible, has not been significantly affected as yet.

The table below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 8. Desired Condition and Existing Condition for Vegetation Series in Beardsley-Donnells Landscape.

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Mixed Conifer	60-80% Mixed Conifer	87% Mixed Conifer
Mixed Conifer/Douglas-Fir – Ponderosa Pine	30-60% Mixed Conifer 30-60% Douglas Fir – Ponderosa Pine	74% Mixed Conifer 0% Douglas-Fir – Ponderosa Pine
Mixed Conifer/Ponderosa Pine/California Black Oak	30-50% Mixed Conifer 30-50% Ponderosa Pine 20-40 California Black Oak	53% Mixed Conifer 1% Ponderosa Pine 5% California Black Oak
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	2% Ponderosa Pine 12% Manzanita 2% Grass
Ponderosa Pine/California Black Oak/Interior Live Oak	20-40% Ponderosa Pine 20-40% California Black Oak 20-40% Interior Live Oak	4% Ponderosa Pine 0% California Black Oak 32% Interior Live Oak
White Fir	60-80% White Fir	68% Mixed Conifer - Fir

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Jeffrey Pine/Rock Outcrop/White Fir/Lodgepole Pine	30-40% Jeffrey Pine 10-30% Rock Outcrop 20-30% White Fir 20-30% Lodgepole Pine	8% Jeffrey Pine 9 Rock Outcrop 37 Mixed Conifer - Fir 15 Lodgepole Pine
Jeffrey Pine/White Fir/Mixed Conifer	20-40% Jeffrey Pine 20-40% White Fir 20-40% Mixed Conifer	3% Jeffrey Pine 0% White Fir 42% Mixed Conifer
Jeffrey Pine/Rock Outcrop/Red Fir	20-40% Jeffrey Pine 20-40% Rock Outcrop 20-40% Red Fir	14% Jeffrey Pine 14% Rock Outcrop 16% Red Fir
Red Fir/Jeffrey Pine	30-50% Red Fir 20-40% Jeffrey Pine 10-20% Rock Outcrop	31% Red Fir 9% Jeffrey Pine 8% Rock Outcrop
Red Fir/White Fir/Jeffrey Pine	20-40% Red Fir 20-40% White Fir 20-40% Jeffrey Pine	23% Red Fir 42% Mixed Conifer - Fir 6% Jeffrey Pine
Red Fir/Lodgepole Pine	40-60% Red Fir 30-50% Lodgepole Pine	39% Red Fir 35% Lodgepole Pine
Red Fir/Jeffrey Pine/Lodgepole Pine/Rock Outcrop	20-40% Red Fir 20-40% Jeffrey Pine 20-40% Lodgepole Pine 10-30% Rock Outcrop	33% Red Fir 9% Jeffrey Pine 17% Lodgepole Pine 23% Rock Outcrop
Red Fir/White Fir	30-60% Red Fir 30-60% White Fir	24% Red Fir 38% Mixed Conifer - Fir
Undifferentiated Montane Shrubland/Jeffrey Pine/Mixed Conifer	40-60% Montane Shrubland 20-40% Jeffrey Pine 10-20% Mixed Conifer	25% Manzanita/Mixed Shrub 3% Jeffrey Pine 26% Mixed Conifer -Fir
Dry Volcanic Meadow/Red Fir	40-60% Dry Volcanic Meadow 20-40% Red Fir	14% Barren 23% Red Fir
Dry Volcanic Meadow/Mountain Mule Ear	40-60% Dry Volcanic Meadow 40-60% Mountain Mule Ear	% Barren or Grass % Montane Mixed Shrub
Dry Volcanic Meadow/Mountain Mule Ear/Jeffrey Pine/Red Fir	20-30% Dry Volcanic Meadow 20-30% Mountain Mule Ear 20-30% Jeffrey Pine 20-30% Red Fir	27% Barren or Grass 6% Montane Mixed Shrub 2% Jeffrey Pine 60% Red Fir

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measures		
PNV	See Table 8 Above	-Higher % fir in the Mixed Conifer Series. -Loss of meadows in Upper Montane Meadow Series.	• Reduce fir species composition in Mixed Conifer Series by thinning. • Increase meadow size in Upper Montane Meadow Series by burning and/or thinning.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Species Composition—sugar pine	5-25% sugar pine canopy cover within Ponderosa Pine, Jeffrey Pine, Mixed Conifer, and White Fir Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—ponderosa pine	≥ 30% ponderosa pine canopy cover within Ponderosa Pine Series	18-46% ponderosa pine	Increase ponderosa pine species component within the listed vegetation series.
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: The seral stage distribution for this landscape indicates that Size Class 4 acreage far exceeds the desired level. All other size classes are at levels below the desired value. As indicated above, it is expected that some level of error exists in this classification. Field inventory and/or photo-interpretation can provide more accurate results.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicators	**Measures**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	1%	Increase acres of Size Class 1 trees for mule deer.
Wildlife Habitat Relationship (WHR) Size Class 2	5%	2%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	9%	
Wildlife Habitat Relationship (WHR) Size Class 4	20%	62%	• Reduce stand density to increase growth to seral stage 5. • Regenerate portions to provide for earlier seral stages.
Wildlife Habitat Relationship (WHR) Size Class 5	55%	25%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: The average SDI value for strata covering 56% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. Prescribed fire, alone, is not a realistic opportunity in stands where fire behavior would be expected to kill significant numbers of desired trees.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI $\leq$ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Red Fir	SDI $\leq$ 440	R3G SDI = 384	
Stand Density Index (SDI) for Lodgepole Pine	SDI $\leq$ 205	A3N SDI = 312 A3P SDI = 192	
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI $\leq$ 333	M0X SDI = 397 M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	
Stand Density Index (SDI) for Ponderosa Pine	SDI $\leq$ 230	P3N SDI = 397 P3P SDI = 304 P4N SDI = 302 PNO SDI = 205	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Field observations indicate that long-term exclusion of fire and vegetation management in riparian areas has allowed conifers to out-compete true riparian species for light and space. The extent of the effect remains a data gap, but in mid and low elevations where conifer growth is relatively fast the evergreen species have become more dominant and true riparian species suppressed. Where conifers have been reduced, however, (i.e. fire, windthrow, avalanche or management) true riparian species have usually responded rapidly to the availability of light and in some cases additional moisture. The effect of conifers on riparian species is most pronounced in stream corridors and in aspen stands.

Aspen stands and willow communities have been affected wherever concentrated grazing occurs. Aspen suckers and willows, especially in the late summer and fall, are very palatable. Annual grazing of aspen shoots and willow seedlings affects seral stage development.

In high elevation portions of this landscape where concentrated grazing does not occur the riparian plant communities are at or near desired condition.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Herbaceous Species	High ecological status in wet and moist meadows; approaching high in dry areas of meadows.	447 acres of meadow— 143 acres of meadow have been surveyed since 1990. Of the 143 acres: 15 acres are in good/high ecological status 128 acres are in fair/moderate status 0 acres in poor/low status.	Increase ecological status in those meadows with fair/moderate status.
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	In riparian areas with long-term exclusion of fire and vegetation management, conifer dominance has suppressed true riparian trees and shrubs. Species composition and seral stage distribution are not at DC but magnitude of change is a data gap (2). In aspen stands and willow communities with concentrated grazing, seral stage distribution is not at DC but magnitude of change is a data gap (2). At high elevations without concentrated grazing, true riparian trees and shrubs are at or near DC (2).	• Increase true riparian species reproduction and growth where adversely altered and feasible to accomplish. • Increase knowledge of amount of change in true riparian species composition and seral stage distribution.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Social/Cultural Hierarchy

Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Economic contributions have traditionally come from timber sales. Fuel hazard reduction is a high priority in this landscape and should provide some business and contracting opportunities (Refer to Desired Condition Statements #9, 10, 11, 12, 13 and 14).

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: Four interpretive sites fall within this landscape: Beardsley Nature Trail; Donnell Vista Point; Trail of the Ancient Dwarfs, and Trail of the Gargoyles (accessed from Herring Creek Road). Beardsley Nature Trail and Donnell Vista Point were constructed as part of the 4(e) conditions for the Beardsley-Donnells hydroelectric project. The Beardsley Nature Trail is in very poor shape with missing signs and eroding pavement. Whether because of its shape or its location, it receives very little use. The Donnell Vista Point, on the other hand, receives high use. It is a popular stopping point for Highway 108 visitors. Within the next two years this facility will be upgraded to meet accessibility standards. Trail of the Ancient Dwarfs is located along the Old Sonora-Mono Road near Niagara Campground. Again, this interpretive site is in poor condition with signs missing and an outdated message. Trail of the Gargoyles is a primitive site—no facilities other than a sign and sign-in board. Opportunities exist to make this site a watchable wildlife site.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference "baseline" data is collected and will be updated every 5 years.	No baseline data exists.	Collect baseline user preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	• Build in annual increase in programs offered/people served, as per demographics. • Change message for Trail of the Gargoyles to incorporate watchable wildlife message.
Written and Oral Information	Information provided at Forest Service sites is $\geq$90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: Relative to use, Forest Service personnel patrol the Beardsley-Donnells Landscape at a rate lower than other areas. Because of low budgets and high demands elsewhere, Forest Service personnel generally visit this area once or twice per week. Retention of campground hosts has been difficult because of the relative isolation and slow response time to the increasing incidents of public nuisance. Tri-Dam funds finance visitation to China Flat only.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Visitation Standards	**All recreation sites and settings are visited at a frequency determined by Meaningful Measures**	**Very low visitation rates from uniformed Forest Service personnel. Public nuisance incidences are increasing within the campground.**	**• Increase visitation frequency by redirecting funding to this area, as other sources come into play in other areas, such as FERC 4(e), cooperative funding with outside sources. • Increase visitation by utilizing volunteers or Forest Service personnel from other functions such as Fire Prevention.**

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists of opportunities for DC#26.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	**Measure**		
Weed Management Areas	**The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas**	**The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.**	**Full participation in Weed Management Area programs, projects and grants.**

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: There are isolated private land parcels in this landscape but none have been identified as potential candidates.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	Measure		
Identified properties	**All lands acquired**	**Some isolated parcels. No identified opportunities**	• **Inventory landscape for potential opportunities** • **If opportunities exist, include in Forest prioritization of parcel acquisitions** • **Maintain and enhance relationships with groups who assist in this activity (e.g. Nature Conservancy, Trust For Public Land, etc.)**

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: The facilities at Beardsley Reservoir are in fair condition—their age varies from 14 to 25 years old. Pavement and restrooms are in fair to good condition. However, the well that provides water to the Beardsley Day Use Area dries up each year by 4th of July weekend. When that happens portable toilets are rented to meet basic sanitation services. The Beardsley boat launch ramp pavement is serviceable but is not long enough to accommodate low water launching. The dock is in very poor condition and needs immediate replacement. The current facilities, relative to demand and preference seems to be in line with the current expectations of users. None meet accessibility standards.

Draft surveys conducted in 2000 show that visitors to Beardsley Reservoir prefer the setting and facilities. Whether or not increased population pressure will maintain this perception is questionable. Beardsley has the potential to attract increased numbers of visitors. Overnight facilities near the lake are limited and substantial expansion near the lake to meet such demand is not possible. Additional facilities would need to be shoreline-based or located within a few miles of the lake to be effective. It is reasonable to attempt such experiments to see if latent demand for such services exists.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	**Recreation opportunities and facilities meet present and future user preference needs.**	**Design, form and function of existing facilities meet preference needs of the 1960's and 70's. Some upgrading for accessibility has been accomplished, but more is needed.**	• **Conduct recurring, focused Visitor Surveys.** • **Utilize general surveys and literature searches.** • **Implement updated design standards, were available. Develop new Design Standards, where appropriate, to reflect user preferences.** • **Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources.** • **Complete accessibility upgrades.**
Population Demographics	**Visitor participation reflects demographics of the service area**	**Data Gap. Suspect diversity of service area is not reflected in existing user groups**	• **Monitor demographic trends and uses to establish baseline use data.** • **Where possible and appropriate, incorporate demographic trends in facility and program development.**

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Facility Occupancy	**Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.**	**Little opportunity along Highway 108 to increase capacity during high use periods. Unknown if public is willing to go somewhere else i.e. Beardsley Reservoir. Low visitation during off-season.**	**• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Construct new facilities to meet this demand at alternate sites, if it is determined this will be effective and environmentally sound (meets Desired Conditions of other elements) • Maximize funding sources: Capital Improvement Program; cooperative funds**
Facility Condition	**Meets Forest Service Meaningful Measures Standards/INFRA Accessibility Guidelines**	**Facilities functional but out of date & in poor condition. Some accessibility upgrades have been completed.**	**• Establish priorities using Meaningful Measures and INFRA data. • Maximize funding for maintenance of facilities: Appropriated funds; Fee Offset; Fee Demo; Volunteers; Capital Improvement Program**

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Existing Condition: Tri-Dam financed the original construction of the facilities at Beardsley. Except for the China Flat picnic area and the Beardsley to Sand bar trail, they do not contribute to maintenance, replacement or operation of any facilities. These are clearly project-induced costs. Opportunities mentioned in DC #27 are clear candidates for FERC-related financing, as well as operation, maintenance, deferred maintenance and accessibility upgrades.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Desired**		
Facilities and activities financed	**100% financing of facilities and activities attributable to present and projected demand generated by FERC projects.**	**Tri-Dam provides some financial contribution for Beardsley Day Use area.**	• **Identify clear present and future project induced impacts.** • **Prioritize importance and "ownership" of all impacts.** • **Set Licensee responsibilities in FERC 4E requirements**

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: See Chapter IV.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Needed roads	**Miles of road retained**	**Unknown**	**Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.**
Unneeded Roads	**Miles of Road decommissioned**	**Unknown**	**Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.**
Roads Maintained	**Miles of roads maintained to standard**	**Unknown**	**Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.**

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: The Beardsley Reservoir to Sand Bar trail receives regular maintenance, financed by Tri-Dam as part of the Sand Bar FERC license. All other trails in the area are in very poor condition. The Bummer Flat Trailhead provides access into the Carson-Iceberg Wilderness.

There is considerable potential for additional trails, both motorized and non-motorized in this landscape, especially on older Level 1 and 2 roads, old railroad grades and the C&S Ditch.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Community-linked trail opportunities	**Miles of non-motorized community-linking trail constructed**	Community-linking trails do not exist.	Construct Community-linking trails identified through public involvement processes (see Map J-1 in Appendix J)
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	OHV trails exist throughout the area and many level 2 roads are used for motorized recreation	• Construct trails identified through public involvement (see Map J-1 in Appendix J). • Decommission or discourage use on trails that receive minimal use (Data Gap).
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails.

Chapter V.2: Clark Fork Landscape

Introduction

The Clark Fork Landscape occurs in the upper northeast portion of the Central Stanislaus Watershed Analysis (CSWA) area, at the headwaters of the Stanislaus River. The Clark Fork of the Stanislaus River flows through the landscape. Disaster and Arnot Creek are significant tributaries to this river. The majority of the landscape lies within designated or proposed wilderness (the Carson-Iceberg Wilderness). Elevations range from 5,600 feet to 11,462 feet on Sonora Peak. The Clark Fork recreation area, scattered along the Clark Fork Road, is a popular recreation area within CSWA. Refer to Map 5 to identify specific locations as they are referenced in the following chapter.

Historical Context

In 1931, the Stanislaus National Forest constructed a low standard road seven miles up Clark Fork from the Sonora-Mono Road, for the purpose of developing and accessing recreation opportunities. The Clark Fork Road, as it was called, would become a major part of a north-south scenic highway called the Sierra Way.

The Sierra Way was promoted as a highly scenic and recreationally desirable means of connecting the Sonora Pass Forest Highway and the Ebbetts Pass Forest Highway. This 21 mile section was to follow the existing low standard road along Clark Fork; from the Iceberg, it would follow the trail along the east side of Disaster Creek, past Adams Camp, through Gardner Meadow to Highland Lakes and Tryon Meadow, hitting the Ebbetts Pass Highway about a mile west of the pass.

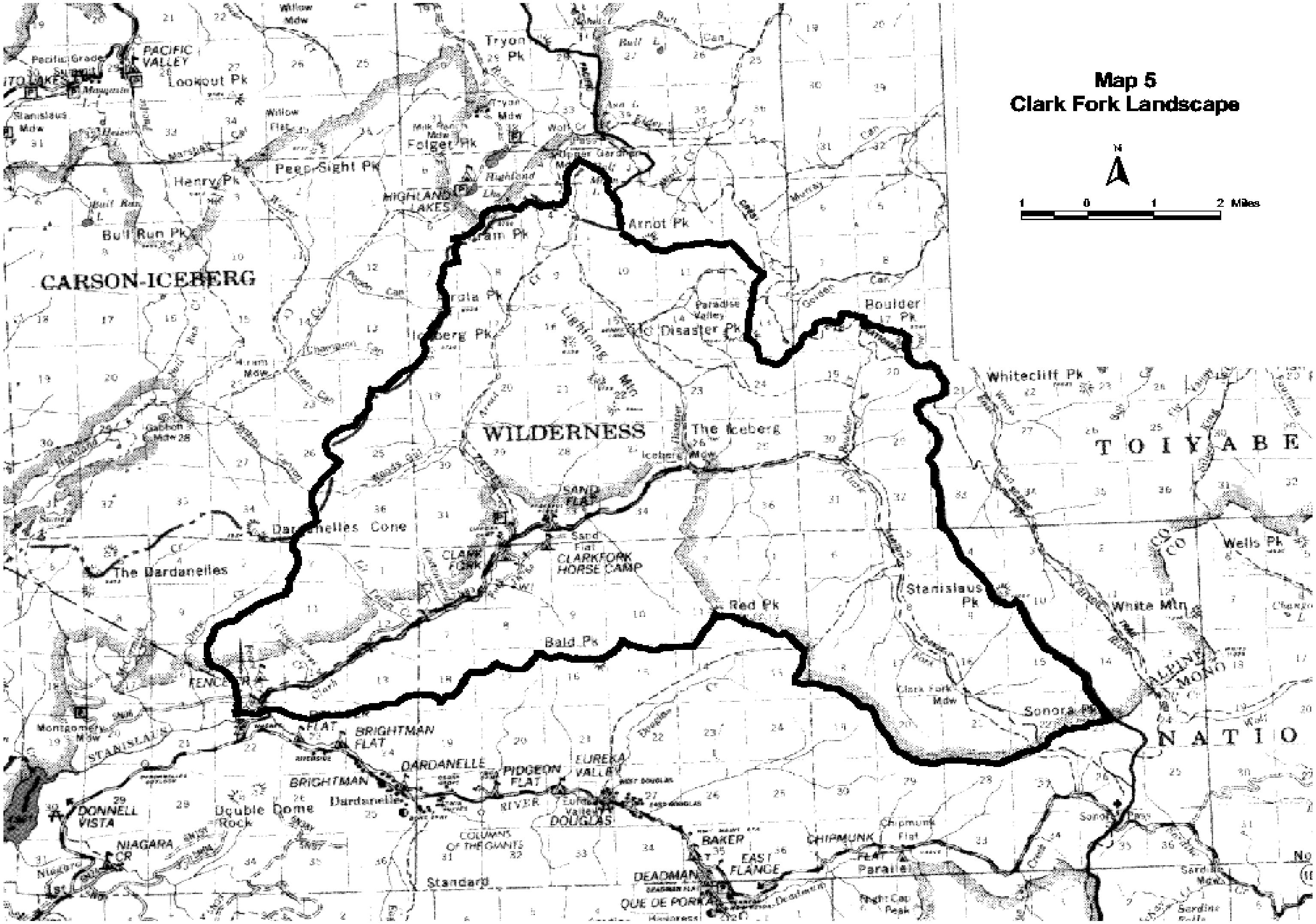
Not every special interest group favored the Clark Fork Road, either as part of the Sierra Way or in its own right. Fishing clubs, for example opposed it on the basis of increased pressure on the fishery.

In 1933, Regional Forester S. B. Show (USDA 1933) reflected that the Forest Service was anxious to cooperate with the conversion of this road from a low to a high standard highway…

> as part of a through route to Lake Tahoe to accommodate tourist travel from the San Joaquin Valley, and since such a road would also afford an opportunity to develop many highly attractive recreation sites in a region practically free of fire hazards, we looked favorably on the proposition.

Reconstruction of the Clark Fork Road as part of the Sierra Way began at the Sonora Pass Forest Highway connection in 1937. The Clark Fork Road never extended past Iceberg.

Today, travelers along the Clark Fork sometimes wonder why this road—dead-ending at Iceberg Meadow—is built to such a comparatively high standard, complete with bridges designed to harmonize with their spectacular surroundings. It endures as an artifact of the Sierra Way concept.


Map 5
Clark Fork Landscape
N
1 0 1 2 Miles
CARSON-ICEBERG
WILDERNESS
TOIYABE
NATIO

Landscape Analysis

Hydrologic Hierarchy

Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Clark Fork landscape. Pacific chorus frogs were found in Upper Clark Fork and Arnot Creek. This landscape is within the elevation range of Yosemite toad, mountain yellow-legged frog, and Mt. Lyell salamander.

There are no recorded sightings of waterfowl species or osprey in this landscape. There may be habitat for harlequin duck. Surveys have not been conducted specific to waterfowl or osprey. There is no lake or reservoir habitat for osprey in this landscape.

Macro invertebrate surveys were conducted in Disaster Creek. The BCI was greater than 90%.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/successful breeding Occupied habitat	15.1 miles and 53 acres surveyed Pacific chorus frog and Yosemite toad located	• Survey un-surveyed areas • Reintroduce species in unoccupied historic habitat • Protect occupied Yosemite toad habitat and breeding toads
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting	• Gather incidental sightings of waterfowl • Survey suitable waterfowl habitat
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Status of population health is unknown in Arnot Creek or Clark Fork Disaster Creek BCI at >90%	• Conduct surveys in Arnot Creek and Clark Fork • Repeat surveys in Disaster Creek • Maintain desired condition in Disaster Creek

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: Lahontan cutthroat trout were introduced into Disaster Creek early in the 1900s. Under the recovery plan (USDI Fish and Wildlife

Service 1994) this population is to be retained. Surveys in 1999 by the California Department of Fish and Game found the lowest numbers of fish since population sampling began in 1986 (S. Stephens, pers. comm. 2000). This may be due in part to the January 1997 floods that altered the stream. Surveys in 1995 determined that the stream was in good condition. The habitat was of high quality as described in the habitat capability model. These surveys should be repeated to determine changes to the habitat. Currently cattle grazing and the trail that parallels the creek affect the habitat quality.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Lahontan cutthroat trout	Suitable habitat Recovery plan objectives met	• Habitat of high quality as determined in 1995 • Population numbers lowest in 14 years of monitoring by Fish and Game	• Protect habitat from effects of cattle grazing • Improve maintenance of trail and correct resource concerns • Monitor population numbers • Resurvey stream condition

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The Clark Fork landscape is in the best condition of any landscape in CSWA (or the Stanislaus National Forest) for amount of type of large woody debris (LWD). This landscape, whose boundary is the same as the Clark Fork watershed, is about 80% designated wilderness with the remainder outside the Clark Fork road corridor along the river managed in a near natural condition. There are a variety of stream sizes and gradients in the landscape that can serve as examples of reference reaches for evaluation of the desired amount and distribution of LWD.

Negligible removal of LWD has occurred in the Clark Fork River along the road corridor and none elsewhere in the landscape. Though the existing fire regime is somewhat less than its natural frequency in the lower elevations of the landscape it is probably not far outside of natural variability. Other factors shape LWD production and distribution in this landscape to a large degree. Since the Clark Fork has no dams or diversions, the natural flow regime transports and deposits LWD within the range of natural variability. Avalanching is a major process in this landscape that recruits LWD into the fluvial system.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
LWD	Pieces/100m of stream, by Channel Type	LWD at or near desired condition throughout landscape (2). Clark Fork landscape serves as a reference area for evaluation of LWD.	• Increase knowledge of LWD reference conditions. • Maintain LWD at desired condition.

Information source: 1—Limited field observations; 2—Long term field observations
3—Data supported observations

Sediment

Desired Condition #4: The delivery, transport and deposition of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: The sediment regime in the Clark Fork landscape is in a near natural condition. This wilderness-dominated landscape is operating within natural erosion and sedimentation processes. Some of this landscape is subject to mass wasting, mostly from infrequent but substantive land sliding, and to a lesser extent from avalanching. Occurrences of mass wasting are within the range of natural variability. For example, a debris flow in January 1997 altered the channel morphology in the upper Adams Camp meadow along Disaster Creek. While change in the stream pattern was noticeable the channel is currently adjusting to this natural disturbance by resetting a meandering channel and regrowing streambank vegetation.

The only noticeable contribution of sediment related to management is the Clark Fork road between the Camp Liahona area and the Sand Flat Campground area. Even though the road is paved, segments are very close to the river. The road plus the Arnot Creek and Clark Fork campground bridges have confined the river, which has increased streamflow velocity, caused accelerated streambank erosion and thus additional sedimentation. While this is not a significant problem at the landscape scale it is the most substantive road effect within the landscape. The proximity of the road to the river, and stream confinement by the bridges has also adversely affected stream channel morphology in lower Arnot Creek and the Clark Fork in this vicinity.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/mi of stream; HCS <.25 mi/mi^2 .	Road density and stream crossings meet desired condition (3). Clark Fork Road near Clark Fork-Arnot Creek confluence affecting sediment. HCS - data gap.	Increase HCS knowledge of portions of Clark Fork road nearest river.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	72% low hazard (3). Lower elevations of landscape have localized higher hazard (3).	Reduce wildfire hazard in portions of landscape where hazard is moderate, high and very high.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable Unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: not applicable in this landscape. Unimpaired streams: Limited observations indicate PSD data gap.	Increase knowledge of stream sediment transport and deposition patterns.
Pool Depth	Residual pool depth is highly similar to reference streams.	Pool depth at desired condition (2, 3-SCI). Clark Fork landscape serves as a reference area for evaluation of pool depth.	Increase knowledge of pool sediment.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream Channels have floodplain connectivity, small cross sections and stable streambanks.

Existing Condition: Stream channel morphology is altered to a minimal extent at the landscape level, since nearly all of it is managed as wilderness, grazing is relatively well dispersed and only one major road exists in the landscape. Most natural processes are occurring within the range of natural variability in the Clark Fork landscape.

The most noticeable altered channel morphology related to management exists at two locations along the Clark Fork River and at Coyote Meadow.

Between the Camp Liahona area and the Sand Flat Campground area, segments of the Clark Fork road are very close to the river. The road and the Arnot Creek and Clark Fork campground bridges have confined the river, which has increased streamflow velocity, accelerated streambank erosion and thus altered channel form. While this is not a significant problem at the landscape scale it is the most substantive road effect within the landscape. Coyote Meadow has altered morphology in the form of headcuts in the lower end of the meadow.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: All low gradient reaches meet 2 or 3 indicators, but problems exist in the Clark Fork-Arnot Creek confluence area, the Cottonwood Picnic area and at Coyote Meadow (2, 3-SCI). Moderate gradient reaches: All 3 indicators are met (2). Steep Gradient streams: Indicator 4 is met (2).	• Move applicable stream reaches toward desired condition and maintain condition of those at desired condition.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quality

Desired Condition #6: Water quality is excellent in streams and special aquatic features such as meadows, lakes, ponds and springs so that all beneficial uses of water are achieved.

Existing Condition: Water quality in this landscape is excellent. About 95% of the area managed as wilderness wherein processes that affect water quality are within the range of natural variability. The principal management activity in the landscape, developed recreation, exists only in about a one square mile area along the Clark Fork River near the Arnot Creek confluence. Facilities here show no evidence of water pollution.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	Meets BPO throughout the landscape (2).	Maintain excellent water quality.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC $\geq$ baseline in lakes sensitive to acid deposition (ANC <50).	N/A	N/A
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	Not applicable in this landscape	

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Not applicable in this landscape.

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: Infiltration at the sub-watershed scale in this landscape is satisfactory. There are, however, numerous tree plantations from past clear-cutting that may have limited soil porosity.

Evapotranspiration is likely excessive in this landscape since over half of it has a vegetative density exceeding Stand Density Index threshold values. From the watershed standpoint regarding vegetation as an indicator flow regime, the stand density problems are most pronounced where evaporation and transpiration are at their greatest. This is in the elevations of the landscape outside the snow zone, or below about 6,500-7,000 feet. Warmer temperatures below the snow zone produce more evaporative potential, and faster tree growth result in more plant transpiration.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub watershed.	>90% at the sub-watershed scale (2, 3).	Maintain high level of infiltration in sub-watersheds.
Evapotranspiration	SDI is < threshold values.	43% of landscape exceeds the SDI threshold values (3)	Reduce Stand Density in portions of landscape most affecting evapotranspiration.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Very few fires over 10 acres have been recorded in the Clark Fork landscape, the largest and most recent being the Arnot Fire (780 acres) in 2000 which was managed for resource benefits. A total of 106 fires have burned 816 acres between 1970 and 2000, 77% of them lightning-caused. Approximately 99% of the acres burned were from lightning-caused fires. Relative fire occurrence is low over the entire landscape.

The historic fire regime for the Clark Fork landscape is primarily fire regime III, long return interval, mixed severity fire. On the south-facing slopes along the Clark Fork River, montane shrub is sustained by infrequent, stand-replacement severity fire (fire regime IV). At lower elevations in the mixed conifer and along the river, fires may have been more frequent and of lower severity (fire regime I), promoting more of a Jeffrey pine and sugar pine component there.

The following table describes the existing condition of the Clark Fork landscape as it relates to the desired condition for the fire element.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
INDICATOR	MEASURE		
Condition Class (CC)	CC1	CC1 - 78% CC2 - 22% primarily in low elevation conifer along Clark Fork River and on north facing slopes	• Move CC2 areas toward CC1 by reducing surface and ladder fuels • Maintain CC1 areas in desired condition
Potential impacts of fire	No negative	CC1–not likely CC2–some potential • Organization camps along Clark Fork Road • Old forest emphasis is > 50% of landscape • 3 PACS all with some high fire hazard characteristics	• Identify potential impacts during preparation of the Fire Management Plan. • Prioritize mitigation measures to reduce potential impacts

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
INDICATOR	**MEASURE**		
Fire hazard—Defense Zone	Low: 90%	Low: 0% Mod: 94% High: 6%	Reduce moderate and high hazard to low by reducing surface and ladder fuels
Fire hazard—Outside Defense Zone	Low: 40% (strategically placed to break up high hazard)	Low: 74% Mod: 10% High: 9% Very high: 7%	• Maintain low hazard areas in desired condition • Reduce higher hazard areas to low as needed by reducing surface and ladder fuels
Suppression effectiveness	Hand crews effective in high value areas (4ft flame length)	In WUI around organizational camps some areas have between 4 and 6 ft flame lengths	Reduce potential flame length where necessary by removing or rearranging surface fuels
Crown fire potential	Surface only	Some passive crown fire potential in low elevation conifer along Clark Fork River and on north facing slopes	Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height

In summary, the existing condition of the Clark Fork landscape as it relates to the fire element is good. Very little restorative treatment is needed, focused on efforts to allow naturally occurring fires to be managed for resource benefits. Maintenance of the existing condition may also involve some fuels management, primarily prescribed fire.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: This landscape is currently in satisfactory condition. No noxious weed populations are currently known in this landscape. Recreational traffic presents a constant potential source of new populations.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	0 occurrences	Monitor, map and record any new occurrences. Implement preventative actions to minimize spread of weeds.
Established weed populations	All populations are treated and eradicated.	0 occurrences	None identified

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: It is unknown whether sensitive plant species occur in the Clark Fork landscape, primarily because very few surveys have been conducted in this area. Much of the area is in wilderness and there has been little need for project related surveys. However, habitat for sensitive plant species exists. The potential exists for *Bruchia bolanderi, Cypripedium montanum, Epilobium howellii, Hulsea brevifolia, Hydrothyria venosa, Lomatium stebbinsii, Meesia triquetra, M. uliginosa,* and *Orthotrichum spjutii* to occur in the area.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	Unknown	• Survey un-surveyed areas • Protect known populations when found

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Existing conditions related to soil productivity vary across the Clark Fork Landscape. At the landscape scale, soil conditions can be described and related to disturbance history and to the Ecological Unit Inventory.

Most of this landscape is within the natural range of variability relative to fire regime, vegetative patterns, and soil conditions. Vegetation is somewhat denser in Ecological Unit 306 and much denser in Ecological Unit 331, which is altering fuel conditions and possibly post wildfire erosion.

There are some older plantations and multiply entry tractor logged areas in Ecological Units 219 and 306. Soil compaction may be at threshold in multiple entry stands and old plantations.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Does not meet DC in older plantations. May not meet DC where multiply entry tractor logging has occurred.	Subsoil skid trails as stands are thinned.
Large Downed Woody Material (LDWM)	Logs per acre >20 inch diameter	Meets DC in much of the landscape; May not meet DC where multiply entry tractor logging has occurred; Lack of LDWM in plantations	Create large woody material where needed for wildlife and soil productivity.
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Mostly at DC; May not be at DC in plantations	Survey for status of soil organisms in plantations See opportunities for managing surface organic matter below.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Nitrogen availability may be low in plantations located in the red fir zone where tractor piling removed surface organics; Soil and surface organics subject to severe burn behavior in dense brush of unit 331	Test for N availability. Thin stands and fertilize where N is low. Rx burn unit 331 to maintain Jeffery pine, cycle nutrients, re-establish natural fire regime, and improve wildlife habitat and diversity.
Topsoil	Organic matter content is 85% of natural	Generally meets DC	

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: There are a number of fens, bogs, and seeps in this landscape associated with high elevation meadows and well watered colluvial sideslopes. They are considered sensitive areas. The Sierra Nevada Forest Plan Amendment (2001) provides direction to inventory and protect these features. Coyote Meadow is one such area with active headcuts.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover (hillslopes)	50 to 70% surface cover that prevents accelerated erosion	Surface cover is generally at DC. Erosion on old skid trails	• Improve surface cover where needed for erosion control • Stabilize eroding skid trails
Surface Cover (RCAs)	75% surface cover that prevents accelerated erosion	Generally meets DC; Some accelerated erosion in dispersed camping sites; Headcuts in some meadows of Clarks Fork allotment; Some meadows have thick organic layers and would qualify as fens and bogs, e.g. Coyote and Eltringham Meadows.	• Monitor surface cover and accelerated erosion in RCAs • Survey dispersed camping sites. Treat or relocate camp sites that are eroding • Treat headcuts in meadows • Inventory fens and bogs

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads, skid trails, and trails, particularly on sensitive soils; Trail from Adams Camp to Paradise meadow in poor condition	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils. • Re-route, decommission, and reconstruct roads and trails with high erosion potential.

Terrestrial Animal Species

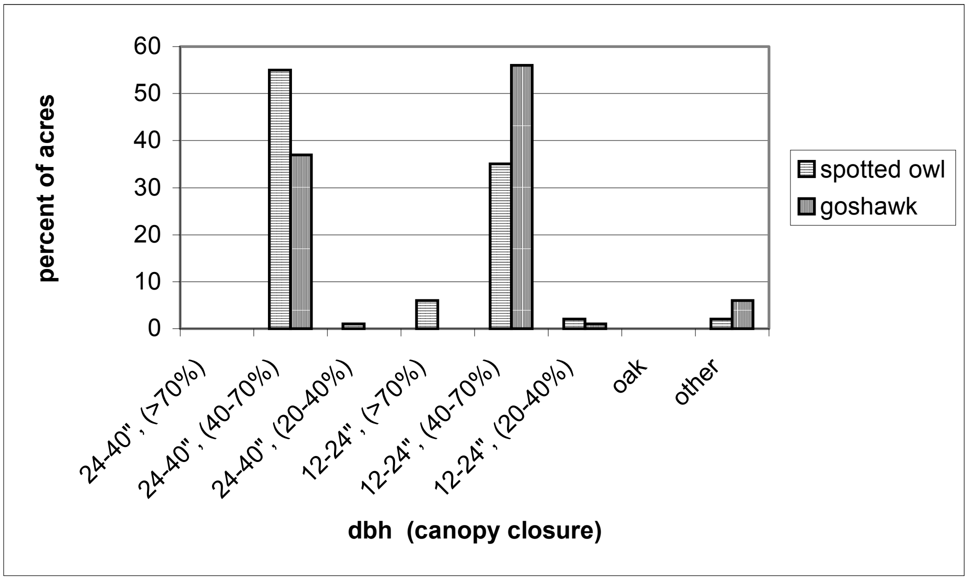
Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk and mule deer are known to occur or have the potential to occur in this landscape.

Old forest associated species—Within the Clark Fork landscape, 58% of the area is mapped as OFEA. Approximately 20% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Twenty percent of the OFEA is not suitable for forest production. This leaves 60% of the OFEA acres to improve to meet old forest desired conditions.

There are 3 California spotted owl PACs within the Clark Fork landscape. There is 1 northern goshawk PAC. Based on the 1997 vegetation data, there are no acres of habitat at desired condition within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that at least some of the acres in PACs currently meet desired conditions. Figure 11 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 11: Clark Fork Protected Activity Centers Vegetation Data



Mule deer— This landscape provides summer (fawning) habitat for the Stanislaus Deer Herd. The 1984 herd management plan indicated that low fawn recruitment was the primary factor limiting recovery of the deer herd (Maddox 1984). One factor affecting low fawn recruitment is the decline in forage quality in summer ranges. Approximately 19% of the landscape is found in oak/hardwood, early succession trees, and grass and chaparral types. The current condition of these areas as foraging habitat, as well as the availability and condition of cover and fawning habitat, is unknown.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, mule deer, bats	Presence/ Successful breeding	Some presence and breeding known for spotted owl and goshawk. One marten sighting. No information for bat species. Some information for mule deer.	• Conduct surveys and monitoring for presence and breeding of spotted owl, goshawk, and forest carnivore and bat species.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Old forest associated species habitat	Presence of late succession habitat- OFEA (Forest carnivores) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 58% of landscape in OFEA; 20% of OFEA in CWHR types 5D/5M; 20% of OFEA not capable of growing old forest Three spotted owl PACs entirely within landscape. All PACs over 300 acres. 0 acres currently at desired condition One goshawk PAC within landscape. 0 acres currently at desired condition. PAC has 126 acres	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of suitable habitat within both spotted owl and goshawk PACs • Increase size of goshawk PAC to 200 acres
Mule Deer Habitat	Early succession habitat	19% of landscape in potential foraging habitat. Current condition unknown.	• Gather data to assess habitat availability and condition. • Enhance/improve montane meadows to increase vegetation height for fawning cover. • Increase amount of early seral chaparral habitat through use of prescribed fire. ▪ Cooperate with annual CDF&G deer her counts. • Continue to monitor fawn recruitment.
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Not applicable for this landscape.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Vegetation types have been changed by limited timber harvest and by the absence of periodic fire. Over several decades, harvesting removed high-value pines, in advance of predicted mortality, over limited portions of the landscape. In the absence of periodic wildfire, shade-tolerant conifers, primarily white fir, increased within existing stands, sometimes becoming the dominant species.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Despite the increasing availability of rust-resistant planting stock, significant efforts to reestablish the species have not occurred. Western white pine, also susceptible, has not been significantly affected as yet.

Table 9 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 9. Desired Condition and Existing Condition for Vegetation Series in Dodge Ridge Landscape

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Mixed Conifer	60-80% Mixed Conifer	92% Mixed Conifer
Mixed Conifer/White Fir	30-50% Mixed Conifer 30-50% White Fir	58% Mixed Conifer 0% White Fir
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	0% Ponderosa Pine 4% Manzanita 4% Grass
White Fir	60-80% White Fir	62% Mixed Conifer - Fir
Jeffrey Pine/Rock Outcrop/Red Fir	20-40% Jeffrey Pine 20-40% Rock Outcrop 20-40% Red Fir	1% Jeffrey Pine 2% Rock Outcrop 75% Red Fir
Lodgepole Pine	60-80% Lodgepole Pine	8% Lodgepole Pine
Red Fir/Lodgepole Pine	40-60% Red Fir 30-50% Lodgepole Pine	40% Red Fir 15% Lodgepole Pine
Red Fir/Jeffrey Pine/Lodgepole Pine/Rock Outcrop	20-40% Red Fir 20-40% Jeffrey Pine 20-40% Lodgepole Pine 10-30% Rock Outcrop	51% Red Fir 11% Jeffrey Pine 12% Lodgepole Pine 9% Rock Outcrop
Undifferentiated Montane Shrubland/Jeffrey Pine/Mixed Conifer	40-60% Montane Shrubland 20-40% Jeffrey Pine 10-20% Mixed Conifer	16% Manzanita 7% Jeffrey Pine 13% Mixed Conifer -Fir
Dry Volcanic Meadow/Mountain Mule Ear	40-60% Dry Volcanic Meadow 40-60% Mountain Mule Ear	82% Barren or Grass 4% Montane Mixed Shrub
Lodgepole Pine/Whitebark Pine/Rock Outcrop	20-40% Lodgepole Pine 20-40% Whitebark Pine 20-40% Rock Outcrop	4% Lodgepole Pine 36% Subalpine Conifer 17% Rock Outcrop

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
PNV	See Table *	-Higher % fir in the Mixed Conifer Series. -Loss of meadows in Upper Montane Meadow Series.	• Reduce fir species composition in Mixed Conifer Series by thinning. • Increase meadows in Upper Montane Meadow Series by burning and/or thinning.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Jeffrey Pine, Mixed Conifer, and White Fir Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: The seral stage distribution for this landscape indicates that Size Class 4 acreage far exceeds the desired level. All other size classes are at levels below the desired value.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicators	**Measures**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	0%	
Wildlife Habitat Relationship (WHR) Size Class 2	5%	0%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	11%	
Wildlife Habitat Relationship (WHR) Size Class 4	20%	70%	Reduce stand density to increase growth to seral stage 5. Regenerate portions to provide for earlier seral stages.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicators	Measures		
Wildlife Habitat Relationship (WHR) Size Class 5	55%	19%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 43% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. As the majority of this landscape is within the Carson-Iceberg Wilderness area, opportunities for direct action are limited. Outside this area, prescribed fire, alone, may not be a suitable treatment approach in stands, as fire behavior would be expected to kill significant numbers of desired trees.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI ≤ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where stand inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Red Fir	SDI ≤ 440	R3G SDI = 384	
Stand Density Index (SDI) for Lodgepole Pine	SDI ≤ 205	A3N SDI = 312 A3P SDI = 192	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Riparian vegetation is at or near desired condition throughout the landscape. The Clark Fork River corridor along the Clark Fork Road, however, has had long-term fire exclusion and only nominal vegetation management. As a result, conifer stand density has increased and likely has had at least a minor effect of suppressing true riparian species. This condition it not believed to be significant but to optimize true riparian trees and shrubs, reduction of density in selected areas would help prevent future severe wildfire and promote true riparian vegetation.

Aspen stands and willow communities have been affected where they exist in areas of concentrated grazing. Aspen suckers and willows, especially in the late summer and fall, are very palatable. Annual grazing of aspen shoots and willow seedlings affects seral stage development.

In high elevation portions of this landscape where concentrated grazing does not occur the riparian plant communities are at or near desired condition.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Meadow vegetation	High ecological status in wet and moist meadows. Approaching high status in dry meadows.	516 acres of meadow. 256 acres of meadows have been surveyed since 1990. Of those, 27 acres—good/high ecological status; 211 acres in fair/moderate status; 18 acres in poor/low status.	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	In riparian corridors with long-term exclusion of fire and vegetation management, conifer dominance has suppressed true riparian trees and shrubs. Species composition and seral stage distribution are not at DC but magnitude is not substantive (2). In aspen stands and willow communities with concentrated grazing, seral stage distribution is not at DC but magnitude of change is a data gap (2). At high elevations without concentrated grazing, true riparian trees and shrubs are at or near DC (2). Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs).	• Increase true riparian species reproduction and growth where altered and feasible to accomplish. • Increase knowledge of amount of change in true riparian species composition and seral stage distribution, especially aspens. • Increase knowledge of special aquatic features (meadows, aspen stands, ponds, springs, fens and bogs). • Maintain true riparian species where desired condition exists.

Social/Cultural Hierarchy
Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Economic contributions have traditionally come from Recreation-related activities, primarily along the Clark Fork road and Carson-Iceberg Wilderness. Resource condition surveys may generate rehabilitation projects, especially at recreation facilities in Riparian Conservation Areas. Other projects may come from dealing with the deferred maintenance backlog at recreation facilities. (Refer to Desired Condition Statements #10, 11, 18, 19, 20, 21 and 28).

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: Use of recreation sites and interpretive services in the Clark Fork landscape is limited. Besides general forest information, few signs and displays are scattered throughout the area. As a highly visited area, this landscape has excellent potential for expanding interpretation and education. Most signs and kiosks are 20 to 30 years old and in need of repair or replacement.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
User preferences	User preference “baseline” data is collected and will be updated every 5 years.	No baseline data exists.	Collect Baseline User Preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	Build in annual increase in programs offered/people served, as per demographics.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Written and Oral Information	Information provided at Forest Service sites is ≥90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: Concessionaires run most developed recreation sites in this landscape. Only Fence Creek campground and the Cottonwood picnic area are managed by the Forest Service, which cannot meet basic visitation standards. Fence Creek is under Fee Demonstration authority, which will enable increased visitation after basic maintenance needs are met. DC#29 below.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	Very low visitation rates from uniformed Forest Service personnel.	• Increase visitation frequency by redirecting funding to this area, as other sources come into play in other areas, and cooperative funding with outside sources. • Increase visitation by utilizing volunteers or Forest Service personnel from other functions such as Fire Prevention.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists opportunities for DC#26.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	**Measure**		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Not applicable for the landscape.

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: Besides Pinecrest and Sonora Pass, this is the most heavily visited recreation area in the CSWA area. Because the Clark Fork road is a dead end it does not see as much transient traffic as Highway 108. The most popular activities are camping, fishing, hiking and equestrian use. It is also a major portal into the Carson-Iceberg Wilderness (Arnot and Iceberg Meadow trailheads). The Clark Fork River and road provide the primary attractions and access to the majority of the recreation facilities. Developed recreation opportunities include 208 campsites in 4 campgrounds, a picnic area, 2 trailheads, two organization camps and a handful of recreation residences. No facilities meet accessibility guidelines. In addition to being a wilderness entry point, the Clark Fork area has been popular with equestrian users. Facility occupancy is generally at or near capacity on summer weekends. Visitation rates at the horse camp have been around 60% (1997 visitor counts).

The present Forest Service owned facilities were generally constructed in the 1960's and 70's. Resource degradation near rivers and streams as well as a desire to provide a more "modern", automobile-friendly camping experience, led to the development of many of the existing campgrounds. Except for flush toilets in Clark Fork Campground "B" loop all other restrooms are outhouse-style. No facilities meet current standards for Universal Design, however some facilities have been recently constructed that will meet standard when completed. Many have reached or exceeded their designed lifecycle of 30 years (FSH 7309.11, 1995). The current deferred maintenance backlog for the Forest Service sites in this area is $600,000 and the annual maintenance shortfall is $50,000 (Source: USDA Forest Service Developed Site Inventory).

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	Design, form and function of existing facilities meet preference needs of the 1960's and 70's.	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, were available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources. • Complete accessibility upgrades.
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in existing user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in facility and program development.
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Little opportunity to increase capacity during high use periods. Low visitation during off-season.	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Construct new facilities to meet this demand at alternate sites, if it is determined this will be effective and environmentally sound (meets Desired Conditions of other elements) • Maximize funding sources: Capital Improvement Program; cooperative funds
Facility Condition	Meets Forest Service Meaningful Measures Standards/INFRA Accessibility Guidelines	Facilities functional but out of date. Some in poor condition.	• Establish priorities using Meaningful Measures and INFRA data. • Maximize funding for maintenance of facilities: Appropriated funds; Fee Offset; Fee Demo; Volunteers; Capital Improvement Program

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Not applicable for this project.

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: The Clark Fork Road provides the main access to and through this landscape. There are no a few spur roads that exit the road that provide access to the campgrounds, trailheads and organization camps that occur here. Near the Arnot Trailhead there is a fairly flat area that has a number of user-created roads.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Needed roads	Miles of road retained	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: Volunteers perform basic trail maintenance on most of the non-wilderness trails within the Clark Fork landscape. Horse users staying at Clark Fork Horse Camp primarily use these trails. Some trails are in poor locations and not well maintained.

There are no recommended or encouraged OHV routes, however this area has not had public pressure to create such routes. There is generally light OSV use in the winter.

There is a heavy trail maintenance backlog on Forest Service maintained trails, especially those leading to the wilderness. Suggestions for potential trails are shown on Map J-1 in Appendix J.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	Community-linking trails do not exist.	Identify and promote trails linking Clark Fork area with Sonora Pass area
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	A network of user-created trails exists both sides of the river, leaving from the Clark Fork Horse Camp.	• Construct trails identified through public involvement (see Map J-1 in Appendix J). • Decommission or discourage use on trails that receive minimal use. • Document user-created trails network; identify desired trails; and establish a partnership for maintenance
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails.

Chapter V.3: Dodge Ridge Landscape

Introduction

The Dodge Ridge Landscape occurs in the central portion of the Central Stanislaus Watershed Analysis (CSWA) area, in the upper length of the North Fork Tuolumne River. Elevations range from approximately 3,200 feet to 8,100 feet on “the Knob” within the Dodge Ridge Ski Area. The communities of Sugar Pine, Mi-Wuk Village, Sierra Village, Long Barn, Cold Springs and the Pinecrest Recreation Area are found in this landscape. It is the most populated landscape and receives the most recreation use, within the CSWA area. Refer to Map 6 to identify specific locations as they are referenced in the following chapter.

Historical Context

The Empire Sawmill located at Browne’s Meadow, supplied a plane mill in Sonora with rough milled lumber that was manufactured into millwork, including moldings, sash, door blinds, and boxes in addition to lumber. In 1899, the *Union Democrat* reported that the Empire Sawmill was still the largest in the county. The newspaper reported that “the big teams will be kept going as long as possible and it is thought they will be able to deliver 500,000 feet of lumber at the yards here before finally drawing off for the winter. The mill’s output for the season has been about 5,000,000 feet, all sugar and yellow pine that is rated in the market as the best in the State”.

By 1902, preliminary surveys were underway to construct a rail system that would ultimately connect the Empire Sawmill, the South Fork Mill, Knudsen’s Mill on Lyons Creek, and the Sonora Lumber Company’s mill near Cold Springs. The Empire City narrow gauge railway built along the North Fork Tuolumne, connecting the Cold Springs and Empire Sawmills, led to a railed tramway that hoisted the lumber on cars, up and over the divide between the North Fork Tuolumne and the South Fork Stanislaus, terminating at the Lyons Creek Transfer near Lyons Dam.

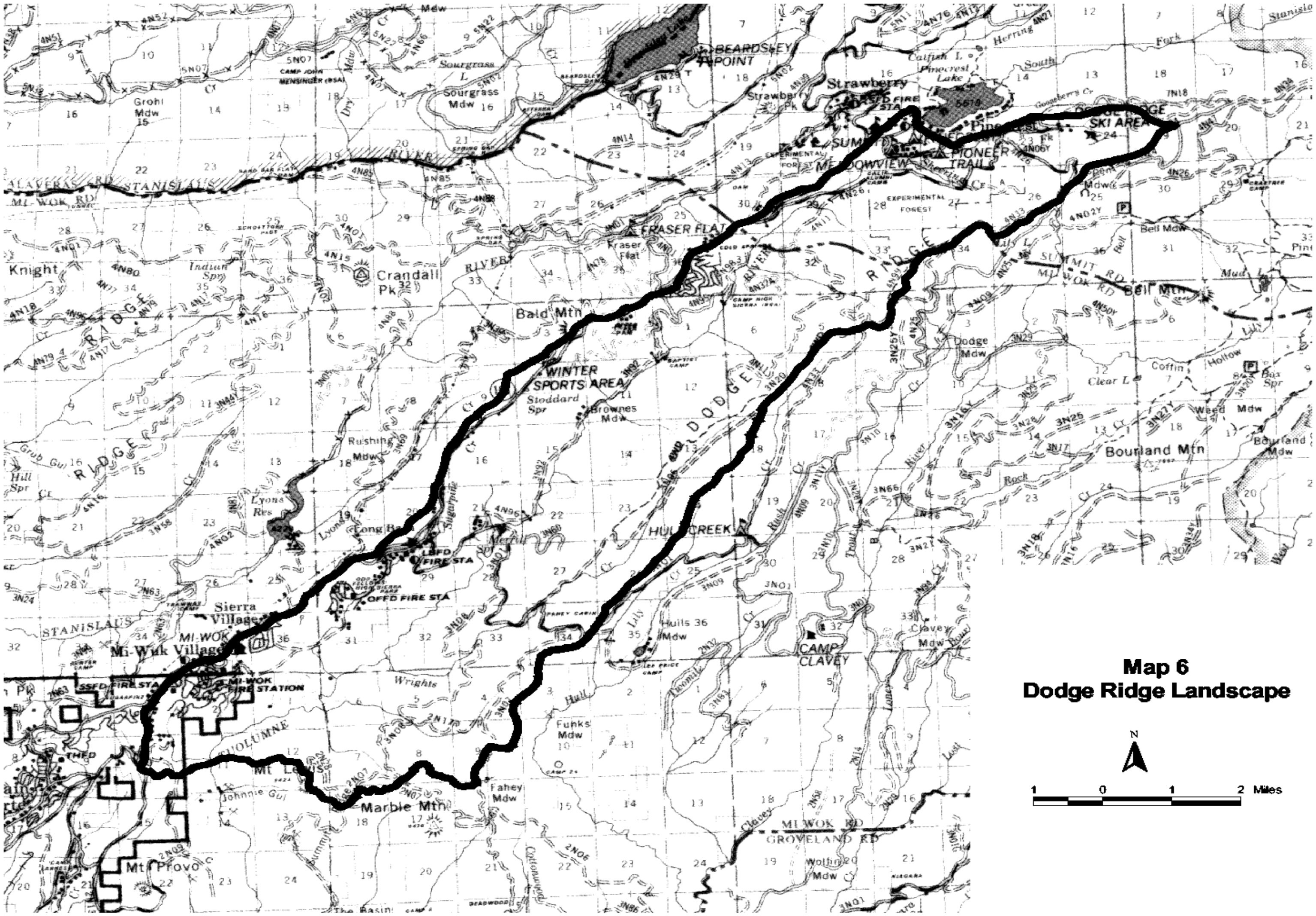
Concern over blister rust control to protect sugar pine appears to have surfaced in 1925. By spring of 1926, Woodbury documented his trip with a team from the Bureau of Plant Industry who "were looking into *Ribes* conditions on the timber belt in the vicinity of Strawberry...." Their intention, after the field trip, was to organize a crew of 15 and "establish a camp at the old Cold Springs mill on the North Fork of the Tuolumne River and from this point will eradicate the *Ribes* on the cutover area to the north in the Tuolumne drainage. They will then establish a camp at Old Strawberry and will work the virgin timber in that vicinity from there. *Grossularia Roesli* "seemed to be particularly thick in virgin timber along streams and gulches. One sample plot along a stream was taken which showed an occurrence of about 480 stems per acre" (Woodbury 1926).

In 1939, the California Forest and Range Experiment Station, having noticed the extent of timber cutting in the area, proposed to withdraw 8,800 acres for creation of a “Middle Fork of the Stanislaus River Experimental Forest. This area contained a gross stand of about 275,000,000 board feet, of which about 62 percent was pine. It was also desirable as an experimental forest because it was the only available virgin area of suitable quality, species, and site combinations within operating distance of its established work center at Strawberry."

Snow-based recreation has also left a legacy in the Dodge Ridge landscape. The largest ski development within the CSWA area was Dodge Ridge—located at the headwaters of the North Fork Tuolumne River—which opened in 1951 with “a few rope tows;” soon, a double chairlift was added on the 425-acre site. The Forest Service encouraged such developments, especially on forests such as the Stanislaus that were near and served large, metropolitan areas and were traversed by major highways. After studying several different alternative locations, the Stanislaus opened the opportunity to develop a ski resort to prospective bidders at Dodge Ridge. Starting with a parking lot designed for 150 cars, by 1962, the main parking area was designed for 1,500. As of 1998, Dodge Ridge had 12 chair lifts.

In 1950 the Wrights Creek Burn burned over 25,000 acres. The fire torched many areas that had been logged in the teens and 1920s by the West Side Lumber Company and which had restocked in pole-sized stands. An early, cursory survey of the area revealed that:

> [p]erhaps 6,000 acres in burned young growth, largely complete kill, to be cruised for salvage estimate. These stands are dense and many are borderline as to operable cut. The pole size usually predominates and it is difficult to judge the sawlog volume occularly. The volume may average around 3 M [thousand board feet] per acre in trees 16" dbh [diameter at breast height] and over, including scattered old growth trees. There are perhaps an additional 2,000 acres in burned old growth that is salvageable, excluding the Duckwall area.
>
> Assisting in the salvage and replanting efforts, roads and railroad grades were well distributed over most of the burned area. By 1956, the Stanislaus National Forest had most of the Wrights Creek burn area replanted.


Map 6
Dodge Ridge Landscape
N
1 0 1 2 Miles

Landscape Analysis

Hydrologic Hierarchy
Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: The Dodge Ridge landscape has not been surveyed for amphibian species. Due to the elevations in this landscape, there is potential for the following TES species to occur: California red-legged frog, foothill yellow-legged frog, mountain yellow-legged frog, western pond turtle, Yosemite toad, slender salamander and hardhead.

There are currently no documented sightings of waterfowl or osprey in Dodge Ridge landscape. Osprey occupancy would be unlikely, as there are no suitable lakes for hunting. The osprey nesting at Pinecrest Lake could build a nest within the Dodge Ridge landscape, although Pinecrest Lake would remain the source of prey. There have been no surveys for waterfowl species or macro invertebrates in this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Native aquatic species	Presence/successful breeding Occupied habitat	0 miles surveyed 0 known miles occupied	• Survey landscape • Reintroduce species in unoccupied historic habitat
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting	• Gather incidental sightings of waterfowl and osprey • Survey suitable waterfowl habitat
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Status of population health is unknown	Conduct surveys

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: There are no historic records of California red-legged frog within the landscape. The landscape is within the range of the species. Critical habitat is designated in this landscape. Twenty-six percent of the landscape, or 7,704 acres is designated critical habitat. Some project specific site assessments were conducted, although they do not cover the entire landscape. Site assessments, when completed, would identify any suitable breeding habitat suitable for this threatened species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California red-legged frog	Suitable habitat Recovery plan objectives met	Some areas with completed suitable habitat site assessments	Complete habitat site assessments for landscape

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: LWD in the Dodge Ridge Landscape is highly variable. The Wrights/Flora Fires (circa 1960) resulted in loss of LWD both from fire and post-fire removal. In other areas LWD has been observed to exist in moderate to even perhaps excessive amounts. Long term exclusion of fire and vegetation management in stream corridors has resulted in many riparian areas exceeding Stand Density Index thresholds. As a result, a potential excessive amount of in-stream LWD that can be recruited currently exists. The amount of LWD at the stream reach scale is a data gap.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
LWD	Pieces/100m of stream, by Channel Type	Wrights Creek <DC in Wrights Creek Meadow and Wrights/Flora plantations (2, 3-SCI). Data gap in remainder of landscape	• Improve amount of LWD in Wrights Creek Meadow and Wrights/Flora plantations. • Increase knowledge of LWD.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Sediment

Desired Condition #14: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: Both of the sub-watersheds in this landscape have road densities and stream crossings in excess of the desired condition. The Wrights Creek sub-watershed has the highest road density and number of stream crossings of any sub-watershed in CSWA. Roads average 7 miles per square mile and 5 crossings per mile of stream, about 3 and 5 times the desired condition, respectively. Wrights Creek was used as a CSWA pilot sub-watershed for inventory of hydrologically connected road segments (HCS). The HCS inventory revealed that there are .79 miles of hydrologically connected roads per square mile in the sub-watershed, over three times the desired condition length. The existing condition of roads in Wrights Creek originated with the reforestation following the Wrights/Flora fires when roads were constructed to harvest the burned timber and reforest the area.

Wildfire hazard in this landscape is excessive. Only 5% of the landscape has a low fire hazard rating. There is a major threat of large and severe wildfire in the landscape, and the sediment consequences would be substantial if such an event occurred.

The Wrights-Flora fire area has led to significantly altered sediment delivery, transport and deposition in much of Wrights Creek. The fires created increased sediment loading, the reforestation ground-disturbing activities resulted in a substantial amount of additional sediment, and the 3N01 road crossing across Wrights Creek meadow has acted as a sediment trap that has further altered sediment processing in the stream. Site preparation for reforestation involved large-scale ground clearing efforts during which cover was reduced to less than 20%. Sediment delivery from hillslopes to streams following site prep was high and, in combination with post-fire accelerated runoff, streambank erosion occurred as well. Road 3N01, crossing the middle of the Wrights Creek meadow area over a large fill, serves an earthen dam and restricts the transport of sediment in the watershed. As a result, sediment transported from the upper portions of Wrights Creek has substantially aggraded the meadow above the crossing and degraded the stream below it. Past season-long grazing has exacerbated the situation by reducing streambank stability. Grazing has now been reduced to limited grazing every other year but the legacy of the altered sediment regime by fire, site prep and roads continues.

Outside of the Wrights Creek sub-watershed the condition of the sediment regime in this landscape is not fully known. Land management activities such as timber harvest, recreation in the Pinecrest area and roads have likely had an effect on stream sediment deposition and transport. Aerial photo analysis indicates that the Browne’s Meadow area (private land) has an altered sediment regime insofar as the channel morphology in the North Fork Tuolumne is not in proper functioning condition. The effect of this on downstream reaches of the North Fork is uncertain.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/ mile of stream; HCS < 0.25 mi/mi^2 .	Road density >2.5 in 2 of 2 sub-watersheds (3). Crossings > 1 in 2 of 2 sub-watersheds (3). HCS—0.79 mi/mi^2 in Wrights Creek sub-watershed (3). Data gap in rest of landscape.	• Improve quality of road system. • Increase HCS knowledge where data gap exists.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	5% low hazard 71% high/very high	Reduce wildfire hazard throughout landscape.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: N/A in this landscape. Unimpaired streams: Not at DC at Wrights Creek Meadow. 3N01 crosses middle of meadow with large fill causing aggradation of sediment throughout meadow above crossing and degradation below crossing. (2, 3-SCI) Data Gap in rest of landscape.	• Increase knowledge of stream sediment transport and deposition patterns. • Improve sediment regime in Wrights Creek.
Pool Depth	Residual pool depth is highly similar to reference streams.	Pool depth < DC in Wrights Creek Meadow (1, 3-SCI). Data gap in rest of landscape.	• Increase knowledge of pool sediment. • Improve sediment regime in Wrights Creek.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: The Wrights Creek sub-watershed has had substantial changes in channel morphology following the Wrights-Flora fires. Alteration of the flow and sediment regimes due to the effects of the fires and post-fire management activities has altered channel morphology in nearly all of the low gradient sensitive reaches within the sub-watershed. In addition, steep headwater tributaries have been altered by runoff following the fires and still show some effects.

In Wrights Creek meadow, steam condition inventory (SCI) has shown that portions of the stream have altered channel condition. Streambank stability is well below desired condition (about 50% compared with a desired stability of 85%). Entrenchment ratios are less than desired in portions of the meadow, especially below road 3N01. Road 3N01 has had and continues to have a significant effect on channel morphology in Wrights Creek Meadow. It is basically a large earthen dam across the middle of a meadow and, as such, is in an inappropriate location. This large fill aggrades the stream in much of the upper meadow and, by depriving the lower meadow of sufficient sediment, degrades the channel.

In Faust Cabin meadow, near the headwaters of an unnamed tributary to the North Fork Tuolumne River just south of Wrights Creek, a large headcut has substantially changed channel morphology. Long-term field observations show that the headcut has not materially advanced but it remains a threat to the meadow. The meadow also has reduced soil porosity from past heavy equipment use. Both conditions render the meadow a candidate for restoration.

Saints Rest meadow lies near the headwaters of Sugar Pine Creek adjacent to State Highway 108 just above Long Barn. It was overgrazed in the late 1800's since it was in the heavily used stock driveway to Sonora Pass. However, restoration activities conducted there about 40 years ago have restored the stream channel and returned the streambanks to a dense cover of dense willows and carex species. At present, the channel morphology is near enough to desired condition that continuing to exclude human disturbances and periodic observations are all that is required to maintain its condition. Vegetative cover is good in the meadow although many of the vegetative species are non-natives planted at the time of the restoration work.

Channel morphology in the remainder of the Dodge Ridge landscape varies from unaffected to highly altered, based on field observations and aerial photo analysis. The main channel of the North Fork Tuolumne River is boulder/bedrock except in the Browne's Meadow area. While there is some reduced streambank stability in the Pinecrest area resulting from recreational traffic, the largest alteration is in the low gradient reaches of the Browne's Meadow area. Aerial photo analysis shows braided and over widened channels. In tributary streams to the North Fork Tuolumne above road 4N11 south of road 4N26 (the West Sheer area), small streams have down cut in sensitive soils as a result of roads and timber management.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: Wrights Creek Meadow, Faust Cabin Meadow and Browne's Meadow do not meet MCI indicators (2, 3-SCI, aerial photo interpretation). Saints Rest Meadow meets indicators. Moderate gradient reaches: All 3 indicators are met in many stream reaches observed but a data gap remains (2). Steep Gradient streams: Indicator 4 is met in many streams observed but a data gap remains (2).	• Take action to move degraded stream reaches toward desired condition. • Increase knowledge of channel morphology condition where data gap exists. • Maintain channel condition in Saints Rest Meadow.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: In most of the tributaries of the North Fork Tuolumne River, water quality is believed to be acceptable if not better than Basin Plan Objectives require. However, there are past and present instances when the CVRWQCB objectives have not been met in the North Fork Tuolumne.

The Pinecrest Wastewater Treatment Plant and its collector system, adjacent to the North Fork Tuolumne, has a continuing history of both planned and unplanned spills since it went on line in 1977. Unplanned spills of raw sewage have affected beneficial uses insofar as downstream fish kills have occurred and forest visitors have become ill during water contact recreation. Planned spills of treated effluent have occurred periodically and their long-term effect on downstream water quality is not well understood.

Pollutants from the Pinecrest Recreation Area are not systematically monitored and the effect of this highly developed locale is not fully known.

The Dodge Ridge Ski Area, in the headwaters of the North Fork Tuolumne, has not been systematically monitored for pollutants from Lodge facilities, parking lots and septic systems. The effect of this concentrated recreation use site is largely unknown.

There is a data gap of quantitative water quality information in this landscape, especially the effects of heavily developed recreation use in the Upper North Fork Tuolumne River watershed. Filling this focused data gap would guide future management plans in the Pinecrest-Dodge Ridge area.

Acid Neutralizing Capacity as an indicator of water quality applies only to Class 1 Wilderness. There is no designated wilderness in the Dodge Ridge landscape.

There are no principal municipal water supplies in this landscape that would constitute designation as municipal watersheds.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	NFK Tuolumne River meets BPO most but not all of the time. The past and current history of sewage spills in the Pinecrest Recreation Area and potential septic effluent the Dodge Ridge Ski Area remain a concern (2, 3). Other streams likely meet BPO except maybe sediment from roads (2).	• Decrease sources of road sediment. • Increase knowledge of water quality effects on beneficial uses in the upper North Fork Tuolumne River.
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC ≥ baseline in lakes sensitive to acid deposition (ANC <50).	N/A	N/A
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	Not applicable in this landscape	N/A

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Not applicable in this landscape.

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: The Dodge Ridge landscape is the only landscape in CSWA where infiltration at the sub-watershed scale is less than the desired condition. This occurs in the Wright/Flora plantations, which are mostly in the Wrights Creek sub-watershed. Compaction during site preparation for reforestation has substantially reduced soil porosity in this area.

Evapotranspiration is likely excessive in this landscape since nearly two thirds or it has a vegetative density exceeding Stand Density Index threshold values. Much of this landscape is mid-elevation where tree growth is good, and thus plant transpiration is high. And high density of vegetation provides a significant amount of plant surface for interception and evaporation of rainwater.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub watershed.	<90% at the sub-watershed scale. Infiltration substantially reduced in the Wrights Creek sub-watershed within the Wrights/Flora plantations (2, 3).	Improve soil porosity in Wrights/Flora plantations.
Evapotranspiration	SDI < threshold values.	64% of landscape exceeds the SDI threshold values (3)	Reduce Stand Density where SDI thresholds exceeded.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Fifteen fires over 10 acres have been recorded within the past century in this landscape with none since 1962. A total of 310 fires have burned 62 acres between 1970 and 2000, 86% of them human-caused. This landscape has the highest occurrence of human-caused fires in the CSWA area, originating primarily around the developed areas of Pinecrest, Sierra Village, and Mi-Wuk Village. The relative risk of fire occurrence is very high near these developments and high or moderate throughout the remainder of the landscape. The historic fire regime for the Dodge Ridge landscape is Fire Regime I, short return interval, low severity fire.

Analysis:

<table>
<tr><th colspan="2">DESIRED CONDITION</th><th colspan="2" rowspan="2">EXISTING CONDITION</th><th rowspan="2">OPPORTUNITIES</th></tr>
<tr><th>Indicator</th><th>Measure</th></tr>
<tr><td>Condition Class (CC)</td><td>CC1</td><td colspan="2">CC1—1% red fir
CC2—28%
CC3—71% in ponderosa pine, lower and upper mixed conifer vegetation groups</td><td>• Move CC3 areas toward CC1 by reducing surface and ladder fuels, and removing excess crown fuels
• Move CC2 areas toward CC1 by reducing surface and ladder fuels
• Maintain CC1 areas in desired condition</td></tr>
<tr><td>Potential impacts of fire</td><td>No negative</td><td colspan="2">Potential impacts in:
• Communities along Hwy 108
• Experimental Forest
• 10 PACS (8 with high fire hazard)
• Old Forest emphasis >50% high hazard</td><td>• Identify potential impacts during preparation of the Fire Management Plan.

• Prioritize mitigation measures to reduce potential impacts</td></tr>
<tr><td>Fire hazard—Defense Zone</td><td>Low: 90%</td><td colspan="2">Low: 12%
Mod: 17%
High: 68%
Very high: 3%
Pinecrest, Cold Springs, Peter Pam, Long Barn, Sierra Village, Mi-Wuk Village, Sugar Pine</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Fire hazard—Outside Defense Zone</td><td>Low: 40% (strategically placed to break up high hazard)</td><td>ALL
<u>OUTSIDE</u>
Low: 3%
Mod: 17%
High: 69%
VHigh: 2%</td><td><u>THREAT</u>
Low: 3%
Mod: 18%
High: 75%
VHigh: 3%</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Suppression effectiveness</td><td>Hand crews effective in high value areas (4’ flame length)</td><td colspan="2">• In WUI >4ft in over 50%; >6ft in WUI southeast and south of Mi-Wuk and Sierra Village, south and east of Cold Springs</td><td>Reduce potential flame length where necessary by removing or rearranging surface fuels</td></tr>
</table>

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Crown fire potential	Surface only	Some crown fire potential in almost 60% of landscape, in all vegetation groups	Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height

In summary the existing condition of the Dodge Ridge landscape as it relates to the fire element is poor. Over 75% of the landscape has high or very high fire hazard characteristics, much of it in the wildland-urban intermix. Fuel treatment has been minimal and on a small scale and there are very few natural barriers to fire spread. Much restorative treatment is needed throughout the entire landscape, in addition to reducing fire hazard and crown fire potential around the many communities along Highway 108.

Plant Species

Desired Condition #12: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: There are a number of different weeds in the Dodge Ridge landscape, most centered along roads. Yellow starthistle has been present along Highway 108 for several years, especially between Long Barn and Little Sweden. Other populations have been recorded on and adjacent to private land east and southwest of Long Barn. CalTrans has sprayed starthistle populations along the highway for the past two years, using clopyralid (Transline). Some hand pulling along Highway 108 was accomplished in 2000. Yellow starthistle also extends into the forest on Forest Road 4N01 near Fahey Cabin (Chambers 2002).

Medusahead grass and jointed goatgrass were discovered in 2000, in two mixed populations on the median strip of Highway 108 above Long Barn. There is one infestation of puncture weed on private land near the upper entrance to Long Barn (Chambers 2002). Tree of heaven was found along Forest Road 4N06Y and has been treated by pulling. It may require additional follow-up.

Of the weeds that are tracked, ox-eye daisy probably covers the largest area in the Dodge Ridge landscape. It is established around Dodge Ridge Ski Area, has been expanding along Crabtree Road to the Aspen Meadow Pack Station, and also down the North Fork of the Tuolumne River. It has spread into some meadows and dominates one gravel bar.

In summary the existing condition of the Dodge Ridge landscape as it relates to noxious weeds is unsatisfactory. However, the number and extent of weed populations is not large, and there are good prospects for eradicating them.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	Existing populations of yellow starthistle, ox-eye daisy, tree of heaven, puncture vine, medusahead grass and jointed goatgrass.	• Eradicate existing populations of noxious weeds. • Monitor, map and record all new occurrences. • Implement preventative actions to minimize spread of weeds.
Established weed populations	All populations are treated and eradicated.	Populations are found along Highway 108 and some other roads. < 1 acres of yellow starthistle, 5-10 acres of ox-eye daisy. Infestation of other species are smaller	• Eradicate yellow starthistle populations. • Eradicate medusahead grass populations. • Eradicate ox-eye daisy • Eradicate jointed goatgrass • Continue monitoring tree of heaven site; eradicate if needed. • Eradicate puncture vine

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: Four sensitive plant species (*Allium tribracteatum, Erythronium tuolumnense, Lomatium stebbinsii,* and *Mimulus pulchellus*) are found in the Dodge Ridge landscape. *Lomatium stebbinsii* is the most widespread of these. *Allium tribracteatum* occurs primarily along the western edge of the landscape. *Erythronium tuolumnense* has only been found once in the limited area of metasedimentary parent material in this landscape. Although the largest meadows are private, there is possible habitat for all of the meadow species that are in range in this landscape. Habitat for other sensitive plant species exists as well. The potential exists for *Bruchia bolanderi, Clarkia biloba* ssp. *australis, Cypripedium montanum, Hulsea brevifolia, Hydrothyria venosa, Meesia triquetra, M. uliginosa, Mimulus gracilipes, Mimulus pulchellus,* and *Orthotrichum spjutii* to occur in the area.

The largest existing impacts to these species are the roads and trails that pass through many of the occurrences. System roads and trails that pass through many of the occurrences, non-system roads pass through nine occurrences, designated OHV trails pass through 11 occurrences and non-designated OHV trails pass through three more occurrences of *Lomatium stebbinsii*. Four-wheel drive vehicles going cross-country through seeps have heavily impacted one *Mimulus pulchellus* occurrence. Since the sensitive plants occur on most of the ridges in this landscape, they are likely to be affected during fire suppression efforts. A boat parking area has also impacted *Lomatium stebbinsii*. There are efforts to minimize these ongoing impacts. Occurrences near Highway 108 are impacted by late season sledding when the plants are emerging below a thin layer of snow and by the litter and waste deposited in the areas.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	As of January 2002: 30 occurrences of *Lomatium stebbinsii;* 8 occurrences of *Allium tribracteatum*; 2 occurrences of *Clarkia australis*, 1 occurrence of *Erythronium tuolumnense*; and 2 occurrences of *Mimulus pulchellus* exist.	• Survey un-surveyed areas • Protect known populations of *Lomatium stebbinsii, Allium tribracteatum, Clarkia australis, Erythronium tuolumnense,* and *Mimulus pulchellus*

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Soil productivity is not at the desired condition in portions of the Dodge Ridge Landscape. The Wrights-Flora burn is one such area. The wildfire and subsequent reforestation site preparation activities have altered soil porosity, large woody material, and topsoil conditions over most of the burn. Loss of soil cover in the burned area resulted in hillslope erosion, scouring of hillslope channels, and deposition of sediments in streams such as Wrights Creek. Most areas within the Wrights-Flora burn probably do not meet desired conditions for soil productivity because of compaction, windrowed topsoil, and removal of downed logs.

The Pinecrest campground area is not at desired condition relative to soil porosity and possibly soil nutrient supply. Soils are compacted in high use areas and forest floor litter and decomposition processes are at reduced levels.

There are other areas within the Dodge Ridge Landscape where ground-based logging has occurred over the same ground more than once. These areas are subject to soil compaction and are likely at or close to the soil porosity threshold.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Does not meet DC in Wrights/Flora burn, Pinecrest campground, and Wrights Creek and Fahey Cabin meadows. May not meet DC where multiply entry tractor logging has occurred.	• Subsoil skid trails as stands are thinned • Subsoil compacted areas in Wrights Creek and Fahey Cabin Meadows • Develop and implement soil restoration plan for Pinecrest campground
Large Downed Woody Material	Logs per acre >20 inch diameter	Generally meets DC in railroad logged second growth stands; Generally meets DC in units 203, 212, and 216. Lack of LWM in Wrights and Flora plantations	• Create large woody material where needed for wildlife and soil productivity
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Status of soil organisms is a data gap. It is thought that the loss of LWM, the loss of frequent low intensity fire alters habitat for soil organisms	• Survey for status of soil organisms by Ecological Unit • See opportunities for managing surface organic matter below
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Lack of frequent low intensity fire has increased surface fuels in Ponderosa pine unit 208 and lower mixed conifer units 217, 219, 227, and 307. Loss of surface organics is probable in areas of high fire hazard.	• Move towards natural fire regime by thinning and Rx burning • Move towards a more fire resistant forest by decreasing white fir and increasing the pine component in lower mixed conifer and Ponderosa pine units
Topsoil	Organic matter content is 85% of natural	Windrowing treatment has displaced large amounts of topsoil in the Wrights and Flora burn; Thin, eroded soils are found in unit 203 of the Wrights and Flora burn	• Re-spread windrows when trees are • Survey areas of eroded soil in unit 203. Develop and implement soil restoration plan

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological Unit (EU).

Existing Condition: Areas of thin eroded lava cap soils within the burn do not meet DC #16. Many of these areas are in a transition zone where shallow lava cap soils meet more productive moderately deep soils. The Wrights Creek Burn and older site preparation techniques removed soil cover that has resulted in past erosion. Most of the areas have stabilized over the last three decades, however enough soil has been lost to reduce soil productivity. These eroded soils are found mostly in EU 203.

There are compacted and gullied meadows within the Dodge Ridge Landscape. Wrights Creek above 3N01 and Fahey Cabin meadow are examples. In West Sheer there are alluvial hillslope RCAs that have active headcuts. These unstable alluvial deposits are found mostly within EU 307, which is located in several landscape watersheds. Their unstable character is thought to be associated with their glacial origin and steep gradients.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover—Hillslopes	50 to 70% surface cover that prevents accelerated erosion	Surface cover is generally at DC; Annual grasses have replaced perennial grasses particularly in unit 203; Existing rare plant habitat in unit 203	• Improve surface cover where needed for erosion control • Reintroduce perennial grasses in areas of low grazing pressure, starting in unit 203 • Survey for native grasses. Develop restoration plan • Culture rare plants
Surface Cover—Riparian Conservation Areas (RCA)	75% surface cover that prevents accelerated erosion	Generally meets DC; Some accelerated erosion in dispersed camping sites; Gully erosion in alluvial hillslope RCA of West Sheer	• Monitor surface cover and accelerated erosion in RCAs • Treat or relocate camp sites that are eroding • Treat West Sheer gully
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads, skid trails, and OHV trails, particularly on sensitive soils in the Dry Meadows area.	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential.

Terrestrial Animal Species

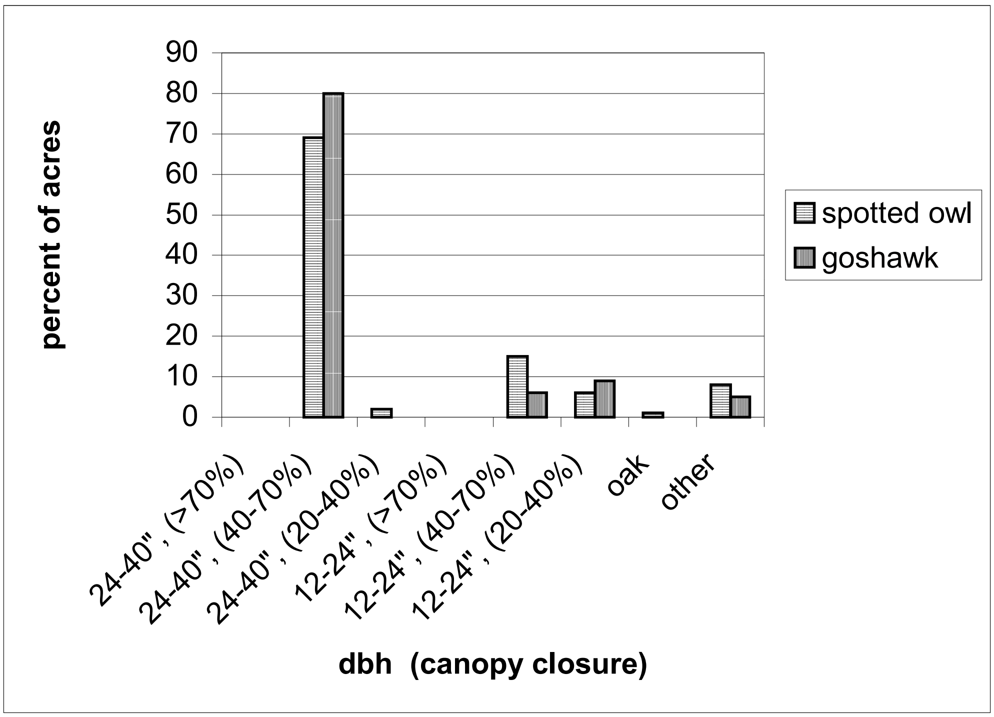
Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk and mule deer are known to occur or have the potential to occur in this landscape.

Old forest associated species—Within the Dodge Ridge landscape, 31% of the area is mapped as OFEA. Approximately 26% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Six percent of the OFEA is in oak and hardwood types, and may or may not exhibit old forest conditions. Nine percent of the OFEA is not suitable for forest production. This leaves 58% of the OFEA acres to improve to meet old forest desired conditions.

There are 11 California spotted owl PACs within the Dodge Ridge landscape. Two of these are partially within other landscapes, and are discussed here because this landscape contains the majority of their acres. There are 3 northern goshawk PACs. Based on the 1997 vegetation data, there are no acres of habitat at desired condition within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that at least some of the acres in PACs are currently at desired condition. Figure 12 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 12: Dodge Ridge Protected Activity Centers Vegetation Data



Mule deer—This landscape provides transition (migratory) habitat and some summer habitat at the higher elevations for the Stanislaus deer herd. Approximately 12% of the landscape is found in oak/hardwood, early succession tees, and grass and chaparral types. In transition and summer range, meadows provide important foraging and fawning habitat for mule deer. As seen in the data presented below in Desired Condition #18, the size and amount of montane meadow vegetation has decreased in this landscape. The current condition of these areas as foraging habitat, as well as the availability and condition of cover and fawning habitat, is unknown.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, mule deer, bats	Presence/ Successful breeding	Known presence and breeding for spotted owl over much of the area, some data for goshawk. One fisher detection. No information for bat species. Some information for mule deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat - OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 31% of landscape in OFEA; 26% of OFEA in CWHR types 5D/5M; 9% of OFEA not capable of growing old forest Nine spotted owl PACs entirely within and 2 partially within the landscape; All PACs over 300 acres; 0 acres currently at desired condition Three goshawk PACs within landscape; All PACs below 200 acres	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of suitable habitat within both spotted owl and goshawk PACs • Increase size of goshawk PACs to 200 acres
Mule Deer Habitat	Early succession habitat	12% of landscape in potential foraging habitat. Current condition unknown.	▪ Gather data to assess habitat availability and condition. ▪ Restore montane meadow vegetation in areas taken over by conifers by burning and/or thinning (See DC#18). ▪ Cooperate with annual CDF&G deer her counts. • Continue to monitor fawn recruitment.
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Not applicable for this landscape.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Vegetation types have been changed by timber harvest, by the absence of periodic fire and the 1950 Wrights Creek fire. Over many decades, harvesting removed high-value pines, in advance of predicted mortality, over much of the landscape. More recently, in response to increasingly sophisticated management strategies, harvesting created openings where most of the existing vegetation was removed and replaced, largely, by planted conifer seedlings. In the absence of periodic wildfire, shade-tolerant conifers, primarily white fir and incense cedar, established themselves within existing stands, sometimes becoming the dominant species. California black oak, whenever faced with increasing conifer density levels, especially among white fir, declines in vigor and dominance.

After the 1950 wildfire, reforestation efforts succeeded in establishing ponderosa and Jeffrey pine forests over much of the burned acreage. Mechanical site preparation, by bulldozer, removed some of the top-killed oak trees, reducing the frequency and distribution of oaks within the planted area.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Despite the increasing availability of rust-resistant planting stock, significant efforts to reestablish the species have not occurred. Western white pine, also susceptible, has not been significantly affected as yet.

Table 10 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 10. Desired Condition and Existing Condition for Vegetation Series in Dodge Ridge Landscape

Vegetation Series	Desired (Potential Natural) Vegetation (PNV)	Existing Vegetation (CALVEG)
Mixed Conifer	60-80% Mixed Conifer	80% Mixed Conifer
Mixed Conifer/Ponderosa Pine	30-60% Mixed Conifer 30-60% Ponderosa Pine	80% Mixed Conifer 14% Ponderosa Pine
Montane Meadow	60-80% Montane Meadow	0% Wet Meadow or Grass
Ponderosa Pine	70-90% Ponderosa Pine	8% Ponderosa Pine
Ponderosa Pine/Douglas-Fir – Ponderosa Pine	30-60% Ponderosa Pine 30-60% Douglas-Fir – Ponderosa Pine	19% Ponderosa Pine 3% Douglas-Fir – Ponderosa Pine

Vegetation Series	Desired (Potential Natural) Vegetation (PNV)	Existing Vegetation (CALVEG)
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	8% Ponderosa Pine 18% Manzanita 13% Grass
Ponderosa Pine/California Black Oak	40-60% Ponderosa Pine 30-50% California Black Oak	9% Ponderosa Pine 0% California Black Oak
Ponderosa Pine/California Black Oak/Interior Live Oak	20-40% Ponderosa Pine 20-40% California Black Oak 20-40% Interior Live Oak	7% Ponderosa Pine 10% California Black Oak 11% Interior Live Oak
Lodgepole Pine/White Fir/Upper Montane Meadow	30-50% Lodgepole Pine 20-40% White Fir 20-40% Upper Montane Meadow	0% Lodgepole Pine 70% Mixed Conifer - Fir 2% Upper Montane Meadow
Red Fir/White Fir	30-60% Red Fir 30-60% White Fir	64% Red Fir 4% Mixed Conifer - Fir

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
PNV	See Table 10 Above	-Higher % fir in the Ponderosa Pine and Mixed Conifer Series. -Loss of meadows in Upper Montane Meadow Series.	• Reduce fir species composition in Pondersoa Pine and Mixed Conifer Series by thinning. • Increase meadow size in Upper Montane Meadow Series by burning and/or thinning.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Ponderosa Pine, Mixed Conifer, and White Fir Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—ponderosa pine	≥ 30% ponderosa pine canopy cover within Ponderosa Pine Series	18-46% ponderosa pine	Increase ponderosa pine species component within the listed vegetation series.
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.
Species Composition—California black oak	≥ 5% basal area California black oak in Ponderosa Pine and Mixed Conifer Series	1-25% planted stands 0-20% mixed conifer 10-18% pine	Favor existing oaks and/or artificially regenerate when needed to restore oaks lost by clearing or competition for light.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: Seral stage Size Class 4 acreage exceeds the desired level. All other size classes are at levels below desired.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicators	**Measures**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	2%	
Wildlife Habitat Relationship (WHR) Size Class 2	5%	1%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	8%	
Wildlife Habitat Relationship (WHR) Size Class 4	20%	45%	• Reduce stand density to increase growth to seral stage 5. • Regenerate portions to provide for earlier seral stages.
Wildlife Habitat Relationship (WHR) Size Class 5	55%	41%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 64% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. Prescribed fire, alone, is not a suitable treatment approach in stands where fire behavior would be expected to kill significant numbers of desired trees.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI $\leq$ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where stand inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Lodgepole Pine	SDI $\leq$ 205	A3N SDI = 312 A3P SDI = 192	

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI ≤ 333	M0X SDI = 397 M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	
Stand Density Index (SDI) for Ponderosa Pine	SDI ≤ 230	P3N SDI = 397 P3P SDI = 304 P3X SDI = 443 P4N SDI = 302 PNO SDI = 205	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Stream corridor true riparian vegetation species are believed to be at less than desired condition in most of the landscape, although they may be within the range of natural variability in some locations. Due to long-term fire suppression and nominal harvest in streamside corridors in recent years, conifer trees may be out competing and overshadowing true riparian trees and shrubs. The natural conifer-hardwood proportions in many streamside areas may be modified from natural conditions.

In the Wrights-Flora burn area of Wrights Creek; true riparian species are not as abundant as their potential. Aspen stands along Wrights Creek in Wrights Creek Meadow are altered insofar as suckers are being grazed annually. Willows in Wrights Creek Meadow have also been grazed annually. Willows planted along the stream in about 1986 have remained cropped and remain about one to two feet high.

There is a substantial data gap in the knowledge of effects of past and current management practices on true riparian species. Inventories in this and other landscapes would help in understanding conditions and would lead to providing guidance for future management of riparian vegetation.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
INDICATOR	**MEASURE**		
Meadow vegetation	High ecological status in wet and moist meadows. Approaching high status in dry meadows.	344 acres of meadow. 33 acres have been surveyed since 1990. Of those surveyed, 0 acres are in good/high ecological status; 9 acres in fair/ moderate status; 24 acres in poor/low status.	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
INDICATOR	MEASURE		
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	In aspen stands and willow communities in Wrights Creek Meadow seral stage distribution is not at DC (2). In streamside corridors with long-term exclusion of fire and vegetation management, conifer dominance has suppressed true riparian trees and shrubs. Species composition and seral stage distribution are not at DC but magnitude of change is a data gap (2). Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs).	• Increase true riparian species reproduction and growth where adversely altered and feasible to accomplish. • Increase knowledge of amount of change in true riparian species composition and seral stage distribution. • Increase knowledge of special aquatic features (meadows, aspen stands, ponds, springs, fens and bogs).

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Social/Cultural Hierarchy

Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Clearly, the dominant economic drivers in this landscape revolve around recreation, especially in the Pinecrest basin. Summer (camping, hiking, fishing, etc.) and winter (Dodge Ridge Ski Area and FS Nordic skiing) dominate this activity. There is capacity for additional use in all but the summer months. However the public generally does not feel an expansion of facilities in the Pinecrest Basin is desirable. Maintaining the high recreation potential and profile of this area will best help with community economic support.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Recreation Use	Recreation Visitor Days (RVDs) increase at a level commensurate with service area demographics	High use campgrounds at or near capacity. Lower use on shoulder season. Day use is generally at it's maximum during peak season. General perception that Pinecrest basin is overcrowded and that use needs to be dispersed.	• Increase use during lower-use periods (shoulder seasons, mid-week, winter). • More public information regarding off-season opportunities • Work with Visitor's Bureau or other entities to encourage off-season use • Encourage permittees, where appropriate, to emphasize off-season use and on-season use outside Pinecrest Basin. Encourage on-season use outside Pinecrest Basin by: • Emphasizing other, less crowded areas • Highlighting access routes leading outside the Basin • Creating new trails leading outside the Basin • Emphasize new facility development outside the Basin. • Secure "Scenic Highway" status for the Sonora Pass Highway (SR 108)
Employment related to ecosystem management (EM) activities	EM/Recreation-generated employment keeps pace w/ overall employment earnings	EM employment (primarily from timber sales) is down from the past. Recreation employment has remained steady.	Emphasize implementation of EM projects in budgeting and program of work development and track progress relative to overall economic picture in Tuolumne County.

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: Use of recreation sites and interpretive services are very high in the Dodge Ridge landscape, centered at Pinecrest. In a typical summer, 6-7,000 people participate in Forest Service interpretive programs and another 10,000 are estimated to visit the interpretive trails found in the area. As stated elsewhere, the interpretive sites are approximately 30 years old and in need of updating.

Within the past 5 years attendance at interpretive programs offered has been declining. The reason for this decline is not known. Is it because there is a change in the audience and their interests and needs? Are programs out-of-date? In the past five years there has also been a change in Forest Service direction. Does the interpretive services program need to change its message(s) accordingly? Questions such as these, when answered, will provide the information needed to make appropriate changes in programs and sites.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference "baseline" data is collected and will be updated every 5 years.	No baseline data exists.	Collect baseline user preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	Build in annual increase in programs offered/people served, as per demographics.
Written and Oral Information	Information provided at Forest Service sites is $\geq$90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: Since 1983, Dodge Ridge Corporation has managed Pinecrest and Meadowview Campgrounds and the Pinecrest Day Use area under a concession authorization. Because of this and continued reduction in appropriations for recreation activities, Forest Service presence in this recreation area is extremely limited, relative to the large number of users. This is changing somewhat. In order to comply with the Service Contract Act, Management of the Day Use area has been returned to the Forest Service. Unfortunately, the cost of staffing and operation of this area comes at the expense of other recreation programs on the Forest, as no additional funds have been provided to manage this workload. Funding options, such as those potentially available through Fee Demonstration or FERC 4E requirements should be sought.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	VERY low visitation from uniformed Forest Service rates. The vast majority of visitors are managed by concessionaires	• Increase visitation frequency by search out new funding sources: • FERC 4E; Use fees (parking, area day passes, etc.) under Fee Demonstration Authority; Cooperative funding with outside sources (local Sheriff, concessionaires) • Increase visitation by utilizing non-recreation personnel by use of volunteers or "partnering" with Fire Prevention personnel

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists of opportunities for DC#25.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	**Measure**		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: While there are a number of private parcels within this landscape, only a few have been identified as potential candidates for acquisition.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	Measure		
Identified properties	All lands acquired	Some high value lands are in private ownership (Little Sweden)	• Prioritize parcel acquisition • Maintain and enhance relationships with groups who assist in this activity (e.g. Nature Conservancy, Trust For Public Land, etc.)

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: The dominant social-cultural themes in the Dodge Ridge landscape revolve around recreation. The dominant feature is the Pinecrest Lake Recreation Area. Although the Dodge Ridge landscape begins just south of the day-use area at Pinecrest Lake, the Pinecrest Recreation Area lies within 3 landscapes. For purposes of simplification (and hopefully for tracking purposes) the analysis of existing condition versus desired condition for this area will only be described in the Dodge Ridge Landscape.

The Pinecrest Recreation area is the most heavily visited area within the Stanislaus National Forest. It has been a popular recreation destination since the 1920's. The immediate surrounding area includes 2 resorts; a marina and boat-launching ramp; a business center; 639 recreation residences and 300 campsites in 2 campgrounds; 1 group camp; 4 organization camps; a day-use/picnic area; 3 swimming beach areas; an amphitheatre and a National Recreation Trail. It is estimated that on high use summer weekends, such as July 4, as many as 10,000 people per day are utilizing the area.

Pinecrest Campground, Meadowview Campground and the Day Use area are aging facilities. Most of the buildings, roads and spurs were constructed in the mid 1960's to 1970's. With no reasonable chances for facility replacement in sight, the Forest Service gained approval for a Capital Improvement Project to upgrade enough facilities within Pinecrest to provide accessibility at the Day Use area and Campground, as well as creating a safe, accessible trail system connecting these areas. This has proven to be a well-received improvement for all visitors. Completion of this project is expected in FY 2001.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	Design, form and function of existing facilities meet preference needs of the 1960's and 70's. Much upgrading for accessibility has been accomplished	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, were available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources. • Complete accessibility upgrades.
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in existing user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in facility and program development.
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Little opportunity in Pinecrest Basin to increase capacity during high use periods. Unknown if public is willing to go somewhere else. Low visitation during off-season.	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Construct new facilities to meet this demand at alternate sites, if it is determined this will be effective and environmentally sound (meets Desired Conditions of other elements) • Maximize funding sources: FERC 4; Capital Improvement Program; cooperative funds

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Facility Condition	Meets Forest Service Meaningful Measures Standards/INFRA Accessibility Guidelines	Facilities functional but out of date & in poor condition. Pinecrest NRT needs maintenance. Some accessibility upgrades have been completed.	• Establish priorities using Meaningful Measures and INFRA data. • Maximize funding for maintenance of facilities: FERC 4E; Appropriated funds; Fee Offset; Fee Demo; Volunteers; Capital Improvement Program

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Existing Condition: Dodge Ridge Corporation has managed Pinecrest and Meadowview Campgrounds and the Pinecrest Day Use area under a concession authorization since 1983. Because of this and continued reduction in appropriations for recreation activities, Forest Service presence in this recreation area is extremely limited, relative to the large number of users. This is changing somewhat. In order to comply with the Service Contract Act, management of the Pinecrest Day Use area has been returned to the Forest Service. Unfortunately, the cost of staffing and operating this area comes at the expense of other Forest recreation areas within the Stanislaus National Forest—as no additional funds have been provided to manage this workload. Funding options such as those potentially available through Fee Demonstration or FERC 4E mitigations will be sought.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Desired**		
Facili**ties and activities financed**	100% financing of facilities and activities attributable to present and projected demand generated by FERC projects.	No financial contribution by PG&E for any induced impacts at Pinecrest or affected areas.	• Identify clear present and future project induced impacts. • Prioritize importance and "ownership" of all impacts. • Set Licensee responsibilities in FERC 4E requirements

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: Refer to Chapter IV.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Needed roads	Miles of road retained	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: Existing trail opportunities within the Dodge Ridge landscape center primarily around Pinecrest. Trails are very popular with the public, especially trails that lead to destinations outside of Pinecrest. Within the Pinecrest area itself, there are a series of accessible paths that link the campgrounds, day use area and business centers; two ¼ mile interpretive trails (Trail of the Survivors and Trail of the Mi-Wuk Village); and the 4-mile National Recreation Trail around Pinecrest Lake. From Pinecrest Lake, the Catfish Lake and Cleo's Bath trails lead into the surrounding forest. From Catfish Lake a 4-mile trail (recently improved) goes up the Pinecrest Peak. Other existing trail opportunities in the landscape include the ¼ mile North Fork Interpretive Trail outside of Long Barn.

The Forest Service maintains a network of cross-country ski trails adjacent to the Dodge Ridge Ski Area (Crabtree and Gooseberry trail systems). Motorized over snow vehicles are not permitted in and around the Pinecrest area.

With the exception of the new accessible trails, there is a heavy trail maintenance backlog. Suggestions for potential trails are shown on the recreation map in Appendix J. The Pinecrest Pathways Trails Committee, a community/Forest Service cooperative effort, identified these trails following the Pinecrest Pathways Future Search Conference in 1998.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	Community-linking trails do not exist.	Construct community-linking trails as identified through public involvement (Appendix J)
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	Trails exist primarily around the Pinecrest. Some OHV trails exist. Many level 2 roads are used for motorized recreation.	• Construct trails identified through public involvement (Appendix J). • Decommission or discourage use on trails that receive minimal use.
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails. • Utilize 4E requirements to ensure Pinecrest Lake trail is maintained to standard.

Chapter V.4: Duckwall Landscape

Introduction

The Duckwall Landscape is located in the southern most portion of the Central Stanislaus Watershed Analysis (CSWA) area, in the lower one-third of the North Fork Tuolumne River. Elevations range from approximately 1,100 feet to 5,830 feet on Duckwall Mountain. Much of this area was burned in the Stanislaus Complex fire in 1987. Refer to Map 11 to identify specific locations as they are referenced in the following chapter.

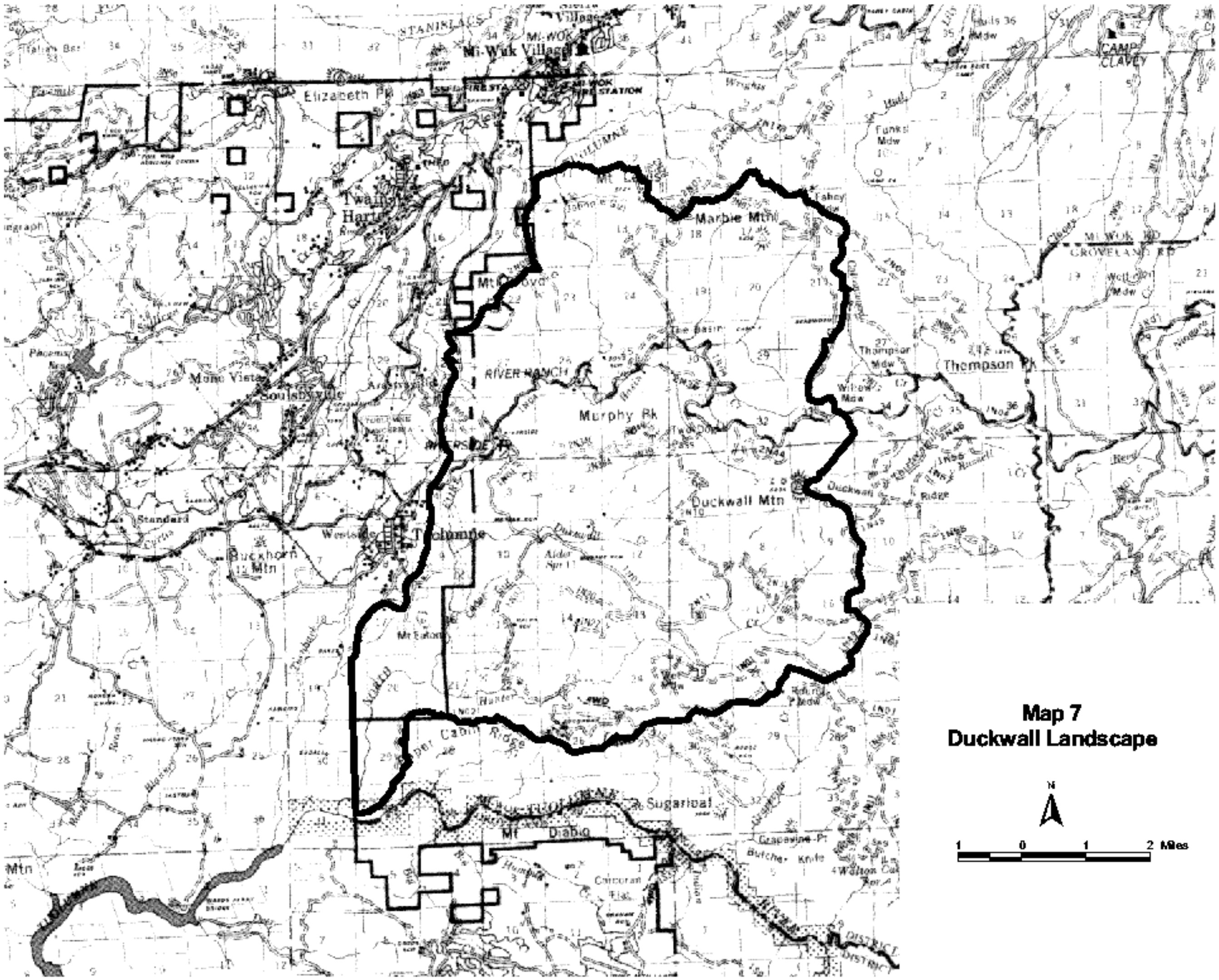
Historical Context

Many productive, historic-era gold mines within the Central Stanislaus Watershed Area were in the Duckwall area, including: Basin Slope, Buchanan, Casa Madera, Confidence, Dead Horse, Excelsior, Fair Oaks, Gem, Green, Grizzly, Lady Washington, Lucky Strike, Mammoth, Poseidon, Providence, Ryan, Sledge, and Spring Gulch.

Scores of gold mines that were located on the fringe of (what would become) the Stanislaus National Forest secured water from streams within the forest. In Summersville, some examples include the Dead Horse Mine and the adjoining Lady Washington Mine both secured water from the North Fork Tuolumne River. The New Albany quartz mine was fed by its own ditch that diverted water from the North Fork of the Tuolumne, probably near today's Riverside day use area.

The Providence Mine, straddling the forest boundary on the North Fork Tuolumne about one-half mile below the confluence of Duckwall Creek, is typical of many Southern Mother Lode mines. Discovered by a prospector who had crossed and re-crossed the area for many years as he traveled to other mines in the vicinity, the Providence Mine was aptly named. Soon after locating the vein, he secured a bond and erected a 16 stamp mill, hoist, and other surface improvements. Eventually reaching 1,400 feet deep, the mine produced two million dollars, but at that depth, the shoots seemed to dissipate.

In 1928, a forest fire that charred over 1,500 acres on the Stanislaus National Forest near the town of Tuolumne destroyed the Providence Mine, Star King and the New Albany mines.



Map 7
Duckwall Landscape

Landscape Analysis

Hydrologic Hierarchy
Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Duckwall landscape. A population of foothill yellow-legged frog and a western pond turtle were found in the North Fork Tuolumne. Hunter Creek contains foothill yellow-legged frog, Pacific chorus frog, western toad and one western pond turtle. Based on the elevation range of this landscape, there is potential for the following TES species to occur: California red-legged frog, foothill yellow-legged frog, western pond turtle, slender salamander, rainbow trout and hardhead.

There are currently no documented sightings of waterfowl or osprey in the Duckwall landscape. Osprey occupancy would be unlikely, as there are no suitable lakes for hunting. There have been no surveys for waterfowl species or macro invertebrates in this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/successful breeding Occupied habitat	5.5 miles surveyed Western pond turtle, foothill yellow-legged frog, western toad and Pacific chorus frog located	• Survey un-surveyed areas • Reintroduce species in unoccupied historic habitat
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting	• Gather incidental sightings of waterfowl • Survey suitable waterfowl habitat
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Status of population health is unknown	Conduct surveys

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: There are no historic records of California red-legged frog within the Duckwall landscape. The landscape is within the elevation range of the species. Critical habitat is designated on 34% or 11,495 acres of this landscape.

Some project specific site assessments were conducted, although they do not cover the entire landscape. Completion of site assessments would identify any habitat suitable for breeding by this threatened species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
California red-legged frog	Suitable Habitat Recovery plan objectives are met	Some areas with completed suitable habitat site assessments	Complete habitat site assessments for landscape

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The amount and type of large woody debris **(**LWD) in the Duckwall landscape is highly variable. The Paper Fire of 1987 resulted in loss of LWD from the fire. In addition, storm flow following the fire redistributed remaining LWD into numerous logjams in the fire area. Earlier large fires in Basin Creek may have affected LWD but the effect is unknown. In areas outside large fires in this landscape, LWD has been observed to exist in moderate to even perhaps excessive amounts. Long term exclusion of fire, and vegetation management in stream corridors outside the Paper Fire area, has resulted in many riparian areas exceeding Stand Density Index thresholds. As a result, a potential excessive amount of in-stream LWD that can be recruited currently exists.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
LWD	Pieces/100m of stream, by Channel Type	Limited observations; data gap at landscape and stream reach scales.	Increase knowledge of LWD.

Information source: 1 – Limited field observations; 2 – Long term field observations; 3 – Data supported observations

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: Three of the four sub-watersheds in this landscape have road densities greater than desired and all four have an excessive number of road stream crossings (Appendix I). The quality of the roads with respect to direct delivery of water to stream courses has not been inventoried. However, long-term observations indicate that the amount of hydrologically connected road segments exceeds desired condition.

The wildfire hazard in this landscape is the highest in CSWA and thus poses a substantial threat to watershed conditions if a large and severe fire occurs. Duckwall and its two contiguous landscapes (Dodge Ridge and Lyons) are the three highest fire hazard areas in CSWA, and thus this area is a key contributor to the existing condition of wildfire hazard in a larger portion of the overall watershed analysis area.

Stream sediment in the landscape has not been inventoried. However, long-term observations in the Paper Fire area indicate that particle size distribution and pool depth are not at desired condition. Erosion from the steep slopes of the Duckwall and Hunter Creek sub-watersheds delivered a significant amount of sediment during storm events following the fire. Many pools were filled with sediment and the mean particle size decreased as the streams silted in. Outside the Paper Fire area in the North Fork Tuolumne and Basin Creek limited observations indicate the stream sediment condition remains a data gap.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/mi of stream; HCS <. 25 mi/mi^2.	Road density >2.5 in 3 of 4 sub-watersheds (3). Road Crossings > 1 in 4 of 4 sub-watersheds (3). HCS - Data gap.	• Reduce road sediment. • Increase HCS knowledge.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	9% low hazard (3) 85% high/very high (3)	Reduce wildfire hazard throughout landscape.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: N/A in this landscape. Unimpaired streams: Not at DC in Hunter and Duckwall Creeks due to Paper Fire and reforestation (2). Data gap in rest of landscape.	• Increase knowledge of stream sediment transport and deposition patterns. • Improve sediment regime in Hunter and Duckwall Creek sub-watersheds.
Pool Depth	Residual pool depth is highly similar to reference streams.	Pool depth < DC in Hunter and Duckwall Creeks (2). Data gap in rest of landscape.	• Increase knowledge of pool sediment. • Improve sediment regime in Hunter and Duckwall Creek sub-watersheds.

Information source: 1 – Limited field observations; 2 – Long term field observations; 3 – Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: The sub-watersheds comprising this landscape have a substantial amount of steep topography. Stream channels are likewise in much of the area, with moderate and high gradient streams prevailing. The Paper Fire of 1987 burned severely through many of these stream channels, reducing streambank vegetation and thus channel stability. Intense storms in the fall of 1987 incised channels and eroded streambanks so that the condition of nearly all moderate- and steep-gradient streams degraded to less than desired. Recovery of vegetation has occurred with time but the current amount bank stability is unknown. Channel morphology in many of the steep headwaters streams is still likely altered; that is, Rosgen A channel types were incised to G types and remain that way.

The only substantial low gradient channel is on Duckwall Creek in the Murphys Ranch area. Aerial photo interpretation indicates that floodplain connectivity may have been lost or threatened to date. This location is on private land within the Duckwall Creek subwatershed.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	• Low gradient reaches: Duckwall Creek in Murphys Ranch not at DC (2, 3- aerial photo interpretation). No other low gradient reaches. • Moderate gradient reaches: Not all 3 indicators were met in many streams following the Paper Fire, but a data gap remains pending updated information (2). • Steep Gradient streams: Indicator 4 was not met in many streams following the Paper Fire, but a data gap remains pending updated information (2).	• Take action to move degraded stream reaches toward desired condition. • Increase knowledge of channel morphology condition where data gap exists.

Information source: 1 – Limited field observations; 2 – Long term field observations; 3 – Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: Water quality is believed to be meet Basin Plan Objectives at the present time with the possible exception of sediment, from roads. Although the Paper Fire substantively altered the erosion and sediment regime in a large portion of the landscape, vegetative recovery over the past 14 years has moderated the adverse watershed conditions caused by the fire.

Reforestation following the Paper Fire resulted in large-scale herbicide application to assist survival of planted tree seedlings. Ground application of glyphosate and triclopyr followed plantations established between 1990 and 1993. In the fall of 1994, aerial application of hexazinone was conducted on private timberland in Hunter Creek. In the spring of 1996, and through 1998, aerial application of hexazinone was conducted on Forest Service land. This was the largest application of hexazinone on Forest Service lands in California; insofar as more than 3,000 acres were treated. Since this herbicide can readily enter water via soil moisture drainage, a monitoring program was established in 1996 to determine the amount and persistence of hexazinone entrained in water. Thus far, quantities detected have been less than predicted and meet Basin Plan Objectives. However, small amounts of hexazinone continue to be detected in Hunter Creek and will be monitored until it is no longer persisting in surface water in order to understand the longevity of this herbicide.

Acid Neutralizing Capacity as an indicator of water quality applies only to Class 1 Wilderness. There is no designated wilderness in the Duckwall landscape.

There are no principal municipal water supplies in this landscape that would constitute designation as municipal watersheds.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	Streams likely meet BPO except maybe sediment from roads (2). Paper Fire area herbicide applications have met BPO but data gap remains on persistence of hexazinone in streams.	• Decrease sources of road sediment. • Continue to increase knowledge of hexazinone persistence in Hunter Creek.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC ≥ baseline in lakes sensitive to acid deposition (ANC <50).	N/A	N/A
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	N/A	N/A

Information source: 1 – Limited field observations; 2 – Long term field observations; 3 – Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation.

Not applicable in this landscape.

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: Infiltration is at desired condition across this landscape. Prior to reforestation of timber burned and harvested following the Paper Fire of 1987, subsoiling was conducted in many areas to reduce vegetative competition with tree seedlings. This retained or improved soil porosity, and the Paper Fire area did not experience a decrease in infiltration as a result of post-fire logging and site preparation techniques as used following preceding fires on the forest.

Evapotranspiration is likely excessive in portions of this landscape outside the Paper Fire area. Even though the SDI, at about 40%, is lower than its neighboring landscapes it remains high in non-plantation areas. In fact, much of the landscape outside the plantations has a high SDI. This landscape is at an elevation where tree growth is good, and thus plant transpiration is high. And high density of vegetation provides a significant amount of plant surface for interception and evaporation of rainfall.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub watershed.	>90% at the sub-watershed scale (2, 3).	Increase knowledge of effect of subsoiling on soil porosity in Paper Fire plantations.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Evapotranspiration	SDI is < threshold values.	38% of landscape exceeds the SDI threshold values (3)	Reduce Stand Density where SDI thresholds exceeded.

Information source: 1 – Limited field observations; 2 – Long term field observations; 3 – Data supported observations

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Over the last century, 37 fires over 10 acres have been recorded in this landscape. Several large severe fires, including part of the Stanislaus Complex in 1987, have affected the south end of the landscape. A total of 86 fires (including the Paper Fire in 1987 that started outside the landscape) Approximately 99% of the acres burned were from human-caused fires. Based on the density of fires occurring over the past 30 years, the relative risk of fire occurrence over this landscape is low.

The historic fire regime for the Duckwall landscape is primarily fire regime I, short return interval, low severity fire. The chaparral slopes on the southwest edge of the landscape historically burned frequently and with stand replacement severity (Fire Regime II).

Analysis:

DESIRED CONDITION		EXISTING CONDITION		OPPORTUNITIES
Indicator	**Measure**	Fire Regime		
		I	II	
Condition Class (CC)	CC1	CC1—0% CC2—18% CC382%, in ponderosa pine and lower mixed conifer	CC1—0% CC2—100% In chaparral	• Move CC3 areas toward CC1 by removing surface, ladder, and excess crown fuels • Move CC2 areas toward CC1 by reducing surface and ladder fuels

<table>
<tr><th colspan="2">DESIRED CONDITION</th><th rowspan="2" colspan="2">EXISTING CONDITION</th><th rowspan="2">OPPORTUNITIES</th></tr>
<tr><th>Indicator</th><th>Measure</th></tr>
<tr><td>Potential impacts of fire</td><td>No negative</td><td colspan="2">Potential impacts:
• Much of landscape is private land, scattered residences in remote areas
• Residential areas to the west of landscape
• 7 PACS (6 with very high or high fire hazard)
• Old Forest emphasis on most of the Forest Service administered acres, almost all in very high or high fire hazard</td><td>• Identify potential impacts during preparation of the Fire Management Plan.
• Prioritize mitigation measures to reduce potential impacts</td></tr>
<tr><td>Fire hazard—Defense Zone</td><td>Low: 90%</td><td colspan="2">Low: 14%
Mod: 14%
High: 42%
Very high: 30%</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Fire hazard—Outside Defense Zone</td><td>Low: 40% (strategically placed to break up high hazard)</td><td><u>ALL OUTSIDE</u>
Low: 9%
Mod: 6%
High: 49%
VHigh: 36%</td><td><u>THREAT</u>
Low: 17%
Mod: 3%
High: 37%
VHigh: 47%</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Suppression effectiveness</td><td>Hand crews effective in high value areas (4’ flame length)</td><td colspan="2">• >6ft potential over 67% of landscape, most in the lower half
• >11ft potential on west edge, adjacent to Tuolumne, Tuolumne Rancheria</td><td>• Reduce potential flame length where necessary by removing or rearranging surface fuels</td></tr>
<tr><td>Crown fire potential</td><td>Surface only</td><td colspan="2">• Crown fire potential in northern 1/3 and southwest corner
• Lower potential in some areas because trees have been replaced by brush, which will burn with stand replacement severity</td><td>• Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height
• Limit extent of stand replacement fire by disrupting continuity of brush crowns</td></tr>
</table>

In summary, the existing condition of the Duckwall landscape as it relates to the fire element is poor. Approximately 82% of the landscape is in condition class 3 due both to the absence of fire in some places and the occurrence of uncharacteristically severe fire in others. Most of those same acres have high or very high fire hazard characteristics. Two prescribed fires have been implemented in the past 10 years and there are very few natural barriers to fire spread. Much restorative treatment is needed throughout the entire landscape, in addition to reducing fire hazard and crown fire potential near the communities adjacent to the west edge of the landscape.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: This landscape contains the highest number of occurrences of noxious weeds in the CSWA area. Yellow starthistle has been found within private lands for several years. It has been spreading along the roads of the landscape, then spreading beyond the roads. Following fires in 1987 and 1996, suppression activities, restoration seeding, and salvage logging appears to have spread starthistle seed widely in activity areas. The populations were thin and scattered when first noticed, but have been expanding in recent years. There are at least one population of medusahead grass, one population of tocalote, and one population of Italian thistle in the area. All are near populations of yellow starthistle and probably came from the same source. There is also a population of broom shrubs in the Hunter Creek drainage. A population of spotted knapweed was found on private land near the eastern edge of the landscape in 1995 (Chambers 1999). Eradication efforts have been ongoing.

In summary the existing condition of the Duckwall landscape as it relates to noxious weeds is unsatisfactory. Though this is the most infested landscape in the CSWA area, treatment methods exist that can eradicate most of the weeds over a period of a few years.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	Existing populations of yellow starthistle and one population of broom	• Eradicate existing populations of noxious weeds. • Monitor, map and record all new occurrences. • Implement preventative actions to minimize spread of weeds.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Established weed populations	All populations are treated and eradicated.	Starthistle populations found along most major roads and also in unroaded acreage. At least 610 total acres are lightly infested. Also one population of broom, about 10 acres, one acre of medusahead grass, and less than one acre of Italian thistle and tocalote.	Eradicate broom, yellow starthistle, medusahead, Italian thistle and tocalote populations.

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: Three sensitive plant species (*Clarkia australis, Clarkia biloba* ssp. *australis,* and *Erythronium tuolumnense*) are found scattered through the Duckwall landscape. Habitat for other sensitive plant species exists—*Allium tribracteatum, Cypripedium montanum, Horkelia parryi, Hulsea brevifolia, Hydrothyria venosa, Lomatium stebbinsii, Mimulus gracilipes,* and *Mimulus pulchellus,* to occur in the area. The area of volcanic soils suitable for *Allium tribracteatum* and *Lomatium stebbinsii* is very limited, but it has not been surveyed and there is *Lomatium stebbinsii* adjacent to this landscape. The sensitive plant species found in this area generally increase after fires and can be affected by reforestation activities if not protected. The OHV trails in this landscape have not been inventoried.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	4 occurrence of *Clarkia australis;* 9 occurrences of *Erythronium tuolumnense*; 9 occurrences of *Clarkia biloba ssp. australis* exist.	• Survey un-surveyed areas • Protect known populations of *Clarkia australis, Clarkia biloba* ssp. *australis* and *Erythronium tuolumnense*

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Most of the Duckwall landscape is a Ponderosa Pine and Chaparral-Mixed Oak-Ponderosa Pine system with some Mixed Conifer at higher elevations and on north slopes. Much of this landscape is outside the natural range of variation relative to natural fire regime and potential natural vegetation (PNV). Major changes in fire regime and PNV can alter or even drive existing soil conditions at the broad landscape scale.
A large part of the Stanislaus Complex burn occurred in this landscape, which illustrates a shift away from the natural fire regime of frequent low intensity fire. When fires do occur they now tend to be stand replacing fires over large areas. The shift in fire regime has created a much higher potential for soil erosion over a much greater portion of the landscape. Changes in PNV and forest structure have also occurred that ultimately affect soil conditions.

Today, brush fields are more common and large areas of the landscape are in early seral stages. Crown density and fuel loading of all vegetation types have increased. Early mining and timbering activities have altered vegetation patterns at the stand and landscape scale. Much of the large Ponderosa pine and black oak once found in Ecological Units 211, 205, and 208 have been cut out or burned up.

The classic Ponderosa pine type (Ecological Unit 208), is occupying a narrower zone across the Sierras than previously existed. The Ponderosa pine Ecological Unit is being squeezed at higher elevations by mixed conifer and at lower elevations by chaparral and hardwoods. There is very little old growth Ponderosa pine. This has implications for soil because a natural Ponderosa pine forest can coexist with fire without large areas of landscape going up in smoke. When PNV and fire regime is out of balance, soil nutrient and erosion cycles may be out of balance in some Ecological Units.

Soil biology is a data gap. It is not fully understood how landscape scale changes in large downed woody material, PNV, or fire regime may alter soil organisms. Downed wood is lacking in much of the landscape because of both wildfire and management history. Old growth hardwoods are uncommon in some Ecological Units. It is thought that oaks beneficially influence nutrient cycling, soil biology, and soil porosity both at the stand and landscape scale.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Meets DC in tilled areas of Stanislaus Complex burn; May not meet DC in other areas where multiple entry tractor logging has occurred	Subsoil compacted areas to meet DC
Large Downed Woody Material	Logs per acre >20 inch diameter	Generally meets DC in railroad logged second growth stands of unit 227; Generally meets DC in units 101, 201, 206, and 216; Lack of LWM in units 211, 205, 208 where site preparation and wildfire has removed woody material.	Create large woody material where needed for soil productivity or wildlife habitat
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Less evidence of soil organisms on south slopes that have burned repeatedly, particularly in unit 211.	Implement treatments that move towards PNV and natural fire regime. Encourage Old growth oak structure in units 211 and 205.
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Less surface organic matter on south slopes that have burned repeatedly in units 205, 208, and 211.	Implement treatments that move towards PNV and natural fire regime in units 205, 208, and particularly 211.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Topsoil	Organic matter content is 85% of natural	Generally meets DC except in highly disturbed areas such as borrow sites and terraced areas; Less topsoil on eroded or tilled Mariposa soils within units 211 and 205	• Restore soil conditions on disturbed sites and terraced areas as practical • Implement treatments that build topsoil organic matter particularly on Mariposa soils. Examples are shred, mulch, fertilize, grow conifers and black oaks faster

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: Roads have affected this landscape, particularly on certain soil types. Roads are chronic sources of erosion. Past disturbances related to wildfire and management in this landscape may have reduced soil productivity, particularly on soils with thin topsoil layers and soils prone to compaction.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover (hillslopes)	50 to 70% surface cover that prevents accelerated erosion	Most areas recovered from Stanislaus Complex burn. Some accelerated erosion on tilled areas of Mariposa soil	Improve surface cover where needed
Surface Cover (RCAs)	75% surface cover that prevents accelerated erosion	Most areas recovered from Stanislaus Complex burn. Large gully in Ingall's Ranch meadow.	Develop partnership with NRCS and private landowner to restore Ingall's Ranch gully.
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads particularly on sensitive soils. Misc. gullies associated with poor road drainage. See 1997 storm damage survey.	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential • Restore gullied areas

Terrestrial Animal Species

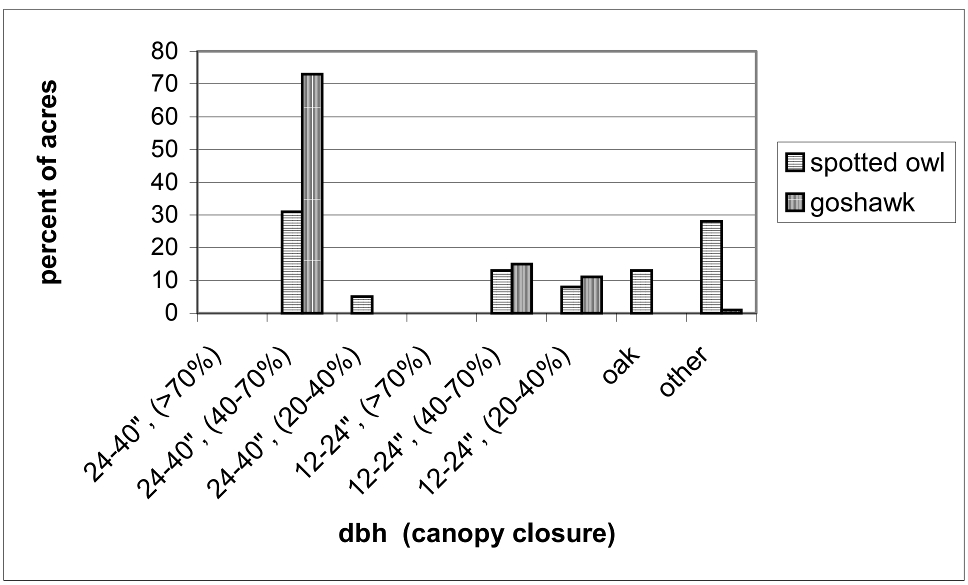
Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk and mule deer are known to occur or have the potential to occur in this landscape.

Old forest associated species—Within the Duckwall landscape, 27% of the area is mapped as OFEA. Approximately 4% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Nine percent of the OFEA is in oak and hardwood types, and may or may not exhibit old forest conditions. Ten percent of the OFEA is not suitable for forest production. This leaves 77% of the OFEA acres to improve to meet old forest desired conditions.

There are 8 California spotted owl PACs within the Duckwall landscape. One of these is partially within another landscape. There is 1 northern goshawk PAC. Based on the current vegetation data, there are no acres of habitat at desired condition within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that at least some of the acres in PACs are currently at desired condition. Figure 13 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 13: Duckwall Protected Activity Centers Vegetation Data



Mule deer—This landscape provides winter and migratory habitat for the Stanislaus and Tuolumne Deer Herds. There are also year-round resident deer in the lower elevations, particularly around the town of Tuolumne. Approximately 33% of the landscape is found in oak/hardwood, early succession trees, and grass and chaparral types. The current condition and available of foraging habitat has improved as a result of the 1987 Stanislaus Complex Burn, however the deer numbers have not shown an increase. Other factors, such as the habitat quality of summer range and predation are now being considered to be limiting, particularly to the Tuolumne Deer Herd.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, mule deer, bats	Presence/ successful breeding	Known presence and breeding for spotted owl over much of the area, some data for goshawk. No known forest carnivore sightings. No information for bat species. Some information for mule deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat- OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 27% of landscape in OFEA; 4% of OFEA in CWHR types 5D/5M; 10% of OFEA not capable of growing old forest California spotted owl: 7 spotted owl PAC entirely within landscape, 1 partially within landscape; All PACs over 300 acres; 0 acres currently at desired condition. Northern goshawk: One goshawk PAC within landscape; 0 acres currently at desired condition; PAC includes 263 acres	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of habitat that meet desired conditions within both spotted owl and goshawk PACs • Decrease size of goshawk PAC
Mule Deer Habitat	Early succession habitat	33% of landscape in potential foraging habitat. Current condition unknown.	▪ Assess habitat availability and condition. ▪ Cooperate with annual CDF&G deer her counts. ▪ Continue to monitor fawn recruitment.
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Existing Condition: Elderberry plants occur within this landscape. It is unknown if these plants provide suitable habitat for the valley elderberry longhorn beetle. It is also unknown if this beetle is currently found within the landscape. Areas with suitable elderberry plants can be mapped within the landscape to aid in management of this species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Valley elderberry longhorn beetle	Habitat provided and protected	Unknown status of elderberry plants	Identify areas with elderberry plants when conducting vegetation surveys

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Historic vegetation patterns and species composition within this landscape began to change when Europeans immigrated into the area. Vegetation types were changed by timber harvest and by the absence of periodic fire. Over many decades, harvesting removed high-value pines, in advance of predicted mortality, over much of the landscape. In the absence of periodic wildfire, shade-tolerant conifers, primarily white fir and incense cedar, established themselves within existing stands, sometimes becoming the dominant species. California black oak, whenever faced with high conifer density levels, especially among white fir, declines in vigor and dominance.

In 1987, the stand-replacing Stanislaus Complex fire affected most of this landscape. In subsequent years, portions have been restored to forest by planting a variety of conifer species on high productive soils. Top-killed oaks quickly re-sprouted and have regained most of their pre-fire canopy cover.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Within recent plantings, rust-resistant planting stock is being used to reestablish the species.

Table 11 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 11. Desired Condition and Existing Condition for Vegetation Series in Duckwall Landscape

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Interior Live Oak	60-80% Interior Live Oak	8% Interior Live Oak
Mixed Conifer	60-80% Mixed Conifer	64% Mixed Conifer
Mixed Conifer/Douglas-Fir – Ponderosa Pine	30-60% Mixed Conifer 30-60% Douglas Fir – Ponderosa Pine	98% Mixed Conifer 0% Douglas-Fir – Ponderosa Pine
Mixed Conifer/Ponderosa Pine	30-60% Mixed Conifer 30-60% Ponderosa Pine	76% Mixed Conifer 9% Ponderosa Pine
Ponderosa Pine	70-90% Ponderosa Pine	29% Ponderosa Pine
Ponderosa Pine/Douglas-Fir – Ponderosa Pine	30-60% Ponderosa Pine 30-60% Douglas-Fir – Ponderosa Pine	38% Ponderosa Pine 9% Douglas-Fir – Ponderosa Pine
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	15% Ponderosa Pine 0% Manzanita 36% Grass
Ponderosa Pine/California Black Oak/Interior Live Oak	20-40% Ponderosa Pine 20-40% California Black Oak 20-40% Interior Live Oak	16% Ponderosa Pine 3% California Black Oak 11% Interior Live Oak
Ponderosa Pine/Interior Live Oak	40-60% Ponderosa Pine 40-60% Interior Live Oak	10% Ponderosa Pine 1% Interior Live Oak

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
PNV	See Table 11 Above	Higher % fir and incense cedar in the Ponderosa Pine and Mixed Conifer Series.	Reduce shade-tolerant species composition in Ponderosa Pine and Mixed Conifer Series by thinning.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Ponderosa Pine and Mixed Conifer Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—ponderosa pine	≥ 30% ponderosa pine canopy cover within Ponderosa Pine Series	18-46% ponderosa pine	Increase ponderosa pine species component within the listed vegetation series.
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: Acreage of seral stage size classes 1 and 3 exceed the desired level. All other size classes are at levels below the desired value.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicators	**Measures**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	24%	Reduce stand density and minimize competing vegetation to increase growth to seral stage 2.
Wildlife Habitat Relationship (WHR) Size Class 2	5%	1%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	22%	Reduce stand density to increase growth to seral stage 4.
Wildlife Habitat Relationship (WHR) Size Class 4	20%	15%	Reduce stand density to increase growth to seral stage 5.
Wildlife Habitat Relationship (WHR) Size Class 5	55%	9%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 38% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found in Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition. Prescribed fire, alone, is not a suitable treatment approach in stands where fire behavior would be expected to kill significant numbers of trees.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI $\leq$ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI $\leq$ 333	M0X SDI = 397 M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	
Stand Density Index (SDI) for Ponderosa Pine	SDI $\leq$ 230	P3N SDI = 397 P3P SDI = 304 P3X SDI = 443 P4N SDI = 302 PNO SDI = 205	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Following the Paper Fire, recovery of true riparian species is progressing. Outside fire areas in this landscape, true riparian vegetation species are believed to be at less than desired condition. Due to long term fire suppression and nominal harvest in streamside corridors in recent decades, conifer trees may be out-competing and overshadowing true riparian trees and shrubs. The natural conifer-hardwood proportions in many streamside areas may be modified from natural conditions.

There are a number of springs that have been observed in this landscape but a full search for these special aquatic features needs to be conducted and documented.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Herbaceous Species	High ecological status in wet and moist meadows; approaching high in dry areas of meadows.	264 acres of meadow. 18 acres have been surveyed since 1990. Of those, 4 acres are in good/high ecological status; 14 acres in fair/moderate status; and 0 acres in poor/low status	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	True riparian species in Paper Fire area not at DC but re-growth indicates recovery toward desired condition (2). In streamside corridors where long-term exclusion of fire and vegetation management has occurred, conifer dominance has suppressed true riparian trees and shrubs. Species composition and seral stage distribution are not at DC but magnitude of change is a data gap (2). Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs).	• Increase true riparian species reproduction and growth where adversely altered and feasible to accomplish. • Increase knowledge of amount of change in true riparian species composition and seral stage distribution. • Increase knowledge of special aquatic features (meadows, aspen stands, ponds, springs, fens and bogs).

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Social/Cultural Hierarchy
Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Economic contributions have traditionally come from ecosystem/timber-related activities. There are large in-holdings of private timber owned by Sierra Pacific Industries, which provide economic support for the lumber and wood products industry. Other private land holdings influence activities on public lands. Recreational activities generating economic benefits are mainly related to OHV use on level 2 roads, minor amounts of dispersed camping, and Riverside Day use. (Refer to Desired Condition Statements #10, 11, 18, 19, 20, 21 and 28).

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: Because of the general remote nature of this landscape, few interpretive activities have occurred in this landscape, however, user preference data is lacking. Opportunities exist for cultural resource and wildflower interpretive sites and/or information along the Westside Railroad Trail outside of Tuolumne. This trail is very popular, especially in winter and spring, with hikers, bikers, and horse riders. It offers spectacular views year-round and wildflower displays in the spring.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference "baseline" data is collected and will be updated every 5 years.	No baseline data exists.	Collect Baseline User Preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population	No programs offered.	Build in annual increase in programs offered/people served, as per demographics.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
	demographics		
Written and Oral Information	Information provided at Forest Service sites is $\geq$ 90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: The only public assistance provided in the field comes from personnel funded through the Green Sticker program and Fire Prevention. (See DC#30 below.)

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	Very low visitation rates from uniformed Forest Service personnel.	Increase visitation frequency by searching out new funding sources; cooperative funding with outside sources; FERC 4E funding in other areas may redirect funding to this area. Increase visitation by utilizing volunteers or Forest Service personnel from other functions such as Fire Prevention.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists of opportunities for DC#26.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	Measure		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: There are isolated private land parcels in this landscape but none have been identified as potential candidates. See Chapter IV.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	Measure		
Identified properties	All lands acquired	Some isolated parcels. No identified opportunities	• Inventory landscape for potential opportunities • If opportunities exist, include in Forest prioritization of parcel acquisitions • Maintain and enhance relationships with groups who assist in this activity (e.g. Nature Conservancy, Trust For Public Land, etc.)

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: Most facilities are 15-30 years old and in general poor shape. Opportunities appear to fit the landscape but user preference data is lacking.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	Facilities built in the (1980's). Unknown if they meet current preference needs.	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, where available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources. • Complete accessibility upgrades.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in existing user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in facility and program development.
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Except for high use weekends, visitation does not exceed capacity. Much capacity to increase facilities, however, demand unknown.	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Maximize funding sources; Capital Improvement Program; cooperative funds
Facility Condition	Meets Forest Service Meaningful Measures Standards/ INFRA Accessibility Guidelines	Facilities do not meet accessibility standards	• Establish priorities using Meaningful Measures and INFRA data. • Maximize funding for maintenance of facilities: appropriated funds; Fee Offset; Fee Demo; Volunteers; Capital Improvement Program

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Not applicable for this landscape.

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: Refer to Chapter IV.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Needed roads	Miles of road retained	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measures		
			amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: The Westside Railroad Trail leaves from Tuolumne and enters this landscape, ending in the vicinity of Riverside Campground. The trail was a cooperative effort between the Forest Service and the Tuolumne Parks and Recreation Department. This trail is very popular with joggers, hikers, bikers and horse riders, particularly in the spring, when there are beautiful wildflower displays. It offers mid-elevation trail opportunities, especially in the winter and spring when high country and wilderness trails are still under snow. This trail is part of a trail corridor identified on the State Trails Plan.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	Community-linking trails do not exist.	No substantive opportunities or demand
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	Many level 2 roads are used for motorized recreation and OHV routes.	Continue work on the Westside Railroad Trail.
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails.

Chapter V.5: Lyons Landscape

Introduction

The Lyons Landscape occurs in the central portion of the Central Stanislaus Watershed (CSWA) area. The South Fork Stanislaus River flows through the landscape. Elevations range from approximately 1,500 feet in the west to 5,600 feet in Strawberry. Some of the earliest hydroelectric activities occurred in this area. Lyon's Reservoir is within this landscape area. Refer to Map 8 to identify specific locations as they are referenced in the following chapter.

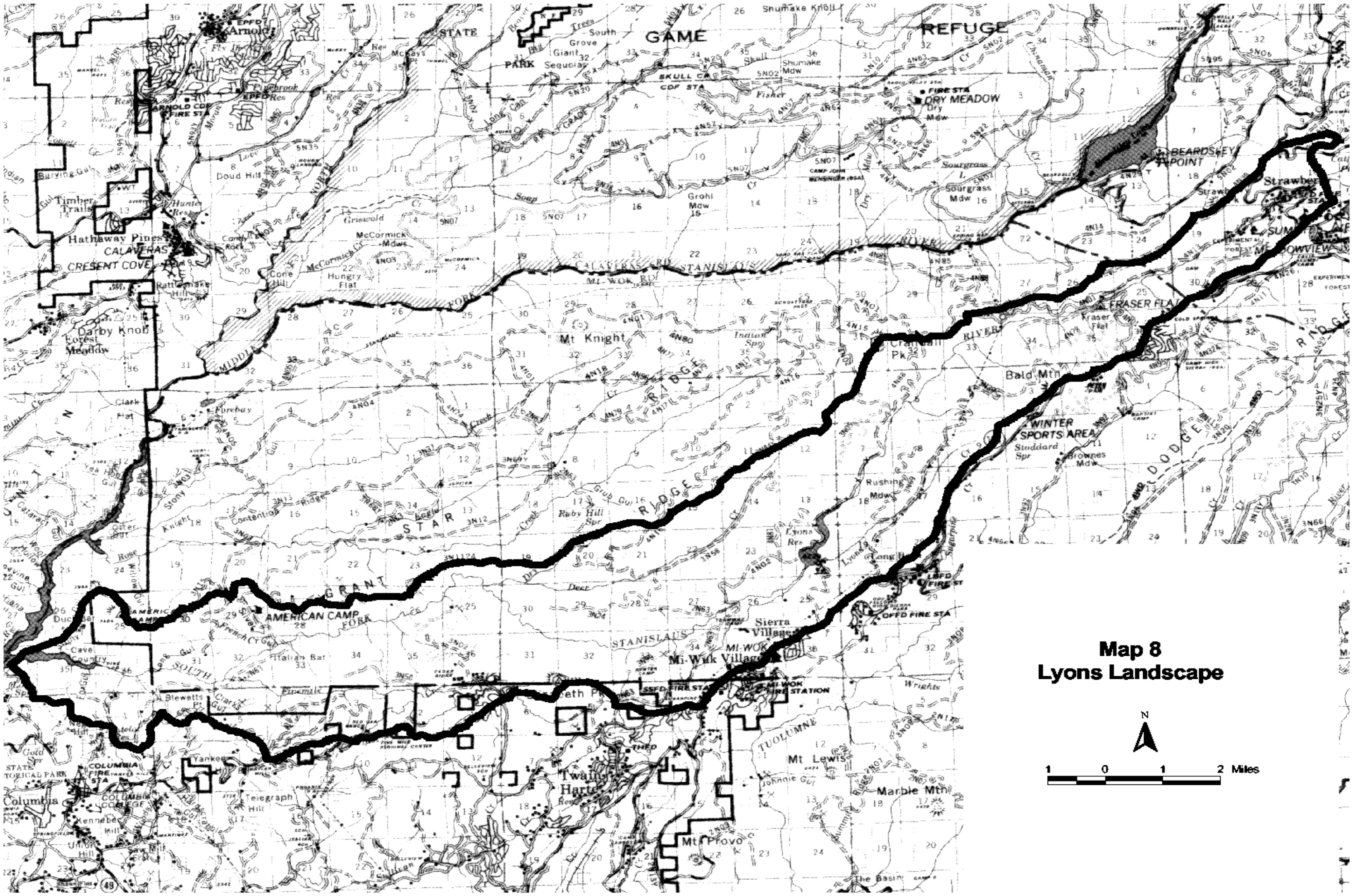
Historical Context

In the 1850's, the Tuolumne County Water Company (TCWC) continued to develop water sources for mining, developing a ditch and flume system to the South Fork Stanislaus River. The first South Fork phase of the project was 20 miles long. A diversion dam was built on the South Fork of the Stanislaus River at Lyon's Flat, where water was diverted into the ditch, flume, and tunnel system, and eventually into Five Mile Creek. From there, it was conveyed into the Columbia basin. At the time of its completion in August 1852, this water system was the longest such project in California (Conners 1989).

By the end of the first decade of the new century, many of the primary pack trails in the lower elevations of the CSWA area had matured into roads passable by a motorized stage. Most of these improved roads seemed to owe their enhancement to timber harvest and development of water manipulation systems and the temporary settlements that arose from them. In 1907, for example, a motor stage ran three times a week between Tuolumne and the Union Construction Company's sawmill at Camp 31, via Confidence, Middle Camp, Sugar Pine, Lyons Dam, and Camp Number 1.

In 1906, the Standard Lumber Company built a 2,200-foot tramway from its South Fork Mill to the Sugar Pine Railway line near Lyons Dam. The *Union Democrat* also reported that the company's narrow gauge railroad connecting its newly acquired Cold Springs Mill and the Empire Mill was now complete. Construction was in progress on the track being laid two miles beyond the Empire Sawmill toward Knudsen's Sawmill. From there, the plan was to continue the rails down to Lyons Dam, connecting with the Sugar Pine Railway.

The hoof and mouth epizootic of 1924 and 1925 affected the Stanislaus, but no other National Forest. The disease reportedly was first discovered on the Casaretto ranch at La Paloma in Merced County. Subsequently found infecting a small number of cattle in Tuolumne County, reports also surfaced of infected deer. The Bureau of Animal Industry began to take control measures, but not before many animals were already on their way to Stanislaus ranges. Minert "Hap" Nielson, a retired Stanislaus National Forest employee recalled that between 700 and 800 of Charlie Kassabaum's cattle… "were condemned and destroyed in the vicinity of Lyons Dam, about half a mile above the old Rushing house. They were driven into an abandoned railroad cut [Sugar Pine Railway]; each animal was then shot in the head. After all were killed, they were cut in the belly to prevent formation of gas and quick lime was placed in the cut. The entire slain herd was then covered with dirt by horse-drawn Fresno scrapers" (USDA 1960).


Map 8
Lyons Landscape
N
1 0 1 2 Miles
GAME
REFUGE
STATE
PARK
Arnold
DRY MEADOW
BEARDSLEY POINT
Strawberry
FRASER FLAT
Mt Knight
Bald Mtn
WINTER SPORTS AREA
Hathaway Pines
CALAVERAS
CRESENT COVE
Darby Knob
AMERICAN CAMP
STAR
RIDGE
STANISLAUS
Sierra Village
Mi-Wuk Village
MI-WOK
Twain Harte
Mt Lewis
Marble Mth
Mt Provo
Columbia
COLUMBIA COLLEGE
Telegraph Hill
Italian Bar
Blewetts
Sourgrass
Lyons Res
Grohl Mdw
Hungry Flat
Cone Hill
Doud Hill
The Basin

Landscape Analysis

Hydrologic Hierarchy

Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Lyons landscape. Pacific chorus frogs were found in Deer Creek, a tributary to the South Fork Stanislaus River and the Stanislaus River. Bullfrogs were found in the South Fork Stanislaus River at the lower elevations. Foothill yellow-legged frogs were found breeding in the South Fork Stanislaus River and one of its tributaries. Western toads were found in Lyons Creek and the South Fork Stanislaus River. This landscape is within the elevation range of California red-legged frog, foothill yellow-legged frog, western pond turtle, hardhead, rainbow trout and slender salamanders.

Lyons Reservoir inundated meadow habitat when the dam was built. The exact amount of meadow inundated is unknown. Topographic maps of the area indicate that the inundated habitat was likely suitable for western pond turtle and foothill yellow-legged frog. Because this habitat remains inundated, we are not able to restore amphibians to their historically occupied habitat in this particular location.

There are currently no documented sightings of waterfowl or osprey in the Lyons landscape. Osprey occupancy would be unlikely, as there are no suitable lakes for hunting. There have been no surveys for waterfowl species or macro invertebrates in this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/ Successful breeding Occupied habitat	14 miles surveyed. Pacific chorus frog, bullfrog, foothill yellow-legged frog and western toad found. Lyons Reservoir inundated historic amphibian habitat.	Survey un-surveyed areas. Reintroduce species in unoccupied historic habitat. Mitigate loss of historic amphibian habitat during FERC relicensing process.
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting	• Gather incidental sightings of waterfowl • Survey suitable waterfowl habitat

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Status of population health is unknown	Conduct surveys

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: The Lyons landscape is within the elevation range of the species. There are no historic records of California red-legged frog within the landscape. Critical habitat is not designated in this landscape. Some project specific site assessments were conducted, although they do not cover the entire landscape. Completion of site assessments would identify any habitat suitable for breeding by this threatened species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California red-legged frog	Suitable habitat Recovery plan objectives met	Some areas with completed suitable habitat site assessments	Complete habitat site assessments for landscape

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The amount and type of large woody debris **(**LWD) in the Lyons landscape has not been surveyed except in the South Fork Stanislaus River between Pinecrest and Lyons Lakes. That potion of the river, identified as the Pinecrest and Philadelphia reaches in the current hydropower-relicensing project, was surveyed in 2000. These reaches were found to be deficient in LWD based on the survey methodology. The South Fork below Lyons Lake was not surveyed since it is outside the relicensing area and it, along with other streams in the landscape, remains a data gap of knowledge about LWD.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
LWD	Pieces/100m of stream, by Channel Type	Amount of LWD in SFK Stanislaus River is deficient (3 – SPLAT). LWD at the sub-watershed and reach scale remains a data gap (2).	• Improve amount of LWD in Pinecrest and Philadelphia Reach of SFK Stanislaus River. • Increase knowledge of LWD at the sub-watershed and stream reach scale.

Information source: 1—Limited field observation; 2—Long term field observations 3—Data supported observations

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: All four of the sub-watersheds in this landscape have road densities greater than desired and all four have an excessive number of road stream crossings (Appendix I). The quality of the roads with respect to direct delivery of water to stream courses has not been inventoried. However, long-term observations indicate that the amount of hydrologically connected road segments exceeds desired condition.

The wildfire hazard in this landscape is the second highest in CSWA and thus poses a substantial threat to watershed conditions if a large and severe fire occurs. Lyons and its two contiguous landscapes (Dodge Ridge and Duckwall) are the three highest fire hazard areas in CSWA, and thus this area is a key contributor to the existing condition of wildfire hazard in a larger portion of the overall watershed analysis area.

Stream sediment in the landscape has been field inventoried in the South Fork Stanislaus River as one of the hydropower relicensing studies but data analysis is pending completion of the study. Sediment characteristics of other streams in the landscape largely remain a data gap. Long-term observations in Deer Creek indicate an altered sediment regime in the Deer Creek Flat near the 2N63 road crossing insofar as changes in stream morphology are evident.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossings/ mile of stream; HCS <.25 mi/mi^2 .	Road density >2.5 in 4 of 4 subwatersheds (3). Crossings > 1 in 4 of 4 sub-watersheds (3). HCS - Data gap.	• Reduce road sediment. • Increase HCS knowledge.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	9% low hazard (3) 83% high/very high (3)	Reduce wildfire hazard throughout landscape.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: intra-reach data gap pending SPLAT study; PSD data gap. Unimpaired streams: Limited observations indicate PSD data gap.	Increase knowledge of stream sediment transport and deposition patterns.
Pool Depth	Residual pool depth is highly similar to reference streams.	Limited observations indicate data gap in landscape.	Increase knowledge of pool sediment.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: There are four low gradient reaches with fine-grained streambanks in this landscape, two on the South Fork Stanislaus River and one each on Deer and Lyons Creeks. All of these reaches have some degree of alteration of channel morphology.

Deer Creek at Deer Creek Flat near the crossing of road 2N63 has become incised and braided in some locations, and has reduced streambank stability. This area has a long history of human occupation and land use due to its accessibility, including Native American habitation, railroad logging, grazing, personal use and commercial woodcutting, and dispersed recreation.

Lyons Creek near the intersection of 3N69 and 3N30 has a small meadow that has become degraded by multiple land uses in the area. Streambank stability is reduced and floodplain connectivity has been reduced.

The two low gradient reaches along the otherwise bedrock controlled South Fork of the Stanislaus River, at Fraser Flat and just upstream from Rushing Meadow, have reduced floodplain connectivity and bank stability

Among the moderate gradient stream reaches in the Lyons landscape, the South Fork of the Stanislaus is bedrock controlled and has unaltered or insignificantly altered channel morphology. Observations of channel morphology in the remaining moderate gradient and the steep gradient channels in the landscape indicate that many are not noticeably altered, but a data gap remains in unobserved areas.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: All reaches not at DC (2). Moderate gradient reaches: SFK Stanislaus River (Pinecrest and Philadelphia Reaches) is bedrock controlled and likely meets all 3 criteria (1, 3-SPLAT); All 3 indicators are met in many other stream reaches observed but a data gap remains (2). Steep Gradient streams: Indicator 4 is met in many streams observed but a data gap remains.	• Take action to move degraded stream reaches toward desired condition. • Increase knowledge of channel morphology condition where data gap exists.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: Water quality is believed to be meet Basin Plan Objectives with three possible exceptions. Road density in this landscape indicates sediment delivery may be a problem and that reduction of road sediment would benefit water quality. Suction dredging for gold in the lower South Fork of the Stanislaus creates turbidity that may be excessive. Summer and fall water temperature in the lower South Fork Stanislaus River may be elevated over natural conditions since streamflow release from Lyons Lake is very low. The potential problems with turbidity and temperature are data gap important to fill via inventory in the near future.

Acid Neutralizing Capacity as an indicator of water quality applies only to Class 1 Wilderness. There is no designated wilderness in the Lyons landscape.

At present the South Fork of the Stanislaus River in the Lyons and Pinecrest landscapes are not designated as municipal watersheds although they are eligible per Forest Service Manual 2542. The South Fork Stanislaus serves as the municipal water supply for about 80% of water customers in Tuolumne County. Municipal watersheds are managed through formal agreements between the water purveyor and the Forest Service that provides management guidelines needed to protect water quality suitable for domestic use.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	Streams likely meet most BPO; exceptions may include sediment from roads, summer temperature and turbidity in SFK Stanislaus below Lyons Reservoir due to limited flow releases and suction dredging, respectively.	• Maintain water quality where at DC. • Decrease sources of road sediment. • Increase knowledge of water temperature and turbidity in the lower SFK Stanislaus River.
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC ≥ baseline in lakes sensitive to acid deposition (ANC <50).	N/A	N/A
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	SFK Stanislaus is principal water supply for about 80% of Tuolumne County water customers.	Coordinate water quality management closely with the applicable municipal water supplier.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Existing Condition: Although the South Fork Stanislaus River has dams and diversions, it is nearly all a bedrock-controlled stream and regulated streamflow has not substantively affected channel morphology. Future flow regime management will be best determined by the habitat requirements of native and desired non-native aquatic species. Key habitat features include flow velocity, volume, temperature and condition of aquatic and riparian vegetation for habitat quality.

The South Fork Stanislaus River within the Lyons landscape is a dammed and diverted river. Foothill yellow-legged frogs are found below Lyons Reservoir within the South Fork Stanislaus River. There is also potential habitat for hardhead and California red-legged frog. Rainbow trout occur within the entire South Fork Stanislaus River in this landscape. Foothill yellow-legged frog have the potential to occur upstream of Lyons Reservoir as well.

Because of the hydropower project "plumbing", there are three flow conditions in this landscape. From Strawberry Dam (Pinecrest Reservoir) to the Philadelphia Ditch the impaired flow is below natural from January to May, and flows are higher than natural from July to December. From the Philadelphia Ditch to Lyons Reservoir flows are reduced from November to July, and increased from August to October. Below Lyons Reservoir, the mean monthly-impaired flow is lower than the unimpaired (natural flow) in all twelve months of the year. This is particularly noticeable from August to December, when 70% or greater of the natural flows are removed. On average, 60% of the natural flows are removed from this section of the South Fork Stanislaus. All three of these flow alterations result in changes to the amount of habitat available for aquatic species. The affect of these changes on habitat is unknown.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Aquatic species habitat	Suitable habitat for each life stage of native and non-native species	Native rainbow trout present, foothill yellow-legged frog found 2000, hardhead present downstream of this landscape	• Provide favorable flows for trout habitat and foothill yellow-legged frog habitat during re-licensing. • Determine extent of foothill yellow-legged frog population. • Provide habitat for hardhead.

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: Infiltration is at desired condition across this landscape. Evapotranspiration is likely excessive in portions of this landscape outside the Paper Fire area. The Stand Density Index, at 53%, is substantial enough to indicate that the landscape is far from desired condition. This landscape is at an elevation where tree growth is good and thus plant transpiration is high. And high density of vegetation provides a significant amount of plant surface for interception and evaporation of rainfall.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub watershed.	>90% at the sub-watershed scale (2, 3).	Maintain desired condition.
Evapotranspiration	SDI is < threshold values.	53% of landscape exceeds the SDI threshold values (3)	Reduce Stand Density where SDI thresholds exceeded.

Information source: 1 – Limited field observations; 2 – Long term field observations 3 – Data supported observations

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Over the last century, 23 fires over 10 acres in size have been recorded in this landscape. One of the most recent large fires was the Creek Fire in 1994. A total of 175 fires have burned 2,487 acres between 1970 and 2000, 73% of them human-caused. Approximately 99% of the acres burned were from human-caused fires. Relative risk of fire occurrence is high along the highway corridor communities of Strawberry, Sierra Village, and Mi-Wuk Village and around the Fraser Flat campground.

The historic fire regime for the Lyons landscape is primarily Fire Regime I, short return interval, low severity fire. The chaparral slopes on the southwest edge of the landscape historically burned frequently and with stand replacement severity (Fire Regime II).

Analysis:

DESIRED CONDITION		EXISTING CONDITION		OPPORTUNITIES
Indicator	**Measure**			
		Fire Regime		
		I	II	
Condition Class (CC)	CC1	CC1—0% CC2—52% CC3—48%, in ponderosa pine, lower mixed conifer vegetation groups	CC1—0% CC2—100% In chaparral	• Move CC3 areas toward CC1 by reducing surface and ladder fuels, and removing excess crown fuels • Move CC2 areas toward CC1 by reducing surface and ladder fuels
Potential impacts of fire	No negative	Potential impacts: • Over ½ landscape in WUI -Cedar Ridge and Hwy 108 communities, Mi-Wuk to Strawberry, scattered remote residences • 16 PACS, 14 with very high or high fire hazard • Old Forest emphasis much of east ½ of landscape (>14,000acres), almost all in high fire hazard		• Identify potential impacts during preparation of the Fire Management Plan. • Prioritize mitigation measures to reduce potential impacts
Fire hazard—Defense Zone	Low: 90%	Low: 6% Mod: 10% High: 78% Very high: 6% Almost 6000 acres, most in high or very high hazard		• Reduce very high and high hazard areas to low by reducing surface and ladder fuels • Reduce moderate hazard areas to low by reducing surface and ladder fuels
Fire hazard–Outside Defense Zone	Low: 40% (strategically placed to break up high hazard)	<u>ALL OUTSIDE</u> Low: 10% Mod: 8% High: 60% VHigh: 22%	<u>THREAT</u> Low: 15% Mod: 7% High: 55% VHigh: 23%	• Reduce very high and high hazard areas to low by reducing surface and ladder fuels • Reduce moderate hazard areas to low by reducing surface and ladder fuels
Suppression effectiveness	Hand crews effective in high value areas (4' flame length)	• In WUI >4ft in much of the west ½ of landscape • >11ft around Cedar Ridge and West/SW of American Camp		Reduce potential flame length where necessary by removing or rearranging surface fuels
Crown fire potential	Surface only	Some crown fire potential in 50% of landscape, in all vegetation groups		Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height

In summary, the existing condition of the Lyons landscape as it relates to the fire element is poor. Approximately 84% of the landscape has high or very high fire hazard characteristics. Two prescribed fires have been implemented in the past 10 years and except for Lyons Lake, there are very few natural barriers to fire spread. Much restorative treatment is needed throughout the entire landscape, in addition to reducing fire hazard and crown fire potential around Cedar Ridge and the many communities along Highway 108.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: This low elevation landscape has a variety of noxious weeds. They are primarily located along the edges of the forest. Yellow starthistle extends into the Forest from both ends of Italian Bar Road. There is also a population of scotch broom spreading down from the road. The largest areas of noxious weeds are near American Camp and are at a helipad, landing the guard station, and along 3N15 and a fuel break. They include yellow starthistle, tocalote, and tree of heaven. The infestation of medusahead grass is in an Off Highway Vehicle trail and extends into at least one sensitive plant population. In the 1980's, a small population of spotted knapweed near Frazier Flat was treated by the Tuolumne County Department of Agriculture. It has not been seen for two years, but monitoring still continues. There are also scattered populations of Himalayan and cutleaf blackberries in some of the riparian areas.

In summary the existing condition of the Lyons landscape as it relates to noxious weeds is unsatisfactory. Although this includes some of the lowest elevation land within the analysis area, there are large areas in this landscape without any state-listed weeds. It is important to prevent the spread of weeds into these areas as well as to eradicate the existing populations. Eradication of weeds along the roads, trails and fuel breaks can help to slow the spread of these weeds.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	10 yellow starthistle infestations; 2 scotch broom infestations; 2 tocalote infestations; 1 tree of heaven infestation; and 1 medusahead grass infestation	• Eradicate existing populations of noxious weeds. • Monitor, map and record any new occurrences. • Implement preventative actions to minimize spread of weeds.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Established weed populations	All populations are treated and eradicated.	35 acres of yellow starthistle; 2 acres of scotch broom; 2 acres of tocalote; 0.5 acres medusahead grass; 0.1 acres tree of heaven	Eradicate yellow starthistle, scotch broom, tocalote, medusahead grass and tree of heaven populations.

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: Six sensitive plant species (*Allium tribracteatum, Clarkia biloba* ssp. *australis, Erythronium tuolumnense, Lomatium stebbinsii, Cypripedium montanum,* and *Mimulus pulchellus*) are found in numerous locations in the Lyons landscape. This landscape has more *Allium tribracteatum* than any other since the two ridges that are the primary habitat bound it. It is also the center of *Erythronium tuolumnense* occurrences including the largest occurrence not on steep slopes. Habitat for *Bruchia bolanderi, Cypripedium montanum, Epilobium howellii, Horkelia parryi, Hulsea brevifolia, Hydrothyria venosa, Meesia triquetra, Mimulus gracilipes,* and *Orthotrichum spjutii* also exists in the area.

Off-highway vehicle activity affects or has the potential to affect all six sensitive plant species. Eleven occurrences (of 38 found in the landscape) of *Lomatium stebbinsii*, two occurrences (of 17 found in the landscape) of *Allium tribracteatum*, three occurrences (of 17 found in the landscape) of *Erythronium tuolumnense*, and three occurrences (of 5 found in the landscape) of *Mimulus pulchellus* have designated OHV trails passing through them. An additional nine, five, one and one (respectively) have non-designated OHV trails passing through them. The parking area at Deer Creek is in the middle of the largest occurrence of *Erythronium tuolumnense* that is not on steep slopes. User created trails repeatedly impacts this occurrence. On-going efforts to reduce these impacts have not been effective. System roads (Levels 1 and 2) pass through 16 sensitive plant occurrences and non-system roads pass through 12 occurrences. Not all of this landscape has been inventoried for OHV trails

The Bald Mountain Helitack base, Donnell-Curtis Transmission Line, and Pinecrest Dump are all along lava caps and have impacted *Allium tribracteatum* and/or *Lomatium stebbinsii* in the past. Planned or existing fuel breaks pass through many of the known occurrences of these plants.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	38 occurrences of *Lomatium stebbinsii;* 17 occurrences of *Allium tribracteatum*; 17 occurrences of *Erythronium tuolumnense*; 2 occurrences of *Clarkia biloba ssp. australis*, one occurrence of *Cypripedium montanum*, and 5 occurrences of *Mimulus pulchellus* exist.	• Survey un-surveyed areas • Protect known populations of *Lomatium stebbinsii, Allium tribracteatum, Erythronium tuolumnense, Clarkia biloba* ssp. *australis, Cypripedium montanum* and *Mimulus pulchellus.*

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Most of the Lyons Landscape below about 4,000 feet elevation is a Ponderosa Pine-Hardwood or a Chaparral-Mixed Oak-Ponderosa Pine system. Above 4,000 feet elevation, Mixed Conifer Ecological Units (EU) dominate, with Ponderosa Pine found in the Sugar Pine, MiWok, and Long Barn area. The mid-elevation Lava Cap EU occurs in upper portions of sub-watersheds such as Deer Creek. Most of this landscape (similar to the Duckwall landscape) is outside the natural range of variation relative to natural fire regime and potential natural vegetation (PNV). Major changes in fire regime and PNV can alter or even drive existing soil conditions at the broad landscape scale.

The PNV is probably most altered in unit 205, which is a Ponderosa Pine-Hardwood type found on Cedar Ridge and Grant Ridge. Historically, fire would be a frequent visitor to such areas. Natural fire would thin brush and understory vegetation, and would promote stands of large pine and black oak. Today, the vegetation is dense and few large pine and black oaks remain. Today, this pine-hardwood type is much less fire resistant. Soil erosion and nutrient cycles are probably altered in this EU. Large downed woody material is lacking in Unit 205 as well as plantation stands found in the general landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Does not meet DC in older plantations. May not meet DC where multiply entry tractor logging has occurred.	• Subsoil skid trails as stands are thinned
Large Downed Woody Material	Logs per acre >20 inch diameter	Generally meets DC in railroad logged second growth stands of units 217, 227, and 307; Generally meets DC in units 101,201, and 206. Lack of LWM in plantation areas and in unit 205 where historic levels of large pine and black oak are much reduced.	• Create large woody material where needed for wildlife and soil productivity • Grow more large pine and black oak in unit 205

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Status of soil organisms is a data gap. It is thought that the loss of large pine and black oaks, the loss of LWM, loss of frequent low intensity fire alters habitat for soil organisms	• Survey for status of soil organisms by Ecological Unit • See opportunities for managing surface organic matter below
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Lack of frequent low intensity fire has increased surface fuels and is converting some areas to long standing brush fields in units 202,204, and 205, which changes the nature of the forest litter and soil organisms.	• Move towards natural fire regime by thinning and Rx burning • Use shredding treatment to provide moisture conserving mulch when thinning south facing slopes • Increase large pine and black oak particularly in unit 205 and north slopes of 204
Topsoil	Organic matter content is 85% of natural	Generally meets DC except in terraced areas such as those on Grant Ridge. Less topsoil on tractor piled or eroded Mariposa soils within unit 204 and 205	• Restore soil conditions on terraced areas as practical • Implement treatments that build topsoil organic matter particularly on Mariposa soils. Examples are shred, mulch, fertilize, grow conifers and black oaks faster

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological Unit.

Existing Condition: Fire regime and crown density has been altered throughout this landscape, however the greatest change has occurred in the Lower Mixed Conifer Integrated Terrestrial Unit. Fire hazard has increased dramatically in this unit. Many stands have a lot of small fir and cedar trees in the understory, which create fire ladders. The potential for soil erosion over large areas is particularly high in Ecological Units 217, 227, and 307. Altered fire regime at lower elevations is creating a higher potential for mass wasting on steep slopes in units 201, 204, and 206. These units in the lower South Fork of the Stanislaus River are naturally susceptible to mass wasting and debris slides. Where the fire hazard is high, slopes are more susceptible to wildfire and mass wasting.

Other factors such as roads have affected this landscape. Roads on certain soil types are chronic sources of erosion. Past disturbances related to wildfire and management may have reduced soil productivity, particularly on soils with thin topsoil layers and soils prone to compaction.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover—Hillslopes	50 to 70% surface cover that prevents accelerated erosion	Some accelerated erosion in planted areas of Rose Creek burn; Annual grasses have replaced perennial grasses altering erosion, fire, and nutrient cycles; Existing rare plant habitat in unit 203; Altered fire regime is creating higher potential for erosion on steep slopes in units 201, 204, 206, and 212	• Improve surface cover where needed for erosion control • Reintroduce perennial grasses in areas of low grazing pressure, starting in unit 203 • Survey for native grasses. Develop restoration plan • Culture rare plants • Rx fire in units 201, 204, 206, and 212 to reduce erosion potential
Surface Cover—Riparian Conservation Areas (RCAs)	75% surface cover that prevents accelerated erosion	Generally meets DC. Some accelerated erosion in dispersed camping areas and OHV trails; Gully erosion in alluvial hillslope RCA of unit 307, Fraser Flat area.	• Monitor surface cover and accelerated erosion in RCAs • Treat or relocate trails and camp sites that are eroding
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads and OHV trails, particularly on sensitive soils.	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential

Terrestrial Animal Species

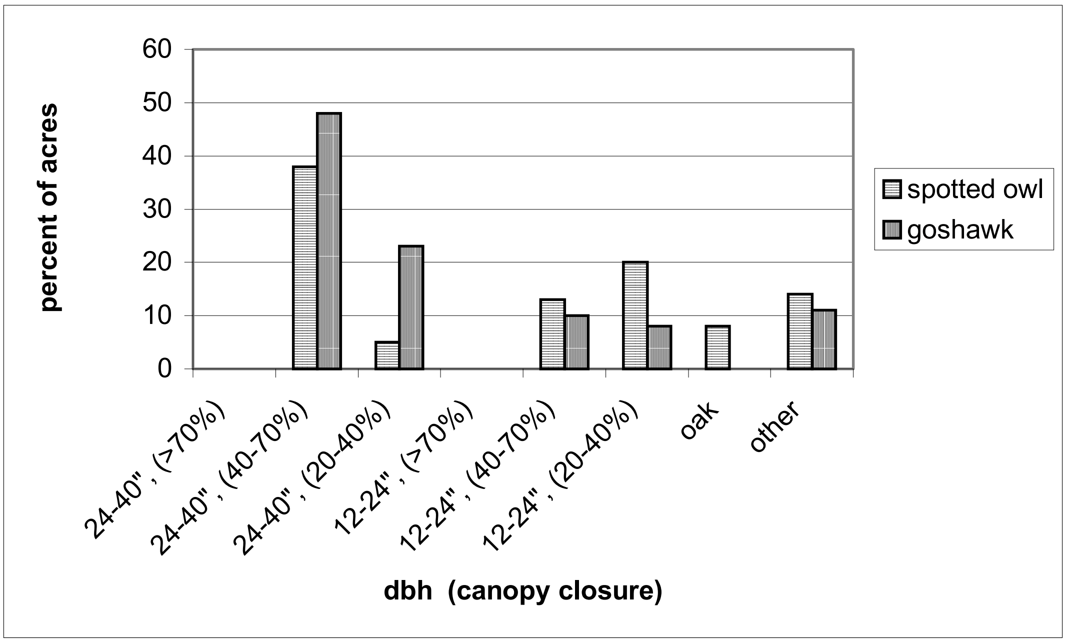
Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk and mule deer are known to occur or have the potential to occur in this landscape.

Old forest associated species—Within the Lyons landscape, 35% of the area is mapped as OFEA. Approximately 40% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Two percent of the OFEA is in oak and hardwood types, and may or may not exhibit old forest conditions. Twelve percent of the OFEA is not suitable for forest production. This leaves 46% of the OFEA acres to improve to meet old forest desired conditions.

There are 21 California spotted owl PACs within the Lyons landscape. Fourteen of these are partially within other landscapes. There are 3 northern goshawk PACs. Based on the current vegetation data, there are 12 acres of habitat at desired condition within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that more of the acres in PACs are currently at desired condition. Figure 14 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 14: Lyons Protected Activity Centers Vegetation Data



Great gray owl—This landscape include a great gray owl PAC at Hess Meadow. This area is currently under private ownership. The Forest is currently negotiating a land exchange that includes this parcel of land. Although a PAC was drawn around this breeding pair, recommendations will not be made until the areas come under Federal ownership. The PAC is 75 acres, and 4% of the acres contain trees in the 24 to 40"dbh range. Thirty-six percent of the area is in oak type, which can provide suitable nesting habitat.

Mule deer—This landscape provides winter and migratory habitat for the Stanislaus Deer Herd in the lower elevations and summer (fawning) habitat for resident deer. The 1984 herd management plan indicated that low fawn recruitment was the primary factor limiting recovery of the deer herd (Maddox 1984). One factor affecting low fawn recruitment is the decline in forage quality on summer, winter and transitional ranges. Approximately 31% of the landscape is found in oak/hardwood, early succession trees, and grass and chaparral types. The current condition of these areas as foraging habitat, as well as the availability and condition of cover and fawning habitat, is unknown, however some improvements, primarily prescribed burns, have occurred in the last decade.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, great gray owl, mule deer, bats	Presence/ Successful breeding	Known presence and breeding for spotted owl over much of the area. some data for goshawk. Two marten and 1 fisher sighting reported. No information for bat species. Some information for deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat- OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 35% of landscape in OFEA; 40% of OFEA in CWHR types 5D/5M; 12% of OFEA not capable of growing old forest Fourteen spotted owl PACs entirely within landscape; 7 partially within landscape; All PACs over 300 acres; 12 acres currently suitable 3 goshawk PACs within landscape; Two PACs below 200 acres; 0 acres currently at desired condition	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of habitat to meet desired conditions within both spotted owl and goshawk PACs • Increase size of goshawk PACs to 200 acres
Great gray owl habitat	PAC of 50 acres plus meadow needed to provide prey	75 acre PAC drawn around Hess Meadow pair on private land	Acquire land
Mule Deer Habitat	Early succession habitat	31% of landscape in potential foraging habitat. Current condition unknown.	• Gather better vegetation data to assess habitat availability and condition. • Increase black oak in ponderosa pine and mixed conifer vegetation types (See DC#18 below). ▪ Cooperate with annual CDF&G deer her counts. • Continue to monitor fawn recruitment.
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Existing Condition: Elderberry plants occur within this landscape. It is unknown if these plants provide suitable habitat for the valley elderberry longhorn beetle. It is also unknown if this beetle is currently found within the landscape. Areas with suitable elderberry plants can be mapped within the landscape to aid in management of this species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Valley elderberry longhorn beetle	Habitat provided and protected	Unknown status of elderberry plants	Identify areas with elderberry plants when conducting vegetation surveys.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Historic vegetation patterns and species composition within this Landscape were altered when Europeans immigrated into the area. Three factors, in particular, led to the change in vegetation: (1) extensive logging took place to supply mining timbers and lumber for the local and national markets; (2) white pine blister rust was introduced; and (3) fire was removed from the forest. In particular, the ponderosa and sugar pine stands were very valuable and therefore they were cut extensively from the early 1900's until recently (See Appendix A for details).

Over many decades, harvesting removed high-value pines, in advance of predicted mortality, over much of the landscape. More recently, in response to increasingly sophisticated management strategies, harvesting created openings where most of the existing vegetation was removed and replaced, largely, by planted conifer seedlings. Additionally, in the absence of periodic wildfire, shade-tolerant conifers, primarily white fir and incense cedar, established themselves within existing stands, sometimes becoming the dominant species. California black oak, whenever faced with increasing conifer density levels, especially among white fir, declines in vigor and dominance.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Despite the increasing availability of rust-resistant planting stock, significant efforts to reestablish the species have not occurred.

The 1994 Creek Fire resulted in the loss of ponderosa pine from a portion of the landscape. Reforestation efforts are currently underway to reestablish forest cover to the area.

Table 12 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 12. Desired Condition and Existing Condition for Vegetation Series in Lyons Landscape

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Blue Oak/Interior Live Oak/Wedgeleaf Ceanothus	30-50% Blue Oak 20-40% Interior Live Oak 20-40% Wedgeleaf Ceanothus	0% Blue Oak 0% Interior Live Oak 66% Ceanothus
Interior Live Oak	60-80% Interior Live Oak	12% Interior Live Oak
Interior Live Oak/Wedgeleaf Ceanothus/Mariposa Manzanita	30-50% Interior Live Oak 30-50% Wedgeleaf Ceanothus 10-20% Mariposa Manzanita	19% Interior Live Oak 36% Ceanothus 0% Mixed Chaparral
Wedgeleaf Ceanothus/Interior Live Oak/Ponderosa Pine	30-50% Wedgeleaf Ceanothus 30-50% Interior Live Oak 10-20% Ponderosa Pine	46% Ceanothus 26% Interior Live Oak 4% Ponderosa Pine
Mixed Conifer	60-80% Mixed Conifer	85% Mixed Conifer
Mixed Conifer/Ponderosa Pine/California Black Oak	30-50% Mixed Conifer 30-50% Ponderosa Pine 20-40 California Black Oak	59% Mixed Conifer 29% Ponderosa Pine 0% California Black Oak
Mixed Conifer/Ponderosa Pine	30-60% Mixed Conifer 30-60% Ponderosa Pine	20% Mixed Conifer 48% Ponderosa Pine
Ponderosa Pine	70-90% Ponderosa Pine	10% Ponderosa Pine
Ponderosa Pine/Douglas-Fir – Ponderosa Pine	30-60% Ponderosa Pine 30-60% Douglas-Fir – Ponderosa Pine	14% Ponderosa Pine 10% Douglas-Fir – Ponderosa Pine
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	21% Ponderosa Pine 12% Manzanita 15% Grass
Ponderosa Pine/California Black Oak	40-60% Ponderosa Pine 30-50% California Black Oak	24% Ponderosa Pine 0% California Black Oak
Ponderosa Pine/California Black Oak/Interior Live Oak	20-40% Ponderosa Pine 20-40% California Black Oak 20-40% Interior Live Oak	11% Ponderosa Pine 0% California Black Oak 23% Interior Live Oak

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
PNV	See Table 12 Above	Higher % fir in the Mixed Conifer Series.	▪ Reduce fir species composition in Mixed Conifer Series by thinning. ▪ Increase black oak in all vegetation types where it is a component.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Ponderosa Pine and Mixed Conifer Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—ponderosa pine	$\geq$ 30% ponderosa pine canopy cover within Ponderosa Pine Series	18-46% ponderosa pine	Increase ponderosa pine species component within the listed vegetation series.
Species Composition—white fir	$\leq$ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: Seral stage distribution for this landscape indicates that size class 3, 4 and 5 acreage are approximately equal. Size classes 1 and 2 are at levels below the desired value.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	0%	
Wildlife Habitat Relationship (WHR) Size Class 2	5%	1%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	27%	• Reduce stand density to increase growth to seral stage 4. • Regenerate portions to provide for earlier seral stages.
Wildlife Habitat Relationship (WHR) Size Class 4	20%	36%	• Reduce stand density to increase growth to seral stage 5. • Regenerate portions to provide for earlier seral stages.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Wildlife Habitat Relationship (WHR) Size Class 5	55%	30%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 53% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. Prescribed fire, alone, is not a suitable treatment approach in stands where fire behavior would be expected to kill significant numbers of desired trees.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI $\leq$ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI $\leq$ 333	M0X SDI = 397 M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	
Stand Density Index (SDI) for Ponderosa Pine	SDI $\leq$ 230	P3N SDI = 397 P3P SDI = 304 P3X SDI = 443 P4N SDI = 302 PNO SDI = 205	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: This landscape contains 215 acres of meadow. None of the meadows have been surveyed since 1990.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Meadow vegetation	High ecological status in wet and moist meadows. Approaching high status in dry meadows.	A wide range of conditions.	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.
Riparian trees and shrubs	Composition highly similar to potential in composition and age classes.	At or near potential in species composition. Generally not near potential in age classes.	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status.

Social/Cultural Hierarchy

Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Economic contributions have traditionally come from ecosystem/timber-related activities. There are large in-holdings of private land owned by PG&E, around Lyons Reservoir. Other private land holdings influence activities on public lands through road use and recreation. Recreational activities generating economic benefits are mainly related to OHV use, Frazier Flat Campground and dispersed camping along the South Fork of the Stanislaus. (Refer to Desired Condition Statements #10, 11, 18, 19, 20, 21 and 28).

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: Interpretive services opportunities are very few, with minor postings at Frazer Flat Campground. Possible opportunities revolve around information and education for the OHV community.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference "baseline" data is collected and will be updated every 5 years.	No baseline data exists.	Collect baseline user preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	Build in annual increase in programs offered/people served, as per demographics.
Written and Oral Information	Information provided at Forest Service sites is $\geq$90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: A concessionaire operates Frazier Flat Campground. All other patrol functions in the landscape are financed solely through the State of California Green Sticker program for OHV enforcement activities. (See DC#29 below.)

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	Very low visitation rates from uniformed Forest Service personnel.	• Increase visitation frequency by searching out new funding sources; cooperative funding with outside sources; FERC 4E funding in other areas may redirect funding to this area. • Increase visitation by utilizing volunteers or Forest Service personnel from other functions such as Fire Prevention.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists of opportunities for DC#25.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: There are isolated private land parcels in this landscape but none have been identified as potential candidates.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	Measure		
Identified properties	All lands acquired	Some isolated parcels. No identified opportunities	• Inventory landscape for potential opportunities • If opportunities exist, include in Forest prioritization of parcel acquisitions • Maintain and enhance relationships with groups who assist in this activity (e.g. Nature Conservancy, Trust For Public Land, etc.)

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: Although not meeting all standards for accessibility, Frazier Flat campground is generally serviceable. As the only developed campground in this landscape, concessionaire operates it. Recreation opportunities appear to fit the landscape, however use data is lacking. Except for heavy use weekends, facilities do not appear to be overloaded and most are relatively new.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	Facilities are relatively new (1980's). Unknown if they meet current preference needs.	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, where available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources. • Complete accessibility upgrades.
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in existing user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in facility and program development.
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Except for high use weekends, visitation does not exceed capacity. Little capacity to increase facilities	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Maximize funding sources: FERC 4E; Capital Improvement Program; cooperative funds
Facility Condition	Meets Forest Service Meaningful Measures Standards/INFRA Accessibility Guidelines	Facilities condition generally OK (may not meet accessibility standards)	• Establish priorities using Meaningful Measures and INFRA data. • Maximize funding for maintenance of facilities: FERC 4E; appropriated funds; Fee Offset; Fee Demo; Volunteers; Capital Improvement Program

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Existing Condition: While the river levels are influenced by releases from Pinecrest Lake, it is unlikely they have any effect on recreation activities downstream. Therefore, it is felt there are no project-induced effects in this landscape.

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: See Chapter IV.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Needed roads	Miles of road retained	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: While there are a few non-motorized trails, the dominant trail opportunities in the Lyons landscape are related to OHV use. This general area, known internally as Big Chunk, is a popular motorcycle riding area. It has 40 miles of signed trails and 140 miles of road open to OHV use extending from north of Crandall Peak to the Deer Creek area northwest of Highway 108. The riding area ranges in elevation of 3500 feet at Deer Creek to 5500 feet at Crandall Peak. Four-wheel drive and ATV trails are limited, but use is allowed on the 140 miles of road.

The Crandall OHV Campground, located at Crandall Peak near Spring Gap off forest road 4N01 and 4N88, accesses these routes and offers dispersed camping and vehicle parking/off loading with restrooms, but no other services or potable water is available. Trails in the Crandall Peak area are usually closed in the winter due to snow blocking access. Four-wheel drive and ATV trails are limited in the riding area, but use is allowed on the 140 miles of road. Some trail inventory has been completed showing a mix of conditions, ranging from well maintained to open, eroding, user-created trails. State Green Sticker funds have been financing maintenance activities, primarily using a SWECO—a small, trail tractor.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	Community-linking trails do not exist.	• No substantive opportunities or demand, other than to keep the area open to OHV uses.
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	Many level 2 roads are used for motorized recreation and OHV routes.	• None identified. (Ask Mi-Wok)
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails.

Chapter V.6: Pinecrest Landscape

Introduction

The Pinecrest Landscape occurs in the south central portion of the Central Stanislaus Watershed Analysis (CSWA) area. Elevations range from approximately 5,600 feet at Pinecrest to 9,800 feet on East Flange Rock. The South Fork Stanislaus River and Herring Creek are dominant creeks running through the landscape. Pinecrest Lake lies in the easternmost section of the landscape. A portion of the landscape occurs in the Emigrant Wilderness. Refer to Map 9 to identify specific locations as they are referenced in the following chapter.

Historical Context

In 1855, the Tuolumne County Water Company (TCWC) launched a plan to build a chain of reservoirs on the South Fork of the Stanislaus, reaching all the way to the edge of today's Emigrant Wilderness, just southwest of Waterhouse Lake. In 1856, at this location, the TCWC built Upper or Big Dam, impounding Lake Gertrude. About seven miles downstream, the company built Middle Dam and about one mile below that, Lower Dam was built at Strawberry Flat (now Pinecrest Lake).

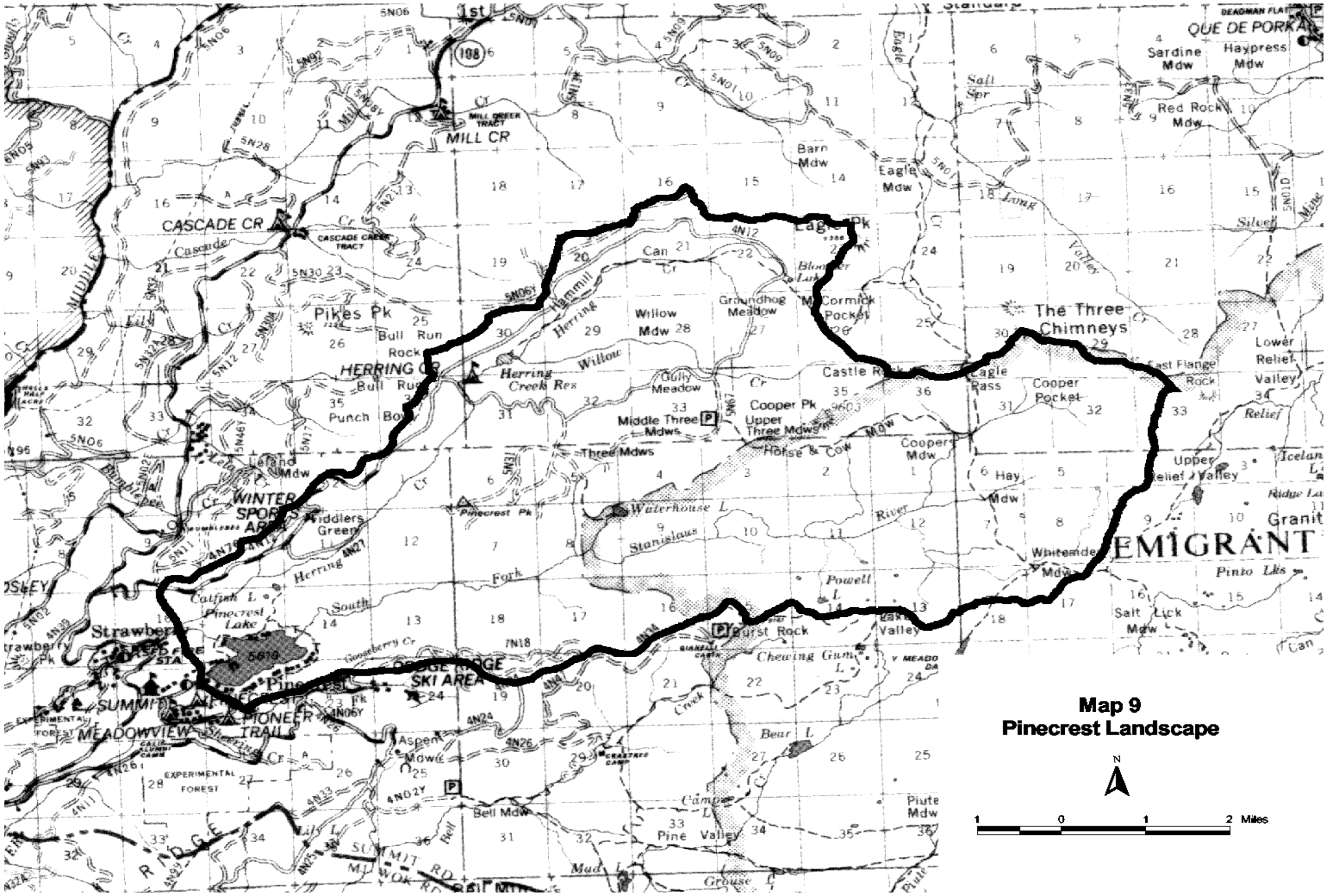
At the turn of the century, the Tuolumne Water Power Company system, dependant on Big, Middle, and Strawberry dams, needed upgrading for the new role of hydroelectric generation. Lower Strawberry Reservoir was chosen as the place to provide more storage capacity. Approved in May 1912, this supplementary permit was acted upon immediately. The log and fill dam creating Strawberry Lake was being replaced with a much larger, concrete one. The new dam, to be constructed just a few hundred feet downstream of the old one, was to be wedged between the South Fork Stanislaus canyon walls. In order to clear the dam site to bedrock and firmly set it's footing the channel was hydraulic-mined.

Construction of the new Strawberry Dam was watched closely, not only by investors and the Forest Service, but also by the new and burgeoning hydroelectric industry. The late 19th and early 20th centuries were a time of intense activity for water rights and developments on the major rivers on the Stanislaus National Forest. In contrast to earlier interests that centered on the water for mining and domestic uses, this rush for "white gold" was to gain rights to hydroelectric potentials. Once the technology for long distance transmission of electricity had been worked out, the floodgates of hydroelectric speculation were opened wide; the race was on to create new water storage reservoirs and to enlarge existing ones.

Nestled around Strawberry Reservoir/Pinecrest Lake, Pinecrest contains the Stanislaus National Forest's most densely occupied cluster of recreation residences. Located in a tree-studded granite basin carved by the South Fork Stanislaus River, Lower Strawberry

Tract was the first to be established under the Term Permit Act on the Stanislaus National Forest. In 1926, the National Forest Manual expounded that "The use of national forests as places of residence should be especially encouraged if not in conflict with other more important uses or with good administration" (Conners 1993).

By the mid-1950s, the Stanislaus National Forest was overwhelmed with demand for recreation uses and attempted to reverse its earlier direction regarding summer homes. Now, instead of encouraging tract developments, studies were being conducted to identify tracts and residences that should—according to the new realities—be eliminated and the space they occupied be assigned to another, more openly public, use.



Map 9
Pinecrest Landscape

Landscape Analysis

Hydrologic Hierarchy

Aquatic Animals

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Pinecrest landscape. Five populations of Yosemite toad were found at Bloomer Lake, Wire Corral Meadow, Castle Meadow, Gully Meadow and Willow Creek. Pacific chorus frogs were found at 10 locations. Mountain yellow-legged frogs were found in Willow Creek. This landscape is within the elevation range of Yosemite toad, mountain yellow-legged frog, rainbow trout, and Mt. Lyell salamander.

Strawberry Reservoir (Pinecrest Lake) inundated meadow habitat when the dam was built. The exact amount of meadow inundated is unknown. Topographic maps of the area indicate that the inundated habitat was likely to be suitable for western pond turtle and foothill yellow-legged frog. Because this habitat remains inundated, we are not able to return native amphibian species to this specific area.

There have been sightings of osprey, wood duck, merganser, mallard and various other waterfowl species in this landscape. There may be habitat for harlequin duck. Surveys have not been conducted specific to waterfowl. There is a nesting osprey at Pinecrest Lake.

Macro invertebrate surveys have not been conducted within the landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/successful breeding Occupied habitat	▪ 13 miles and 253 acres surveyed—Yosemite toad, Pacific chorus frog and mountain yellow-legged frog found. ▪ Strawberry Reservoir inundated historic amphibian habitat.	• Survey un-surveyed areas. • Reintroduce species in unoccupied historic habitat. • Mitigate loss of historic habitat during FERC relicensing activities.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	• Waterfowl: unknown nesting . • Osprey: nest site on south shore of Pinecrest Lake.	• Gather incidental sightings of waterfowl. • Survey suitable waterfowl habitat. • Monitor success of Pinecrest Lake osprey.
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Status of population health is unknown.	Conduct surveys.

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Not applicable for this landscape.

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The amount and type of large woody debris **(**LWD) in the Pinecrest landscape is at or near desired condition based on long-term observations. The South Fork of the Stanislaus River upstream of Pinecrest Lake is either designated wilderness or managed in a near-natural condition. Natural processes for LWD recruitment and distribution occur in an intact manner. In Herring Creek, the other sub-watershed in this landscape, ecosystem processes for LWD occurrence are within the range of natural variability. Herring Creek and the Upper South Fork Stanislaus are high enough elevation, with much of their stream length above 6,500 feet, that alteration of the fire regime has not substantially affected LWD recruitment and deposition.

LWD has been removed at Pinecrest Dam and thus not all wood has been allowed to pass on downstream. This does not affect the Pinecrest landscape, whose downstream end is at the outlet of Pinecrest Lake, but does lessen the amount of LWD available to the Lyons landscape.

Although there is a quantitative data gap regarding LWD, inventory of large wood in this landscape is most suitable for learning more about reference conditions. Current estimates of LWD based on long-term observations and knowledge of recruitment processes is sufficient for management if natural processes related to LWD are maintained.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
LWD	Pieces/100m of stream, by Channel Type	LWD at or near desired condition throughout landscape (2). LWD is removed at Pinecrest dam (2).	• Maintain LWD at desired condition. • Increase knowledge of LWD reference conditions. • Improve the amount of LWD in the South Fork Stanislaus River below Pinecrest Lake.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: The sediment regime in the Pinecrest landscape is in a relatively near natural condition with some localized exceptions. The upper South Fork Stanislaus River watershed has a high degree of minimally erodible glaciated granitic bedrock outcropping, with primary erosion sources from the less frequent but more erodible hillslopes of volcanic origin and from meadow stream reaches with reduced streambank stability. Herring Creek has some sediment input streambank erosion and from roads although its road density is just above desired condition. Overall, the existing condition is very good at the landscape scale though some roads and eroded streambanks in some meadows represent problems that are restorable. Herring Creek Reservoir is a minor sediment trap. The small dam, which impounds water on a previous meadow, has accumulated sediment to the extent that the Reservoir has become very shallow. This small water body transports much of the sediment input it receives.

The Pinecrest landscape has the lowest fire hazard rating of any of the CSWA landscapes. Over 80% is rated low, much due to the low density of vegetation in the Upper South Fork Stanislaus sub-watershed. The lower elevations of Herring Creek, and the portions of Pinecrest in this landscape still have fire hazards deserving consideration for fuels treatment.

In-stream PSD and pool sediment surveys have not been conducted in this landscape but long-term observations indicate that most streams are at or near desired condition. Two areas in the landscape are most likely to have pools and particle size distribution may be altered due to channel morphology changes from grazing in the meadows along the stream. These are Herring Creek above Herring Creek Reservoir and the Cooper, Hay, and Whitesides Meadow area in the headwaters of the Upper South Fork Stanislaus River.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/mi of stream; HCS <0.25 mile/mile^2 .	Road density >2.5 in 1 of 2 sub-watersheds (3). Crossings >1 in 1 of 2 sub-watersheds (3). HCS - data gap.	• Reduce road sediment in the Herring Creek sub-watershed. • Increase HCS knowledge in the Herring Creek sub-watershed.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	83% low hazard (3). Lower elevations of landscape have localized higher hazard (3).	Reduce wildfire hazard in the lower elevation portions of this landscape where hazard is moderate, high or very high.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: not applicable in this landscape. Unimpaired streams: Limited observations indicate PSD data gap.	Increase knowledge of stream sediment transport and deposition patterns in Herring Creek.
Pool Depth	Residual pool depth is highly similar to reference streams.	Limited observations indicate pool depth data gap.	Increase knowledge of pool sediment.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: The Pinecrest landscape has the highest number of low gradient stream reaches with fine-grained streambanks in CSWA (Appendix I). These reaches are nearly all in meadows ranging in size from about five to over 100 acres. Nearly all of these reaches have altered channel morphology. The most frequent indicator of alteration is reduced streambank stability, but many have increased entrenchment and enlarged cross sections as well. Historic and/or current grazing is the principal land use in these areas. The overall condition of low gradient stream reaches in the Pinecrest landscape is less than desired. Some of these reaches have the potential for active restoration but in other cases, such as in wilderness passive restoration will likely be the preferred method of moving them toward desired condition.

The Herring Creek Reservoir area is a notable location regarding channel morphology. The reservoir site is a former meadow that was dammed in the past with a small dam. The confluence of Herring and Willow Creeks occurs in low gradient reaches just upstream from the reservoir. These reaches have aggraded as natural sediment loads that have silted in much the reservoir depth have backed up into these reaches as well. The reservoir, originally constructed for water supply purposes, has become a recreation site but reservoir silt and turbid waters are degrading the latter use when wind stirs the lake surface. Some time soon decisions will need to be made as to the future of the reservoir. Options range from maintaining as is to enlargement to removal are possible, all of which affect channel morphology, sediment and recreation.

Long-term observations of moderate and steep gradient channels in this landscape show them to be at or near desired condition. There have few management related disturbances to affect them since much of the landscape where moderate and steep gradient streams exist is wilderness, near natural or roadless.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: Nearly all low gradient reaches do not meet all 3 indicators (2, 3-SCI). Herring Creek Reservoir is a problem area of channel morphology alteration (2). Moderate gradient reaches: All 3 indicators are met (2). Steep Gradient streams: Indicator 4 is met (2).	Move applicable stream reaches toward desired condition and maintain condition of those at desired condition.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: Water quality in the streams in this landscape likely meet BPO's based on long-term observations. Of the two reservoirs, Pinecrest meets BPO's based on recent water quality monitoring as part of the current hydropower relicensing. Herring Creek Reservoir has had no recent monitoring and thus water quality remains uncertain. There is concern that this small reservoir may have degraded water quality due to concentrated recreation use, reservoir siltation and grazing.

Acid neutralizing capacity (ANC) was sampled in selected lakes in this landscape in 2000 as part of a Sierra Nevada pilot program to determine sensitive lakes that could be monitored for long-term air pollution effects on lake water chemistry in Class 1 Wilderness. The Emigrant Wilderness is a Class 1 Wilderness (Wildernesses established prior to 1977), a portion of which is in the Pinecrest landscape. Powell Lake was found to be a sensitive lake and is a candidate for long-term monitoring. Sensitive is defined as <50 ueq/l of ANC, and means those lakes that have low buffering capacity against increases in acid deposition.

At present the South Fork of the Stanislaus River in the Lyons and Pinecrest landscapes are not designated as municipal watersheds although they are eligible per Forest Service Manual 2542. The South Fork Stanislaus serves as the municipal water supply for about 80% of water customers in Tuolumne County. Municipal watersheds are managed through formal agreements between the water purveyor and the Forest Service that provides management guidelines needed to protect water quality suitable for domestic use.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	Meets BPO in streams throughout the landscape (2). Pinecrest Lake meets BPO's (3-SPLAT). Herring Creek Reservoir water quality uncertain (2).	• Maintain excellent water quality where at desired condition. • Increase knowledge of water quality in Herring Creek Reservoir.
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC ≥ baseline in lakes sensitive to acid deposition (ANC <50).	Powell Lake baseline ANC 18.6 ueq/l.	Maintain ANC at or above baseline.
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	SFK Stanislaus is principal water supply for about 80% of Tuolumne County water customers.	Coordinate water quality management closely with the applicable municipal water supplier.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation.

This desired condition is not applicable in this landscape. Pinecrest Lake is at the outlet of this landscape and Herring Creek Reservoir does not regulate streamflow since the outlet valve is no longer functional.

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: Infiltration at the sub-watershed scale in this landscape is at desired condition. There is very little reduced soil porosity in either of the two sub-watersheds.

The Stand Density Index exceeds threshold values in only 27% of the landscape, similar in magnitude to the Sonora Pass landscape. Stand density exceeds index values in the lower elevations of the landscape, so large expanses of this landscape are not a stand density problem from the watershed process standpoint. Thus, evapotranspiration in this landscape is very near desired condition.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub watershed.	>90% at the sub-watershed scale (2,3).	• Maintain high level of infiltration in sub-watersheds.
Evapotranspiration	SDI < threshold values.	27% of landscape exceeds the SDI threshold values (3)	• Reduce Stand Density in portions of landscape most affecting evapotranspiration.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Over the last century, the largest fire recorded was a 10-acre fire occurring in 1997. A total of 118 fires have burned a total of 40 acres between 1970 and 2000, 52% of them human-caused. Approximately 75% of the acres burned were from human-caused fires. Based on the density of fires occurring over the past 30 years, the relative risk of fire occurrence over this landscape is low except in the area around Pinecrest Lake where it is very high or high.

The historic fire regime for the Pinecrest landscape is primarily fire regime III, long return interval, mixed severity fire. The lower elevation mixed conifer on the southwest edge of the landscape historically burned frequently and with low severity (Fire Regime I).

Analysis:

DESIRED CONDITION		**EXISTING CONDITION**		**OPPORTUNITIES**
Indicator	**Measure**			
Condition Class (CC)	CC1	<u>Fire Regime I</u> CC1 - 0% CC2 - 27% CC3 - 73%, In lower and upper mixed conifer vegetation groups	<u>Fire Regime III</u> CC1 - 79% CC2 - 21% In red fir, Jeffrey pine, lodgepole pine	• Move CC3 areas toward CC1 by reducing surface and ladder fuels, and removing excess crown fuels • Move CC2 areas toward CC1 by reducing surface and ladder fuels • Maintain CC1 areas in desired condition
Potential impacts of fire	No negative	Potential impacts: • Pinecrest area summer homes and recreation, Dodge Ridge • Emigrant Wilderness, Class I Airshed • Old Forest emphasis on most of the forested acres outside Pinecrest developed area (75% of landscape) • 2 PACs		• Identify potential impacts during preparation of the Fire Management Plan. • Prioritize mitigation measures to reduce potential impacts
Fire hazard – Defense Zone	Low: 90%	Low: 1% Mod: 18% High: 81% Very small amount of acres in defense zone around Pinecrest Lake		• Reduce high hazard areas to low by reducing surface and ladder fuels • Reduce moderate hazard areas to low by reducing surface and ladder fuels

DESIRED CONDITION		EXISTING CONDITION		OPPORTUNITIES
Indicator	**Measure**			
Fire hazard—Outside Defense Zone	Low: 40% (strategically placed to break up high hazard)	ALL OUTSIDE Low – 85% Mod – 8% High – 5% VHigh – 2%	THREAT Low – 9% Mod – 42% High – 49%	• Reduce high hazard areas in threat zone to low by reducing surface and ladder fuels • Reduce moderate hazard areas in threat zone to low by reducing surface and ladder fuels • Maintain areas of low hazard in desired condition
Suppression effectiveness	Hand crews effective in high value areas (4' flame length)	>6ft potential near cabins around Pinecrest Lake, especially along south shore		Reduce potential flame length where necessary by removing or rearranging surface fuels
Crown fire potential	Surface only	Some crown fire potential on south side of Pinecrest Lake and north of lake in Herring Creek drainage		Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height

In summary, the existing condition of the Pinecrest landscape as it relates to the fire element is good. Approximately 83% of the landscape has low fire hazard characteristics and one third of the landscape is barren of vegetation. What little restorative treatment is needed, should be primarily focused on (a) reducing fire hazard and crown fire potential around Pinecrest Lake and (b) efforts to allow naturally occurring fires over the remainder of the landscape to be managed for resource benefits. Maintenance of the existing condition may also involve some fuels management, primarily prescribed fire.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: Two infestations of Tree of Heaven *(Ailanthis altissima)* have been found in this landscape. Cutting the tree and pulling out the stump treated one infestation. A repeat visit is needed to check if any new plants have sprouted from seeds or remaining roots.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	2 *Ailanthus* occurrences	• Eradicate existing populations of noxious weeds. • Monitor, map and record all new occurrences. • Implement preventative actions to minimize spread of weeds.
Established weed populations	All populations are treated and eradicated.	2 single trees	Eradicate the two trees, monitor and re-treat sprouts or seedlings.

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: There is one known occurrence of *Bruchia bolanderi* and one possible occurrence of *Epilobium howellii* in the Pinecrest landscape. Both of these species are found in meadows. There are numerous meadows and lava caps in this area and very few surveys conducted. The potential also exists for *Bruchia bolanderi, Cypripedium montanum, Epilobium howellii, Hulsea brevifolia, Hydrothyria venosa, Lomatium stebbinsii, Meesia triquetra, M. uliginosa,* and *Orthotrichum spjutii* to occur in the area.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	One occurrence of *Bruchia bolanderi*	• Survey un-surveyed areas • Protect known populations when found

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Soil Porosity and large downed woody material may not be at desired condition in clearcuts or where multiply entry tractor logging has occurred. Some meadows have active headcuts and gullies. Certain meadows have organic soil layers and are sensitive to changes in water table. Old clearcuts on Pinecrest Peak may have reduced levels of nitrogen and soil biology. Removal of surface organics during site preparation in older red fir clearcuts may have affected site nitrogen.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Does not meet DC in older plantations. May not meet DC where multiply entry tractor logging has occurred.	Subsoil skid trails as stands are thinned
Large Downed Woody Material	Logs per acre >20 inch diameter	Lack of LWM in plantations	Create large woody material where needed for wildlife and soil productivity

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Mostly at DC; May not be at DC in plantations	• Survey for status of soil organisms in plantations • See opportunities for managing surface organic matter below
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Nitrogen availability may be low in plantations located in the red fir zone where tractor piling removed surface organics	Test for N availability. Thin stands and fertilize where N is low.
Topsoil	Organic matter content is 85% of natural	Generally meets DC	

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: Much of this landscape is at elevations above 6,500 feet where fire regime and PNV is relatively unaltered, and therefore soil erosion and nutrient cycles at the landscape scale are within natural reference conditions. There are stand level disturbances that have altered soil conditions locally.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover—Hillslopes	50 to 70% surface cover that prevents accelerated erosion	Surface cover is generally at DC	Improve surface cover where needed for erosion control
Surface Cover—Riparian Conservation Areas (RCAs)	75% surface cover that prevents accelerated erosion	Generally meets DC. Some accelerated erosion in dispersed camping areas and OHV trails; Gullies and downcutting in some meadows; Some meadows have thick organic layers and would qualify as a bog.	• Monitor surface cover and accelerated erosion in RCAs • Treat or relocate trails and camp sites that are eroding • Treat gullies in meadows • Inventory bogs
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads and OHV trails, particularly on sensitive soils.	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential

Terrestrial Animal Species

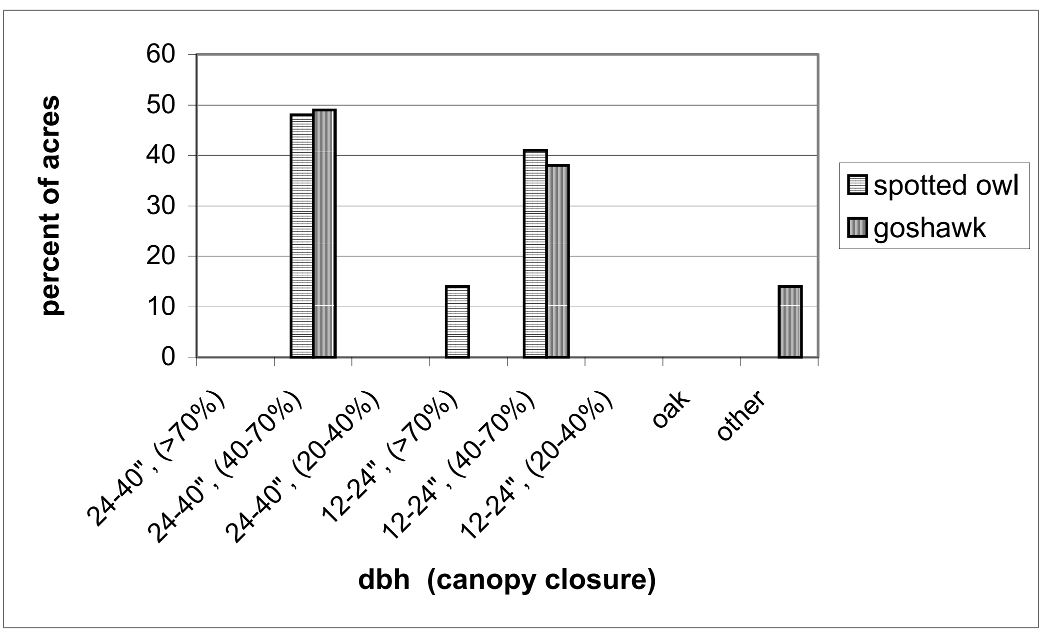
Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk and mule deer are known to occur or have the potential to occur in this landscape.

Old forest associated species—Within the Pinecrest landscape, 55% of the area is mapped as OFEA. Approximately 8% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Twenty-one percent of the OFEA is not suitable for forest production. This leaves 71% of the OFEA acres to improve to meet old forest desired conditions.

There are 3 California spotted owl PACs within the Pinecrest landscape. One of these is partially within another landscape. There is 1 northern goshawk PAC. Based on the current vegetation data, there are no suitable acres of habitat within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that at least some of the acres in PACs are currently suitable. Figure 15 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 15: Pinecrest Protected Activity Centers Vegetation Data



Mule deer—This landscape provides migratory habitat in the lower elevations and summer (fawning) habitat in the higher elevations for the Stanislaus and

Tuolumne deer herds. The 1984 Stanislaus deer herd management plan indicated that low fawn recruitment was the primary factor limiting recovery of the deer herd (Maddox 1984). One factor affecting low fawn recruitment is the decline in forage quality on summer, winter and transitional ranges. Approximately 9% of the landscape is found in oak/hardwood, early succession trees, and meadow and chaparral types. Montane meadows are an important component of summer range for mule deer, providing forage and cover for both the doe and the fawn. Within the Pinecrest landscape, several large meadows occur; Cooper Meadow, Horse and Cow Meadow, Hay Meadow, Whitesides Meadow, Three Meadows, Groundhog Meadow, Willow Meadow and Herring Reservoir Meadow. The current condition of these areas as foraging habitat, as well as the availability and condition of cover and fawning habitat, is unknown. Another factor influencing fawn recruitment is road density and the potential for disturbance, particularly during the fawning season. This situation exists within the Hammill Canyon area of the Herring Creek sub-watershed. In the past, roads have been blocked in this area, to reduce the effect of disturbance to deer. The Hammill Canyon area is also heavily hunted in the fall because it is easily accessible by automobile.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, mule deer, bats	Presence/ Successful breeding	Known presence and breeding for spotted owl over most of the area, some data for goshawk. Six fisher and 7 marten sightings. No information for bat species. Some information for mule deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat- OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 55% of landscape in OFEA; 8% of OFEA in CWHR types 5D/5M; 21% of OFEA not capable of growing old forest Two spotted owl PACs entirely and 1 partially within landscape; All PACs over 300 acres; 0 acres currently at desired condition One goshawk PAC within landscape; PAC at 206 acres; 0 acres currently at desired condition	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of habitat within both spotted owl and goshawk PACs that meet desired conditions

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Mule Deer Habitat	Early succession habitat	9% of landscape in potential foraging habitat. Current condition unknown.	• Assess habitat availability and condition. • Reduce disturbance factors within the Herring Creek sub-watershed, particularly around meadows and riparian areas.
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	Conduct bat surveys Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Not applicable for this landscape.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Vegetation types have been changed by timber harvest and by the absence of periodic fire. Over many decades, harvesting removed high-value pines, in advance of predicted mortality, over much of the landscape. More recently, in response to increasingly sophisticated management strategies, harvesting created openings where most of the existing vegetation was removed and replaced, largely, by planted conifer seedlings. Additionally, in the absence of periodic wildfire, shade-tolerant conifers, primarily white fir and incense cedar, established themselves within existing stands, sometimes becoming the dominant species. California black oak, whenever faced with increasing conifer density levels, especially among white fir, declines in vigor and dominance.

In portions of the Pinecrest Recreation Area, sustained visitor use within heavily used campgrounds and other recreation sites, vegetation is on the decline. Faced with compacted soils and historical traffic patterns, seedling establishment is rare. Replacement vegetation, desired after tree mortality or inadvertent clearing, is not adequate.

Vegetation types within the landscape do not meet desired species composition, in particular: (a) there is too much white fir in some vegetation types; (b) ponderosa pine and sugar pine are below desired levels in some vegetation types, (c) oak levels are below those desired in some vegetation types, and (d) meadow vegetation is below historic levels.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Despite the increasing availability of rust-resistant planting stock, significant efforts to reestablish the species have not occurred. Western white pine, also susceptible, has not been significantly affected as yet.

Table 13 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 13. Desired Condition and Existing Condition for Vegetation Series in Pinecrest Landscape

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Mixed Conifer	60-80% Mixed Conifer	79% Mixed Conifer
White Fir	60-80% White Fir	0% White Fir
Jeffrey Pine/Rock Outcrop/Red Fir	20-40% Jeffrey Pine 20-40% Rock Outcrop 20-40% Red Fir	4% Jeffrey Pine 50% Rock Outcrop 13% Red Fir
Lodgepole Pine/White Fir/Upper Montane Meadow	30-50% Lodgepole Pine 20-40% White Fir 20-40% Upper Montane Meadow	50% Lodgepole Pine 0% White Fir 2% Upper Montane Meadow
Red Fir/Jeffrey Pine	30-50% Red Fir 20-40% Jeffrey Pine 10-20% Rock Outcrop	32% Red Fir 4% Jeffrey Pine 5% Rock Outcrop
Red Fir/Lodgepole Pine	40-60% Red Fir 30-50% Lodgepole Pine	16% Red Fir 2% Lodgepole Pine
Red Fir/Jeffrey Pine/Lodgepole Pine/Rock Outcrop	20-40% Red Fir 20-40% Jeffrey Pine 20-40% Lodgepole Pine 10-30% Rock Outcrop	31% Red Fir 11% Jeffrey Pine 40% Lodgepole Pine 7% Rock Outcrop
Red Fir/White Fir	30-60% Red Fir 30-60% White Fir	78% Red Fir 2% Mixed Conifer - Fir
Rock Outcrop/Lodgepole Pine	30-60% Rock Outcrop 30-60% Lodgepole Pine	36% Rock Outcrop 11% Lodgepole Pine
Dry Volcanic Meadow/Mountain Mule Ear/Jeffrey Pine/Red Fir	20-30% Dry Volcanic Meadow 20-30% Mountain Mule Ear 20-30% Jeffrey Pine 20-30% Red Fir	68% Barren or Grass 12% Montane Mixed Shrub 0% Jeffrey Pine 4% Red Fir

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
PNV	See Table 13 Above	Higher % fir in the Mixed Conifer Series. Loss of meadows in Upper Montane Meadow Series.	• Reduce fir species composition in Mixed Conifer Series by thinning. • Increase meadows in Upper Montane Meadow Series by burning and/or thinning.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Ponderosa Pine, Mixed Conifer, and White Fir Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: Seral stage distribution indicates that Size Class 4 acreage far exceeds the desired level. All other size classes are at levels below the desired value.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	1%	
Wildlife Habitat Relationship (WHR) Size Class 2	5%	1%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	11%	
Wildlife Habitat Relationship (WHR) Size Class 4	20%	72%	• Reduce stand density to increase growth to seral stage 5. • Regenerate portions to provide for earlier seral stages.
Wildlife Habitat Relationship (WHR) Size Class 5	55%	15%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 27% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. Prescribed fire, alone, is not a suitable treatment approach in stands where fire behavior would be expected to kill significant numbers of desired trees.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI $\leq$ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Red Fir	SDI $\leq$ 440	R3G SDI = 384	
Stand Density Index (SDI) for Lodgepole Pine	SDI $\leq$ 205	A3N SDI = 312 A3P SDI = 192	
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI $\leq$ 333	M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Riparian vegetation condition is variable in the Pinecrest landscape. In the lower elevations of Herring Creek, conifer stand density in riparian areas has increased due to long-term fire suppression and exclusion of vegetation management. This has likely has had some effect of suppressing true riparian species. The condition it not believed to be significant but to optimize true riparian trees and shrubs, reduction of density in selected areas would help prevent future severe wildfire and promote true riparian vegetation. In the higher elevation portions of this landscape where concentrated grazing does not occur the riparian plant communities are at or near desired condition.

Aspen stands and willow communities have been affected where they exist in areas of concentrated grazing. Aspen suckers and willows, especially in the late summer and fall, are very palatable. Annual grazing of aspen shoots and willow seedlings has affected seral stage development.

Location and condition of special aquatic features are not fully known. They are believed to be frequent in this landscape and are thus important both as features and inventory projects.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Herbaceous Species	High ecological status in wet and moist meadows; approaching high in dry areas of meadows.	1238 acres of meadow. 602 acres of meadow have been surveyed since 1990. Of those, 99 acres are in good/high ecological status; 412 acres in fair/mid status; and 91 acres in poor/low status	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	In riparian corridors along lower Herring Creek, long-term exclusion of fire and vegetation management has suppressed true riparian trees and shrubs. Species composition and seral stage distribution are not at DC but magnitude is not fully known (2). In aspen stands and willow communities with concentrated grazing, seral stage distribution is not at DC but magnitude of change is a data gap (2). At high elevations without concentrated grazing, true riparian trees and shrubs are at or near DC (2). Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs).	• Increase true riparian species reproduction and growth where altered and feasible to accomplish. • Increase knowledge of amount of change in true riparian species composition and seral stage distribution, especially aspens. • Increase knowledge of special aquatic features (meadows, aspen stands, ponds, springs, fens and bogs). • Maintain true riparian species where desired condition exists.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Social/Cultural Hierarchy
Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: See DC #22 for the Dodge Ridge Landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Recreation Use	Recreation Visitor Days (RVDs) increase at a level commensurate with service area demographics	High use campgrounds at or near capacity. Lower use on shoulder season. Day use is generally at its maximum July-September. General perception that Pinecrest basin is overcrowded and that use needs to be dispersed.	• Increase use during lower-use periods (shoulder seasons, mid-week, winter). • More public information regarding off-season opportunities • Work with Visitor's Bureau to encourage off-season use • Encourage permittees, where appropriate, to emphasize off-season use and on-season use outside Pinecrest Basin. • Encourage on-season use outside Pinecrest Basin by: • Emphasizing other, less crowded areas • Highlighting access routes leading outside the Basin • Emphasize new facility development outside the Basin • Secure "Scenic Highway" status for the Sonora Pass Highway (SR 108)
Employment related to ecosystem management (EM) activities	EM/Recreation-generated employment keeps pace w/ overall employment earnings	EM employment (primarily from timber sales) is down from the past. Recreation employment has remained steady.	• Emphasize implementation of EM projects in budgeting and program of work development and track progress relative to overall economic picture in Tuolumne County.

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: See DC #23 for the Dodge Ridge landscape for information about Pinecrest Basin. Interpretive opportunities elsewhere in this landscape (information boards, Trail of the Gargoyles) are generally limited and in poor condition.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference “baseline” data is collected and will be updated every 5 years.	No baseline data exists.	Collect Baseline User Preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	Build in annual increase in programs offered/people served, as per demographics.
Written and Oral Information	Information provided at Forest Service sites is $\geq$ 90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: See DC #24 for the Dodge Ridge landscape for information about Pinecrest Basin. Other recreation sites have the same low visitation as Pinecrest. There is more OHV patrol activity along the Herring Creek road and loop. Volunteer hosts manage Herring Creek campground.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	VERY low visitation from uniformed Forest Service rates. The vast majority of visitors are managed by concessionaires	• Increase visitation frequency by search out new funding sources: FERC 4E; Use fees (parking, area day passes, etc.) under Fee Demonstration Authority; Coop funding with outside sources (local Sheriff, concessionaires) • Increase visitation by utilizing non-recreation personnel: such as volunteers and Fire Prevention personnel

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists of opportunities for DC#25.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Not applicable for this landscape.

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: See DC #23 for the Dodge Ridge landscape for information about Pinecrest Basin. Additional opportunities within the Pinecrest Landscape center around more primitive developed and dispersed camping along the Herring Creek Road, around the Herring Creek loop and adjacent to Herring Creek

Reservoir. These areas are particularly popular with OHV users. Herring Creek and Reservoir Campgrounds are generally in poor condition and are located in sensitive riparian areas. They are a high priority for redesign and/or relocation.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	Design, form and function of existing facilities meet preference needs of the 1960's and 70's. Much upgrading for accessibility has been accomplished	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, were available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of all facilities. Include recommended changes to mitigate negative impacts on other resources. • Complete Accessibility upgrades.
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in all phases of facility and program development.
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Occupancy at capacity during high use periods.	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Construct new facilities to address resource conditions first. • Maximize funding sources: • Capital Improvement Program; Cooperative funds
Facility Condition	Meets Forest Service Meaningful Measures Standards/ INFRA Accessibility Guidelines	Herring Creek and Herring Reservoir Campgrounds are in poor condition and are poorly located.	• Use Meaningful Measures and INFRA data to establish priorities • Maximize Maintenance funding: Appropriated funding; Fee Offset from concessionaires; Fee Demonstration Authority; Volunteers; Capital Improvement Program funding • Relocate Herring Reservoir Campground

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Existing Condition: See DC #8 for the Dodge Ridge landscape for information about Pinecrest Basin. There are no project-induced effects outside of Pinecrest.

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: See Chapter IV.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Needed roads	Miles of road retained	Unknown.	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: See DC #23 for the Dodge Ridge landscape for information about Pinecrest Basin. Popular non-motorized trail opportunities within this landscape access Bloomer Lake, Cleo's Bath and the Emigrant Wilderness at Pinecrest peak and Coyote Meadows (Cooper Trailhead). As with other trails on the Forest, they are in poor condition. OHV use on level 2 roads is very popular in the Herring Creek area.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	No community-linking trails exist.	Construct Community-linking trails identified through public involvement processes (see Map J-1 in Appendix J)

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	There is a largely user-developed, unplanned trail system, concentrated mainly around the Pinecrest area. Some OHV trails exist throughout the area and many level 2 roads are used for motorized recreation	• Construct trails identified through public involvement (see Map J-1). • Decommission or discourage use on trails that receive minimal use (Data Gap).
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails. • Utilize 4E requirements to ensure Pinecrest Lake trail is maintained to standard.

Chapter V.7: Rose Creek Landscape

Introduction

The Rose Creek Landscape occurs in the western portion of the Central Stanislaus Watershed Analysis (CSWA) area. Rose and Knight Creeks are the main streams within the landscape area. Elevations range from approximately 1,400 feet to 5,400 feet on Crandall Peak. The landscape is characterized by the diversity of vegetation and wildlife habitat. It is a popular area for off-highway vehicle recreation. Refer to Map 10 to identify specific locations as they are referenced in the following chapter.

Historical Context

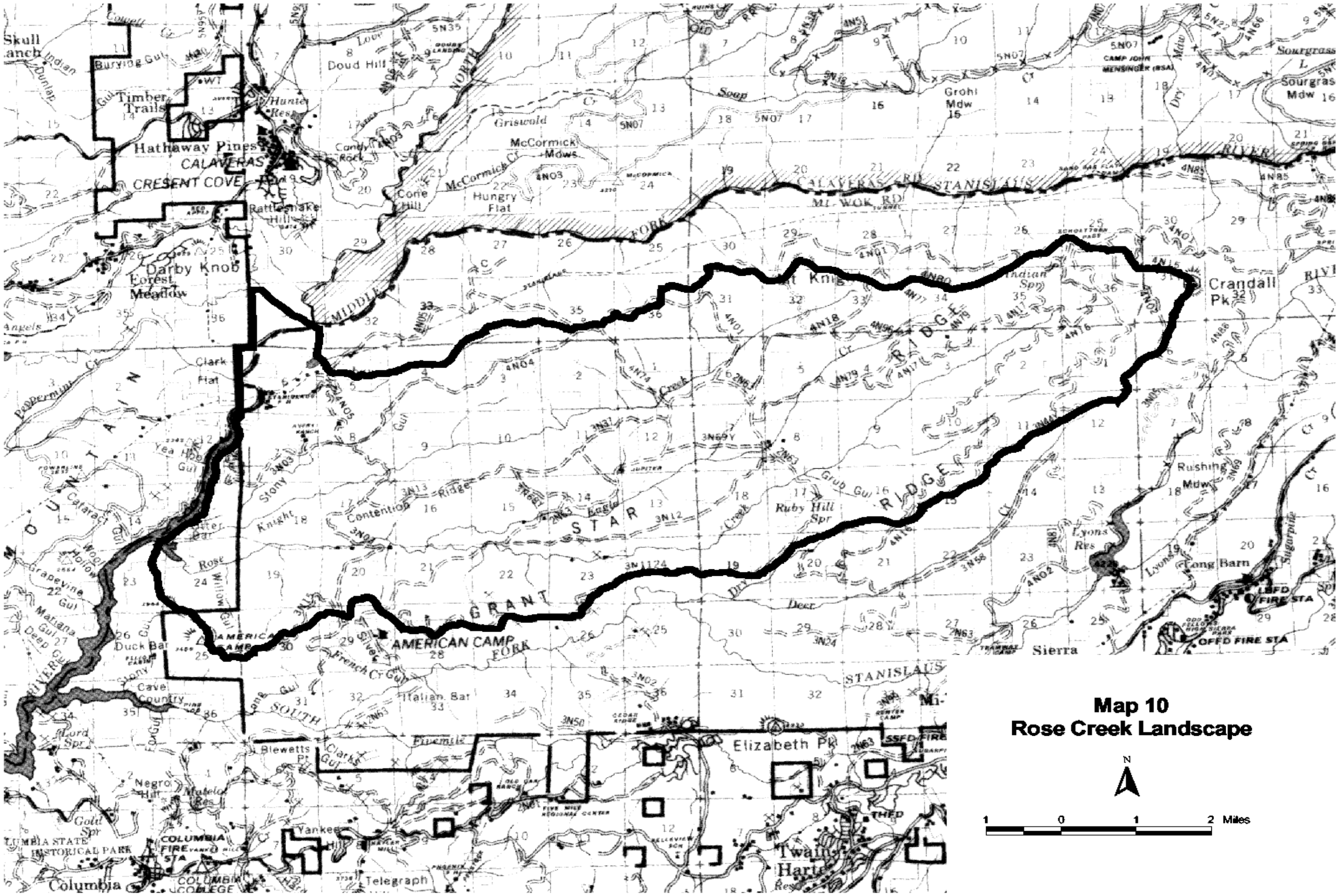
The American Camp Ditch served several of the mines in this area. Drawing water from Rose Creek and built sometime between 1856 and 1864, the ditch was 22 miles long. Its period of use was apparently relatively short. By 1912, the American Camp Ditch was referred to as old and abandoned. This historic ditch, however, is still readily apparent on the landscape and is one of the few intact systems that has not been re-used by later water developments or reincarnated as a road.

A backlash developed in the 1940s and continued through the 1950s to Stanislaus National Forest and California Department of Fish & Game's apparent emphasis on habitat development and fish stocking in the high country streams and lakes where use was relatively low and where the accessibility was by backpacking or horseback. Pressure was exerted to develop small reservoirs in lower elevations that were accessible by automobile or a short hike. Four of these proposals were within the CSWA area and included alternatives on Rose Creek, Deer Creek, Herring Creek, and just above Strawberry Lake.

In his 1953 inspection of the Stanislaus' range and wildlife programs, Assistant Regional Forester F. P. Cronemiller noted that the forest was "aggressively following its flow-maintenance dam program" and was tending to raise the level of existing dams before considering adding new ones.

> We looked over the Apple Tree dam site in the head of Rose Creek that has been considered as a possible storage reservoir for improving the flow of that stream during the summer period.... However, that would be adequate to keep fish alive at least and prevent their complete loss. The forest has made a survey of the site and is submitting it to the State for study. It is doubted if the project will be found to be feasible".
>
> Recreational gold dredging became a concern on Rose, Eagle, and Knight Creeks, at least in the 1980s. The California Department of Fish & Game (CDF&G) issued permits for this activity. Numbering seven permits for all of CDF&G's

Region 4 in 1986, department officials believed that this level of "dredging activity probably has no more impact on fish life than does dredging activity on other streams that are open all year to unlimited numbers of dredgers" (CDF&G 1986).


Hathaway Pines
CALAVERAS
CRESENT COVE
Timber Trails
Darby Knob
Forest Meadow
Doud Hill
Griswold
McCormick Mdws
Hungry Flat
Cone Hill
CALAVERAS
STANISLAUS
MI-WOK RD
RIVER
Grohl Mdw
Sourgrass Mdw
Crandall Pk
STAR RIDGE
RIDGE
Ruby Hill Spr
Grub Gul
Contention Ridge
Clark Flat
Stony
Knight
Rose
GRANT
AMERICAN CAMP
FORK
Italian Bar
SOUTH
STANISLAUS
Duck Bar
Cave Country
Mariana
Grabevine
Cataract
MOUNTAIN
Rushing Mdw
Lyons Res
Long Barn
Sierra
Elizabeth Pk
Blewetts Pt
Negro Bar
Gold Spr
Yankee Hill
Telegraph
Columbia
COLUMBIA STATE HISTORICAL PARK
COLUMBIA COLLEGE
Twain Harte
Map 10
Rose Creek Landscape
N
1 0 1 2 Miles

Landscape Analysis

Hydrologic Hierarchy

Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Rose Creek landscape. A breeding population of foothill yellow-legged frog was located in Rose Creek, with sightings of several individuals at Eagle Creek. One western pond turtle was found in Rose Creek. Western toad was discovered in Rose Creek and Eagle Creek, and Pacific chorus frog was found in Rose Creek, Knight Creek and Eagle Creek. This landscape is within the elevation range of California red-legged frog, foothill yellow-legged frog, western pond turtle, hardhead, rainbow trout, and slender salamanders.

There are currently no documented sightings of waterfowl or osprey in Rose Creek landscape. Osprey occupancy would be unlikely, as there are no suitable lakes for hunting. There have been no surveys for waterfowl species in this landscape. A local nonprofit group, People for Healthy Forests, completed some macro invertebrate surveys under a Memorandum of Understanding. These surveys followed the California Stream Bioassessment Procedure (CDF&G 1995), which does not calculate a BCI. The Forest Service has not received the data from these surveys.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/successful breeding Occupied habitat	15.1 miles and 14 acres surveyed—Foothill yellow-legged, western pond turtle, western toad and Pacific chorus frog found	• Survey un-surveyed areas • Reintroduce species in unoccupied historic habitat
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting	• Gather incidental sightings of waterfowl • Survey suitable waterfowl habitat
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Surveys conducted by a citizen-monitoring group using a different protocol. Data not available.	Conduct surveys

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: There are no historic records of California red-legged frog within the landscape. The landscape is within the elevation range of the species. Critical Habitat is not designated in this landscape. Some project specific site assessments were conducted, although they do not cover the entire landscape. Completion of site assessments would identify any habitat suitable for breeding by this threatened species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California red-legged frog	Suitable habitat Recovery plan objectives met	Some areas have completed suitable habitat site assessments	Complete habitat site assessments for landscape

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The amount and type of large woody debris (LWD) in the Rose Creek landscape remains a data gap except in the Ruby Fire area of Rose Creek. The Ruby Fire of 1992 burned the upper third of the Rose Creek sub-watershed, including about two miles of riparian vegetation. Burned timber was not removed from the stream corridor and has accumulated in aggregates in some locations. More streamside standing timber will be recruited into the stream as it decays and falls. It is expected that monitoring and management of the wood will be needed to balance the benefits of sufficient wood with the adverse effects of excessive amounts.

In other areas of the Rose Creek landscape LWD volume is not well known. Long-term exclusion of fire and vegetation management has occurred in many stream corridors, resulting in some riparian areas exceeding Stand Density Index thresholds. As a result, a potential excessive amount of in-stream or recruitable LWD currently exists. The amount of LWD at the stream reach scale is a data gap.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
LWD	Pieces/100m of stream, by Channel Type	LWD excessive in Rose Creek in Ruby burn (2, 3-SCI). Data gap in remainder of landscape	• Monitor LWD in Ruby Fire area of Rose Creek and manage toward desired condition. • Increase knowledge of LWD.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: All four sub-watersheds in the Rose Creek landscape have an excessive amount of roads and stream crossings. The number of stream crossings is high relatively to road density, most likely since the topography in this landscape is well dissected and results in a high drainage density. The frequency of hydrologically connected road segments in the landscape is a data gap.

Wildfire hazard in this landscape remains very high even after the intense Ruby Fire in 1992. Only 9% of the landscape has a low fire hazard rating, and two thirds has a high and very high rating. There remains a major threat of large and severe wildfire in the landscape.

Knowledge of stream sediment is a data gap in most of the landscape. However, observations in the Ruby Fire area along Rose Creek indicate that particle size distribution and pool depth have been altered. Storm events following the fire and reforestation activities have led to stream siltation that has embedded cobble substrate and reduced pool depth.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/mi of stream; HCS <.25 mi/mi^2.	Road density >2.5 in 4 of 4 sub-watersheds (3). Crossings > 1 in 4 of 4 sub-watersheds (3). HCS - data gap.	• Improve quality of road system. • Increase HCS knowledge.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	9% low hazard 65% high/very high	• Reduce wildfire hazard throughout landscape.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: N/A in this landscape. Unimpaired streams: Not at desired condition in Ruby Burn area of Rose Creek (2). Data Gap in rest of landscape. Concern in Rose Creek from suction dredging.	• Increase knowledge of stream sediment transport and deposition patterns. • Improve sediment regime in Rose Creek.
Pool Depth	Residual pool depth is highly similar to reference streams.	• Not at DC in Ruby Burn area of Rose Creek (2). • Data gap in rest of landscape.	• Increase knowledge of pool sediment. • Improve sediment regime in Rose Creek.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: The only substantial low gradient stream reach with fine-grained streambanks in this landscape is on Rose Creek in the Ruby Burn. As a result of pre-fire and post-fire land uses channel morphology has been altered. Railroad logging operations skidded logs across the channel, increased post-fire stormflow, and grazing affected floodplain connectivity, width-to-depth ratio and streambank stability. However, riparian conservation via cattle exclosure fencing for the past five years has helped natural recovery of riparian vegetation and channel morphology. It will take many years and conservation efforts to improve the channel to desired condition.

Channel morphology in moderate and steep gradient streams in the landscape indicates satisfactory condition where observations have been made. However, there remains a data gap since channel condition of some streams has not been inventoried. There is a concern about effects of suction dredging on streambank stability.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: Rose Creek in the Ruby Burn does not meet MCI indicators (2). Moderate gradient reaches: All 3 indicators are met in many stream reaches observed but a data gap remains. There is concern about effects of suction dredging (2). Steep Gradient streams: Indicator 4 is met in many streams observed but a data gap remains (2).	• Take action to move degraded stream reaches toward desired condition. • Increase knowledge of channel morphology condition where data gap exists.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: Based on long-term observations, water quality is believed to meet Basin Plan Objectives except perhaps sediment and turbidity.

Sediment from roads in the landscape has increased streambed sediment. The magnitude is not known, but since sediment is difficult and expensive to measure, improvement in road quality is the prudent response. Sediment resulting from the Ruby Fire and post-fire management activities has been observed in Rose Creek. The rate of sediment delivery has declined as the watershed has recovered and is now minimal.

Suction dredging, an activity in the gold bearing substrate of some streams in this landscape, causes turbidity. The extent is unknown but a concern is present.

To assist survival of tree seedlings planted to reforest the Ruby fire area, herbicides were applied in the Rose Creek sub-watershed in recent years. Hexazinone, a soil active herbicide that becomes entrained in surface water via soil moisture drainage, was monitored to determine if it met Basin Plan Objectives (BPO) for pesticides. Hexazinone, as expected, was detected in water and continues to be, in very low quantities. The concentrations remained in compliance with BPOs, and toxicity tests performed by the CVRWQCB showed no toxicity to test organisms when hexazinone was present in water. The persistence of hexazinone in Rose Creek continues and will be monitored to determine the length of time until it disappears from the fluvial system.

Acid Neutralizing Capacity as an indicator of water quality applies only to Class 1 Wilderness. There is no designated wilderness in the Dodge Ridge landscape.

There are no principal municipal water supplies in this landscape that would constitute designation as municipal watersheds.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	Streams meet BPOs except perhaps sediment and turbidity (2). Hexazinone persists at low concentrations in Rose Creek (3).	• Decrease sources of road sediment and turbidity. • Increase knowledge of persistence of hexazinone in Rose Creek.
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC $\geq$ baseline in lakes sensitive to acid deposition (ANC <50).	N/A	N/A
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	N/A	N/A

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation.

This desired condition is not applicable in this landscape. The short Camp Nine reach of Stanislaus River is located in a small portion of the northwest corner of this landscape, but it is not considered since it is regulated by hydropower projects on the North Fork of the Stanislaus River. The principal streams in this landscape—Rose, Eagle and Knight Creeks—do not have dams and diversions.

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: Infiltration at the sub-watershed scale is at desired condition. There are localized areas of reduced infiltration but they are not substantive at the landscape scale.

Stand Density Index threshold values are exceeded in just over a third of the landscape due to a combination of a substantial brush component and the Ruby Fire. However, evapotranspiration remains excessive in many forested areas in the landscape since dense stands exist outside the fire area.

Evapotranspiration has been substantially reduced inside the Ruby Fire area. Rose Creek has responded to increased streamflow rates during the summer and fall with renewed true riparian vegetation and an increase in the fish population.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Infiltration	Natural rate over >90% of sub watershed.	>90% at the sub-watershed scale (3).	Maintain soil porosity at the project scale.
Evapotranspiration	SDI is < threshold values.	37% of landscape exceeds the SDI threshold values (3)	Reduce Stand Density where SDI thresholds are exceeded.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Thirteen fires over 10 acres have been recorded in this landscape in the past 100 years. The most recent was the Ruby Fire that burned approximately 3875 acres in 1992. In addition to the Ruby Fire, 48 fires have burned have burned 78 additional acres between 1970 and 2000. Although only 61% of the fires were human-caused, they burned 99.8% of the acres. The relative risk of occurrence is low throughout landscape.

The historic Fire Regime for the Rose Creek landscape is primarily Fire Regime I, short return interval, low severity fire. The chaparral slopes on the west edge of the landscape historically burned frequently and with stand replacement severity (Fire Regime II).

Analysis:

<table>
<tr><th colspan="2">DESIRED CONDITION</th><th colspan="2" rowspan="2">EXISTING CONDITION</th><th rowspan="2">OPPORTUNITIES</th></tr>
<tr><th>Indicator</th><th>Measure</th></tr>
<tr><td rowspan="3">Condition Class (CC)</td><td rowspan="3">CC1</td><td colspan="2">Fire Regime</td><td rowspan="3">• Move CC3 areas toward CC1 by removing surface, ladder, and excess crown fuels
• Move CC2 areas toward CC1 by reducing surface and ladder fuels</td></tr>
<tr><td>I</td><td>II</td></tr>
<tr><td>CC1—0%
CC2—80%
CC3—20%, in ponderosa pine, lower mixed conifer vegetation groups</td><td>CC1—0%
CC2—100%
In chaparral</td></tr>
<tr><td>Potential impacts of fire</td><td>No negative</td><td colspan="2">Potential impacts:
• Much private land, scattered small clusters of residences throughout
• 11 PACS (7 with high fire hazard in at least half the area)
• 3775 acres of Old Forest emphasis >50% high or very high hazard</td><td>• Identify potential impacts during preparation of the Fire Management Plan.
• Prioritize mitigation measures to reduce potential impacts</td></tr>
<tr><td>Fire hazard—Defense Zones</td><td>Low: 90%</td><td colspan="2">Low: 8%
Mod: 25%
High: 29%
Very high: 36%
Scattered clusters of homes in remote areas</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Fire hazard—Outside Defense Zones</td><td>Low: 40% (strategically placed to break up high hazard)</td><td><u>ALL OUTSIDE</u>
Low: 10%
Mod: 24%
High: 36%
VHigh: 30%</td><td><u>THREAT</u>
Low: 14%
Mod: 28%
High: 34%
VHigh: 24%</td><td>• Reduce very high and high hazard areas to low by reducing surface and ladder fuels
• Reduce moderate hazard areas to low by reducing surface and ladder fuels</td></tr>
<tr><td>Suppression effectiveness</td><td>Hand crews effective in high value areas (4’ flame length)</td><td colspan="2">• >4’ in over 50% of defense zone
• >11’ in defense zones in northwest part of landscape</td><td>Reduce potential flame length where necessary by removing or rearranging surface fuels</td></tr>
<tr><td>Crown fire potential</td><td>Surface only</td><td colspan="2">Some crown fire potential in 1/3 of landscape, in lower mixed conifer, ponderosa pine, and canyon types</td><td>Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height</td></tr>
</table>

In summary, the existing condition of the Rose Creek landscape as it relates to the fire element needs to be improved. Over half of this landscape is in the wildland-urban intermix and 2/3 of those acres have high or very high fire hazard characteristics. The scattered clusters of residences in remote areas make protection efforts difficult. There are no natural barriers to fire spread and only two prescribed burns have been implemented in the past 10 years. There is a need to maintain these treatment effects and expand treatment to other areas.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: This landscape is currently in unsatisfactory condition, and at high risk for additional weed populations. There are an increasing number of yellow starthistle populations along roads north of American Camp. There is also yellow starthistle around the Stanislaus Forebay and along Forest Road 3N03 and nearby private land within and just outside the Forest boundary. Himalayan blackberry is also around the Forebay. Heavy recreation traffic, particularly Off Highway Vehicle use, presents a constant threat of new weed introductions.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	Several roadside and other yellow starthistle populations.	• Eradicate existing populations of noxious weeds. • Monitor, map and record all new occurrences. • Implement preventative actions to minimize spread of weeds.
Established weed populations	All populations are treated and eradicated.	About 10 acres total	Eradicate the populations, monitor and re-treat as needed.

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: Four sensitive plant species (*Allium tribracteatum, Erythronium tuolumnense, Lomatium stebbinsii,* and *Mimulus pulchellus*) are found in numerous locations in the Rose Creek landscape. Habitat for other sensitive plant species exists. The potential exists for *Clarkia biloba* ssp. *australis, Horkelia parryi, Hydrothyria venosa,* and *Mimulus gracilipes,* to occur in the area. All potential habitat for *Cypripedium montanum* was burned in the Ruby Fire.

Most of the occurrences of *Allium tribracteatum* and *Lomatium stebbinsii* are on ridges where fire suppression activities often take place. Approximately half of the occurrences have system roads (Levels 1-2) passing through them. Designated OHV trails pass through two occurrences of *Allium tribracteatum* and five occurrences of *Lomatium stebbinsii*. Non-designated OHV trails pass through one occurrence each. System roads and non-system roads pass through one occurrence each of *Erythronium tuolumnense*. There are no roads or trails through the *Mimulus pulchellus* occurrences. Not all of this landscape has been inventoried for OHV trails.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	10 occurrences of *Lomatium stebbinsii;* 5 occurrences of *Allium tribracteatum*; 9 occurrences of *Erythronium tuolumnense*, and 2 occurrences of *Mimulus pulchellus* exist.	• Survey un-surveyed areas • Protect known populations of *Lomatium stebbinsii, Allium tribracteatum, Erythronium tuolumnense,* and *Mimulus pulchellus.*

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Rose Creek Landscape is similar to the Duckwall Landscape. Fire regime, natural vegetation patterns (PNV), existing soil conditions, and Ecological Units (EU) are similar and interact in a similar manner across the landscape.

The Rose Creek or Ruby burn occurred in this landscape, which illustrates a shift away from the natural fire regime of frequent low intensity fire. When fires do occur they now tend to be stand replacing fires over large areas. The shift in fire regime has created a much higher potential for soil erosion over a much greater portion of the landscape, particularly in EU 204 which is prone to mass wasting. Changes in PNV and forest structure have also occurred that ultimately affect soil conditions.

Today, brush fields are more common and large areas such as the Ruby burn are in early seral stages. Crown density and fuel loading of all vegetation types have increased. Early mining and timbering activities have altered vegetation patterns at the stand and landscape scale. Much of the large Ponderosa pine and black oak once found in EUs 211, 205, and 208 have been cut out or burned up. The largest area of Ponderosa pine in this landscape burned up in the Ruby fire in the early 90s. The classic Ponderosa pine type (EU 208), is occupying a narrower zone than previously existed throughout the Sierras. The Ponderosa pine EU is being squeezed at higher elevations by mixed conifer and at lower elevations by chaparral and hardwoods. There is very little old growth Ponderosa pine. This has implications for soil because a natural Ponderosa pine forest can coexist with fire without large areas of landscape going up in smoke. When PNV and fire regime is out of balance, soil nutrient and erosion cycles may be out of balance in some Ecological Units.

Soil biology is a data gap. It is not fully understood how landscape scale changes in large downed woody material, PNV, or fire regime may alter soil organisms. Downed wood is lacking in much of the landscape because of both wildfire and management history. Old growth hardwoods are uncommon in some EUs. It is thought that oaks beneficially influence nutrient cycling, soil biology, and soil porosity both at the stand and landscape scale.

Other factors such as roads have affected this land unit. Roads on certain soil types are chronic sources of erosion. Past disturbances related to wildfire and management may have reduced soil productivity, particularly on soils with thin topsoil layers and soils prone to compaction.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Does not meet DC in older plantations. May not meet DC in units 205, 208, and 217 where multiply entry tractor logging have occurred.	Subsoil skid trails as stands are thinned
Large Downed Woody Material	Logs per acre >20 inch diameter	Generally meets DC in units 101, 201, 202, 206, and 216. Generally meets DC in second growth railroad logged areas. Lack of LWM in plantation areas and in units 211 and 205 where historic levels of large pine and black oak are much reduced.	• Create large woody material where needed for soil productivity and wildlife habitat • Grow more large pine and black oak in units 211 and 205
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Status of soil organisms is a data gap. It is thought that the loss of large pine and black oaks, the loss of LWM, lack of frequent low intensity fire alters habitat for soil organisms	• Survey for status of soil organisms by Ecological Unit • See opportunities for managing surface organic matter below

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Lack of frequent low intensity fire has increased surface fuels and is converting some areas to long standing brush fields in units 202,204, 211, and 205, which changes the nature of the forest litter and soil organisms.	• Move towards natural fire regime by thinning and Rx burning • Use shredding treatment to provide moisture conserving mulch when thinning south facing slopes • Increase large pine and black oak particularly in units 211 and 205
Topsoil	Organic matter content is 85% of natural	Generally meets DC except in terraced areas such as those on Grant Ridge. Less topsoil on tractor piled or eroded Mariposa soils within units 204, 211 and 205	• Restore soil conditions on terraced areas as practical • Implement treatments that build topsoil organic matter particularly on Mariposa soils. Examples are shred, mulch, fertilize, grow conifers and black oaks faster

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: See discussion above for DC#14.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover (hillslopes)	50 to 70% surface cover that prevents accelerated erosion	Some accelerated erosion in planted areas of Rose Creek burn; Annual grasses have replaced perennial grasses altering erosion, fire, and nutrient cycles; Existing rare plant habitat in unit 203; Altered fire regime is creating higher potential for erosion on steep slopes in unit 204	• Improve surface cover where needed for erosion control • Reintroduce perennial grasses in areas of low grazing pressure, starting in unit 203 • Survey for native perennial grasses in unit 203. Develop restoration plan for perennial grasses • Culture rare plants • Rx fire in unit 204 to lesson potential for mass wasting
Surface Cover (RCAs)	75% surface cover that prevents accelerated erosion	Generally meets DC. Some accelerated erosion in dispersed camping areas and OHV trails	• Monitor surface cover and accelerated erosion in RCAs

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads and OHV trails, particularly on sensitive soils.	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential

Terrestrial Animal Species

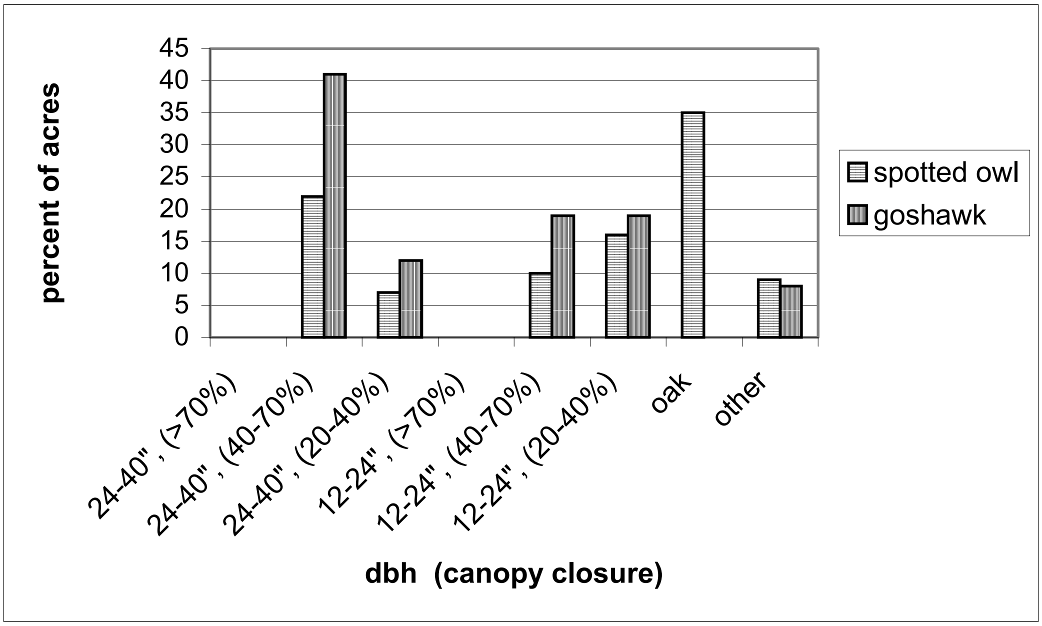
Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk and mule deer are known to occur or have the potential to occur in this landscape.

Old forest associated species—Within the Rose Creek landscape, 12% of the area is mapped as OFEA. Approximately 5% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Thirty-one percent of the OFEA is in oak and hardwood types, and may or may not exhibit old forest conditions. Thirteen percent of the OFEA is not suitable for forest production. This leaves 51% of the OFEA acres to improve to meet old forest desired conditions.

There are 14 California spotted owl PACs within the Rose Creek landscape. Ten of these are partially within other landscapes. There is 1 northern goshawk PAC, which crosses over into the Sand Bar landscape. Based on the current vegetation data, there are 4 acres of habitat at desired condition within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that more of the acres in PACs are currently at desired condition. Figure 16 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 16: Rose Creek Protected Activity Centers Vegetation Data



Great gray owl—This landscape include a great gray owl PAC at Ruby. The PAC is 46 acres, and 37% of the acres contain trees in the 24 to 40"dbh range. Thirty-five percent of the area is in oak type, which will provide suitable nesting habitat. This PAC is adjacent to the Ruby Fire, which currently provides the foraging habitat for this pair.

Mule deer—This landscape provides winter habitat for the Stanislaus deer herd. Approximately 45% of the landscape is found in oak/hardwood, early succession trees, and grass and chaparral types. An assessment of the Stanislaus Deer Herd, focusing on the winter range, was prepared in 1995 by the Mi-Wok District Wildlife Biologist. Using the 1984 herd management plan (Maddox 1984) as a basis, the assessment indicated that low fawn recruitment was the primary factor limiting recovery of the deer herd. One factor affecting low fawn recruitment is the decline in forage quality on summer, winter and transitional ranges.

Approximately 45% of the Rose Creek landscape includes vegetation types considered suitable for mule deer: oak/hardwood, early succession trees, and grass and chaparral types. At the time of the assessment, much of the chaparral vegetation was considered to be over-mature and of low quality for foraging mule deer. Using the Potential Natural Vegetation information presented in DC#19 below, black oak and grassland vegetation types are below those desired (these two vegetation types are important foraging habitat components). Since 1995 some habitat improvement projects have occurred in this landscape, in particular several prescribed burns have been conducted.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, great gray owl, mule deer, bats	Presence/ Successful breeding	Known presence and breeding for spotted owl over most of the area, some data for goshawk. No sightings of forest carnivores. No information for bat species. Some information for mule deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat- OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 12% of landscape in OFEA; 5% of OFEA in CWHR types 5D/5M; 13% of OFEA not capable of growing old forest Four spotted owl PACs entirely within landscape, 10 partially within landscape; All PACs over 300 acres; 0 acres currently meet desired condition One goshawk PAC within landscape—PAC has 414 acres; 0 acres currently meet desired condition	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of habitat within both spotted owl and goshawk PACs to meet desired conditions • Decrease size of goshawk PAC to 200 acres
Great gray owl habitat	PAC of 50 acres plus meadow needed to provide prey	46 acre PAC drawn around Ruby	Increase PAC size to at least 50 acres
Mule Deer Habitat	Early succession habitat	45% of landscape in potential foraging habitat. Current condition of chaparral unknown. Reduced amount of black oak and grassland vegetation compared to desired condition (DC#19).	▪ Cooperate with annual CDF&G deer her counts. ▪ Continue to monitor fawn recruitment. ▪ Increase black oak and grassland vegetation types. ▪ Assess habitat availability and condition.
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Existing Condition: Elderberry plants occur within this landscape. It is unknown if these plants provide suitable habitat for the valley elderberry longhorn beetle. It is also unknown if this beetle is currently found within the landscape. Areas with suitable elderberry plants can be mapped within the landscape to aid in management of this species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Valley elderberry longhorn beetle	Habitat provided and protected	Unknown status of elderberry plants	Identify areas with elderberry plants when conducting vegetation surveys

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Historic vegetation patterns and species composition within this Landscape were altered when Europeans immigrated into the area. Three factors, in particular, led to the change in vegetation: (1) extensive logging took place to supply mining timbers and lumber for the local and national markets; (2) white pine blister rust was introduced; and (3) fire was removed from the forest. In particular, the ponderosa and sugar pine stands were very valuable and therefore they were cut extensively from the early 1900's until recently (See Appendix A for details).

Vegetation types have been changed by timber harvest and by the absence of periodic fire. Over many decades, harvesting removed high-value pines, in advance of predicted mortality, over much of the landscape. More recently, in response to increasingly sophisticated management strategies, harvesting created openings where most of the existing vegetation was removed and replaced, largely, by planted conifer seedlings. Additionally, in the absence of periodic wildfire, shade-tolerant conifers, primarily white fir and incense cedar, established themselves within existing stands, sometimes becoming the dominant species. California black oak, whenever faced with increasing conifer density levels, especially among white fir, declines in vigor and dominance.

Following the 1992 stand-replacement Ruby Fire, forest vegetation has been restored to most of the higher-productive soils. Top-killed oaks have resprouted and regaining their pre-fire canopy cover level. Efforts to reestablish the conifers are proceeding.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Rust-resistant sugar pine seedlings have been planted within the Ruby Fire area.

At this time, vegetation types within the landscape do not meet desired species composition, in particular: (a) there is too much white fir in some vegetation types; (b) ponderosa pine and sugar pine are below desired levels in some vegetation types, and (c) oak levels are below those desired in some vegetation types.

Table 14 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 14. Desired Condition and Existing Condition for Vegetation Series in Rose Creek Landscape

Vegetation Series	Desired (Potential Natural) Vegetation (PNV)	Existing Vegetation (CALVEG)
Blue Oak/Interior Live Oak/Wedgeleaf Ceanothus	30-50% Blue Oak 20-40% Interior Live Oak 20-40% Wedgeleaf Ceanothus	0% Blue Oak 1% Interior Live Oak 46% Ceanothus
Chamise/Mariposa Manzanita	30-50% Chamise 30-50% Mariposa Manzanita	0% Chamise 73% Ceanothus
Interior Live Oak	60-80% Interior Live Oak	16% Interior Live Oak
Interior Live Oak/Wedgeleaf Ceanothus/Mariposa Manzanita	30-50% Interior Live Oak 30-50% Wedgeleaf Ceanothus 10-20% Mariposa Manzanita	19% Interior Live Oak 22% Ceanothus 0% Mixed Chaparral
Mariposa Manzanita/Chamise/Foothill Pine/Wedgeleaf Ceanothus	15-30% Mariposa Manzanita 15-30% Chamise 15-30% Foothill Pine 15-30% Wedgeleaf Ceanothus	0% Mariposa Manzanita 0% Chamise 1% Foothill Pine 59% Ceanothus
Wedgeleaf Ceanothus/Interior Live Oak/Ponderosa Pine	30-50% Wedgeleaf Ceanothus 30-50% Interior Live Oak 10-20% Ponderosa Pine	19% Wedgeleaf Ceanothus 22% Interior Live Oak 12% Ponderosa Pine
Mixed Conifer/Douglas-Fir – Ponderosa Pine	30-60% Mixed Conifer 30-60% Douglas Fir – Ponderosa Pine	61% Mixed Conifer 12% Douglas-Fir – Ponderosa Pine
Mixed Conifer/Ponderosa Pine/California Black Oak	30-50% Mixed Conifer 30-50% Ponderosa Pine 20-40 California Black Oak	61% Mixed Conifer 39% Ponderosa Pine 0% California Black Oak
Mixed Conifer/Ponderosa Pine	30-60% Mixed Conifer 30-60% Ponderosa Pine	45% Mixed Conifer 41% Ponderosa Pine
Ponderosa Pine	70-90% Ponderosa Pine	26% Ponderosa Pine
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	25% Ponderosa Pine 5% Manzanita 14% Grass
Ponderosa Pine/California Black Oak/Interior Live Oak	20-40% Ponderosa Pine 20-40% California Black Oak 20-40% Interior Live Oak	21% Ponderosa Pine 0% California Black Oak 10% Interior Live Oak

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
PNV	See Table 14 Above	-Higher % pine in the Ponderosa Pine and Mixed Conifer Series. California black oak series appears to be lower than desired.	• Increase pine species composition by artificial regeneration. • Encourage increased species composition levels by selective thinning and/or artificial regeneration.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Ponderosa Pine and Mixed Conifer Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—ponderosa pine	≥ 30% ponderosa pine canopy cover within Ponderosa Pine Series	18-46% ponderosa pine	Increase ponderosa pine species component within the listed vegetation series.
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: Seral stage distribution indicates that size class 3 and 4 acreage exceeds desired levels. Size class 5 acreage is currently much far below the desired 55%, however, the acreage in classes 3 and 4 are capable of filling the deficit.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	8%	Reduce stand density and minimize competing plants to increase growth to seral stage 2.
Wildlife Habitat Relationship (WHR) Size Class 2	5%	1%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	46%	Reduce stand density to increase growth to seral stage 4.
Wildlife Habitat Relationship (WHR) Size Class 4	20%	30%	Reduce stand density to increase growth to seral stage 5.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Wildlife Habitat Relationship (WHR) Size Class 5	55%	14%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 37% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. Prescribed fire, alone, is not a suitable treatment approach in stands where fire behavior would be expected to kill significant numbers of desired trees.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI ≤ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI ≤ 333	M0X SDI = 397 M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	
Stand Density Index (SDI) for Ponderosa Pine	SDI ≤ 230	P3N SDI = 397 P3P SDI = 304 P3X SDI = 443 P4N SDI = 302 PNO SDI = 205	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Stream corridor true riparian vegetation species are believed to be at less than desired condition in portions of the landscape, although they may be within the range of natural variability in some locations. Due to long-term fire suppression and nominal harvest in streamside corridors in recent years, conifer trees may be out competing and overshadowing true riparian trees and shrubs. The natural conifer-hardwood proportions in many streamside areas may be modified from natural conditions.

There is a substantial data gap in the knowledge of effects of past and current management practices on true riparian species. Inventories in this and other landscapes would help in understanding conditions and would lead to providing guidance for future management of riparian vegetation.

The location and condition of special aquatic features in the landscape is not fully known. The network of springs and other wetlands outside of stream corridors has not been mapped. These sites are habitat for plants and some animal life that do not exist in other type of locations.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Meadow vegetation	High ecological status in wet and moist meadows. Approaching high status in dry meadows.	132 acres of meadow. No meadows have been surveyed since 1990.	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	In some streamside corridors with long-term exclusion of fire and vegetation management, conifer dominance has suppressed true riparian trees and shrubs. Species composition and seral stage distribution are not at DC but magnitude of change is a data gap (2). Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs).	• Increase true riparian species reproduction and growth where adversely altered and feasible to accomplish. • Increase knowledge of amount of change in true riparian species composition and seral stage distribution. • Increase knowledge of special aquatic features (meadows, aspen stands, ponds, springs, fens and bogs).

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Social/Cultural Hierarchy
Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Economic contributions have traditionally come from ecosystem/timber-related activities and activity connected with the Ruby Fire rehabilitation effort. There are numerous scattered private land parcels, which influence activities on public lands from road and local recreation use.

Recreational activities generating economic benefits are mainly related to OHV use. There are no developed sites. (Refer to Desired Condition Statements #10, 11, 18, 19, 20, 21 and 28).

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: There are no interpretive services opportunities offered in this landscape. There is much potential, given the fire history, ecological recovery and OHV use.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference "baseline" data is collected and will be updated every 5 years.	No baseline data exists.	Collect Baseline User Preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	Build in annual increase in programs offered/people served, as per demographics.
Written and Oral Information	Information provided at Forest Service sites is $\geq$90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: All patrol functions in the landscape are financed solely through the State of California Green Sticker program for OHV enforcement activities and Fire Prevention.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	Very low visitation rates from uniformed Forest Service personnel.	• Increase visitation frequency by searching out new funding sources; cooperative funding with outside sources; FERC 4E funding in other areas may redirect funding to this area. • Increase visitation by utilizing volunteers or Forest Service personnel from other functions such as Fire Prevention.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists of opportunities for DC#25.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: There are isolated private land parcels in this landscape but none have been identified as potential candidates.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	**Measure**		
Identified properties	All lands acquired	Some isolated parcels. No identified opportunities	• Inventory landscape for potential opportunities • If opportunities exist, include in Forest prioritization of parcel acquisitions • Maintain and enhance relationships with groups who assist in this activity (e.g. Nature Conservancy, Trust For Public Land, etc.)

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: There are no developed recreation facilities. For more information see DC #27 and #30 for the Lyons Landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	No developed facilities (except trails) Unknown if they meet current preference needs.	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, where available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources. • Complete accessibility upgrades.
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in existing user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in facility and program development.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Except for high use weekends, visitation does not exceed capacity.	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Maximize funding sources: Capital Improvement Program; cooperative funds
Facility Condition	Meets Forest Service Meaningful Measures Standards/INFRA Accessibility Guidelines	N/A	N/A

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Not applicable for this landscape.

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: See Chapter IV.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Needed roads	Miles of road retained	Unknown.	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: See DC #30 for Lyons Landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	Community-linking trails do not exist.	No substantive opportunities or demand.
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	Many level 2 roads are used for motorized recreation and OHV routes.	None identified.
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as a baseline. • Prioritize maintenance activities toward heavily used trails.

Chapter V.8: Sand Bar Landscape

Introduction

The Sand Bar Landscape occurs in the northwest portion of the Central Stanislaus Watershed (CSWA) area, in the lower section of the Middle Fork Stanislaus River. Elevations range from approximately 1,100 feet to 3,400 feet at Beardsley Dam. The steep slopes of the Stanislaus River characterize this landscape area. Hydroelectric facilities have occurred in this landscape since mid-1800. Refer to Map 11 to identify specific locations as they are referenced in the following chapter.

Historical Context

The Sand Bar Flat diverting dam for the Spring Gap power plant was the first major hydroelectric project within the Stanislaus National Forest. It was a log crib structure, filled with rock and faced with plank. Initiated by Beach Thompson and the Stanislaus Electric Power Company (SEPCo)—reconfigured as the Sierra and San Francisco Power Company—this project was ultimately subsumed under the Pacific Gas & Electric Company. The entrance chamber was rubble masonry with timber entrance gates. The timber flume was 14.7 miles long and ended in a ditch 1,755 feet long. The water from the ditch ran into the Forebay—having a capacity of 13,500,000 cubic feet—formed by two dams. In itself, the SEPCo flume from Sand Bar Flat to Forebay, a distance of 14.8 miles, was a marvel.

The flume's overall design was to accommodate water to a depth of 6' 4". Boards on the inside were surfaced and joints were stopped with four-inch battens through which 300 second feet could flow 4' 3" deep and 400 second feet could flow 5' 3" deep. But since the flume was built with but three, 12" boards to a side, the flume, as of early 1909, could not carry the 160-second feet necessary to operate the entire plant. According to Consulting Engineer Galloway, another board needed to be added on each side the entire length in order to attain the desired water volume.

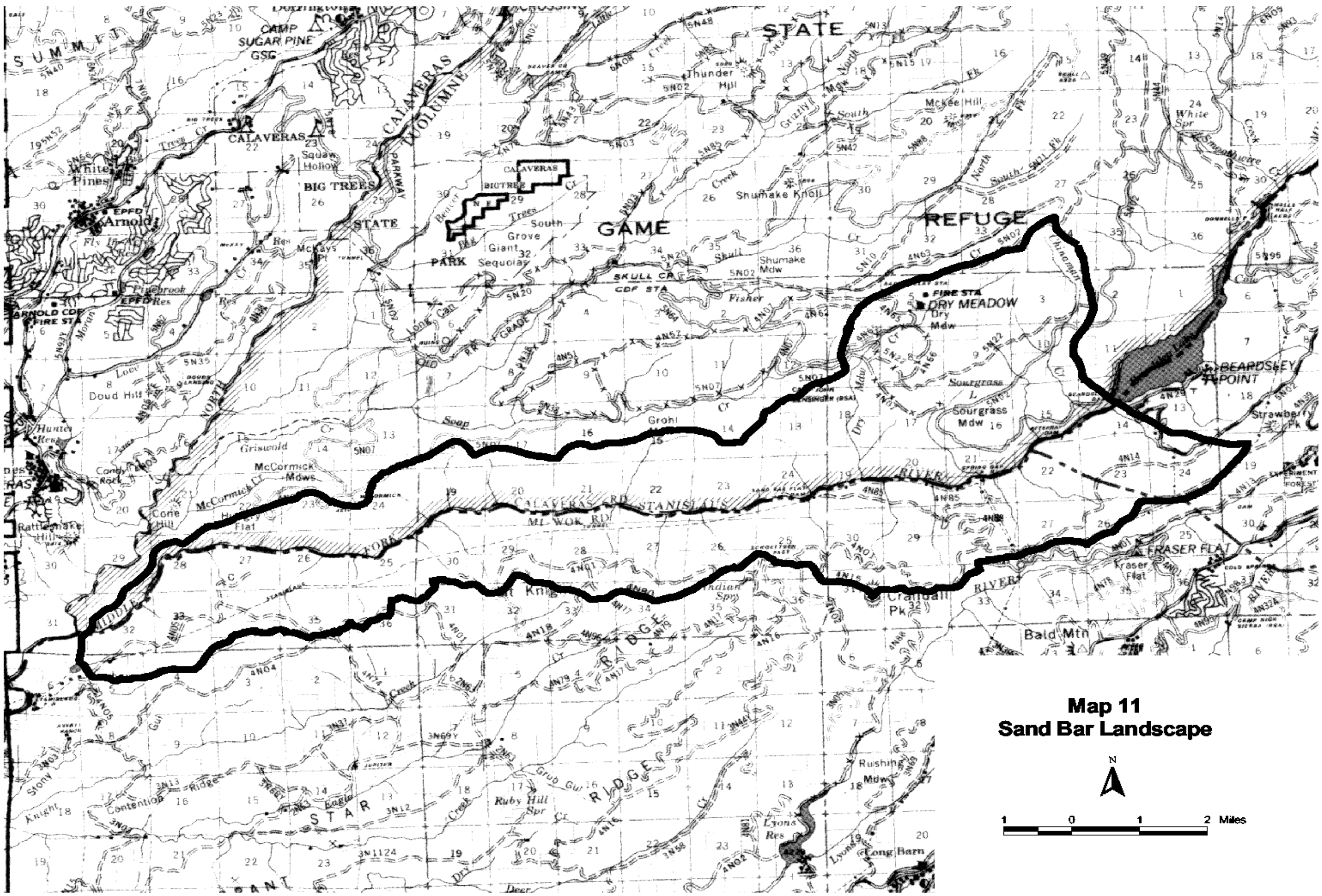
> The flume was supported by 5,223 supporting bents spaced at 15-foot centers. Eight by ten-inch posts were set on bearing blocks of pine resting on cedar footings, except where concrete was necessary in the rock cuts.... The locking and battens are of sugar pine and all other timbers of yellow pine. The flume contains about 18,000,000 board feet. The tramways, which were used and now [1917] of which there remains but ruins, were operated in two ways. One [tramway] was operated by gravity and the other … tramway at Sand Bar was operated by a steam hoist.

There were early concerns voiced that these large-scale water manipulations prevented or seriously impeded the movement of fish in the forest's streams. The Stanislaus National

Forest's "Report to the Fish and Game Commission" for 1916 lamented that none of the dams and diversions on the South Fork Stanislaus River were outfitted with fish ladders:

> On the South Fork of the Stanislaus, there are Lyons Dam, diverting dam at the head of the Philadelphia Ditch, Lower Strawberry Dam, and upper dam, all of them being impassable for fish. On the Main Stanislaus there is the diverting dam at Sand Bar, over which the fish cannot pass. The Relief Dam also is not provided with a ladder, although there it is quite probable that the fish could not get to the base of the dam on account of the natural falls, etc.

In addition to dams and hydroelectric diversions, the area's many ditches that fed off of the Stanislaus and Tuolumne river systems were a hindrance to fish. Precious few of these ditches were fitted with screens that would have kept fish in the streams.



Map 11
Sand Bar Landscape

Landscape Analysis

Hydrologic Hierarchy

Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Sand Bar landscape. Foothill yellow-legged frog and Pacific chorus frog were found within Hungry Flat Creek. This landscape is within the elevation range of California red-legged frog, foothill yellow-legged frog, western pond turtle, hardhead, rainbow trout, and slender salamanders.

There are currently no documented sightings of waterfowl or osprey in the Sand Bar landscape. Osprey occupancy would be unlikely, as there are no suitable lakes for hunting. There have been no surveys for waterfowl species or macro invertebrates in this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/ Successful breeding; Occupied habitat	4.8 miles surveyed; Foothill yellow-legged and Pacific chorus frog found	• Survey un-surveyed areas • Reintroduce species in unoccupied historic habitat
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting	• Gather incidental sightings of waterfowl • Survey suitable waterfowl habitat
Aquatic macro invertebrate	Healthy populations (Biotic Condition Index)	Unknown	Conduct surveys

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Existing Condition: There are no historic records of California red-legged frog within the landscape. The landscape is within the elevation range of the species. Critical Habitat is not designated in this landscape. Some project specific site assessments were conducted, although they do not cover the entire landscape. Completion of site assessments would identify any habitat suitable for breeding by this threatened species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California red-legged frog	Suitable habitat; Recovery plan objectives met	Some areas with completed suitable habitat site assessments	Complete habitat site assessments for landscape

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The Middle Fork Stanislaus is deficient in large woody debris (LWD), most likely as a result of removal at dam sites. The amount of LWD at the stream reach scale in tributaries of the Middle Fork Stanislaus is a data gap.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
LWD	Pieces/100m of stream, by Channel Type	Amount of LWD in MFK Stanislaus River is deficient (3 – SPLAT). LWD in tributaries of the MFK Stanislaus River is a data gap.	• Improve amount of LWD in the MFK Stanislaus River downstream of Beardsley Reservoir. • Increase knowledge of LWD in tributaries of the MFK Stanislaus River

Information source: 1 – Limited field observations; 2 – Long term field observations; 3 – Data supported observations

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: Three of four subwatersheds in the Sand Bar landscape have an excessive amount of road and all four exceed desired condition for number of stream crossings. The Dry Meadows Creek subwatershed is a notable problem area because roads overlay highly erodible soils in many areas. The amount of hydrologically connected road segments is an important data gap to be filled in all subwatersheds.

Wildfire hazard in this landscape is excessive. Two thirds of the landscape is in a high or very high hazard condition.

Particle size distribution in streams is currently a data gap across the landscape. The hydropower projects currently undergoing relicensing are examining PSD in the stream reaches affected by dams and diversions. These data should be available and analyzed by the end of 2001. In streams without dams and diversions, particle size distribution or pool depth has not been evaluated. This data gap can be assessed along with road sediment measures; if road system improvements are implemented a quantitative sediment survey may not be necessary.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/mi of stream; HCS <0.25 mi/mi^2 .	Road density >2.5 in 3 of 4 sub-watersheds (3). Crossings > 1 in 4 of 4 sub-watersheds (3). HCS - data gap.	• Improve quality of road system where not at DC. • Increase HCS knowledge where road density and stream crossings not at DC.
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	16% low hazard 65% high/very high	Reduce wildfire hazard in portions of landscape where hazard is moderate, high and very high.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: intra-reach data gap pending SPLAT study; PSD data gap. Unimpaired streams: Limited observations indicate PSD data gap.	Increase knowledge of stream sediment transport and deposition patterns.
Pool Depth	Residual pool depth is highly similar to reference streams.	Limited knowledge indicates pool depth data gap.	Increase knowledge of pool sediment.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: Much of the Sand Bar landscape consists of the walls of the Middle Fork Stanislaus River canyon. As such, low gradient reaches with fine-grained streambanks are nonexistent in this landscape. (Dry Meadow and Sourgrass Meadow, both on private land, do not contain noticeable stream channels).

Among moderate gradient stream reaches, the Middle Fork Stanislaus River – a bedrock controlled reach – is at or near desired condition. Although streamflow has been altered for over 40 years, channel morphology has remained stable since the river in this landscape is not sensitive to substantive change. Long term observations of moderate gradient reaches with coarse-grained streambanks tributary to the Middle Fork indicate that channel morphology is satisfactory. However, in places where reach morphology has not been observed an inventory would be useful to determine if undiscovered problems exist.

Though a data gap of steep gradient stream condition exists to some extent, one stream has severely altered morphology. It is adjacent to the inlet of the Spring Gap Powerhouse penstock. The stream is used as a bypass channel when water cannot be run through the penstock. It has become severely incised as high velocity water is periodically discharged into it.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: none in this landscape. Moderate gradient reaches: MFK Stanislaus River is bedrock controlled and likely meets all 3 criteria (1, 3-SPLAT); All 3 indicators are met in many other stream reaches observed but a data gap remains (2). Steep Gradient streams: Indicator 4 is met in many streams observed but a data gap remains. Indicator 4 not met in Spring Gap Penstock bypass channel.	Improve applicable stream reaches toward desired condition, especially the Spring Gap penstock bypass.

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: As a result of the hydropower relicensing water quality study it is apparent that all but perhaps one CVRWQCB Basin Plan Objective is met in the Middle Fork Stanislaus River. Water temperature in relation to amphibian habitat requirements remains a data gap until later in 2001 when data will be available.

In the tributaries of the Middle Fork, there is a quantitative data gap regarding BPO's. However, based on long-term observations the only parameter that may be at risk is sediment. The principal source is forest roads and with this problem identified in this analysis future actions are anticipated that will reduce this road sediment. Another substantive sediment source is the Spring Gap penstock bypass channel.

Acid Neutralizing Capacity as an indicator of water quality applies only to Class 1 Wilderness. There is no designated wilderness in the Sand Bar landscape.

There are no principal municipal water supplies in this landscape that would constitute designation as municipal watersheds.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	MFK Stanislaus meets BPO except maybe temperature regarding amphibian habitat requirements. (3-SPLAT). Other streams likely meet BPO except perhaps sediment (2).	• Decrease sources of sediment, from roads and the Spring Gap penstock bypass. • Increase knowledge of temperature during amphibian breeding and rearing periods.
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC $\geq$ baseline in lakes sensitive to acid deposition (ANC <50).	N/A	N/A
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	N/A	N/A

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Existing Condition: Although the Middle Fork Stanislaus River has dams and diversions, it is a bedrock-controlled stream and the regulated streamflow has not substantively affected channel morphology. Future flow regime management will be best determined by habitat requirements of native and desired non-native aquatic species. Key habitat features include flow velocity, volume, temperature and condition of aquatic and riparian vegetation for habitat quality.

Foothill yellow-legged frogs were found in this stretch of the Middle Fork Stanislaus in 2000. Surveys have not been completed in the reach. The California Department of Fish and Game designated a 4-mile stretch of the River as a wild trout stream. Brown and rainbow trout are found here. There is also potential habitat for hardhead and California red-legged frog.

The mean monthly-impaired flow is lower than the unimpaired (natural flow) in all twelve months of the year. On average, 56% of the natural flow is removed from this section of the Middle Fork Stanislaus. This results in changes to amount of habitat available for aquatic species. In addition, flow releases occur from the bottom of the dam, which results in water temperature lower than natural at the time of year that foothill yellow-legged frog breed. Foothill yellow-legged frog will breed when water temperatures exceed 12 degrees Celsius. Development time of this species is temperature dependent; lower temperatures result in longer development times. It is unknown what affect the existing condition has on the species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Streamflow	N/A	N/A	N/A
Aquatic Species Habitat	Suitable habitat for each life stage of native and non-native species.	CDFG wild trout designated stream, introduced brown trout and native rainbow trout present, foothill yellow-legged frog found 2000, hardhead present downstream of this landscape	• Provide favorable flows for trout habitat and foothill yellow legged frog habitat and breeding during re-licensing • Determine extent of foothill yellow-legged frog population • Provide habitat for hardhead • Determine need to provide flows for California red-legged frog in consultation with USFWS

Information source: 1—Limited field observations; 2—Long term field observations 3—Data supported observations

Desired Condition #8: The stream flow regime in streams without dams and diversions is highly similar to a natural flow regime.

Existing Condition: Infiltration at the sub-watershed scale in this landscape is satisfactory. Evapotranspiration is likely excessive in this landscape since nearly half of it has a vegetative density exceeding Stand Density Index threshold values. From the watershed standpoint regarding vegetation as an indicator of flow regime, the stand density problems are not too significant in this landscape. The principal stream in the Sand Bar landscape, the Middle Fork of the Stanislaus River, is regulated and accretion from groundwater on the walls of the river canyon is not a significant contributor to streamflow. However, reduction in stand density remains of value in the tributaries on the north-facing slope of the river canyon. Vegetation at desired condition here would benefit base flow and reduce the wildfire hazard.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub watershed.	>90% at the sub-watershed scale (3).	Maintain high level of infiltration in sub-watersheds.
Evapotranspiration	SDI < threshold values.	45% of landscape exceeds the SDI threshold values (3)	Reduce Stand Density in portions of landscape most affecting evapotranspiration.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Ten fires over 10 acres have been recorded in this landscape in the past century, the largest approximately 2000 acres in 1919. A total of 59 fires have burned 245 acres between 1970 and 2000. Although only 49% of the fires were human-caused, they burned 96% of the acres. The relative risk of occurrence is low throughout landscape.

The historic fire regime for the Sand Bar landscape is primarily Fire Regime I, short return interval, low severity fire. The chaparral slopes on the north side of the Stanislaus River on the west edge of the landscape historically burned frequently and with stand replacement severity (Fire Regime II).

Analysis:

DESIRED CONDITION		EXISTING CONDITION		OPPORTUNITIES
INDICATOR	**MEASURE**			
		Fire Regime		
		I	II	
Condition Class (CC)	CC1	CC1—0% CC2—64% CC3—36%, in ponderosa pine, lower mixed conifer vegetation groups	CC1—0% CC2-100% in chaparral	• Move CC3 areas toward CC1 by removing surface, ladder, and excess crown fuels • Move CC2 areas toward CC1 by reducing surface and ladder fuels
Potential impacts of fire	No negative	Potential impacts: • Beardsley Dam, Camp Mensinger, Spring Gap, Mt. Knight • 14 PACS, all with high or very high fire hazard in at least half the area • Old Forest emphasis >50% high or very high hazard		• Identify potential impacts during preparation of the Fire Management Plan. • Prioritize mitigation measures to reduce potential impacts
Fire hazard—Defense Zone	Low: 90%	Low: 11% Mod: 25% High: 56% Very high: 8% Spring Gap, Beardsley Dam, Camp Mensinger, Dry Meadow		• Reduce very high and high hazard areas to low by reducing surface and ladder fuels • Reduce moderate hazard areas to low by reducing surface and ladder fuels
Fire hazard—Outside Defense Zone	Low: 40% (strategically placed to break up high hazard)	ALL OUTSIDE Low: 16% Mod: 19% High: 43% VHigh: 22%	THREAT Low: 6% Mod: 26% High: 55% VHigh: 13%	• Reduce very high and high hazard areas to low by reducing surface and ladder fuels • Reduce moderate hazard areas to low by reducing surface and ladder fuels
Suppression effectiveness	Hand crews effective in high value areas (4' flame length)	• In WUI >4ft in over 50%, • >6ft in areas of threat zone north of Mt. Knight and along river around Spring Gap		Reduce potential flame length where necessary by removing or rearranging surface fuels
Crown fire potential	Surface only	Some crown fire potential in 50% of landscape, in lower mixed conifer and canyon types		Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height

In summary, the existing condition of the Sand Bar landscape as it relates to the fire element could be improved. Over half of the landscape exhibits high or very high fire hazard. There are very few natural barriers to fire spread, however several prescribed burns have been implemented in the landscape in the past 10 years totaling over 6,500 acres. There is a need to maintain these treatment effects and expand treatment to other areas.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: This landscape is currently in unsatisfactory condition due to the presence of noxious weeds. The Stanislaus Forebay, with its yellow starthistle, is also partially in this landscape. There is another infestation of yellow starthistle at Sand Bar Flat associated with hydropower facilities. There is a possible infestation of spotted knapweed along the Middle Fork of the Stanislaus River in a remote area. Bouncing bet (*Saponaria officinalis*) is spreading down the Middle Fork of the Stanislaus starting at the Spring Gap powerhouse. It was not listed in the Sierra Nevada Forest Plan Amendment, but is on the California Exotic Pest Plants Council (CalEPPC) list 2a, the most invasive wildland pest plants with only a regional distribution.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Noxious weeds and undesired invasive plants	0 occurrences	2 yellow starthistle infestations, one possible spotted knapweed, and numerous infestations of bouncing bet along the Middle Fork Stanislaus below Spring Gap powerhouse.	• Eradicate known infestations • Monitor, map and record any new occurrences. • Implement preventative actions to minimize spread of weeds.
Established weed populations	All populations are treated and eradicated.	0 occurrences	None identified

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: Two sensitive plant species (*Allium tribracteatum* and *Lomatium stebbinsii*) are found in the Sand Bar landscape. *Lomatium stebbinsii* is scattered over the volcanic habitat. There are two occurrences of *Allium tribracteatum* on the edge of the landscape. Most of the volcanic openings north of the Stanislaus River are difficult to reach during the spring and have not been surveyed for sensitive species. Habitat for other sensitive plant species exists. The potential exists for *Clarkia biloba* ssp. *australis, Cypripedium montanum,* *Erythronium tuolumnense, Horkelia parryi, Hulsea brevifolia, Hydrothyria venosa, Mimulus gracilipes,* and *Mimulus pulchellus* to occur in the area.

Designated OHV trails pass through one occurrence of *Allium tribracteatum* and two occurrences of *Lomatium stebbinsii.* Not all of this landscape has been inventoried for OHV trails.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	10 occurrences of *Lomatium stebbinsii;* 2 occurrences of *Allium tribracteatum* exist.	• Survey un-surveyed areas • Protect known populations of *Lomatium stebbinsii* and *Allium tribracteatum*

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Most of this landscape is a Canyon and Steep Slope Integrated Terrestrial Unit (ITU) or a Lower Mixed Conifer Upland ITU. Vegetation is somewhat denser in the Canyon ITU along the Middle Fork of the Stanislaus. This area makes up approximately half of the landscape. Existing soil conditions are generally within the natural range of variation in Ecological Units (EU) 101, 201, 212, and 216, which are grouped into the Canyon ITU. Mass wasting potential may be somewhat greater in Canyon EUs where fire hazard is high. In contrast, vegetation is much denser in the Lower Mixed Conifer EUs 217 and 219. This dramatically alters fuel conditions and fire hazard, which increases potential for post wildfire erosion. EU 217 and 219 are much less fire resistant today.

Large downed woody material is generally present in this landscape with possible exceptions being in plantations and in parts of EUs 205 and 208.

Other factors such as roads have affected this land unit. Roads on certain soil types are chronic sources of erosion. For example, road maintenance and control of water is difficult on certain soil types found in the Dry Meadows area. Past disturbances related to wildfire and management may have reduced soil productivity, particularly on soils with thin topsoil layers and soils prone to compaction.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Does not meet DC in older plantations. May not meet DC where multiply entry tractor logging has occurred.	Subsoil skid trails as stands are thinned
Large Downed Woody Material	Logs per acre >20 inch diameter	Generally meets DC in railroad logged second growth stands of units 208, 217, 219, and 307; Generally meets DC in units 101, 201, 206,212, 216. Lack of LWM in plantation areas and in unit 205 where historic levels of large pine and black oak are much reduced.	• Create large woody material where needed for wildlife and soil productivity • Grow more large pine and black oak in unit 205
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Status of soil organisms is a data gap. It is thought that the loss of large pine and black oaks, the loss of LWM, loss of frequent low intensity fire alters habitat for soil organisms	• Survey for status of soil organisms by Ecological Unit • See opportunities for managing surface organic matter below
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Lack of frequent low intensity fire has increased surface fuels in the lower mixed conifer units 217, 219, 227, and 307. Loss of surface organics is probable in areas of high fire hazard.	• Move towards natural fire regime by thinning and Rx burning • Move towards a more fire resistant forest by decreasing white fir and increasing the pine component in lower mixed conifer units
Topsoil	Organic matter content is 85% of natural	Generally meets DC	

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: See discussion above for DC#14.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover (hillslopes)	50 to 70% surface cover that prevents accelerated erosion	Surface cover is generally at DC; Annual grasses have replaced perennial grasses altering erosion, fire, and nutrient cycles; Existing rare plant habitat in unit 203; Altered fire regime and denser vegetation is creating higher potential for wildfire and erosion on steep slopes in units 201, 212, 216	• Improve surface cover where needed for erosion control • Reintroduce perennial grasses in areas of low grazing pressure, starting in unit 203 • Survey for native grasses. Develop restoration plan • Culture rare plants • Rx fire in units 201, 212 and 216 to decrease mass wasting potential
Surface Cover (RCAs)	75% surface cover that prevents accelerated erosion	Generally meets DC. Some accelerated erosion in dispersed camping areas and OHV trails	• Monitor surface cover and accelerated erosion in RCAs • Treat or relocate trails and camp sites that are eroding
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads and OHV trails, particularly on sensitive soils in the Dry Meadows area.	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential

Terrestrial Animal Species

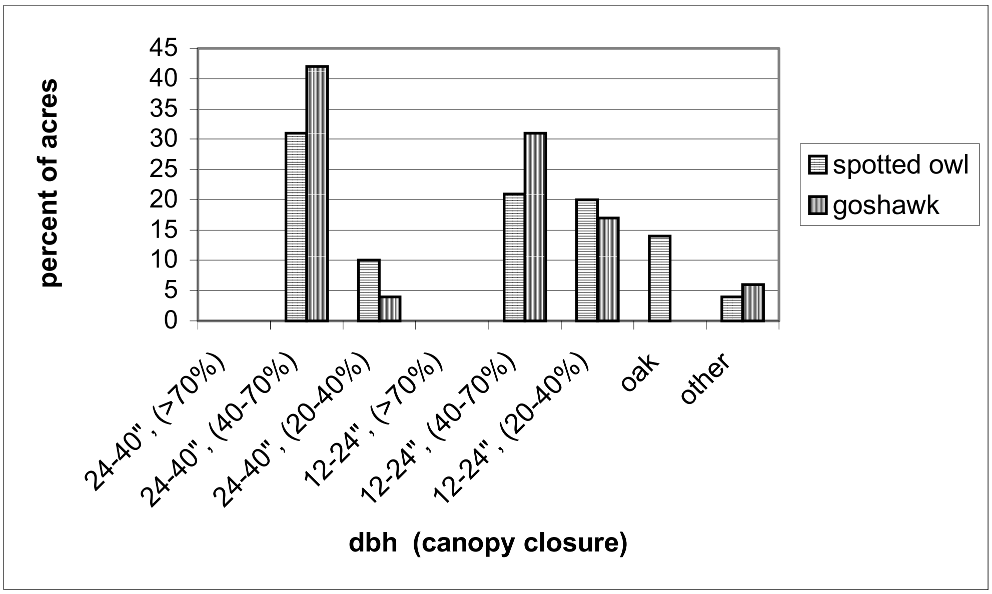
Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk and mule deer are known to occur or have the potential to occur in this landscape.

Old forest associated species—Within the Sand Bar landscape, 23% of the area is mapped as OFEA. Approximately 12% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Thirty-nine percent of the OFEA is in oak and hardwood types, and may or may not exhibit old forest conditions. Six percent of the OFEA is not suitable for forest production. This leaves 43% of the OFEA acres to improve to meet old forest desired conditions.

There are 17 California spotted owl PACs within the Sand Bar landscape. Eight of these are partially within other landscapes. There are 3 northern goshawk PACs. One of these is partially within the Rose Creek landscape. Based on the current vegetation data, there are 15 acres of habitat that meet desired conditions for the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that more of the acres in PACs are currently at desired condition. Figure 17 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 17: Sand Bar Protected Activity Centers Vegetation Data



Mule deer—This landscape provides Stanislaus deer herd wintering and migratory habitat in the lower elevations and summer/fawning habitat in the higher elevations. The 1984 herd management plan indicated that low fawn recruitment was the primary factor limiting recovery of the deer herd (Maddox 1984). One factor affecting low fawn recruitment is the decline in forage quality on summer, winter and transitional ranges. Approximately 38% of the landscape is found in oak/hardwood, early succession trees, and grass and chaparral types. The current condition of these areas as foraging habitat, as well as the availability and condition of cover and fawning habitat, is unknown, however some habitat improvements have occurred in the last decade (primarily prescribed burning). Data presented in the next section (Desired Condition #18) that black oak levels are below those desired.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, mule deer, bat species	Presence/ Successful breeding	Known presence and breeding for spotted owl over most of the area, some data for goshawk. One marten sighting. No information for bat species. Some information for mule deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat- OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24" trees with >70% canopy Northern goshawk PACs, 200 acres of >24" trees with >70% canopy	OFEA habitat: 23% of landscape in OFEA; 12% of OFEA in CWHR types 5D/5M; 6% of OFEA not capable of growing old forest Nine spotted owl PACs entirely and 8 partially within landscape; All PACs over 300 acres; 15 acres currently at desired condition Two goshawk PACs entirely and 1 partially within landscape; 1 PAC below 200 acres; 2 PACs above 200 acres; 0 acres currently at desired condition	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of habitat within both spotted owl and goshawk PACs that meet desired conditions • Increase size of goshawk PAC to 200 acres, decrease size in other 2 PACs
Mule Deer Habitat	Early succession habitat	38% of landscape in potential foraging habitat. Current condition unknown. Black oak levels below those desired.	▪ Gather better vegetation data to assess habitat availability and condition. ▪ Improve oak woodland habitat to increase size and number of oaks.
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Existing Condition: Elderberry plants occur within this landscape. It is unknown if these plants provide suitable habitat for the valley elderberry longhorn beetle. It is also unknown if this beetle is currently found within the landscape. Areas with suitable elderberry plants can be mapped within the landscape to aid in management of this species.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Valley elderberry longhorn beetle	Habitat provided and protected	Unknown status of elderberry plants	Identify areas with elderberry plants when conducting vegetation surveys

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Historic vegetation patterns and species composition within this Landscape were altered when Europeans immigrated into the area. Three factors, in particular, led to the change in vegetation: (1) extensive logging took place to supply mining timbers and lumber for the local and national markets; (2) white pine blister rust was introduced; and (3) fire was removed from the forest. In particular, the ponderosa and sugar pine stands were very valuable and therefore they were cut extensively from the early 1900's until recently (See Appendix A for details).

Vegetation types have been changed by timber harvest and by the absence of periodic fire. Over many decades, harvesting removed high-value pines, in advance of predicted mortality, over much of the landscape. More recently, in response to increasingly sophisticated management strategies, harvesting created openings where most of the existing vegetation was removed and replaced, largely, by planted conifer seedlings. Additionally, in the absence of periodic wildfire, shade-tolerant conifers, primarily white fir and incense cedar, established themselves within existing stands, sometimes becoming the dominant species. California black oak, whenever faced with increasing conifer density levels, especially among white fir, declines in vigor and dominance.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Despite the increasing availability of rust-resistant planting stock, significant efforts to reestablish the species have not occurred.

At this time, vegetation types within the landscape do not meet desired species composition, in particular: (a) there is too much white fir in some vegetation types; (b) ponderosa pine and sugar pine are below desired levels in some vegetation types, and (c) oak levels are below those desired in some vegetation types.

Table 15 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 15. Desired Condition and Existing Condition for Vegetation Series in Sand Bar Landscape

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Interior Live Oak	60-80% Interior Live Oak	13% Interior Live Oak
Mariposa Manzanita/Chamise/Foothill Pine/Wedgeleaf Ceanothus	15-30% Mariposa Manzanita 15-30% Chamise 15-30% Foothill Pine 15-30% Wedgeleaf Ceanothus	0% Mariposa Manzanita 0% Chamise 1% Foothill Pine 73% Ceanothus
Mixed Conifer	60-80% Mixed Conifer	70% Mixed Conifer
Mixed Conifer/Douglas-Fir – Ponderosa Pine	30-60% Mixed Conifer 30-60% Douglas Fir – Ponderosa Pine	55% Mixed Conifer 0% Douglas-Fir – Ponderosa Pine
Mixed Conifer/Ponderosa Pine/California Black Oak	30-50% Mixed Conifer 30-50% Ponderosa Pine 20-40 California Black Oak	90% Mixed Conifer 7% Ponderosa Pine 0% California Black Oak
Mixed Conifer/Ponderosa Pine	30-60% Mixed Conifer 30-60% Ponderosa Pine	89% Mixed Conifer 3% Ponderosa Pine
Ponderosa Pine	70-90% Ponderosa Pine	90% Mixed Conifer - Pine
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	15% Ponderosa Pine 13% Manzanita 11% Grass
Ponderosa Pine/California Black Oak/Interior Live Oak	20-40% Ponderosa Pine 20-40% California Black Oak 20-40% Interior Live Oak	10% Ponderosa Pine 0% California Black Oak 29% Interior Live Oak

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
PNV	See Table 15 Above	Lower % pine in the Ponderosa Pine and Mixed Conifer Series. California black oak series appears to be less frequent than desired.	• Increase pine species composition by artificial regeneration. • Increase black oak levels by selective thinning and/or artificial regeneration.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Ponderosa Pine and Mixed Conifer Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—ponderosa pine	$\geq$ 30% ponderosa pine canopy cover within Ponderosa Pine Series	18-46% ponderosa pine	Increase ponderosa pine species component within the listed vegetation series.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: Seral stage distribution indicates that size class 3 and 4 acreage exceeds the desired level. All other size classes are at levels below the desired value.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicators	**Measures**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	1%	
Wildlife Habitat Relationship (WHR) Size Class 2	5%	2%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	40%	Reduce stand density to increase growth to seral stage 4. Regenerate portions to provide for early seral stage (Size Class 1 and 2) vegetation.
Wildlife Habitat Relationship (WHR) Size Class 4	20%	33%	Reduce stand density to increase growth to seral stage 5. Regenerate portions to provide for early seral stage (Size Class 1 and 2) vegetation.
Wildlife Habitat Relationship (WHR) Size Class 5	55%	24%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 45% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix F. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. Prescribed fire, alone, is not a suitable treatment approach in stands where fire behavior would be expected to kill significant numbers of desired trees.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI ≤ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI ≤ 333	M0X SDI = 397 M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	
Stand Density Index (SDI) for Ponderosa Pine	SDI ≤ 230	P3N SDI = 397 P3P SDI = 304 P4N SDI = 302 PNO SDI = 205	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Field observations show that where long-term exclusion of fire and vegetation management in riparian areas has occurred, conifers have tended to out-compete true riparian species for light and space. The extent of the effect remains a data gap, but in productive sites where conifer growth is relatively fast the evergreen species have become more dominant and true riparian species suppressed.

The location of special aquatic features is not fully known in this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Herbaceous Species	High ecological status in wet and moist meadows; approaching high in dry areas of meadows.	34 acres of meadow. No meadows have been surveyed since 1990.	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	In riparian areas with long-term exclusion of fire and vegetation management, conifer dominance has suppressed true riparian trees and shrubs. Species composition and seral stage distribution are not at DC but magnitude of change is a data gap (2). Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs).	• Increase true riparian species reproduction and growth where adversely altered and feasible to accomplish. • Increase knowledge of amount of change in true riparian species composition and seral stage distribution. • Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs).

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Social/Cultural Hierarchy

Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Economic contributions have traditionally come from ecosystem/timber-related activities, primarily in the eastern ½ of the landscape. There are large in-holdings of private timber owned by Sierra Pacific Industries, which provide economic support for the lumber and wood products industry. Recreational activities generating economic benefits are few but do add additional dimensions to the recreation picture such as a wild trout fishery below Beardsley Dam and a recommendation of Wild and Scenic status for 10 miles of the Middle Fork Stanislaus below Sand Bar. (Refer to Desired Condition Statements #10, 11, 18, 19, 20, 21 and 28).

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: Interpretive services opportunities are very few, with minor postings at Sand Bar Campground. Possible opportunities exist with wild and scenic characteristics of Middle Fork Stanislaus.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference "baseline" data is collected and will be updated every 5 years.	No baseline data exists.	Collect baseline user preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Service Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	Build in annual increase in programs offered/people served, as per demographics.
Written and Oral Information	Information provided at Forest Service sites is ≥ 90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: Forest Service assistance at Sand Bar Campground is partially financed by the Fee Demonstration program, supplementing funds from the FERC license. All other patrol functions in the landscape are financed solely through the State of California Green Sticker program for OHV enforcement activities. (See DC#29 below.)

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	Very low visitation rates from uniformed Forest Service personnel.	• Increase visitation frequency by searching out new funding sources: FERC 4E redirecting funding to this area, as other sources come into play in other areas; cooperative funding with outside sources. • Increase visitation by utilizing volunteers or Forest Service personnel from other functions such as Fire Prevention.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

Existing Condition: The following table compares desired condition with existing condition and lists of opportunities for DC#25.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	Measure		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: There are isolated private land parcels in this landscape but none have been identified as potential candidates.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITES
Indicator	Measure		
Identified properties	All lands acquired	Some isolated parcels. No identified opportunities	• Inventory landscape for potential opportunities • If opportunities exist, include in Forest prioritization of parcel acquisitions • Maintain and enhance relationships with groups who assist in this activity (e.g. Nature Conservancy, Trust For Public Land, etc.)

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: For developed site information, see DC #28. Recreation opportunities currently fit the landscape, with wild trout fishing as the dominant theme in the river canyon. Facilities do not appear to be overloaded and most are relatively new. Future opportunities should emphasize wild and scenic river qualities. For OHV opportunities, see DC #30 for the Lyons Landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	Facilities are relatively new (1980's). Unknown if they meet current preference needs.	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, where available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources. • Complete accessibility upgrades.
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in existing user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in facility and program development.
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Except for high use weekends, visitation does not exceed capacity. Little capacity to increase facilities	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Maximize funding sources: FERC 4E; Capital Improvement Program; cooperative funds
Facility Condition	Meets Forest Service Meaningful Measures Standards/INFRA Accessibility Guidelines	Facilities condition generally OK (may not meet accessibility standards)	• Establish priorities using Meaningful Measures and INFRA data. • Maximize funding for maintenance of facilities: FERC 4E; appropriated funds; Fee Offset; Fee Demo; Volunteers; Capital Improvement Program

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Existing Condition: Under the Sand Bar Project FERC 4(e) conditions, Tri-Dam financed the construction of the China Flat picnic area and Sand Bar campground. In addition, approximately $30,000 per year is provided for daily operations and public assistance at these facilities, as well as annual trail maintenance of the fisherman trail linking these two sites. The fishing regulations below Hartley Reservoir call for single barb less hook and a two fish limit. Numerous complaints surfaced from the public regarding the lack of enforcement of these regulations by the California Department of Fish and Game.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Desired**		
Facilities and activities financed	100% financing of facilities and activities attributable to present and projected demand generated by FERC projects.	Tri-Dam pays for operations and maintenance of Sand Bar, China Flat and two miles of the four-mile trail connecting the two sites. Unknown ownership of the bridge across the Stanislaus River at Sand Bar Campground—currently a safety hazard to the public.	• Identify clear present and future project induced impacts. • Prioritize importance and "ownership" of all impacts, including the bridge at Sand Bar. • Set additional responsibilities in FERC 4(e) requirements to include maintenance of entire four-mile trail between China Flat and Sand Bar.

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: See Chapter IV

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measures**		
Needed roads	Miles of road retained	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: Except for the fisherman trail connecting Sand Bar and China Flat, few non-motorized trails exist. For OHV Trails, see DC #30 in the Lyons Landscape. There is a heavy trail maintenance backlog for the non-motorized trails.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	Community-linking trails do not exist.	No substantive opportunities or demand
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	Many level 2 roads are used for motorized recreation and OHV routes.	None identified.
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails.

Chapter V.9: Sonora Pass Landscape

Introduction

The Sonora Pass Landscape occurs in the eastern section of the Central Stanislaus Watershed Analysis (CSWA) area. Elevations range from approximately 6,000 feet at Brightman Flat to 11,570 feet on Leavitt Peak. Portions of the landscape occur in the Emigrant Wilderness and in a section proposed for addition to the Carson-Iceberg Wilderness. Outside of Pinecrest, the Brightman Flat-Dardanelle recreation area, along Highway 108, receive the highest recreation use within the CSWA area. Refer to Map 12 as needed to identify specific locations as they are referenced in the following chapter.

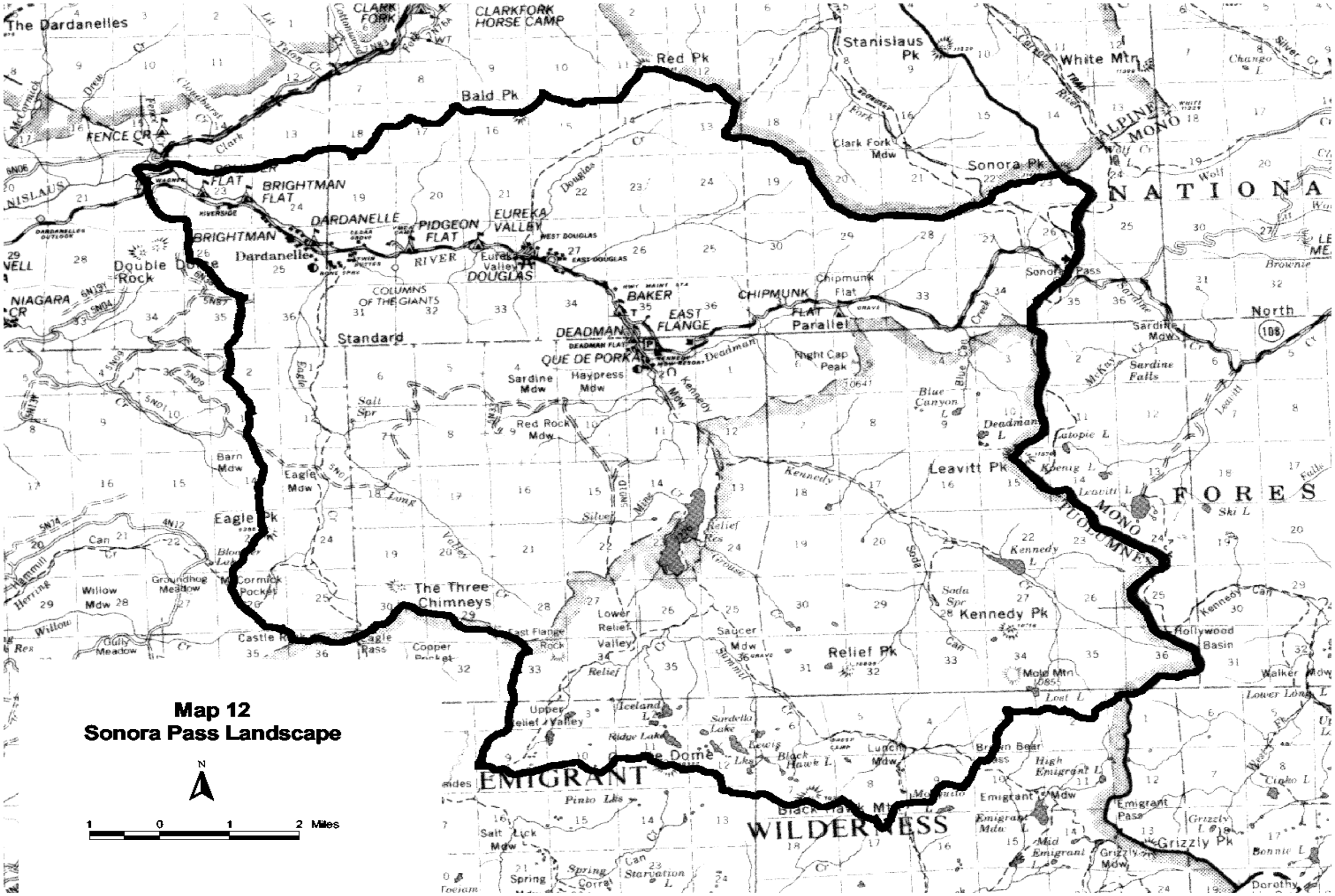
Historical Context

For hundreds of years, the MiWok, Piute and other native people traveled, traded, hunted, and fished the area. Although not a popular route, the Sonora Pass area was used as a travel-way for emigrants crossing the Sierra. The Bartleson-Bidwell Party of 1841 was the first group of non-native emigrants to cross the Sierra in the vicinity of today's Sonora Pass. Through the last half of the 19th century, high Sierra passes, including Sonora Pass, provided the travel route for sheep and cattle grazing between the Central Valley of California and the east slope of the Sierra Nevada.

The first wagon train of emigrants did not travel this course until 1852. This is when the Clark-Skidmore Party—also known as the Elizabethtown-California Company—straggled over the crest at a location about eight miles south of today's Sonora Pass. After initially abandoning their wagons and then retrieving them, probably at Leavitt or Walker Meadow, the group passed through what is now Relief Valley, behind Dodge Ridge, down through the North Fork Tuolumne area, and finally into Sonora and Columbia. The journey from Elizabethtown, Ohio to Columbia had taken them a tortuous four months and three days. Word of their woes over the challenging route did nothing to promote its popularity in a year when an estimated 52,000 emigrants crossed the plains by various routes into California.

In 1861 and 1862, Robert Wallace surveyed part of the route that was ultimately chosen for the Sonora-Mono Road. After a number of false starts, the route east of the Clark Fork confluence was re-surveyed in 1863. The Sonora-Mono Wagon Road was completed in November 1864. By the latter 1890s the road had been sorely neglected and was described as "a hard thoroughfare to travel." Local advocates believed they had a very good chance of bringing this road under the state highway system when Tuolumne County's J. B. Curtain was elected to the Senate. Largely as a result of Curtain's efforts, in 1901, the upper section of the Sonora-Mono Wagon Road, from Long Barn to Bridgeport, became part of the State Highway system as Route 13 (Turner and Elliott 1995).

It was the construction of Relief Reservoir, rather than trans-Sierra trade—on the cusp of the availability of mass-produced automobiles—that provided the stimulus that kept the upper Sonora-Mono Road viable. In 1908, as dam related construction commenced, improvements were made from Sonora to Baker's Station. By this juncture, interests on both sides of the Sierra pressed for this wagon road to become a state highway.



Map 12
Sonora Pass Landscape
N
1 0 1 2 Miles
The Dardanelles
FENCE CR
Bald Pk
Red Pk
Stanislaus Pk
White Mtn
CLARK FORK
CLARKFORK HORSE CAMP
Clark Fork Mdw
Sonora Pk
ALPINE
MONO
N A T I O N A
BRIGHTMAN FLAT
DARDANELLE
PIDGEON FLAT
EUREKA VALLEY
Dardanelle
Double Dome Rock
COLUMNS OF THE GIANTS
RIVER
Eureka Valley
DOUGLAS
NIAGARA CR
Standard
BAKER
EAST FLANGE
CHIPMUNK FLAT
Chipmunk Flat
Parallel
Sonora Pass
North
DEADMAN
QUE DE PORKA
Sardine Mdw
Haypress Mdw
Red Rock Mdw
Night Cap Peak
Blue Canyon L
Deadman L
Sardine Mdw
Sardine Falls
Leavitt Pk
Leavitt L
Koenig L
F O R E S
TUOLUMNE
Ski L
Barn Mdw
Eagle Mdw
Eagle Pk
Long Valley
Relief Res
Kennedy L
Kennedy Pk
Soda Spr
Willow Mdw
Groundhog Meadow
McCormick Pocket
The Three Chimneys
Castle Rock
Eagle Pass
Copper Pocket
East Flange Rock
Lower Relief Valley
Saucer Mdw
Relief Pk
Mojo Mtn
Lost L
Hollywood Basin
Walker Mdw
Lower Long L
Upper Relief Valley
Iceland L
Ridge Lake
Sardella Lake
Black Hawk L
Lunch Mdw
Brown Bear Pass
High Emigrant L
Emigrant Mdw
Emigrant Pass
Grizzly Pk
EMIGRANT
WILDERNESS
Pinto Lks
Salt Lick Mdw
Spring Corral
Starvation L
Mid Emigrant L
Grizzly Mdw
Bonnie L
Dorothy L

Landscape Analysis

Hydrologic Hierarchy

Aquatic Animal Species

Desired Condition #1: All native aquatic species, including Forest Service designated sensitive species, are present in viable populations and occur in greater than 70% of their historically occupied habitats.

Existing Condition: Presence and breeding surveys for amphibians were conducted in the Sonora Pass landscape. Seven populations of Yosemite toad were found. Mountain yellow-legged frog was located at eight locations, and Pacific chorus frog was found in 10 locations. This landscape is within the elevation range of Yosemite toad, mountain yellow-legged frog and Mt. Lyell salamander. There is a population of Mt. Lyell salamander at Sonora Pass.

Relief Reservoir inundated meadow habitat when the dam was built. The exact amount of meadow inundated is unknown. Topographic maps of the area indicate that the inundated habitat was likely to be suitable for mountain yellow-legged frog and Yosemite toad. Because this meadow remains inundated, we are not able to restore native amphibian species to this particular site.

There have been sightings of merganser, mallard and various other waterfowl species in this landscape. There may be habitat for harlequin duck. Surveys have not been conducted specific to waterfowl or osprey. There is limited habitat for osprey due to the elevation of available hunting habitat.

There have been no macro invertebrate surveys within the landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Native aquatic species	Presence/ successful breeding Occupied habitat	• 476 acres surveyed. • Yosemite toad, mountain yellow-legged frog and Pacific chorus frog found. • Relief Reservoir inundated historic amphibian habitat.	• Survey un-surveyed areas. • Reintroduce species in unoccupied historic habitat. • Protect occupied Yosemite toad habitat. • Maintain and enhance current mountain yellow-legged frog populations. • Mitigate loss of historic amphibian habitat during FERC relicensing process.
Waterfowl and Osprey	Nest sites occupied and successfully fledge young	Unknown nesting.	• Gather incidental sightings of waterfowl and osprey. • Survey suitable waterfowl habitat.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Aquatic macro invertebrate	Biotic Condition Index	Unknown	Conduct surveys.

Desired Condition #2: Habitat for federal threatened and endangered species is in excellent condition and recovery plan requirements are met.

Not applicable for this landscape.

Large Woody Debris in Streams

Desired Condition #3: The amount and distribution of wood in stream channels enhances stream stability and aquatic habitat complexity.

Existing Condition: The amount of large woody debris (LWD) in the Middle Fork Stanislaus River is below desired condition. LWD in the Relief Reach of the Middle Fork, between Relief and Donnells Reservoirs, was evaluated in 2000 as part of the current hydropower-relicensing project on the river. LWD was found to be less than the amount desired in the Forest Land and Resource Management Plan. This confirmed long-term observation of the reach, comparison with the adjacent Clark Fork of the Stanislaus and knowledge that LWD has been periodically removed from locations along the Middle Fork.

Based on long-term observation, LWD in tributaries to the Middle Fork Stanislaus is at or near desired condition. Processes that result in wood recruitment to streams are nearly intact. Growth and decay of trees, windthrow, avalanche and the natural fire regime have not been substantially altered in the vast majority of this high elevation landscape. Some of these tributaries may be candidates for inventorying LWD for reference conditions.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
LWD	Pieces/100m of stream, by Channel Type	LWD deficient in the MFK Stanislaus River (2, 3-SPLAT) LWD at or near desired condition throughout remainder of landscape (2).	• Improve the amount of LWD in MFK Stanislaus River. • Maintain LWD at desired condition in tributaries to the MFK Stanislaus River. • Increase knowledge of LWD reference conditions.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Sediment

Desired Condition #4: The delivery and transport of stream sediment is balanced so that stream channels are not excessively aggrading or degrading over time.

Existing Condition: The sediment regime in the Sonora Pass landscape is in a near natural condition except in the Middle Fork Stanislaus. -The degree of alteration of streambed sediment in the Middle Fork is a data gap pending completion of studies for the current hydropower-relicensing project. Relief Reservoir has trapped sediment for most of the 20th century and streambank erosion in the low gradient segments of the Relief Reach has contributed to change.

Natural erosion rates and in-stream transport and deposition of sediment in tributaries of the Middle Fork remain nearly intact except in localized low gradient reaches. These reaches, though individually important, represent a small percentage of stream mileage in the landscape. Some of the Middle Fork tributary stream reaches may serve as reference sites for further understanding of particle size distribution and pool sediment.

Roads have not had noticeable effect on the sediment regime in this landscape. The road density and the frequency of road crossings in all five subwatersheds in the landscape are at desired condition. There is a concern within the Eagle Creek sub-watershed, however, regarding the Eagle Meadow road location in the vicinity of the Eagle and Long Valley Creek crossings. While the road has been in place for many decades, streambank erosion could be reduced by road improvements. Inventory of hydrologically connected road segments in this area would be the best focus for filling the HCS data gap that exists in this landscape.

The Sonora Pass landscape has the second lowest fire hazard rating of any of the CSWA landscapes. Seventy-five percent is rated low, much due to the low density of vegetation in the upper elevations of the landscape. The lower elevations, along the Middle Fork Stanislaus have fire hazards deserving consideration for fuels treatment.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Roads	Road density <2.5 mi/mi^2; < 1 stream crossing/mi of stream; HCS < 0.25 $mile/mile^2$.	Road density <2.5 in all 5 sub-watersheds (3). Crossings >1 in all 5 sub-watersheds (3). HCS - data gap.	Maintain roads at desired condition.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Wildfire	Hazard Rating: >50% of landscape is low; <25% is high or very high	75% low hazard (3).	• Reduce wildfire hazard in the lower elevation portions of this landscape where hazard is moderate, high or very high.
Particle Size Distribution	Streams with dams and diversions: intra-reach sediment well distributed & PSD similar to comparable unimpaired streams; Unimpaired streams: PSD highly similar to reference streams.	Streams with dams and diversions: intra-reach data gap pending SPLAT study; PSD data gap. Unimpaired streams: Limited observations indicate PSD data gap.	• Increase knowledge of stream sediment transport and deposition patterns in MFK Stanislaus. • Increase knowledge of PSD and pool sediment reference conditions in applicable streams.
Pool Depth	Residual pool depth is highly similar to reference streams.	Limited observations indicate pool depth data gap.	Increase knowledge of pool sediment.

Information source: 1—Limited field observations; 2—Long term field observations; 3 – Data supported observations

Stream Channel Morphology

Desired Condition #5: Stream channels have a single-thread pattern, small cross sections, stable banks and connectivity with their floodplains.

Existing Condition: Channel morphology is altered to some extent in nearly all-low gradient stream reaches with fine-grained streambanks in the Sonora Pass landscape. The most frequent indicator of alteration is reduced streambank stability, but many have increased entrenchment and enlarged cross sections as well. Stream flow regulation for hydropower and historic and/or current grazing are the principal land uses along these reaches. Some of these reaches have the potential for active restoration but in other cases, such as in wilderness passive restoration will likely be the preferred method of moving them toward desired condition. The areas of most concern are Eagle Meadow (stream channel, road and recreation) and the Middle Fork Stanislaus River between Kennedy Meadows and Brightman Flat (effects of streamflow regulation). The condition of the Kennedy Canyon area has not been observed in recent years and, as the largest wetland on the Stanislaus National Forest, should be evaluated in the near future.

Long-term observations of moderate and steep gradient channels in this landscape show them to be at or near desired condition. There have few management related disturbances to affect them since much of the landscape where moderate and steep gradient streams exist is wilderness, near natural or roadless.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Morphology Condition Index (MCI)	DC is achieved when: Indicators 1-3 are met or nearly met in low gradient reaches with fine-grained streambanks Indicators 1-3 are met or nearly met in moderate gradient reaches with coarse-grained streambanks Indicator 4 is met in high gradient reaches.	Low gradient reaches: Nearly all low gradient reaches do not meet all 3 indicators (2, 3-SCI). Moderate gradient reaches: All 3 indicators are met (2). Steep Gradient streams: Indicator 4 is met (2).	• Move applicable stream reaches toward desired condition and maintain condition of those at desired condition.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quality

Desired Condition #6: Water quality in streams, lakes and special aquatic habitats (springs, fens, etc.) is excellent so that all beneficial uses of water are achieved.

Existing Condition: Water quality in the Middle Fork Stanislaus River meet BPO's based on studies recently completed for the current hydropower-relicensing project. Tributaries of the Middle Fork likely meet BPO's since their sub-watersheds are largely wilderness, near natural or otherwise have low intensity management. A concern exists about water quality in Kennedy Creek due to concentrated recreation use and grazing. Water quality is a data gap here and should be evaluated in the near future.

Acid neutralizing capacity (ANC) was sampled in selected lakes in this landscape in 2000 as part of a Sierra Nevada pilot program to determine sensitive lakes that could be monitored for long-term air pollution effects on lake water chemistry in Class 1 Wilderness. The Emigrant Wilderness is a Class 1 Wilderness (Wildernesses established prior to 1977), a portion of which is in the Sonora Pass landscape. Sensitive lakes are those with an ANC of <50 ueq/l. Such lakes have a low buffering capacity against increases in acid deposition. Nine lakes were sampled, all of which had ANC values of <50 ueq/l. Six of these lakes had ANC values of <20 ueq/l, placing them in a group of the most acid-sensitive lakes in the Sierra Nevada.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
California CVRWQCB Regulations	Meet Basin Plan Objectives (BPO)	MFK Stanislaus River meets BPO's (2, 3-SPLAT). Tributaries of the MFK Stanislaus likely meet BPOs but concern exists in Kennedy Creek (2).	• Maintain excellent water quality where at desired condition. • Increase knowledge of water quality in Kennedy Creek.
Acid Neutralizing Capacity (ANC) in Class 1 Wilderness Lakes	ANC ≥ baseline in lakes sensitive to acid deposition (ANC <50).	Nine lakes with low ANC: 1 between 25-50 ueq/l, 6 between 10-25 ueq/l and 2 < 10 ueq/l.	Maintain ANC at or above baseline.
Municipal Water Supplies	Identify and Manage Principal Local Municipal Watersheds	N/A	N/A

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Water Quantity

Desired Condition #7: The flow regime in streams with dams and diversions provides favorable conditions of water flows to maintain proper channel morphology and riparian vegetation, and provides suitable habitat for native and desired non-native aquatic species.

Existing Condition: Flow regime in the Middle Fork Stanislaus River in this landscape has been altered for about 90 years. Relief Reservoir, completed in 1910, was one of the earliest impoundments in the Sierra Nevada. The design intent of the project was to use the river as an open conduit to route stored water about 35 miles downstream to Sand Bar and then place it into a diversion that supplies a penstock-powerhouse facility to generate electricity. The streamflow regulation scenario was to release water in the summer-fall period, the time of most hydropower demand. The use of the natural river channel as the conveyance resulted in an unusual impaired hydrograph—increasing flows at a time of year when flows are naturally decreasing. This flow regulation scenario continued until the late 1950's when Beardsley and Donnells Reservoirs were constructed on the Middle Fork between Relief Reservoir and the Sand Bar Diversion. Since then, the summer-fall flow augmentation in the Middle Fork occurs upstream of Donnells Reservoir since water is diverted immediately below Donnells. This area of current flow alteration, the Relief Reach, has a substantial amount of low gradient channel with fine-grained streambanks since the river courses through a valley comprised of glacial deposition.

The increase in summer-fall flows is substantial compared with the natural hydrograph. Mean monthly streamflow is increased over natural flow rates by about 12% in July, 90% in August, 160% in September and 100% in October. Streamflow is nearly doubled over the course of this four-month period. These flows result in water temperatures that are lower than those that would occur in a naturally flowing river. The large flow increase occurs at a time when the decline in the natural hydrograph provides the means for riparian vegetation reproduction and establishment. The streambed remains inundated when emergence of stream margins is important. The altered flow regime produces additional sheer stress on the stream channel during this period, increasing the erodibility of the fine-grained streambank segments of the river. At present, the altered flow regime between November and May averages out to be at about desired condition. Variation is from about 10% to 40%.

This section of the Middle Fork Stanislaus River provides habitat for introduced brown and rainbow trout and brook char. Since amphibian surveys have not been conducted it is unknown what species currently occupy this stretch of river. There is potential habitat for Yosemite toad in the meadows and mountain yellow-legged frog in streams and meadow lakes.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Streamflow	In gravel bed stream reaches, streamflow is within 10% of unimpaired daily flow hydrograph from June through October, and is within an average of 20% the remainder of the year.	In Relief Reach of the MFK Stanislaus River: During June through October mean monthly-impaired flow is about 75% above unimpaired (increases to about 90% from July through October). Remainder of year mean monthly-impaired flow is about 20% below impaired (3-SPLAT).	• Adjust flow regime in Relief Reach of MFK Stanislaus River.
Aquatic Species Habitat	Suitable habitat for each life stage of native and non-native species.	Introduced brown and rainbow trout present, unknown amphibian presence	• Provide favorable flows for trout habitat during re-licensing • Provide favorable flows for amphibians if they occur in the landscape

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Desired Condition #8: The stream flow regime in streams without dams and diversions are highly similar to a natural flow regime.

Existing Condition: Infiltration at the sub-watershed scale in this landscape is at desired condition. There is very little reduced soil porosity in either of the two sub-watersheds.

The Stand Density Index exceeds threshold values in only 28% of the landscape, similar in magnitude to the Pinecrest landscape. Stand Density Index is exceeded in the lower elevations of the landscape. Large expanses of this landscape are not a stand density problem from the watershed process standpoint. Thus, evapotranspiration in this landscape is very near desired condition.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Infiltration	Natural rate over >90% of sub-watershed.	>90% at the sub-watershed scale (2, 3).	Maintain high level of infiltration in sub-watersheds.
Evapotranspiration	SDI is < threshold values.	28% of landscape exceeds the SDI threshold values (3)	Reduce Stand Density in lower elevations of landscape.

Information source: 1—Limited field observations; 2—Long term field observations; 3—Data supported observations

Terrestrial Hierarchy

Fire

Desired Condition #9: Fire functions as a natural process, approximating the characteristics of the historic fire regime to the extent possible considering the effects on people, property, and natural resources.

Desired Condition #10: The spread and intensity of wildland fire is interrupted over the landscape and the potential for large severe wildfires is low, allowing for the safe and effective protection of people, property, and natural resources.

Existing Condition: Very few fires over 10 acres have been recorded in the Sonora Pass landscape over the past century. A total of 233 fires have burned 139 acres between 1970 and 2000, 66% of them lightning-caused. Relative fire occurrence is low over most of the landscape, and moderate along the highway corridor where a greater percentage of human-caused fires have occurred.

The historic fire regime for the Sonora Pass landscape is primarily fire regime III, long return interval, mixed severity fire. On the south-facing slopes along the Stanislaus River, montane shrub is sustained by infrequent, stand-replacement severity fire (Fire Regime IV). At lower elevations in the mixed conifer and along the river, fires may have been more frequent and of lower severity (fire regime I), promoting more of a Jeffrey pine and sugar pine component there.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Condition Class (CC)	CC1	CC1—97% CC2—3% in fire regime I, low elevation conifer along Stanislaus River	• Move CC2 areas toward CC1 by reducing surface and ladder fuels • Maintain CC1 areas in desired condition
Potential impacts of fire	No negative	CC1—Not likely CC2—Some potential: along Hwy 108 corridor, Long Valley, Eagle Meadow, Old forest emphasis 1/3 of landscape, 3 PACS with moderate or low fire hazard characteristics	• Identify potential impacts during preparation of the Fire Management Plan • Prioritize mitigation measures to reduce potential impacts
Fire hazard - defense	Low –90%	Low: 47% Mod: 24% High: 24% Very high: 5% Higher hazard along highway corridor, especially on the west	• Reduce moderate, high, and very high hazard to low by reducing surface and ladder fuels
Fire hazard - outside	Low - 40% (strategically placed to break up high hazard)	Low: 77% Mod: 9% High: 4% Very high: 10%	• Maintain low hazard areas in desired condition • Reduce higher hazard areas to low as needed by reducing surface and ladder fuels
Suppression effectiveness	Hand crews effective in high value areas (4' flame length)	In WUI along Hwy 108 some potential for >4' flame lengths	• Reduce potential flame length where necessary by removing or rearranging surface fuels
Crown fire potential	Surface only	Some passive crown fire potential in lower elevation conifer along Stanislaus River	• Reduce crown fire potential by reducing surface and ladder fuels, and/or increasing the crown to base height

In summary, the existing condition of the Sonora Pass landscape as it relates to the fire element is good. There are many natural barriers to fire spread, as approximately 40% of this landscape is barren of vegetation. What little restorative treatment is needed, should be focused on efforts to allow naturally occurring fires to be managed for resource benefits. Maintenance of areas where existing condition is at desired condition may also involve some fuels management, primarily prescribed fire.

Plant Species

Desired Condition #11: Designated noxious weeds and other undesired invasive plant populations have been removed and establishment of new weed populations is prevented.

Existing Condition: This landscape is currently, so far as known, in satisfactory condition. No state-listed noxious weed populations are currently confirmed in this landscape. Yellow starthistle was found in the rosette stage at the Sonora Pass Trailhead. We have received unconfirmed reports of a small population of yellow starthistle on private land at Kennedy Meadows. Some of the highest known infestations of cheatgrass occur near this recreation area and Relief Reservoir. Heavy recreational traffic presents a constant potential source of new populations both from the east and west side of the Sierra Nevada.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Noxious weeds and undesired invasive plants	0 occurrences	0 occurrences?	• Monitor, map and record any new occurrences. • Implement preventative actions to minimize spread of weeds.
Established weed populations	All populations are treated and eradicated.	0 occurrences	None identified

Desired Condition #12: All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.

Existing Condition: It is unknown whether sensitive plant species occur in the Sonora Pass landscape, primarily because very few surveys have been conducted in this area. However, habitat for sensitive plant species exists. The potential exists for *Bruchia bolanderi, Cypripedium montanum, Epilobium howellii, Hulsea brevifolia, Hydrothyria venosa, Lomatium stebbinsii, Meesia triquetra, M. uliginosa,* and *Orthotrichum spjutii* to occur in the area.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
TES plant species	Populations of TES species are present, protected and contributing to the maintenance of species viability	Unknown	• Survey un-surveyed areas • Protect known populations when found

Desired Condition #13: Important populations of plant species traditionally used by Native Americans are recorded, restored, and maintained in a usable condition.

Existing Condition: Traditional Native American plants occur throughout this landscape, however, the extent and specific locations are not documented. Without specific information about the plant species and locations in this landscape, specific management actions that would enhance the plant species cannot be identified or initiated at this time.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Traditional Plant Populations	Important populations are recorded, protected and available for use	Unknown	Record locations of traditional use plants when they are found.
Populations Restored	Populations of traditional plants are reintroduced or increased, if absent from or under-represented in current compared to potential natural vegetation.	Unknown	When traditional use plant populations are found, work with Native American partners to identify actions that would restore (if necessary), enhance or maintain the population.
Traditional Plant Populations Maintained	90% of known important populations are determined to be in a usable state.	Unknown	Unknown at this time.

Soil Productivity

Desired Condition #14: Soil porosity, biology and nutrient supply have a high similarity to native soil and PNV conditions. Conditions apply to at least 85% of hill slopes, 95% of Riparian Conservation Areas, and an average of 90% for a sub-watershed.

Existing Condition: Most of the Sonora Pass Landscape is at high elevations where fire regime, soil conditions, and Potential Natural Vegetation are relatively unaltered. Exceptions are in Ecological Units (EU) 304 and 331, in certain meadow areas, and possible in older clearcut areas at high elevations.

EU 304 is an extensive alluvial flat-conifer unit that follows the Upper Middle Fore of the Stanislaus River (Refer to map in Appendix B). Changes in stream hydrology have probably also altered certain soil characteristics. Unit 331 is an extensive upper montane shrub unit on steep, rocky, granitic slopes. Natural fire would occasionally burn through this brush type. Fire would thin and rejuvenate shrub species and provide openings for Jeffery pine seedlings. Today, the vegetation is dense and more subject to a high intensity burn which could damage the soil. Wildlife values are high in this unit when natural fire is allowed to thin and rejuvenate shrubs.

There are older timber harvest units in the Brightman area, for example, that may not be at desired condition relative to soil porosity, large downed woody material, available nitrogen, or soil biology. The Juniper Mine is a site where existing soil conditions are less than desired.

There are many meadows in this glaciated landscape. Some meadows or parts of meadows will have organic surface layers that would classify as a fen or bog. Such meadows are identified in the Sierra Nevada Forest Plan Amendment (USDA 2001) as special features to inventory and protect. Certain meadows in the Eagle Creek sub-watershed are known to have headcuts and gullies present.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Soil Porosity	>90% of natural porosity	Does not meet DC in older plantations. May not meet DC where multiply entry tractor logging has occurred.	• Subsoil skid trails as stands are thinned
Large Downed Woody Material	Logs per acre >20 inch diameter	Meets DC in much of the landscape; May not meet DC where multiply entry tractor logging has occurred; Lack of LWM in plantations	• Create large woody material where needed for wildlife and soil productivity
Evidence of Soil Organisms	Presence of bio-indicators and natural soil structure	Mostly at DC; May not be at DC in plantations	• Survey for status of soil organisms in plantations • See opportunities for managing surface organic matter below
Surface Organic Matter	Litter, duff, small woody material is 50% of natural	Nitrogen availability may be low in plantations located in the red fir zone where tractor piling removed surface organics; Soil and surface organics subject to severe burn behavior in dense brush of unit 331	• Test for N availability. Thin stands and fertilize where N is low. • Rx burn unit 331 to maintain Jeffery pine, cycle nutrients, re-establish natural fire regime, and improve wildlife habitat and diversity

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Topsoil	Organic matter content is 85% of natural	Generally meets DC	

Desired Condition #15: Soil erosion rates do not exceed the natural erosion rate for the Ecological unit.

Existing Condition: See discussion for DC#14 above.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Surface Cover (hillslopes)	50 to 70% surface cover that prevents accelerated erosion	Surface cover is generally at DC. Erosion on old skid trails; Jupiter mine does not meet topsoil and surface cover DCs	• Improve surface cover where needed for erosion control • Stabilize eroding skid trails • Restore Jupiter mine
Surface Cover (RCAs)	75% surface cover that prevents accelerated erosion	Generally meets DC; Some accelerated erosion in dispersed camping sites; Headcuts in some meadows of Eagle Creek sub-watershed; Some meadows have thick organic layers and would qualify as fens and bogs	• Monitor surface cover and accelerated erosion in RCAs • Survey dispersed camping sites. Treat or relocate camp sites that are eroding • Treat headcuts in meadows • Inventory fens and bogs
Roads and OHV Trails on Sensitive Soils	Miles of native surface roads and trails on sensitive soils	Accelerated erosion on native surface roads, skid trails, and trails, particularly on sensitive soils	• Implement Roads Analysis and ID native surface roads and trails on sensitive soils • Re-route, decommission, re-construct roads and trails with high erosion potential

Terrestrial Animal Species

Desired Condition #16: Habitat for all native terrestrial species, including Forest Service designated sensitive species, is available in a spatial pattern on the landscape to maintain viable populations.

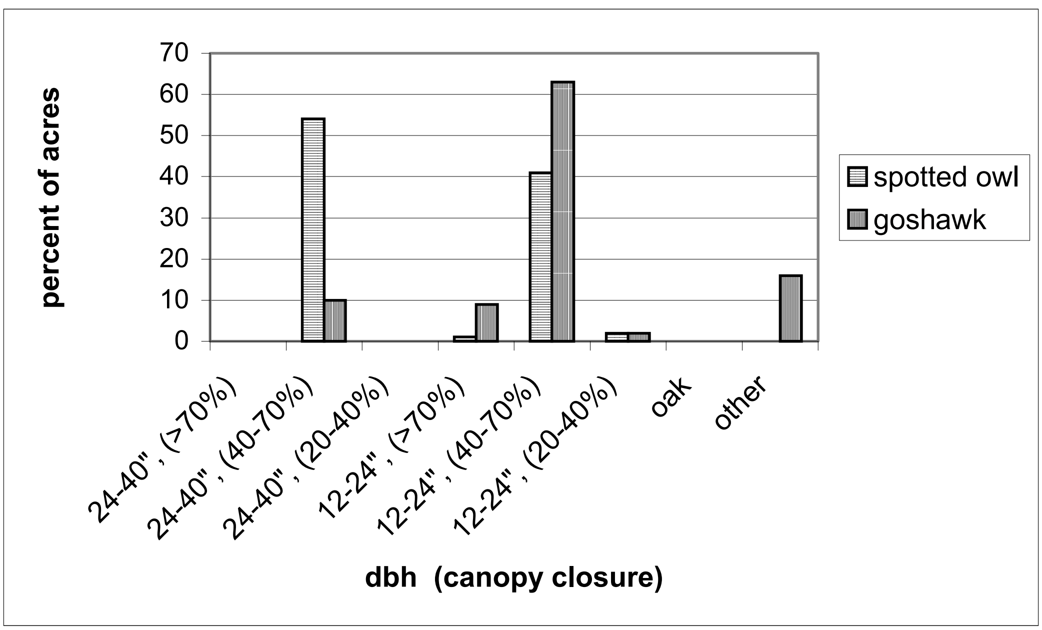
Existing Condition: Western red bat, Townsend's big eared bat, pallid bat, fisher, marten, Sierra Nevada red fox, wolverine, California spotted owl, goshawk, peregrine falcon and mule deer are known to occur or have the potential to occur in this landscape.

Peregrine falcon—There is potential habitat for this species in the Sonora Pass landscape. No sightings have been reported.

Old forest associated species—Within the Sonora Pass landscape, 33% of the area is mapped as OFEA. Approximately 13% of the OFEA exhibits old forest characteristics in size of trees and canopy cover. Thirty percent of the OFEA is not suitable for forest production. This leaves 57% of the OFEA acres to improve to meet old forest desired conditions.

There are three California spotted owl PACs within the Sonora Pass landscape. There are four northern goshawk PACs. Based on the current vegetation data, there are no acres of habitat that meet the desired condition within the designated PACs. The PACs were designated using aerial photo interpretation of photos taken in 1997 and 2000. It is likely that at least some of the acres in PACs are currently at desired condition. Figure 18 displays the percentage of PAC acres by vegetation size and canopy closure.

Figure 18: Sonora Pass Protected Activity Centers Vegetation Data



Great gray owl—This landscape include a great gray owl PAC at Eagle Meadow. The PAC is 99 acres, with 77% of the acres containing trees in the 12 to 24"dbh range.

Mule deer—This landscape provides summer (fawning) habitat for the Stanislaus and Tuolumne deer herds. Over 50% of this landscape is within wilderness (designated or proposed). The 1984 Stanislaus deer herd management plan indicated that low fawn recruitment was the primary factor limiting recovery of the deer herd (Maddox 1984). One factor affecting low fawn recruitment is the decline in forage quality on summer, winter and transitional ranges. Approximately 14% of the landscape is found in oak/hardwood, early succession trees, and meadow and chaparral types.

Montane meadows are an important component of summer range for mule deer, providing forage and cover for both the doe and the fawn. A number of large meadows occur in this landscape: Upper and Lower Relief Valleys, Saucer, Kennedy Lake, Lunch, Eagle, Long Valley, Sardine, Red Rock, and Haypress Meadows. In addition, there are numerous small meadows associated with seeps, springs and creeks. The current condition of these areas as foraging habitat, as well as the availability and condition of cover and fawning habitat, is unknown. Portions of two cattle allotments (Eagle Meadow/Long Valley and Cooper) occur in this landscape.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Old forest associated species, peregrine falcon, great gray owl, mule deer, bats	Presence/ Successful breeding	Known presence and breeding for spotted owl over some of the area, some data for goshawk. Four fisher, 15 marten, 2 wolverine and 2 red fox sightings. Limited surveys for bat species. Some information for mule deer.	• Conduct surveys for presence and breeding of forest carnivores and bat species • Conduct additional surveys for goshawk • Monitor known breeding locations
Old forest associated species habitat	Presence of late succession habitat- OFEA (Forest carnivore) Spotted owl PACs, 300 acres of >24” trees with >70% canopy Northern goshawk PACs, 200 acres of >24” trees with >70% canopy	OFEA habitat: 33% of landscape in OFEA; 13% of OFEA in CWHR types 5D/5M; 30% of OFEA not capable of growing old forest Three spotted owl PACs entirely within landscape; All PACs over 300 acres; 0 acres currently at desired condition. Four goshawk PACs within landscape; 2 PACs below 200 acres; 1 PAC at 387 acres; 0 acres currently at desired condition.	• Increase acres of OFEA that exhibit old forest characteristics • Increase acres of habitat within both spotted owl and goshawk PACs that meet desired conditions • Increase size of 2 goshawk PACs to 200 acres, decrease size of 1 PAC

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Peregrine falcon habitat	Nest sites protected from disturbance	Suitable eyrie sites exist. No known nesting.	Conduct surveys at suitable eyrie sites.
Great gray owl habitat	PAC of 50 acres plus meadow needed to provide prey	99 acre PAC at Eagle Meadow	Assess condition of habitat within PAC.
Mule Deer Habitat	Early succession habitat	14% of landscape in potential foraging habitat. Current condition unknown.	Assess habitat availability and condition. Relationship with range ecological status?
Bat Habitat	Identified occupied habitat is described	Surveys have not been completed to identify occupied habitat.	• Conduct bat surveys • Collect habitat data at occupied sites.

Desired Condition #17: Habitat for federal threatened and endangered species in excellent condition and species and recovery plan requirements is met.

Not applicable for this landscape.

Vegetation Mosaic

Desired Condition #18: Vegetation type and species distribution approach Potential Natural Vegetation (PNV).

Existing Condition: Vegetation types have been changed by timber harvest and by the absence of periodic fire. The portion within the Emigrant Wilderness Area, vegetation change is only associated with fire suppression and recreation use. In portions of the remaining area, over many decades, harvesting removed high-value pines, in advance of predicted mortality. More recently, in response to increasingly sophisticated management strategies, harvesting created openings where most of the existing vegetation was removed and replaced, largely, by planted conifer seedlings. Additionally, in the absence of periodic wildfire, shade-tolerant conifers, primarily white fir, established themselves within existing stands, sometimes becoming the dominant species.

The presence of white pine blister rust in this landscape has reduced the frequency of sugar pine. This pressure, combined with the continual threat of mountain pine beetle-related mortality, is a major concern. Despite the increasing availability of rust-resistant planting stock, significant efforts to reestablish the species have not occurred. Western white pine, also susceptible, has not been significantly affected as yet.

At this time, vegetation types within the landscape do not meet desired species composition, in particular: (a) there is too much white fir in some vegetation types; (b) sugar pine is below desired levels in some vegetation types, and (c) meadow vegetation is below historic levels.

Table 16 below lists the desired conditions and existing vegetation types, for comparison. Refer to the discussion about vegetation mapping in Chapter IV before drawing conclusions from the table. Species composition, within any particular landscape, should be based on local field inventories. Nevertheless, the table provides several starting points that should be evaluated.

Table 16. Desired Condition and Existing Condition of Vegetation Series in Sonora Pass Landscape

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Mixed Conifer	60-80% Mixed Conifer	72% Mixed Conifer
Mixed Conifer/White Fir	30-50% Mixed Conifer 30-50% White Fir	64% Mixed Conifer 0% White Fir
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	30-50% Ponderosa Pine 30-50% Mariposa Manzanita 20-40% Annual Grassland	0% Ponderosa Pine 0% Manzanita 99% Barren
White Fir	60-80% White Fir	40% Mixed Conifer - Fir
Jeffrey Pine/Rock Outcrop/White Fir/Lodgepole Pine	30-40% Jeffrey Pine 10-30% Rock Outcrop 20-30% White Fir 20-30% Lodgepole Pine	1% Jeffrey Pine 2% Barren 7% Mixed Conifer - Fir 33% Lodgepole Pine
Jeffrey Pine/Rock Outcrop	50-70% Jeffrey Pine 20-40% Rock Outcrop	11% Jeffrey Pine 24% Barren
Lodgepole Pine	60-80% Lodgepole Pine	23% Lodgepole Pine
Lodgepole Pine/White Fir/Upper Montane Meadow	30-50% Lodgepole Pine 20-40% White Fir 20-40% Upper Montane Meadow	38% Lodgepole Pine 0% White Fir 0% Upper Montane Meadow
Red Fir	60-80% Red Fir	46% Red Fir
Red Fir/Jeffrey Pine	30-50% Red Fir 20-40% Jeffrey Pine 10-20% Rock Outcrop	7% Red Fir 2% Jeffrey Pine 13% Rock Outcrop
Red Fir/Lodgepole Pine	40-60% Red Fir 30-50% Lodgepole Pine	19% Red Fir 54% Lodgepole Pine
Red Fir/Jeffrey Pine/Lodgepole Pine/Rock Outcrop	20-40% Red Fir 20-40% Jeffrey Pine 20-40% Lodgepole Pine 10-30% Rock Outcrop	33% Red Fir 20% Jeffrey Pine 19% Lodgepole Pine 9% Rock Outcrop
Rock Outcrop/Lodgepole Pine	30-60% Rock Outcrop 30-60% Lodgepole Pine	% Rock Outcrop % Lodgepole Pine
Undifferentiated Montane Shrubland/Jeffrey Pine/Mixed Conifer	40-60% Montane Shrubland 20-40% Jeffrey Pine 10-20% Mixed Conifer	22% Montane Mixed Shrub 9% Jeffrey Pine 17% Mixed Conifer -Fir
Dry Volcanic Meadow/Red Fir	40-60% Dry Volcanic Meadow 20-40% Red Fir	19% Barren 36% Red Fir
Dry Volcanic Meadow/ Mountain Mule Ear	40-60% Dry Volcanic Meadow 40-60% Mountain Mule Ear	88% Barren or Grass 1% Montane Mixed Shrub

Vegetation Series	Desired Potential Natural Vegetation (PNV)	Existing Vegetation (CALVEG)
Dry Volcanic Meadow/Mountain Mule Ear/Jeffrey Pine/Red Fir	20-30% Dry Volcanic Meadow 20-30% Mountain Mule Ear 20-30% Jeffrey Pine 20-30% Red Fir	55% Barren or Grass 9% Montane Mixed Shrub 3% Jeffrey Pine 21% Red Fir
Lodgepole Pine/Whitebark Pine/Rock Outcrop	20-40% Lodgepole Pine 20-40% Whitebark Pine 20-40% Rock Outcrop	21% Lodgepole Pine 12% Subalpine Conifer 19% Rock Outcrop

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
PNV	See Table 16 above.	Higher % fir in the Mixed Conifer Series. Loss of meadows in Upper Montane Meadow Series.	• Reduce fir species composition in Mixed Conifer Series by thinning. • Increase meadows in Upper Montane Meadow Series by burning and/or thinning.
Species Composition—sugar pine	5-25% sugar pine canopy cover within Jeffrey Pine, Mixed Conifer, and White Fir Series.	7-12% sugar pine	Increase sugar pine species composition within the listed vegetation series, with the higher percentage in the mixed conifer series.
Species Composition—white fir	≤ 45% basal area white fir in Mixed Conifer Series	13-53% white fir	Decrease white fir species composition in stands that show > 45% basal area white fir using stand exam data.

Desired Condition #19: Seral stages exist in an arrangement that provides for the long-term development and replacement of key wildlife habitat structure.

Existing Condition: The seral stage distribution indicates that Size Class 4 acreage far exceeds the desired level. All other size classes are at levels below the desired value.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Wildlife Habitat Relationship (WHR) Size Class 1	5%	0%	
Wildlife Habitat Relationship (WHR) Size Class 2	5%	0%	
Wildlife Habitat Relationship (WHR) Size Class 3	15%	10%	
Wildlife Habitat Relationship (WHR) Size Class 4	20%	77%	• Reduce stand density to increase growth to seral stage 5. • Regenerate portions to provide for earlier seral stages.
Wildlife Habitat Relationship (WHR) Size Class 5	55%	13%	

Desired Condition #20: Stand Density is below identified thresholds to minimize insect/drought-related mortality.

Existing Condition: Currently, the average SDI value for strata covering 28% of the landscape are above, or projected to approach, threshold values. Specific data to support these statements can be found Appendix *. The table below describes the existing conditions for this landscape, as it relates to the desired condition for this element. As much of this landscape is within the Emigrant Wilderness area, opportunities for direct action are limited. Outside this area, prescribed fire, alone, may not be a suitable treatment approach in stands, as fire behavior would be expected to kill significant numbers of desired trees.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Stand Density Index (SDI) for Mixed Conifer-Fir	SDI ≤ 300	F3N SDI = 336 F4N SDI = 283	Thinning or prescribed fire in stands where inventories show SDI is approaching, or has exceeded, the threshold.
Stand Density Index (SDI) for Red Fir	SDI ≤ 440	R3G SDI = 384	
Stand Density Index (SDI) for Lodgepole Pine	SDI ≤ 205	A3N SDI = 312 A3P SDI = 192	
Stand Density Index (SDI) for Mixed Conifer-Pine	SDI ≤ 333	M3N SDI = 304 M3P SDI = 443 M4N SDI = 302	

Desired Condition #21: Vegetation in Riparian Conservation Areas (stream corridors and special aquatic features such as meadows, aspen stands, lakes, ponds, springs, fens and bogs) is highly similar to natural potential.

Existing Condition: Riparian vegetation condition is variable in the Sonora Pass landscape. Long–term streamflow regulation, grazing and recreation have affected true riparian trees and shrubs in stream corridors and other wetland sites.

In the higher elevation portions of this landscape where concentrated grazing does not occur the riparian plant communities are at or near desired condition. Natural regenerative processes are nearly intact. Aspen stands and willow communities have been affected where they exist in areas of concentrated grazing. Aspen suckers and willows, especially in the late summer and fall, are very palatable. Annual grazing of aspen shoots and willow seedlings has affected seral stage development. Areas of concern include Kennedy Canyon and Eagle Meadow.

Where low gradient stream reaches with fine-grained streambanks occur along the Middle Fork of the Stanislaus River, true riparian species composition and seral stage development have been altered. As a result of about 90 years of a regulated streamflow regime downstream of Relief Reservoir, a shift in understory species frequency has occurred that favors mountain alder over willow species. Stream margin substrate is now inundated during much of the summer period when willows can regenerate. There also is an apparent gap in seral stage distribution of cottonwood trees. Late seral stage trees remain but early and mid seral stages occur with reduced frequency. Optimum replenishment of cottonwoods occurs where streamflow regime alterations are absent or minimized.

Location and condition of special aquatic features are not fully known. They are believed to be frequent in this landscape and are thus important both as features and inventory projects. Kennedy Canyon is one of the most notable special features in the landscape since it is the largest wetland on the Stanislaus National Forest.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Meadow vegetation	High ecological status in wet and moist meadows. Approaching high status in dry meadows.	1453 acres of meadow. 287 acres of meadow have been surveyed since 1990. Of those, 55 acres are in good/high ecological status, 86 acres in fair/moderate status, and 26 acres in poor/low status.	• Ensure that uses and disturbances to meadow and streamside vegetation occur within parameters that achieve and maintain high ecological status. • Restore degraded meadow conditions, as opportunity exists.

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
True Riparian Trees and Shrubs	Species composition highly similar to PNV; Seral stage distribution relatively uniform.	True riparian trees and shrubs at or near DC in riparian areas without streamflow regulation or concentrated grazing (2). True riparian trees and shrubs not at DC in the Relief Reach of the MFK Stanislaus River due to flow regime alteration (2, 3). In aspen stands and willow communities with concentrated grazing, seral stage distribution is not at DC but magnitude of change is a data gap (2). Location of some special aquatic features is a data gap (meadows, aspen stands, ponds, springs, fens and bogs). Of special note is Kennedy Canyon, the largest wetland on the Stanislaus National Forest.	• Maintain true riparian species where desired condition exists. • Move species composition and seral stage distribution toward desired condition where altered and feasible to accomplish. • Increase knowledge of location and condition of special aquatic features (meadows, aspen stands, ponds, springs, fens and bogs).

Social/Cultural Hierarchy

Economics

Desired Condition #22: Ecosystem management activities and recreation contribute to the economic viability of the local community.

Existing Condition: Economic contributions have traditionally come from Recreation-related activities, primarily along the Highway 108 corridor and Emigrant Wilderness. Resource condition surveys may generate rehabilitation projects, especially at recreation facilities in Riparian Conservation Areas. Other projects may come from dealing with the deferred maintenance backlog at recreation facilities. (Refer to Desired Condition Statements #10, 11, 18, 19, 20, 21 and 28).

Information and Education

Desired Condition #23: The Stanislaus National Forest provides accurate and timely natural and cultural resource information and education.

Existing Condition: The Columns of the Giants, an interpretive site that includes a ½ mile interpretive trail (also designated a National Recreation Trail), two kiosks and two vault toilets, is found in this landscape. In addition, two other interpretive signs occur along the highway above Kennedy Meadows. A rustic trail and interpretive handout are used to highlight the worlds largest Jeffrey Pine, near Douglas Flat picnic area. Most signs and kiosks are 30 to 40 years old and in need of repair or replacement.

As a highly visited area, this landscape has excellent potential for expanding interpretation and education. The Columns of the Giant reconstruction has been funded through the Capital Improvement Program for renovation in 2003.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User preferences	User preference "baseline" data is collected and will be updated every 5 years.	No baseline data exists.	Collect Baseline User Preference data as a first critical step in improving information and education.
Interpretive Program Implementation	The Stanislaus National Forest Interpretive Plan will be updated to include user preference information	Interpretive Plan is not up-to-date.	Include update and annual review of Interpretive Plan in annual program of work. Integrate Baseline Data in Interpretive Plans.
Interpretive Services Offered	Interpretive services increase at a rate commensurate with population demographics	Programs offered have been relatively static over the years.	Build in annual increase in programs offered/people served, as per demographics.
Written and Oral Information	Information provided at Forest Service sites is $\geq$90% accurate.	Information is often out-of-date. A system to identify resource message needs does not exist.	Integrate interpretive and public information programs and information sharing protocols with all resources.

Desired Condition #24: The Forest Service provides public assistance at all developed and dispersed recreation areas and sites.

Existing Condition: Forest service public assistance is very limited in this landscape. All developed campgrounds are maintained and managed by concessionaires. Most visitations by Forest Service personnel are related to administration of the concession permits, fire prevention or scattered OHV use.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Visitation Standards	All recreation sites and settings are visited at a frequency determined by Meaningful Measures	Very low visitation rates from uniformed Forest Service personnel.	• Increase visitation frequency by redirecting funding to this area, as other sources come into play in other areas, such as FERC 4E, cooperative funding with outside sources. • Increase visitation by utilizing volunteers or Forest Service personnel from other functions such as Fire Prevention.

Desired Condition #25: Noxious weed populations on land adjacent to the Forest are removed or under control, lessening the potential for weeds spreading into the Forest.

The following table compares desired condition with existing condition and lists of opportunities for DC#25.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Weed Management Areas	The Stanislaus NF is an active participant in Tuolumne, Calaveras, Mariposa and Alpine County Weed Management Areas	The Stanislaus National Forest participates in the Tuolumne and Calaveras County Weed Management Areas.	Full participation in Weed Management Area programs, projects and grants.

Land Use

Desired Condition #26: Isolated private lands of high ecological, recreational, cultural or aesthetic value are part of the public land base.

Existing Condition: Kennedy Meadows and the Sanguinetti parcels have been identified as potential candidates for acquisition.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	Measure		
Identified properties	All lands acquired	Some high value lands are in private ownership	• Prioritize parcel acquisition • Maintain and enhance relationships with groups who assist in this activity (e.g. Nature Conservancy, Trust For Public Land, etc.)

Desired Condition #27: Recreation opportunities are provided and facilities are well maintained, accessible, appropriate to the setting, and meet future population demands in an environmentally sound way.

Existing Condition: The dominant social-cultural themes in the Sonora Pass area revolve around recreation. Besides Pinecrest, this is the most heavily visited recreation area in the CSWA area. The Middle Fork of the Stanislaus and State Highway 108 provide the primary attraction and access to the majority of the recreation facilities. Developed recreation opportunities include 177 campsites in 7 campgrounds, a picnic area, 3 trailheads, a resort, an organization camp, a private resort/campground, private pack station (operating on public land as an outfitter-guide) and 150 recreation residences. Many facilities such as Dardanelle Resort, Kennedy Meadows Resort (on private land) and many recreation residences were built prior to 1950 and are eligible for historical status. Camping, fishing, hiking and sightseeing are the primary activities with some hunting during the fall. The Sonora Pass Landscape has the most snowmobile use, with activity concentrated along Highway 108 and the Eagle Meadow/Haypress areas. The Eagle Meadow area is a popular dispersed camping destination for hunters, horse users, 4-wheel drive enthusiasts and those who enjoy dispersed camping opportunities. The only designated camping area is the Eagle Horse camp, which has no facilities. The main portal to the Emigrant Wilderness is near Kennedy Meadows. Several private lots and cabins are interspersed along the Eagle Meadow Road between Eagle Creek and Haypress Meadow.

The present Forest Service owned facilities were generally constructed in the 1960's and 70's. Resource degradation near rivers and streams as well as a desire to provide a more "modern", automobile-friendly camping experience, led to the development of many of the existing campgrounds. Because their creation predates most accessibility laws, they do not meet current standards for Universal Design. Most have reached or exceeded their designed lifecycle of 30 years (FSH 7309.11, 1995). The current deferred maintenance backlog for the Forest Service sites in this area is $700,000 and the annual maintenance shortfall is $60,000 (USDA Forest Service INFRA Developed Site Inventory, 2000)

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
User Preferences	Recreation opportunities and facilities meet present and future user preference needs.	Design, form and function of existing facilities meet preference needs of the 1960's and 70's. Some upgrading for accessibility has been accomplished	• Conduct recurring, focused Visitor Surveys. • Utilize general surveys and literature searches. • Implement updated design standards, were available. Develop new Design Standards, where appropriate, to reflect user preferences. • Develop a Facility Management Plan that prioritizes the "what, where and how" of facilities. Include changes needed to mitigate negative impacts on natural resources. • Complete accessibility upgrades.
Population Demographics	Visitor participation reflects demographics of the service area	Data Gap. Suspect diversity of service area is not reflected in existing user groups	• Monitor demographic trends and uses to establish baseline use data. • Where possible and appropriate, incorporate demographic trends in facility and program development.
Facility Occupancy	Recreation facilities are constructed within 3 years of determining that occupancy/use has exceeded 90% seasonally adjusted capacity for two consecutive years.	Little opportunity along Highway 108 to increase capacity during high use periods. Unknown if public is willing to go somewhere else. Low visitation during off-season.	• Monitor use levels. • Concentrate facility upgrades and change in areas of highest use. • Construct new facilities to meet this demand at alternate sites, if it is determined this will be effective and environmentally sound (meets Desired Conditions of other elements) • Maximize funding sources: Capital Improvement Program; cooperative funds
Facility Condition	Meets Forest Service Meaningful Measures Standards/INFRA Accessibility Guidelines	Facilities functional but out of date & in poor condition. Some accessibility upgrades have been completed.	• Establish priorities using Meaningful Measures and INFRA data. • Maximize funding for maintenance of facilities: Appropriated funds; Fee Offset; Fee Demo; Volunteers; Capital Improvement Program

Desired Condition #28: Federal Energy Regulatory Commission (FERC) licenses contain adequate mitigations for project induced recreation activities and facilities.

Existing Condition: Relief Reservoir is part of the Spring Gap-Stanislaus hydroelectric project. It is a popular quasi-wilderness destination. (The Emigrant Wilderness surrounds most of the reservoir and the only public access is by trail). There are trail and campsite impacts related to visitation, especially from day-use, which should be considered for inclusion in FERC 4(e) conditions.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Facilities and activities financed	100% financing of facilities and activities attributable to present and projected demand generated by FERC projects.	No financial contribution by PG&E for any induced impacts at Pinecrest or affected areas. PG&E maintenance cabin at the edge of the Emigrant Wilderness. Numerous user-created trails exist between the Huckleberry Trail and the reservoir. Large camp area at Grouse Creek and at other locations near the reservoir.	• Identify clear present and future project induced impacts. • Prioritize importance and "ownership" of all impacts. • Set Licensee responsibilities in FERC 4(e) requirements to include removal of maintenance cabin and management of user-created trails and campsites (among others).

Desired Condition #29: The road system provides adequate access for public and administrative uses.

Existing Condition: See Chapter IV.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Needed roads	Miles of road retained	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Unneeded Roads	Miles of Road decommissioned	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.
Roads Maintained	Miles of roads maintained to standard	Unknown	• Implement Roads Analysis procedures as outlined in the SNFP amendment: level 3 to 5 roads w/in 2 years; level 1-2 roads w/in 5 years.

Desired Condition #30: The trail system outside wilderness connects communities and accesses other popular locations.

Existing Condition: Existing trail opportunities generally lead from trailheads (Kennedy Meadows, Sonora Pass and Blue Lakes) to the Emigrant Wilderness. The Kennedy Trailhead is the most popular on the Stanislaus. While this is very popular, trail emphasis is to be directed outside the wilderness. The non-wilderness trails include Seven Pines, St. Mary's Pass, Bloomer Lake, Eagle Creek and Silver Mine Creek 4-wheel drive. No trails connect the many recreation destinations along Highway 108. There is a heavy trail maintenance backlog. Suggestions for potential trails are shown on Map J-1 in Appendix J.

Analysis:

DESIRED CONDITION		EXISTING CONDITION	OPPORTUNITIES
Indicator	**Measure**		
Community-linked trail opportunities	Miles of non-motorized community-linking trail constructed	Community-linking trails do not exist.	Construct community-linking trails as identified through public involvement (see Map J-1)
Motorized and non-motorized trails outside wilderness	Miles of trail constructed	Trails exist that primarily access the Emigrant Wilderness and Eagle Meadow. Some OHV use occurs near East Flange and Silver Mine Creek. Most OHV use is restricted to level 2 roads.	• Construct trails identified through public involvement (see Map J-1). • Decommission or discourage use on trails that receive minimal use (Data Gap).
Motorized and non-motorized trails maintained	Miles of trail maintained to standard	Landscape-specific data is lacking, but there is a heavy forest-wide trail maintenance backlog.	• Use Meaningful Measures/INFRA maintenance standards as baseline. • Prioritize maintenance activities toward heavily used trails. • Utilize 4E requirements to ensure Relief trails are maintained to standard.

Chapter VI: Recommendations

This chapter lists recommendations for each of the nine CSWA landscapes. Recommendations in each landscape can be tracked from their origin in Chapter III (Desired Condition) through Chapter IV (Existing Condition) to Chapter V (Landscape Analysis) where comparison of existing and desired conditions revealed opportunities for management action recommendations to achieve desired resource conditions.

Recommendations for each landscape are organized into four categories:

1. Potential Projects—actions that can be implemented on the ground.
2. Inventories and Monitoring—data collection needed to support project actions.
3. Plans, Analyses and Guides—activities and publications.
4. Land Management Plan Amendments

Recommendation categories are divided into subheadings that represent important resource topics related to the ecosystem elements analyzed in CSWA. For example, there are seven subheadings for Potential Projects:

1. Landscape Scale Vegetation Management
2. Patch/Site Scale Vegetation Management
3. Soil Productivity
4. Aquatic/Riparian
5. Recreation Sites and Activities
6. Trails and Roads
7. Animals and Plants
8. Land Acquisition

Each recommendation has an identification number, text describing the recommendation, a reference to its principal desired condition(s), a FERC-related designation where applicable, and lead program area(s).

There are multiple recommendations for most Potential Project subheadings. For example, in Beardsley-Donnells there are 15 recommendations related to Landscape Scale Vegetation Management: Fire (3), Wildlife (3), Watershed (4) and Silviculture (5).

Further integration of recommendations, as in the example above, should be conducted. All recommendations per subheading should be considered together to understand the overall context and rationale so they can be developed into a program of work at the subunit level. The CSWA team believes the final integration of recommendations is done best at the most local management level since that is the most suitable level for developing management actions and priorities for implementation.

Chapter VI.1: Beardsley-Donnells Landscape

#	Potential Projects	Program Lead
Landscape Scale Vegetation Management		
1-1	In the wildland-urban intermix (WUI) zones around Leland Meadows, all summer home tracts, the Beardsley day use area, Hells Half Acre, and transmission and distribution power line buffer zones, reduce surface and ladder fuels and remove excess crown fuels in areas with high fire hazard and condition class 3 and 2. Priority is defense zone, then threat zone. Use of hand and/or mechanical treatments are recommended adjacent to developed areas. All available tools should be considered to accomplish fuels management objectives outside of the defense zone of the WUI. (Refer to Desired Conditions 9, 10)	Fire
1-2	Outside of the WUI, hazard fuel reduction in areas with high fire hazard, condition class 3 or 2, and crown fire potential. Priority is Old Forest Emphasis Areas and California spotted owl PACs TL-183, 099, 083,167, 168, 004, 078, 048, and 017. (Refer to Desired Conditions 9, 10)	Fire
1-3	Maintain previously treated vegetation on both sides of Beardsley Lake using prescribed fire. (Refer to Desired Conditions 9, 10)	Fire
1-4	Increase habitat at desired condition by thinning trees/reintroduction of fire in spotted owl PACs TL183 and TL179. After checking the vegetation typing in spotted owl PACs TL017, TL038 and TL048 use thinning and reintroduction of fire as needed to reach desired condition. (Refer to Desired Condition 16)	Wildlife
1-5	Increase the size of the Brushy Hollow, Chinaman Creek and Miller goshawk PACs. After checking the vegetation typing in the Cascade, Mill and Shoofly goshawk PACs, use thinning and reintroduction of fire as needed to reach desired condition. (Refer to Desired Condition 16)	Wildlife
1-6	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-7	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key locations are areas below about 7,000 feet throughout the landscape. (Refer to Desired Conditions 4, 8)	Watershed
1-8	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are perennial and intermittent streams below about 7,000 feet where true riparian species exist or have the potential to exist. (Refer to Desired Conditions 8, 21).	Watershed
1-9	Restore the natural fire frequency in RCA's and uplands to maintain vegetative conditions that are currently at or near natural potential. Key restoration locations are wilderness and other roadless areas. (Refer to Desired Condition 21)	Watershed
1-10	Reduce mass wasting potential in EU 212 and where feasible in 216 by prescribed burning. (Refer to Desired Condition 15)	Watershed
1-11	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Condition 20)	Silviculture

#	Potential Projects	Program Lead
1-12	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-13	Increase sugar pine within its natural range of occurrence to meet PNV. (Refer to Desired Condition 18).	Silviculture
1-14	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-15	Increase ponderosa pine in mixed conifer/ponderosa pine vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-16	Re-map the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	In meadows in the Upper Montane Meadow PNV Series where conifer encroachment has occurred, increase meadow size to natural potential by thinning or prescribed burning. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-4	In non-wilderness locations where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-5	Restore aspen stand condition to protect or enhance aspen populations. Key restoration locations are aspen stands with conifer encroachment and/or livestock grazing of aspen suckers. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-6	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. Treat the infestation of Canada thistle in the Dardanelle Creek sub-watershed. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-7	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-8	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-9	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Create large woody material (LWM) where needed for soil productivity. (Refer to Desired Condition 14)	Watershed
3-2	Fertilize plantations in red fir timber types where available nitrogen is low. (Refer to Desired Condition 14)	Watershed
3-3	Restore trenched skid trails where feasible. (Refer to Desired Condition 14)	Watershed
3-4	Subsoil areas where compaction occurs as a result of ground disturbing projects. (Refer to Desired Condition 14)	Watershed

#	Potential Projects	Program Lead
3-5	Stabilize old skid trails in the upper portion of the Cow Creek sub-watershed. (Refer to Desired Condition 15)	Watershed
Aquatic/Riparian		
4-1	Adjust streamflow regime in streams with dams and diversions to restore and sustain proper stream channel morphology, optimize structural and species diversity of riparian vegetation, and maintain viable populations of native and desired non-native aquatic fauna. The key location is the Middle Fork Stanislaus River in the Donnells Reach where flow should provide suitable habitat for native aquatic species, including amphibians. (Refer to Desired Condition 7) *(FERC Related)*	Aquatic Biology
4-2	Where reservoirs have inundated historic amphibian habitat, mitigate for habitat loss as a condition of hydropower relicensing. (Refer to Desired Condition 2) *(FERC Related)*	Aquatic Biology
4-3	Maintain and restore habitat/populations of Yosemite toads and mountain yellow legged frogs to insure species viability. (Refer to Desired Condition 1) *(FERC Related)*	Aquatic Biology
4-4	Maintain and restore habitat/populations of foothill yellow legged frogs and western pond turtle to insure species viability. (Refer to Desired Condition 1) *(FERC Related)*	Aquatic Biology
4-5	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed
4-6	Reduce road density, hydrologically connected road segments and stream crossings that are contributing to excessive stream sedimentation and increased routing of water to streams. Key locations are sub-watersheds with high road density on the west side of the MFK of the Stanislaus River between Beardsley and Donnells Reservoirs, and the Cow and lower Mill Creek sub-watersheds. (Refer to Desired Conditions 1, 4, 6, and 8) *(FERC Related)*	Watershed/ Engineering
4-7	Reconstruct or decommission roads built on sensitive soils to minimize erosion and stream sedimentation. (Refer to Desired Conditions 4, 14, 15) *(FERC Related)*	Watershed/ Engineering
4-8	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Condition 4, 15)	Watershed/ Recreation
4-9	Retain Large Woody Debris in stream channels unless it is adversely affecting property, stream condition or public safety. Key locations include the Middle Fork Stanislaus River, where passage of LWD through Donnells Dam should occur.(Refer to Desired Condition 3) *(FERC Related)*	Watershed
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Condition 27, 28, 30) *(FERC Related)*	Recreation
5-2	Develop a network of approved and improved dispersed campsite locations. Revise Recreation Opportunity Guide. (Refer to Desired Conditions 23, 24)	Recreation
5-3	Explore the potential for creating overnight facilities within easy driving distance of the boat launching facilities at Beardsley Reservoir. (Refer to Desired Condition 27) *(FERC Related)*	Recreation
5-4	Initiate fee collection system at Beardsley Day Use. (Refer to Desired Conditions 24, 27) *(FERC Related)*	Recreation
5-5	Implement Fee Collection at developed campgrounds meeting minimum criteria for collection (FSM 2300). (Refer to Desired Conditions 24, 27)	Recreation

#	Potential Projects	Program Lead
5-6	Increase Forest Service presence at Pinecrest. (Refer to Desired Conditions 24, 28) *(FERC Related)*	Recreation
Trails and Roads		
6-1	Build the old Mono Road Trail. (Refer to Desired Condition 30)	Recreation
6-2	Build mid-elevation trails in Beardsley Canyon, utilizing old RR grades and/or the historic C&S Ditch. (Refer to Desired Condition 30)	Recreation
6-3	Construct a connecting OHV 4x4 trail between 5N09X (the 4700 foot road) and 5N06 as a highly technical, low-to-no impact jeep trail. (Refer to Desired Condition 30)	Recreation/ Engineering
6-4	Repair and maintain Beardsley Point Trail. (Refer to Desired Condition 23, 30) *(FERC Related)*	Recreation
6-5	Provide trails connecting this landscape with adjacent landscapes to achieve a network of non-motorized trails between landscapes. (Refer to Desired Condition 30)	Recreation
6-6	Route all trails entering Wilderness through established trailheads to ensure dissemination of wilderness information prior to entry. (Refer to Desired Conditions 23, 30)	Recreation
6-7	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. Consider OHV loop roads in the area around 5N02 and 5N14. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-8	Secure Scenic Byway status for Highway 108. (Refer to Desired Condition 22)	Recreation
6-9	Develop an alternative access route to Beardsley Reservoir from Highway 108 using the 4N14 corridor. (Refer to Desired Condition 29)	Engineering
6-10	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29) *(FERC Related)*	Engineering/ Watershed
6-11	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, recontouring). (Refer to Desired Condition 29) *(FERC Related)*	Engineering/ Watershed
Animal/Plant Species		
7-1	Eradicate the Canada thistle within the Carson-Iceberg Wilderness. (Refer to Desired Condition 11)	Resource Management
7-2	Continue monitoring known weed locations. (Refer to Desired Condition 11)	Resource Management

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife

#	Inventories and Monitoring	Program Lead
1-4	Collect habitat data in the designated bald eagle territories. (Refer to Desired Condition 17)	Wildlife
Patch/Site Scale Vegetation Management		
2-1	Determine ecological status of all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 21)	Range
2-2	Inventory the frequency and distribution of conifer encroachment in meadows. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-3	Inventory high and moderate risk areas for new noxious weed occurrences (train forest employees and volunteers in weed identification). (Refer to Desired Condition 11)	Range
2-4	Inventory the frequency, distribution and condition of Quaking Aspen stands. (Refer to Desired Condition 21)	Watershed
Soil Productivity		
3-1	Identify native surface roads on sensitive soils. Focus on roads in Shoofly area. (Refer to Desired Condition 14, 15)	Watershed
3-2	Inventory LWM by Ecological Unit and in plantations. (Refer to Desired Condition 14)	Watershed
3-3	Test for Nitrogen availability in plantations in red fir timber types. (Refer to Desired Condition 14)	Watershed
3-4	Survey status of soil organisms in plantations. (Refer to Desired Condition 14)	Watershed
3-5	Inventory soil porosity in plantations and in multiple entry tractor units. (Refer to Desired Condition 8, 14)	Watershed
3-6	Inventory trenched skid trails on non-cohesive soils found in Ecological Units 303 and 307. (Refer to Desired Condition 15)	Watershed
3-7	Identify areas within Ecological Units that are subject to mass wasting following severe wildfire and where prescribed burning may reduce wildfire risk in these sensitive areas. Applicable EU's include 201, 204, 206, 212 and 216. (Refer to Desired Condition 15)	Watershed
Aquatic/Riparian		
4-1	Conduct native aquatic species surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macroinvertebrate surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Complete habitat site assessments for California red-legged frog in areas under 5000' in elevation. (Refer to Desired Condition 2)	Aquatic Biology
4-5	Inventory LWD in reference areas (i.e., unmanaged wilderness streams) and managed sub-watersheds. (Refer to Desired Condition 3)	Watershed
4-6	Inventory hydrologically connected road segments in sub-watersheds where road density and/or stream crossings exceed desired condition (see Appendix I). (Refer to Desired Condition 4)	Watershed/ Engineering
4-7	Inventory the frequency, distribution and condition of special aquatic features (i.e., springs, ponds, fens, bogs). (Refer to Desired Condition 21)	Watershed
4-8	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in reference areas such as unmanaged wilderness streams. (Refer to Desired Condition 4)	Watershed
4-9	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed
4-10	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in streams with dams and diversions and in sub-watersheds where roads are not at desired condition. (Refer to Desired Condition 4)	Watershed

#	Inventories and Monitoring	Program Lead
4-11	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) at reference locations. (Refer to Desired Condition 5)	Watershed
4-12	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) in managed sub-watersheds (see Appendix I). (Refer to Desired Condition 5)	Watershed
4-13	Monitor applicable parameters of water quality where degradation may exist (see Appendix I). (Refer to Desired Condition 6)	Watershed
Recreation Sites/Activities		
5-1	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-2	Conduct facility condition survey. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Conditions 22, 23, 27, 28, 29, 30)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct furbearer and bat inventories. (Refer to Desired Condition 16)	Wildlife
7-2	Conduct additional surveys for goshawk. (Refer to Desired Condition 16)	Wildlife
7-3	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany
7-4	Survey for new weed populations, particularly near trailheads. (Refer to Desired Condition 11)	Resource Management
7-5	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management

#	Plans, Analyses and Guides	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures to reduce impacts to the public and high value areas and to expand the use of naturally occurring fire for resource benefit inside and outside of the wilderness. (Refer to Desired Condition 10, 11)	Fire
2	Conduct Roads Analysis in the roaded portion of the landscape. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
3	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
4	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
5	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
6	Complete the Donnells Peregrine Falcon eyrie management strategy. (Refer to Desired Condition 16)	Wildlife
7	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
8	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany

#	Plans, Analyses and Guides	Program Lead
9	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Condition 21)	Range
10	Prepare a habitat management guide for lava caps, to include fuelbreak designs and strategies that minimize impacts to sensitive plants on lava caps. (Refer to Desired Condition 12)	Botany/Fire

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.2: Clark Fork Landscape

#	Potential Projects	Program Lead
	Landscape Scale Vegetation Management	
1-1	In the defense zone around developed areas along Clark Fork Road, reduce surface and ladder fuels and remove excess crown fuels using primarily hand and/or mechanical treatment. (Refer to Desired Conditions 9, 10)	Fire
1-2	Outside of the defense zones, implement hazard fuel reduction in areas with high fire hazard and/or crown fire potential. Priority is Old Forest Emphasis Area (OFEA), primarily using prescribed fire. (Refer to Desired Conditions 9, 10, 16)	Fire/Wildlife
1-3	Improve and maintain the remainder of the landscape with naturally occurring fire where possible. Hazard fuel treatment may be necessary to facilitate the use of naturally occurring fire in the future. (Refer to Desired Conditions 9, 10)	Fire
1-4	After checking the vegetation typing in spotted owl PACs AP004 and AP008, use thinning and reintroduction of fire as needed to reach desired condition. This landscape has a lower priority than other landscapes based on the fire/fuels recommendations. (Refer to Desired Conditions 9, 16, 19)	Wildlife/Fire
1-5	Increase the acres in the Iceberg goshawk PAC. (Refer to Desired Condition 16)	Wildlife
1-6	Increase late succession habitat by thinning trees/reintroduction of fire in Old Forest Emphasis Areas and spotted owl PACs TL056 and TL157. (Refer to Desired Conditions 16, 20, 21, 23	Wildlife
1-7	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are below about 7,000 feet in the Clark Fork canyon between the confluence of the MFK Stanislaus and Iceberg Meadow. (Refer to Desired Conditions 4, 8)	Watershed
1-8	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are the Clark Fork River RCA and the Arnot Creek RCA between Clark Fork and Woods Gulch. (Refer to Desired Conditions 8, 9, 10, 21)	Watershed/Fire
1-9	Restore the natural fire frequency in RCA's and uplands to maintain vegetative conditions that are currently at or near natural potential. Key restoration locations are wilderness and other roadless areas. (Refer to Desired Conditions 21)	Watershed
1-10	Ecologic Unit 331—Prescribe burn to reduce the high erosion potential from wildfire. (Refer to Desired Conditions 9, 10, 15)	Fire/Watershed
1-11	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Conditions 20)	Silviculture
1-12	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-13	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Conditions 18, 20)	Silviculture

#	Potential Projects	Program Lead
1-14	Re-map the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	In meadows in the Upper Montane Meadow PNV Series where conifer encroachment has occurred, increase meadow size to natural potential by thinning or prescribed burning. (Refer to Desired Condition 21)	Range/ Watershed
2-4	In non-wilderness locations where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-5	Restore aspen stand condition to protect or enhance aspen populations. Key restoration locations are aspen stands with conifer encroachment or livestock grazing of aspen suckers. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-6	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. (Refer to Desired Condition 11)	Resource Management
2-7	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11)	Resource Management
2-8	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11)	Range
2-9	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Subsoil areas where compaction occurs as a result of ground disturbing projects. (Refer to Desired Condition 14)	Soils
Aquatic/Riparian		
4-1	*Maintain and restore habitat/populations of Yosemite toads and mountain yellow legged frogs to insure species viability. (Refer to Desired Condition 1)*	Aquatic Biology
4-2	Protect Lahontan cutthroat trout habitat in Disaster Creek from cattle grazing. (Refer to Desired Condition 2)	Aquatic Biology
4-3	Improve the trail in the Disaster Creek watershed and correct resource concerns to protect the Lahontan cutthroat trout habitat. (Refer to Desired Condition 2)	Aquatic Biology
4-4	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed
4-5	Remove the gabions at the Cottonwood Picnic Area on the Clark Fork. (Refer to Desired Condition 5)	Watershed
4-6	Redesign and/or relocate the Clark Fork road and bridges in the vicinity of the Clark Fork and Sand Flat Campground areas. (Refer to Desired Conditions 4, 5)	Watershed
4-7	Retain Large Woody Debris in stream channels unless it is adversely affecting property, stream condition or public safety. Note: LWD in the Clark Fork Landscape is at desired condition. (Refer to Desired Condition 3)	Watershed

#	Potential Projects	Program Lead
4-8	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed/ Recreation
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30)	Recreation
5-2	Increase Forest Service presence (i.e. FS employees and volunteers) in Clark Fork Recreation Area. (Refer to Desired Conditions 24, 28)	Recreation
Trails and Roads		
6-1	Connect the Clark Fork trail system with the proposed Old Mono Road Trail. (Refer to Desired Condition 30)	Recreation
6-2	Re-route or re-construct trail from Adams Camp Meadow to Paradise Valley. (Refer to Desired Conditions 15, 30)	Watershed/ Recreation
6-3	Route all trails entering Wilderness through established trailheads to ensure dissemination of wilderness information prior to entry. (Refer to Desired Conditions 23, 30)	Recreation
6-4	Work with volunteer groups to identify all trails and work towards establishing the appropriate system by maintaining needed trails and decommissioning unneeded trails. (Refer to Desired Conditions 29, 30)	Recreation
6-5	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29)	Engineering/ Watershed
6-6	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, re-contouring). (Refer to Desired Condition 29)	Engineering/ Watershed
Animal/Plant Species		
7-1	Survey meadows for sensitive plants and fens. (Refer to Desired Condition 12)	Botany
7-2	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife
Patch/Site Scale Vegetation Management		
2-1	Evaluate ecological status for all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 21)	Range/ Watershed

#	Inventories and Monitoring	Program Lead
2-2	Inventory the frequency and distribution of conifer encroachment in meadows. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-3	Inventory high and moderate risk areas for new noxious weed occurrences (train forest employees and volunteers in weed identification). (Refer to Desired Condition 11)	Range
2-4	Inventory the frequency, distribution and condition of Quaking Aspen stands. (Refer to Desired Condition 21)	Watershed
Aquatic/Riparian		
4-1	Conduct native aquatic species surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macroinvertebrate surveys in Arnot Creek and Clark Fork; repeat surveys conducted in Disaster Creek. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Inventory LWD in reference areas (i.e., unmanaged wilderness streams) and managed sub-watersheds. (Refer to Desired Condition 3)	Watershed
4-5	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in reference areas such as unmanaged wilderness streams. (Refer to Desired Condition 4)	Watershed
4-6	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) at reference and managed locations (see Appendix I). (Refer to Desired Condition 5)	Watershed
4-7	Inventory the frequency, distribution and condition of special aquatic features (i.e., meadows, springs, ponds, fens, bogs). (Refer to Desired Conditions 1, 14, 21)	Watershed
4-8	Re-survey Disaster Creek for current stream condition using the R5 Stream Condition Inventory protocol. (Refer to Desired Conditions 2, 5)	Aquatic Biology
4-9	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed
Recreation Sites/Activities		
5-1	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-2	Conduct facility condition survey. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Condition 22, 23, 27, 28, 29, 30)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Pant Species		
7-1	Monitor the population numbers of Lahontan cutthroat trout in Disaster Creek. (Refer to Desired Condition 2)	Aquatic Biology
7-2	Conduct spotted owl, goshawk, forest carnivore and bat inventories. (Refer to Desired Condition 16)	Wildlife
7-3	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany
7-5	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management

#	Plans, Analyses and Guides	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize	Fire

#	Plans, Analyses and Guides	Program Lead
	mitigation measures necessary to expand the use of naturally occurring fire for resource benefit inside and outside of the wilderness. Coordinate with the Toiyabe National Forest on wildland fire management along the east edge of the landscape. (Refer to Desired Conditions 9, 10)	
2	Conduct Roads Analysis in the roaded portion of the landscape. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering/ Recreation
3	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
4	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
5	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
6	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Condition 21)	Range
7	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
8	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.3: Dodge Ridge Landscape

#	Potential Projects	Program Lead
	Landscape Scale Vegetation Management	
1-1	In the wildland-urban intermix (WUI) zones around Sugar Pine, Mi-Wuk Village, Sierra Village, Long Barn, Cold Springs/Peter Pam, Pinecrest, and transmission and distribution power line buffer zones reduce surface and ladder fuels and remove excess crown fuels in areas with high fire hazard and condition class 3 and 2. Priority is defense zone, then threat zone. Use of hand and/or mechanical treatments are recommended adjacent to developed areas. All available tools should be considered to accomplish fuels management objectives outside of the defense zone of the WUI. (Refer to Desired Condition 10)	Fire
1-2	Outside of the WUI, hazard fuel reduction in areas with high fire hazard, condition class 3 or 2, and crown fire potential. Priority is Old Forest Emphasis Areas and California spotted owl PACs TL-183, 099, 083,167, 168, 004, 078, 048, and 017. (Refer to Desired Conditions 9, 10)	Fire
1-3	Work with the private landowners to complete and improve a defensible fuel profile zone (DFPZ) between Sugar Pine and Long Barn. The Cold Springs/ Pinecrest/ Strawberry area should also be assessed for development of DFPZs. (Refer to Desired Condition 10)	Fire
1-4	In Wrights/Flora Burn plantations, disrupt the continuity of surface and crown fuels, and remove ladder fuels. Maintain previously treated areas. (Refer to Desired Conditions 9, 10, 22)	Fire
1-5	Improve and expand fire station facilities at Pinecrest, Long Barn and Bald Mountain. (Refer to Desired Conditions 9, 10)	Fire
1-6	Increase late succession habitat by thinning trees/reintroduction of fire in Old Forest Emphasis Areas and spotted owl PACs TL056 and TL157. (Refer to Desired Conditions 16, 19, 20, 22)	Wildlife
1-7	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-8	Increase habitat at desired condition by thinning trees/reintroduction of fire in spotted owl PACs TL057 and TL157. (Refer to Desired Condition 16)	Wildlife
1-9	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are stands throughout the landscape where SDI currently exceeds or will exceed threshold values within the next ten years. (Refer to Desired Conditions 4, 8)	Watershed
1-10	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are perennial and intermittent streams throughout the landscape where true riparian species exist or have the potential to exist. (Refer to Desired Conditions 8, 21)	Watershed
1-11	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Condition 20)	Silviculture

#	Potential Projects	Program Lead
1-12	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-13	Ecological Units 208, 217, 219, 227, 307—Move towards natural fire regime by thinning and prescribed burning in ponderosa pine and Lower Mixed Conifer ecological units. (Refer to Desired Conditions 9, 10, 14, 15)	Watershed/ Fire
1-14	Increase sugar pine within its natural range of occurrence to meet PNV. (Refer to Desired Condition 18).	Silviculture
1-15	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Condition 18, 22)	Silviculture
1-16	Increase ponderosa pine in mixed conifer/ponderosa pine vegetation types to meet PNV. (Refer to Desired Condition 18, 22)	Silviculture
1-17	In Wrights/Flora Burn plantations increase conifer diversity to meet PNV for mixed conifer/ponderosa pine PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-18	Re-map the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	Where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-4	Restore aspen stand condition to protect or enhance aspen populations. Key restoration locations are aspen stands along Wrights Creek where livestock grazing occurs. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-5	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. Remove starthistle and medusahead grass occurrences along Highway 108. Remove starthistle occurrences along other roads in the landscape. (Refer to Desired Condition 11)	Resource Management
2-6	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11)	Resource Management
2-7	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11)	Resource Management
2-8	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Create large woody material (LWM) where needed for soil productivity. (Refer to Desired Condition 14)	Watershed
3-2	Fertilize plantations in red fir timber types where available nitrogen is low. (Refer to Desired Condition 14)	Watershed
3-3	Restore trenched skid trails where feasible. (Refer to Desired Condition 14)	Watershed
3-4	In Wrights/Flora Burn plantations re-spread windrows as stands are thinned. (Refer to Desired Condition 14)	Watershed

#	Potential Projects	Program Lead
3-5	Subsoil compacted areas on hillslopes and Riparian Conservation Areas in the Wrights Creek subwaterhed. (Refer to Desired Condition 15)	Watershed
3-6	Ecological Units 217 and 227—subsoil skid trails as stands are thinned. (Refer to Desired Conditions 14, 15, 22)	Watershed
3-7	Ecological Unit 203—In Wrights Burn, increase amount of surface fine organic matter and vegetation cover. Develop and implement soil restoration plan for eroded soil areas. (Refer to Desired Conditions 14, 15, 22)	Watershed
3-8	In Ecological Unit 203 reintroduce native bunchgrasses in areas with minimal grazing. (Refer to Desired Conditions 14, 15, and 22).	Watershed
3-9	Develop and implement soil restoration plan for Pinecrest Campground. (Refer to Desired Conditions 14, 15)	Watershed
3-10	Subsoil compacted areas in Wrights Creek Meadow. (Refer to Desired Conditions 8, 22)	Watershed
Aquatic/Riparian		
4-1	Maintain and restore habitat/populations of Yosemite toads and mountain yellow legged frogs to insure species viability. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Maintain and restore habitat/populations of foothill yellow legged frogs and western pond turtle to insure species viability. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques (Refer to Desired Conditions 5, 14, 15)	Watershed
4-4	Retain or increase Large Woody Debris in stream channels as needed. Reduce or relocate LWD only when it is adversely affecting property, stream condition or public safety. Key treatments include recruiting and/or placing LWD where deficient in Wrights Creek within the Wrights/Flora plantations. (Refer to Desired Condition 3)	Watershed
4-5	Reduce road density, hydrologically connected road segments and stream crossings that are contributing to excessive stream sedimentation and increased routing of water to streams. Key locations are the Wrights Creek and Upper NFK Tuolumne River subwaterheds. (Refer to Desired Conditions 1, 4, 6, and 8)	Watershed
4-6	Relocate 3N01 road crossing at crossing with Wrights Creek (at Wrights Creek Meadow). (Refer to Desired Conditions 4, 8)	Watershed
4-7	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed/ Recreation
4-8	Reconstruct or decommission roads built on sensitive soils to minimize erosion and stream sedimentation. (Refer to Desired Conditions 4, 14, 15)	Watershed
4-9	Plant riparian species along Wrights Creek within plantations. (Refer to Desired Condition 21)	Watershed
4-10	Ecological Unit 307—Stabilize downcutting in alluvial hillslope Riparian Conservation Areas in the West Sheer area. (Refer to Desired Conditions 5, 15, 22)	Watershed
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30)	Recreation
5-2	Develop a network of approved and improved dispersed campsite locations. Revise Recreation Opportunity Guide. (Refer to Desired Conditions 23, 24)	Recreation
5-3	Institute a fee collection system at the Pinecrest Day Use area. (Refer to Desired Conditions 24, 27)	Recreation

#	Potential Projects	Program Lead
5-4	Increase Forest Service presence (i.e. FS employees and volunteers) at Pinecrest. (Refer to Desired Condition 24)	Recreation
5-5	Create demonstration/interpretive site for thinning/fuels reduction/watershed management. (Refer to Desired Condition 23)	Interpretive Services
Trails and Roads		
6-1	Build Old Mono Road Trail. (Refer to Desired Condition 30)	Recreation
6-2	Build Emigrant Trail. (Refer to Desired Condition 30)	Recreation
6-3	Build Pinecrest Loop Trail. (Refer to Desired Conditions 30, 11, 24)	Recreation
6-4	Provide trails connecting this landscape with adjacent landscapes to achieve a network of non-motorized trails between landscapes. (Refer to Desired Condition 30)	Recreation
6-5	Provide connecting trails between the trails within the Duckwall landscape and other landscapes. (Refer to Desired Condition 30)	Recreation
6-6	Secure Scenic Byway status for Highway 108. (Refer to Desired Conditions 22, 23)	Recreation
6-7	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-8	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29)	Engineering/ Watershed
6-9	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, recontouring). (Refer to Desired Condition 29)	Engineering/ Watershed
Animal/Plant Species		
7-1	Map ox-eye daisy and eradicate near roads, meadows and rivers. (Refer to Desired Condition 11)	Resource Management
7-2	Eradicate yellow starthistle, medusahead grass, and jointed goatgrass. (Refer to Desired Condition 11)	Resource Management
7-3	Place barriers around impacted *Mimulus pulchellus* sites. (Refer to Desired Condition 12)	Botany
7-4	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management
Land Acquisition		
8-1	Acquire Little Sweden. (Refer to Desired Conditions 12, 26)	Lands

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife

#	Inventories and Monitoring	Program Lead
Patch/Site Scale Vegetation Management		
2-1	Determine ecological status of all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 1)	Range
2-2	Inventory the frequency, distribution and condition of Quaking Aspen stands. (Refer to Desired Condition 21)	Watershed
2-3	Inventory high and moderate risk areas for new noxious weed occurrences. Train Forest employees and volunteers in weed identification. (Refer to Desired Condition 11)	Resource Management
2-4	Inventory ecological status of meadows and condition of conifer stands within the Pinecrest Basin. (Refer to Desired Conditions 19, 20, 21)	Watershed/ Silviculture
Soil Productivity		
3-1	Survey for status of soil productivity indicators in Pinecrest Basin. (Refer to Desired Condition 14)	Watershed
3-2	Inventory soil porosity in plantations and in multiple entry tractor units. (Refer to Desired Conditions 8, 14)	Watershed
3-3	Inventory trenched skid trails on non-cohesive soils found in Ecological Units 303 and 307. (Refer to Desired Condition 15)	Watershed
3-4	Inventory large woody material (LWM) by Ecological Unit and also in plantations. (Refer to Desired Conditions 14, 15)	Watershed
3-5	Ecological Unit 203—Survey areas of eroded soil in Wrights/Flora plantations. (Refer to Desired Conditions 14, 15)	Watershed
3-6	Ecological Unit 307—Inventory sensitive glacial/alluvial soils. (Refer to Desired Condition 15)	Watershed
3-7	Survey for status of soil organisms by Ecological Unit and in plantations. (Refer to Desired Condition 14)	Watershed
Aquatic/Riparian		
4-1	Surveys for native aquatic species in un-surveyed areas. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macro invertebrate inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Conduct California red-legged frog habitat site assessments in Designated Critical Habitat first, and the remainder of the watershed below 5000' elevation second. (Refer to Desired Condition 2)	Aquatic Biology
4-5	Inventory LWD in managed subwaterheds. (Refer to Desired Condition 3)	Watershed
4-6	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in subwaterheds where roads are not at desired condition. (Refer to Desired Condition 4)	Watershed
4-7	Inventory hydrologically connected road segments in subwaterheds where road density and/or stream crossings exceed desired condition (see Appendix I). (Refer to Desired Condition 4)	Watershed
4-8	Monitor applicable parameters of water quality where degradation may exist (see Appendix I). (Refer to Desired Condition 6)	Watershed
4-9	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) in managed subwaterheds (see Appendix I). (Refer to Desired Condition 5)	Watershed
4-10	Conduct Stream Condition Inventories in Wrights Creek and North Fork Tuolumne above 4N26. (Refer to Desired Conditions 3, 4, 5)	Watershed
4-11	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed

#	Inventories and Monitoring	Program Lead
4-12	Inventory the frequency, distribution and condition of special aquatic features (i.e., springs, ponds, fens, bogs). (Refer to Desired Condition 21)	Watershed
Recreation Sites/Activities		
5-1	Conduct facility condition inventories. (Refer to Desired Condition 27)	Recreation
5-2	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preferences inventories. (Refer to Desired Conditions 23, 24, 27)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct furbearer and bat inventories. (Refer to Desired Condition 16)	Wildlife
7-2	Conduct additional goshawk surveys. (Refer to Desired Condition 16)	Wildlife
7-3	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany
7-4	Conduct regular surveys for weeds at trailheads and horse camps. (Refer to Desired Condition 11)	Resource Management
7-5	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management

#	Plans, Analyses and Guides	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures, in addition to those above, to reduce impacts to the public and high value areas. (Refer to Desired Conditions 9, 10)	Fire
2	Conduct Roads Analysis landscape wide. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
3	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
4	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
5	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
6	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Condition 21)	Range
7	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
8	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany
9	Prepare a habitat management guide for lava caps, to include fuelbreak designs and strategies that minimize impacts to sensitive plants on lava caps. (Refer to Desired Condition 12)	Botany/Fire

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.4: Duckwall Landscape

#	Potential Projects	Program Lead
Landscape Scale Vegetation Management		
1-1	In the wildland-urban intermix (WUI) zones around Mt. Provo, Ponderosa Hills, Forest Vista, Tuolumne, scattered remote clusters of residences, and transmission and distribution power line buffer zones reduce surface and ladder fuels and remove excess crown fuels in areas with high fire hazard and condition class 3 and 2. Priority is defense zone, then threat zone. Use of hand and/or mechanical treatments are recommended adjacent to developed areas. All available tools should be considered to accomplish fuels management objectives outside of the defense zone of the WUI. (Refer to Desired Conditions 9, 10)	Fire
1-2	Outside of the WUI, hazard fuel reduction in areas with high fire hazard, condition class 3 or 2, and crown fire potential. Priority is Old Forest Emphasis Areas and California spotted owl PACs (except TL-063). (Refer to Desired Conditions 9, 10, 16)	Fire/Wildlife
1-3	Work with the private landowners to complete and improve a defensible fuel profile zone (DFPZ) from Mt. Provo to Tuolumne. (Refer to Desired Conditions 9, 10)	Fire
1-4	Maintain previously treated (using prescribe fire) areas. (Refer to Desired Conditions 9, 10)	Fire
1-5	Develop site plan and engineering specifications for a fire station at Cottonwood Summit. (Refer to Desired Conditions 9, 10)	Fire
1-6	After checking the vegetation typing in spotted owl PACs TL210 and TL146, use thinning and reintroduction of fire as needed to reach desired condition. (Refer to Desired Conditions 16, 19, 9)	Wildlife/Fire
1-7	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-8	In PNV series containing oak and oak-grassland components, increase the frequency and distribution of oaks and oak-grassland vegetation communities. (Refer to Desired Conditions 18)	Wildlife
1-9	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are stands throughout the landscape where SDI currently exceeds or will exceed threshold values within the next ten years. (Refer to Desired Conditions 4, 8)	Watershed
1-10	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are perennial and intermittent streams throughout the landscape where true riparian species exist or have the potential to exist. (Refer to Desired Conditions 8, 9, 10, 21)	Watershed/ Fire
1-11	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Conditions 20)	Silviculture
1-12	In areas containing seral stages 1, 3, and 4, reduce stand density to increase	Silviculture

#	Potential Projects	Program Lead
	growth to seral stages 2, 4, and 5. In areas containing seral stage 1-size classes, reduce stand density and minimize plant competition to accelerate growth rates. (Refer to Desired Conditions 19, 22)	
1-13	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-14	Ecological Units 208 and 217—Move towards natural fire regime by thinning and prescribed burning in ponderosa pine and lower mixed conifer vegetation. (Refer to Desired Conditions 9, 10, 14, 15)	Watershed/ Fire
1-15	Increase sugar pine within its natural range of occurrence to meet PNV. (Refer to Desired Conditions 18).	Silviculture
1-16	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-17	Increase ponderosa pine in mixed conifer/ponderosa pine vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-18	Re-map the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	Where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-4	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. (Refer to Desired Condition 11)	Range
2-5	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11)	Range
2-6	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11)	Range
2-7	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Create large woody material (LWM) where needed for soil productivity. (Refer to Desired Condition 14)	Watershed
3-2	Restore trenched skid trails where feasible. (Refer to Desired Condition 14)	Watershed
3-3	Ecological Units 205, 208 and 211—use shredding treatment to provide moisture-conserving mulch when thinning south facing slopes. (Refer to Desired Condition 14, 15)	Watershed
3-4	Implement treatments that build topsoil organic matter on Mariposa soils. Examples are shred, mulch, fertilize, and grow conifers and oaks. (Refer to Desired Condition 14, 15)	Watershed
3-5	Treat, relocate, and decommission roads, OHV trails, and campsites that are eroding. (Refer to Desired Condition 14)	Watershed

#	Potential Projects	Program Lead
Aquatic/Riparian		
4-1	Maintain and restore habitat/populations of foothill yellow legged frogs and western pond turtle to insure species viability. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed
4-3	Reduce road density, hydrologically connected road segments and stream crossings that are contributing to excessive stream sedimentation and increased routing of water to streams. (Refer to Desired Conditions 1, 4, 6, and 8)	Watershed
4-4	Retain or increase Large Woody Debris in stream channels. Reduce or relocate LWD only when it is adversely affecting property, stream condition or public safety. Key treatments include removing any LWD aggregates remaining from the 1987 Stanislaus Complex fire that continue to threaten stream condition or impair fish passage. (Refer to Desired Condition 3)	Watershed
4-5	Determine interest in developing and implementing a cooperative stream restoration plan with private landowners in the Murphy's Ranch area on Duckwall Creek. (Refer to Desired Conditions 4, 5, 21)	Watershed
4-6	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30)	Recreation
5-2	Develop a network of approved and improved dispersed campsite locations. Revise Recreation Opportunity Guide. (Refer to Desired Conditions 23, 24)	Recreation
5-3	Implement fee Collection at developed campgrounds meeting minimum criteria for collection (FSM 2300). (Refer to Desired Conditions 24, 27)	Recreation
5-4	Increase Forest Service presence, especially in popular OHV areas. (Refer to Desired Conditions 24)	Recreation
Trails and Roads		
6-1	Provide trails connecting this landscape with adjacent landscapes to achieve a network of non-motorized trails between landscapes. (Refer to Desired Conditions 30)	Recreation
6-2	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-3	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29)	Engineering/ Watershed
6-4	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, recontouring). (Refer to Desired Condition 29)	Engineering/ Watershed

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife
Patch/Site Scale Vegetation Management		
2-1	Evaluate ecological status for all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Conditions 21)	Range
2-2	Inventory high and moderate risk areas for new noxious weed occurrences. Train Forest employees and volunteers in weed identification. (Refer to Desired Condition 11)	Range
2-3	Identify locations of elderberry plants during vegetation surveys. (Refer to Desired Condition 17)	Wildlife
Soil Productivity		
3-1	Ecological Unit 211—Test Mariposa soils for loss of topsoil nutrients in Stanislaus Complex burn. (Refer to Desired Condition 14)	Watershed
3-2	Inventory LWM by ecological unit and also in plantations. (Refer to Desired Condition 14)	Watershed
3-3	Survey for status of soil organisms by ecological unit and also in plantations. (Refer to Desired Condition 14)	Watershed
3-4	Identify areas within Ecological Units that are subject to mass wasting following severe wildfire and where prescribed burning may reduce wildfire risk in these sensitive areas. Applicable EU's include 201, 204, 206, 212 and 216. (Refer to Desired Condition 15)	Watershed
3-5	Inventory soil porosity in plantations and in multiple entry tractor units. (Refer to Desired Conditions 8, 14)	Watershed
Aquatic/Riparian		
4-1	Surveys for native aquatic species in un-surveyed areas. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macro invertebrate surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Conduct California red-legged frog habitat site assessments in Designated Critical Habitat first, and the remainder of the watershed below 5000' elevation second. (Refer to Desired Condition 2)	Aquatic Biology
4-5	Inventory LWD in managed sub-watersheds. (Refer to Desired Condition 3)	Watershed
4-6	Inventory hydrologically connected road segments in sub-watersheds where road density and/or stream crossings exceed desired condition (see Appendix I). (Refer to Desired Condition 4)	Watershed
4-7	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in sub-watersheds where roads are not at desired condition and/or are recovering from the Stanislaus Complex Fire of 1987. (Refer to Desired Condition 4)	Watershed
4-8	Monitor applicable parameters of water quality where degradation may exist (see Appendix I). (Refer to Desired Condition 6)	Watershed

#	Inventories and Monitoring	Program Lead
4-9	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed
4-10	Inventory the frequency, distribution and condition of special aquatic features (i.e., springs, ponds, fens, bogs). (Refer to Desired Condition 21)	Watershed
Recreation Sites/Activities		
5-1	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-2	Conduct facility condition survey. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Conditions 22, 23, 27, 28, 29, 30)	Recreation
Recreation Sites/Activities		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct furbearer and bat inventories. Conduct additional surveys for goshawk. (Refer to Desired Conditions16)	Wildlife
7-2	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany

#	Plans, Analyses and Guides	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures, in addition to those above, to reduce impacts to the public and high value areas. (Refer to Desired Conditions 9, 10)	Fire
2	Develop plantation protection plan for the Paper and Cottonwood Fire areas. (Refer to Desired Conditions 9, 10)	Fire
3	Conduct Roads Analysis landscape wide. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
4	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
5	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
6	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
7	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Conditions 21)	Range
8	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
9	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.5: Lyons Landscape

#	Potential Projects	Program Lead
	Landscape Scale Vegetation Management	
1-1	In the wildland-urban intermix (WUI) zones from Cedar Ridge to Twain Harte, communities along Highway 108 to Strawberry, American Camp, clusters of residences along the South Fork of the Stanislaus River, and transmission and distribution power line buffer zones, reduce surface and ladder fuels and remove excess crown fuels in areas with high fire hazard and condition class 3 and 2. Priority is defense zone, then threat zone. Use of hand and/or mechanical treatments are recommended adjacent to developed areas. All available tools should be considered to accomplish fuels management objectives outside of the defense zone of the WUI. (Refer to Desired Conditions 9, 10)	Fire
1-2	Outside of the WUI, hazard fuel reduction in areas with high fire hazard, condition class 3 or 2, and crown fire potential. Priority is Old Forest Emphasis Areas and California spotted owl PACs (except TL-105 and TL-161). (Refer to Desired Conditions 9, 10, 16)	Fire/Wildlife
1-4	Work with the private landowners to complete and improve a defensible fuel profile zone (DFPZ) around communities along the southwest edge of the landscape. The Cold Springs/Pinecrest/Strawberry area should also be assessed for development of DFPZs. (Refer to Desired Conditions 9, 10)	Fire
1-3	Maintain previously treated (i.e. prescribed burn) areas. (Refer to Desired Conditions 9, 10)	Fire
1-5	After checking the vegetation typing in spotted owl PACs TL163, TL055 and TL 058, and the Deer Creek goshawk PAC, use thinning and reintroduction of fire as needed to reach desired condition. (Refer to Desired Condition 16)	Wildlife
1-6	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-7	Increase the acres in the Strawberry goshawk PAC. (Refer to Desired Condition 16)	Wildlife
1-8	In PNV series containing oak and oak-grassland components, increase the frequency and distribution of oaks and oak-grassland communities. (Refer to Desired Condition 18)	Wildlife
1-9	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are stands throughout landscape where SDI currently exceeds or will exceed threshold values within the next ten years. (Refer to Desired Conditions 4, 8)	Watershed
1-10	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are perennial and intermittent streams throughout the landscape where true riparian species exist or have the potential to exist. (Refer to Desired Conditions 8, 21)	Watershed

#	Potential Projects	Program Lead
1-11	Ecological Units 208, 217, 227 and 307—Move towards natural fire regime by thinning and prescribed burning in ponderosa pine and lower mixed conifer ecological units. (Refer to Desired Conditions 9, 10, 14, 15, 18)	Watershed/ Fire
1-12	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Condition 20)	Silviculture
1-13	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-14	Increase sugar pine within its natural range of occurrence to meet PNV. (Refer to Desired Condition 18).	Silviculture
1-15	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-16	Increase ponderosa pine in mixed conifer/ponderosa pine vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-17	Re-map the Old Forest Emphasis Areas as inaccurately located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	In meadows in the Upper Montane Meadow PNV Series where conifer encroachment has occurred, increase meadow size to natural potential by thinning or prescribed burning. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-4	Where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-5	Restore aspen stand condition to protect or enhance aspen populations. Key restoration locations are aspen stands with conifer encroachment or grazing. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-6	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-7	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-8	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-9	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Create large woody material (LWM) where needed for soil productivity. (Refer to Desired Condition 14)	Watershed
3-2	Restore trenched skid trails where feasible. (Refer to Desired Condition 14)	Watershed

#	Potential Projects	Program Lead
3-3	Re-spread windrows in Sonnet burn on Grant Ridge. (Refer to Desired Condition 14)	Watershed
3-4	Restore soil conditions on terraced areas as practical. (Refer to Desired Condition 14)	Watershed
3-5	Implement treatments such as shredding, mulching, fertilizing, growing conifers and hardwoods, that build topsoil organic matter on Mariposa soils. (Refer to Desired Condition 14)	Watershed
3-6	Ecological Unit 205—Use shredding treatment to provide moisture-conserving mulch when thinning south facing slopes. (Refer to Desired Conditions 14, 15)	Watershed
Aquatic/Riparian		
4-1	Adjust streamflow regime in streams with dams and diversions to restore and sustain proper stream channel morphology, optimize structural and species diversity of riparian vegetation, and maintain viable populations of native and desired non-native aquatic fauna. The key location is the South Fork Stanislaus River. In the reach below Lyons Reservoir, increase minimum flows per new requirements in the Phoenix Project license or to flows that meet temperature objectives for amphibians, whichever is greater. If Lyons Reservoir is enlarged in the future, establish a new flow regime that provides suitable flow and temperature for native and desired non-native aquatic species. (Refer to Desired Condition 7) *(EREC Related)*	Aquatic Biology
4-2	Where reservoirs have inundated historic amphibian habitat, mitigate for habitat loss as a condition of hydropower relicensing. (Refer to Desired Condition 2) *(FREC Related)*	Aquatic Biology
4-3	Maintain and restore habitat/populations of foothill yellow legged frogs and western pond turtle to insure species viability. (Refer to Desired Condition 1) *(FERC Related)*	Aquatic Biology
4-4	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed
4-5	Reduce road density, hydrologically connected road segments and stream crossings that are contributing to excessive stream sedimentation and increased routing of water to streams. The key location is the Middle SFK Stanislaus River subwatershed. (Refer to Desired Conditions 4, 6, and 8)	Watershed
4-6	Reconstruct or decommission roads built on sensitive soils to minimize erosion and stream sedimentation. (Refer to Desired Conditions 4, 14, 15) *(FERC Related)*	Watershed/ Engineering
4-7	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed
4-8	Retain or increase Large Woody Debris in stream channels. Reduce or relocate LWD only when it is adversely affecting property, stream condition or public safety. Key actions include allowing LWD passage through Lyons Dam. (Refer to Desired Condition 3) *(FERC Related)*	Watershed
Recreation/Sites Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30) *(FERC Related)*	Recreation
5-2	Develop a network of approved and improved dispersed campsite locations. (Refer to Desired Conditions 24)	Recreation

#	Potential Projects	Program Lead
5-3	Institute fee collection at developed campgrounds meeting minimum criteria for collection (FSM 2300). (Refer to Desired Conditions 24, 27)	Recreation
5-4	Increase Forest Service presence, especially in popular OHV areas. (Refer to Desired Conditions 24, 28)	Recreation
Trails and Roads		
6-1	Complete Sugar Pine Railroad Trail between Twain Harte and Fraser Flat. (Refer to Desired Condition 30)	Recreation
6-2	Provide trails connecting this landscape with adjacent landscapes to achieve a network of non-motorized trails between landscapes. (Refer to Desired Condition 30)	Recreation
6-3	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-4	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29) *(FERC Related)*	Engineering/ Watershed
6-5	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, re-contouring). (Refer to Desired Conditions 29) *(FERC Related)*	Engineering/ Watershed
Animal/Plant Species		
7-1	Eradicate yellow starthistle and tocalote at proposed American Camp underburn. (Refer to Desired Condition 11)	Resource Management/ Fire
7-2	Eradicate medusahead grass in OHV trail. (Refer to Desired Condition 11)	Resource Management/ Recreation
7-3	Eradicate scotch broom infestations. (Refer to Desired Condition 11)	Resource Management
7-4	Move the OHV parking and camping away from known sensitive plant populations. (Refer to Desired Condition 12)	Recreation
7-5	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management
Land Acquisition		
8-1	Acquire the Hess Meadow property to protect great gray owl habitat. (Refer to Desired Condition 16)	Lands/Wildlife

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment CSWA-wide. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife

#	Inventories and Monitoring	Program Lead
Patch/Site Scale Vegetation Management		
2-1	Determine ecological status for all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 21)	Range
2-2	Inventory high and moderate risk areas for new noxious weed occurrences. Train Forest employees and volunteers in weed identification. (Refer to Desired Condition 11)	Range
2-3	Inventory the frequency and distribution of conifer encroachment in meadows. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-4	Inventory the frequency, distribution and condition of Quaking Aspen stands. (Refer to Desired Condition 21)	Watershed
2-5	Identify locations of elderberry plants during vegetation surveys. (Refer to Desired Condition 17)	Wildlife
Soil Productivity		
3-1	Inventory LWM by Ecological Unit and also in plantations. (Refer to Desired Condition 14)	Watershed
3-2	Survey for status of soil organisms by Ecological Unit and in plantations. (Refer to Desired Condition 14)	Watershed
3-3	Inventory soil porosity in plantations and in multiple entry tractor units. (Refer to Desired Condition 14)	Watershed
3-4	Identify areas within Ecological Units that are subject to mass wasting following severe wildfire and where prescribed burning may reduce wildfire risk in these sensitive areas. Applicable EU's include 201, 204, 206, 212 and 216. (Refer to Desired Conditions 15)	Watershed
Aquatic/Riparian		
4-1	Conduct native aquatic species surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macro invertebrate surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Complete habitat site assessments for California red-legged frog in areas under 5000' in elevation. (Refer to Desired Condition 2)	Aquatic Biology
4-5	Conduct LWD inventory in selected subwaterheds. The priorities are Deer Creek, Five Mile Creek and the Lower South Fork Stanislaus (below Lyons Reservoir). (Refer to Desired Condition 3)	Watershed
4-6	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in streams with dams and diversions and in sub-watersheds where roads are not at desired condition. (Refer to Desired Condition 4)	Watershed
4-7	Monitor applicable parameters of water quality where degradation may exist (see Appendix I). (Refer to Desired Condition 6)	Watershed
4-8	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) in managed subwaterheds (see Appendix I). (Refer to Desired Condition 5)	Watershed
4-9	Conduct inventory of hydrologically connected road segments (HCS) with the priority being the Middle SFK Stanislaus subwaterhed above Lyons Reservoir, and Deer Creek. (Refer to Desired Conditions 4, 6)	Watershed
4-10	Inventory frequency/distribution of true riparian trees and shrubs across landscape. (Refer to Desired Condition 21)	Watershed
4-11	Inventory special aquatic features (springs, seeps, fens, bogs) across the landscape. (Refer to Desired Condition 21)	Watershed

#	Inventories and Monitoring	Program Lead
Recreation Sites/Activities		
5-1	Conduct facility condition survey. (Refer to Desired Condition 27)	Recreation
5-2	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Conditions 22, 23, 27, 28, 29, 30)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Condition 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct furbearer and bat inventories. (Refer to Desired Condition 16)	Wildlife
7-2	Conduct additional surveys for goshawk. (Refer to Desired Condition 16)	Wildlife
7-3	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany
7-4	Complete the inventory of OHV trails and evaluate impacts to sensitive plants. (Refer to Desired Condition 12)	Recreation/ Botany
7-5	Survey meadows for sensitive plants and fens. (Refer to Desired Conditions 12, 21)	Botany/ Watershed

#	Plans, Analyses and Guides	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures, in addition to those above, to reduce impacts to the public and high value areas. (Refer to Desired Conditions 9, 10)	Fire
2	Conduct Roads Analysis landscape wide. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
3	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
4	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
5	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
6	Develop a cooperative Municipal Watershed water quality management plan with Tuolumne Utilities District. (Refer to Desired Condition 6)	Watershed
7	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Conditions 21)	Range
8	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
9	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany
10	Prepare a habitat management guide for lava caps, to include fuelbreak designs and strategies that minimize impacts to sensitive plants on lava caps. (Refer to Desired Condition 12)	Botany/Fire

#	Land and Resource Management Plan Amendments	Program Lead
1	At next Forest Plan revision, consider Special Interest Area status designation for the Deer Creek watershed. (Refer to Desired Condition 12)	Botany/LMP
2	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
3	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.6: Pinecrest Landscape

#	Potential Projects	Project Lead
	For potential projects around Pinecrest Lake, see also the Dodge Ridge Landscape.	
Landscape Scale Vegetation Management		
1-1	In the wildland–urban intermix (WUI) zones around the Pinecrest developed area; reduce surface and ladder fuels and remove excess crown fuels in areas with high fire hazard and condition class 3 and 2. Priority is the defense zone, then threat zone. Use of hand and/or mechanical treatments are recommended adjacent to developed areas. All available tools should be considered to accomplish fuels management objectives outside of the defense zone of the WUI. (Refer to Desired Conditions 9, 10)	Fire
1-2	Outside of the WUI, implemented hazard fuel reduction in areas with higher fire hazard and/or crown fire potential. Priority is Old Forest Emphasis Area (OFEA) and Ecological Units 219 and 319. (Refer to Desired Conditions 9, 10)	Fire
1-3	Improve and maintain the remainder of the landscape with naturally occurring fire where possible. Hazard fuel treatment may be necessary to facilitate the use of naturally occurring fire in the future. (Refer to Desired Conditions 9, 10)	Fire
1-4	After checking the vegetation typing in spotted owl PACs TL108 (S14) and the Herring goshawk PAC, use thinning and reintroduction of fire as needed to reach desired condition. (Refer to Desired Condition 16)	Wildlife
1-5	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-6	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are below about 7,000 feet where SDI currently exceeds or will exceed threshold values within the next ten years. (Refer to Desired Conditions 4, 8)	Watershed
1-7	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are perennial and intermittent streams below about 7,000 feet where true riparian species exist or have the potential to exist. (Refer to Desired Conditions 8, 21)	Watershed
1-8	Restore and maintain the natural fire frequency in RCA's and uplands where vegetative conditions are at or near desired condition. Key restoration locations are wilderness and other areas above about 7,000 feet. (Refer to Desired Condition 21)	Watershed
1-9	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Condition 20)	Silviculture
1-10	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-11	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-12	Increase ponderosa pine in mixed conifer/ponderosa pine vegetation types to meet	Silviculture

#	Potential Projects	Project Lead
	PNV. (Refer to Desired Conditions 18, 22)	
1-13	Increase sugar pine within its natural range of occurrence to meet PNV. (Refer to Desired Condition 18).	Silviculture
1-14	Re-map the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	In meadows in the Upper Montane Meadow PNV Series where conifer encroachment has occurred, increase meadow size to natural potential by thinning or prescribed burning. (Refer to Desired Condition 21)	Range/ Watershed
2-4	In non-wilderness locations where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-5	Restore aspen stand condition to protect or enhance aspen populations. Key restoration locations are aspen stands with conifer encroachment or livestock grazing of aspen suckers. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-6	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-7	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Conditions 11) *(FERC Related)*	Resource Management
2-8	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11) *(EREC Related)*	Resource Management
2-9	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Create large woody material (LWM) where needed for soil productivity. (Refer to Desired Condition 14)	Watershed
3-2	Fertilize plantations in red fir timber types where available nitrogen is low. (Refer to Desired Condition 14)	Watershed
3-3	Restore trenched skid trails where feasible. (Refer to Desired Condition 14)	Watershed
Aquatic/Riparian		
4-1	Adjust streamflow regime in streams with dams and diversions to restore and sustain proper stream channel morphology, optimize structural and species diversity of riparian vegetation, and maintain viable populations of native and desired non-native aquatic fauna. The key location is the SFK Stanislaus River downstream from Pinecrest Reservoir, to provide suitable temperature and flow requirements for amphibian rearing and breeding. (Refer to Desired Condition 7) *(FERC Related)*	Aquatic Biology
4-2	Where reservoirs have inundated historic amphibian habitat, mitigate for habitat loss as a condition of hydropower relicensing. (Refer to Desired Condition 2) *(FERC Related)*	Aquatic Biology

#	Potential Projects	Project Lead
4-3	Maintain and restore habitat/populations of Yosemite toads and mountain yellow legged frogs to insure species viability. (Refer to Desired Condition 1) *(FERC Related)*	Aquatic Biology
4-4	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed
4-5	Reduce road density, hydrologically connected road segments and stream crossings that are contributing to excessive stream sedimentation and increased routing of water to streams. The key location is the Herring Creek sub-watershed. (Refer to Desired Conditions 1, 4, 6, and 8) *(FERC Related)*	Watershed/ Engineering
4-6	Retain or increase Large Woody Debris in stream channels. Reduce or relocate LWD only when it is adversely affecting property, stream condition or public safety. (Refer to Desired Conditions 3)	Watershed
4-7	Allow passage of logs (LWD) over Pinecrest Dam. (Refer to Desired Condition 3) (*FREC Related*)	Watershed
4-8	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed/ Recreation
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30) *(FERC Related)*	Recreation
5-2	Develop a network of approved and improved dispersed campsite locations. Revise Recreation Opportunity Guide. (Refer to Desired Conditions 23, 24)	Recreation
5-3	Implement fee Collection at developed campgrounds meeting minimum criteria for collection (FSM 2300). (Refer to Desired Conditions 24, 27)	Recreation
5-4	Increase Forest Service presence (i.e. FS employees and volunteers) at all developed/dispersed sites. (Refer to Desired Condition 24) (*FERC Related*)	Recreation
5-5	Redesign/relocate Herring Creek and Reservoir campgrounds to better protect riparian and soil resources. (Refer to Desired Conditions 4, 5, 6, 7, 21, 27, 30)	Recreation
5-6	Improve the Herring Creek Reservoir area after determining the best management options for the reservoir and surrounding land. (Refer to Desired Conditions 5, 6, 27)	Recreation/ Watershed
Trails and Roads		
6-1	Build the Old Mono Road Trail. (Refer to Desired Condition 30)	Recreation
6-2	Build Emigrant Trail. (Refer to Desired Condition 30)	Recreation
6-3	Route all trails entering Wilderness through established trailheads to ensure dissemination of wilderness information prior to entry. (Refer to Desired Conditions 23, 30)	Recreation
6-4	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-5	Secure Scenic Byway status for Highway 108. (Refer to Desired Conditions 23, 27)	Recreation
6-6	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29) *(FERC Related)*	Engineering/ Watershed

#	Potential Projects	Project Lead
6-7	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, re-contouring). (Refer to Desired Condition 29) *(FERC Related)*	Engineering/ Watershed

#	Inventories and Monitoring	Project Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment CSWA-wide. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife
Patch Scale Vegetation Management		
2-1	Determine ecological status for all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 21)	Range
2-2	Inventory the frequency and distribution of conifer encroachment in meadows. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-3	Inventory high and moderate risk areas for new noxious weed occurrences (train forest employees and volunteers in weed identification). (Refer to Desired Condition 11)	Range
2-4	Inventory the frequency, distribution and condition of Quaking Aspen stands. (Refer to Desired Condition 21)	Watershed
Soil Productivity		
3-1	Inventory LWM by Ecological Unit and in plantations. (Refer to Desired Condition 14)	Watershed
3-2	Test for Nitrogen availability in plantations in red fir timber types. (Refer to Desired Condition 14)	Watershed
3-3	Survey for status of soil organisms by ecological unit and in red fir plantations. (Refer to Desired Condition 14)	Watershed
3-4	Inventory fens and other organic soils in meadows. (Refer to Desired Conditions 14, 15, 21)	Watershed
Aquatic/Riparian		
4-1	Conduct native aquatic species surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macro invertebrate surveys. (Refer to Desired Conditions 1)	Aquatic Biology
4-4	Monitor success of the osprey nest at Pinecrest Lake yearly. (Refer to Desired Condition 1)	Wildlife
4-5	Inventory LWD in reference areas (i.e., unmanaged wilderness streams) and managed subwatersheds. (Refer to Desired Condition 3)	Watershed

#	Inventories and Monitoring	Project Lead
4-6	Inventory hydrologically connected road segments in sub-watersheds where road density and/or stream crossings exceed desired condition (see Appendix I). (Refer to Desired Condition 4)	Watershed
4-7	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in sub-watersheds where roads are not at desired condition. (Refer to Desired Condition 4)	Watershed
4-8	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in reference areas such as unmanaged wilderness streams. (Refer to Desired Condition 4)	Watershed
4-9	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) in managed sub-watersheds (see Appendix I). (Refer to Desired Condition 5)	Watershed
4-10	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) at reference locations. (Refer to Desired Condition 5)	Watershed
4-11	Monitor applicable parameters of water quality where degradation may exist (see Appendix I). (Refer to Desired Condition 6)	Watershed
4-12	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed
4-13	Inventory the frequency, distribution and condition of special aquatic features (i.e., springs, ponds, fens, bogs). (Refer to Desired Condition 21)	Watershed
Recreation Sites/Activities		
5-1	Conduct facility condition survey. (Refer to Desired Conditions 27)	Recreation
5-2	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Conditions 22, 23, 27, 28, 29, 30)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct furbearer and bat inventories. Conduct additional goshawk surveys. (Refer to Desired Condition 16)	Wildlife
7-2	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany

#	Plans, Analyses and Guides	Project Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures to reduce impacts to the public and high value areas and to expand the use of naturally occurring fire for resource benefit inside and outside of the wilderness. (Refer to Desired Conditions 9, 10)	Fire
2	Conduct Roads Analysis in the roaded portion of the landscape. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
3	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
4	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering

#	Plans, Analyses and Guides	Project Lead
5	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
6	Develop a cooperative Municipal Watershed water quality management plan with Tuolumne Utilities District. (Refer to Desired Condition 6)	Watershed
7	Prepare a developed recreation site plan for the Herring Creek Reservoir area (i.e., campground location, capacity and design; reservoir management options; grazing protection). (Refer to Desired Condition 27)	Recreation/ Watershed/ Range
8	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Condition 21)	Range
9	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
10	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.7: Rose Creek Landscape

#	Potential Projects	Program Lead
Landscape Scale Vegetation Management		
1-1	In the wildland-urban intermix (WUI) zones around Mt. Knight, Jupiter, Grant Ridge, Avery Ranch, Star Ridge, scattered remote clusters of residences, and transmission and distribution power line buffer zones, reduce surface and ladder fuels and remove excess crown fuels in areas with high fire hazard and condition class 3 and 2. Priority is defense zone, then threat zone. Use of hand and/or mechanical treatments are recommended adjacent to developed areas. All available tools should be considered to accomplish fuels management objectives outside of the defense zone of the WUI. (Refer to Desired Conditions 9, 10)	Fire
1-2	Outside of the WUI, hazard fuel reduction in areas with high fire hazard, condition class 3 or 2, and crown fire potential. Priority is Old Forest Emphasis Areas and California spotted owl PACs (except TL-106, 108, 110, 138). (Refer to Desired Conditions 9, 10)	Fire
1-3	Work with the private landowners to complete and improve a defensible fuel profile zone (DFPZ) along Grant Ridge. (Refer to Desired Conditions 9, 10)	Fire
1-4	Maintain previously treated (i.e. prescribed fire) areas. (Refer to Desired Conditions 9, 10)	Fire
1-5	Develop site plan and engineering specifications for a fire station and identify location for it somewhere between Ruby Hill Springs and Mt. Knight. (Refer to Desired Conditions 9, 10)	Fire
1-6	After checking the vegetation typing in spotted owl PACs TL136, TL138, TL110, TL106 and TL107, use thinning and reintroduction of fire as needed to reach desired condition. (Refer to Desired Condition 16)	Wildlife
1-7	Increase the size of the Ruby great gray owl PAC to at least 50 acres. (Refer to Desired Condition 16)	Wildlife
1-8	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-9	In PNV series containing oak and oak-grassland components, increase the frequency and distribution of oaks and oak-grassland communities. (Refer to Desired Condition 18)	Wildlife
1-10	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are stands throughout landscape where SDI currently exceeds or will exceed threshold values within the next ten years. (Refer to Desired Condition 8)	Watershed
1-11	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are perennial and intermittent streams where true riparian species exist or have the potential to exist. (Refer to Desired Conditions 8, 21)	Watershed
1-12	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Condition 20)	Silviculture

#	Potential Projects	Program Lead
1-13	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-14	Increase sugar pine within its natural range of occurrence to meet PNV. (Refer to Desired Condition 18).	Silviculture
1-15	Decrease white fir in mixed conifer vegetation types to meet PNV. Focus efforts in Ecological Units 205, 211, and north slopes with productive soils in EU 204. (Refer to Desired Conditions 18, 22)	Silviculture
1-16	Increase ponderosa pine in mixed conifer/ponderosa pine vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-17	Re-map the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	Where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-4	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. (Refer to Desired Condition 11)	Resource Management
2-5	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11)	Resource Management
2-6	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11)	Resource Management
2-7	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Create large woody material (LWM) where needed for soil productivity. (Refer to Desired Condition 14)	Watershed
3-2	Restore trenched skid trails where feasible. (Refer to Desired Condition 14)	Watershed
3-3	Ecological Units 205 and 211—provide moisture-conserving mulch when thinning south facing slopes. (Refer to Desired Conditions 14, 15)	Watershed
3-4	Implement treatments such as shredding, mulching, fertilizing, and growing conifers and hardwoods that build topsoil organic matter on Mariposa soils. (Refer to Desired Conditions 14, 15)	Watershed
3-5	Maintain soil porosity by sub-soiling project areas that compact soil. (Refer to Desired Conditions 8, 14)	Watershed
Aquatic/Riparian		
4-1	Maintain and restore habitat/populations of foothill yellow legged frogs and western pond turtle to insure species viability. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed

#	Potential Projects	Program Lead
4-3	Reduce road density, hydrologically connected road segments and stream crossings that are contributing to excessive stream sedimentation and increased routing of water to streams. The key location is the Rose Creek subwatershed. (Refer to Desired Conditions 1, 4, 6, and 8)	Watershed
4-4	Reconstruct or decommission roads built on sensitive soils to minimize erosion and stream sedimentation. (Refer to Desired Conditions 4, 14, 15)	Watershed/ Engineering
4-5	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed/ Recreation
4-6	Retain or increase Large Woody Debris in stream channels. Reduce or relocate LWD only when it is adversely affecting property, stream condition or public safety. The key location is Rose Creek in the Ruby Fire area. (Refer to Desired Condition 3)	Watershed
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30)	Recreation
5-2	Develop network of approved and improved dispersed campsite locations. (Refer to Desired Condition 24)	Recreation
5-3	Increase Forest Service presence, especially in popular OHV areas. (Refer to Desired Conditions 24, 28)	Recreation
Trails and Roads		
6-1	Provide trails connecting this landscape with adjacent landscapes to achieve a network of non-motorized trails between landscapes. (Refer to Desired Condition 30)	Recreation
6-2	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-3	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29)	Engineering/ Watershed
6-4	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, recontouring). (Refer to Desired Condition 29).	Engineering/ Watershed
Animal/Plant Species		
7-1	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife
Patch/Site Scale Vegetation Management		
2-1	Evaluate ecological status for all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 21)	Range
2-2	Inventory the frequency and distribution of conifer encroachment in meadows. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-3	Inventory high and moderate risk areas for new noxious weed occurrences (train forest employees and volunteers in weed identification). (Refer to Desired Condition 11)	Range
2-4	Identify locations of elderberry plants during vegetation surveys. (Refer to Desired Condition 17)	Wildlife
Soil Productivity		
3-1	Inventory LWM by ecological unit and in plantations. (Refer to Desired Conditions 14, 15)	Watershed
3-2	Survey for status of soil organisms by ecological unit. (Refer to Desired Conditions 14, 15)	Watershed
3-3	Inventory soil porosity in plantations and in multiple entry tractor units. (Refer to Desired Conditions 14, 15)	Watershed
3-4	Identify areas within Ecological Units that are subject to mass wasting following severe wildfire and where prescribed burning may reduce wildfire risk in these sensitive areas. Applicable EU's include 201, 204, 206, 212 and 216. (Refer to Desired Condition 15)	Watershed
Aquatic/Riparian		
4-1	Conduct native aquatic species surveys. Monitor existing population of foothill yellow legged frog in Rose Creek. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macro invertebrate surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Complete habitat site assessments for California red-legged frog in areas under 5000' in elevation. (Refer to Desired Condition 2)	Aquatic Biology
4-5	Inventory LWD at selected locations. (Refer to Desired Condition 3)	Watershed
4-6	Inventory hydrologically connected road segments in subwatersheds where road density and/or stream crossings exceed desired conditions (see Appendix I). (Refer to Desired Condition 4)	Watershed
4-7	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in subwatersheds where roads are not at desired condition. (Refer to Desired Condition 4)	Watershed
4-8	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine-grained streambanks) in managed subwatersheds (see Appendix I). (Refer to Desired Condition 5)	Watershed

#	Inventories and Monitoring	Program Lead
4-9	Monitor applicable parameters of water quality where degradation may exist (see Appendix I) (Refer to Desired Condition 6)	Watershed
4-10	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed
4-11	Inventory the frequency, distribution and condition of special aquatic features (i.e., springs, ponds, fens, bogs). (Refer to Desired Condition 21)	Watershed
Recreation Sites/Activities		
5-1	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-2	Conduct facility condition survey. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Conditions 22, 23, 27, 28, 29, 30)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct bat, forest carnivore, and additional goshawk inventories. (Refer to Desired Conditions16)	Wildlife
7-2	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany
7-3	Complete the inventory of OHV trails and evaluate impacts to sensitive plants. (DC 12)	Recreation/ Botany

#	Plans, Analyses and Guides	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures, in addition to those above, to reduce impacts to the public and high value areas. (Refer to Desired Conditions 9, 10)	Fire
2	Develop plantation protection plan for the Ruby Fire area. (Refer to Desired Conditions 9, 10)	Fire
3	Conduct Roads Analysis landscape wide. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
4	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Conditions	Engineering
5	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
6	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
7	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Condition 21)	Range
8	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
9	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany
10	Prepare a habitat management guide for lava caps, to include fuelbreak designs and strategies that minimize impacts to sensitive plants on lava caps. (Refer to Desired Condition 12)	Botany/Fire

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.8: Sand Bar Landscape

#	Potential Projects	Program Lead
Landscape Scale Vegetation Management		
1-1	In the wildland-urban intermix (WUI) zones around Mt. Knight, Camp Mensinger, Dry Meadow, Spring Gap, Beardsley Dam powerhouse, and the transmission and distribution power line buffer zones, reduce surface and ladder fuels and remove excess crown fuels in areas with high fire hazard and condition class 3 and 2. Priority is defense zone, then threat zone. Use of hand and/or mechanical treatments are recommended adjacent to developed areas. All available tools should be considered to accomplish fuels management objectives outside of the defense zone of the WUI. (Refer to Desired Conditions 9, 10)	Fire
1-2	Outside of the WUI, hazard fuel reduction in areas with high fire hazard, condition class 3 or 2, and crown fire potential. Priority is Old Forest Emphasis Areas and all California spotted owl PACs. (Refer to Desired Conditions 9, 10)	Fire
1-3	Maintain previously treated (i.e. prescribe burns) areas. (Refer to Desired Conditions 9, 10)	Fire
1-4	Improve fire station facilities at Dry Meadow Station. (Refer to Desired Conditions 9, 10)	Fire
1-5	After checking the vegetation typing in spotted owl PACs TL121, use thinning and reintroduction of fire as needed to reach desired condition. (Refer to Desired Condition 16)	Wildlife
1-6	Reduce the number of acres in the Tunnel Creek goshawk PAC and increase the acres in the Spring Gap goshawk PAC. (Refer to Desired Condition 16)	Wildlife
1-7	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-8	In PNV series containing oak and oak-grassland components, increase the frequency and distribution of oaks and oak-grassland communities. (Refer to Desired Condition 18)	Wildlife
1-9	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are stands throughout landscape where SDI currently exceeds or will exceed threshold values within the next ten years. (Refer to Desired Conditions 4, 8)	Watershed
1-10	Reduce density of conifer vegetation in stream corridors to optimize true riparian trees and shrubs, and to reduce risk of large and severe wildfire in Riparian Conservation Areas. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are perennial and intermittent streams where true riparian species exist or have the potential to exist. (Refer to Desired Conditions 8, 21)	Watershed
1-11	Ecological Units 208, 217 and 307—Restore natural fire regime by thinning and prescribed burning in ponderosa pine and lower mixed conifer. (Refer to Desired Conditions 9, 10, 14, 15, 18)	Watershed/Fire
1-12	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Condition 20)	Silviculture

#	Potential Projects	Program Lead
1-13	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-14	Increase sugar pine within its natural range of occurrence to meet PNV. (Refer to Desired Condition 18).	Silviculture
1-15	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-16	Increase ponderosa pine in mixed conifer/ponderosa pine vegetation types to meet PNV. Focus on Ecological Units 217 and 307. (Refer to Desired Conditions 18, 22)	Silviculture
1-17	Ecological Unit 205—restore pine and black oak component. (Refer to Desired Conditions 14, 18)	Silviculture
1-18	Re-map the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21).	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	Where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-4	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. (Refer to Desired Conditions11) *(FERC Related)*	Resource Management
2-5	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-6	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-7	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Create large woody material (LWM) where needed for soil productivity. (Refer to Desired Condition 14)	Watershed
3-2	Restore trenched skid trails where feasible. (Refer to Desired Condition 14)	Watershed
Aquatic/Riparian		
4-1	Maintain and restore habitat/populations of foothill yellow legged frogs and western pond turtle to insure species viability. (Refer to Desired Condition 1) *(FERC Related)*	Aquatic Biology

#	Potential Projects	Program Lead
4-2	Adjust streamflow regime in streams with dams and diversions to restore and sustain proper stream channel morphology, optimize structural and species diversity of riparian vegetation, and maintain viable populations of native and desired non-native aquatic fauna. The key location is the MFK Stanislaus River in the Spring Gap and Sand Bar reaches, to include suitable flows for successful breeding and rearing of native amphibian species. (Refer to Desired Condition 7) *(FERC Related)*	Aquatic Biology
4-3	Retain or increase Large Woody Debris in stream channels. Reduce or relocate LWD only when it is adversely affecting property, stream condition or public safety. Key treatments include allowing passage of LWD through the Spring Gap and Sand Bar reaches of the MFK Stanislaus River. (Refer to Desired Condition 3)	Watershed
4-4	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed
4-5	Restore Spring Gap Penstock bypass gully and redesign bypass channel. (Refer to Desired Conditions 1, 4, 5, 6) *(FERC Related)*	Watershed
4-6	Reduce road density, hydrologically connected road segments and stream crossings that are contributing to excessive stream sedimentation and increased routing of water to streams. Key locations are the Dry Meadow and Sourgrass Creek subwatersheds. (Refer to Desired Conditions 1, 4, 6, and 8)	Watershed
4-7	Reconstruct or decommission roads built on sensitive soils to minimize erosion and stream sedimentation. (Refer to Desired Conditions 4, 14, 15) *(FERC Related)*	Watershed/ Engineering
4-8	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed/ Recreation
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30) *(FERC Related)*	Recreation
5-2	Develop network of approved and improved dispersed campsite locations. (Refer to Desired Condition 24)	Recreation
5-3	Implement fee Collection at developed campgrounds meeting minimum criteria for collection (FSM 2300). (Refer to Desired Condition 24) *(FERC Related)*	Recreation
5-4	Increase Forest Service Presence, especially in popular OHV areas. (Refer to Desired Conditions 24, 28)	Recreation
Trails and Roads		
6-1	Provide trails connecting this landscape with adjacent landscapes to achieve a network of non-motorized trails between landscapes. (Refer to Desired Condition 30)	Recreation
6-2	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-3	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29) *(FERC Related)*	Engineering/ Watershed

#	Potential Projects	Program Lead
6-4	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, recontouring). (Refer to Desired Condition 29). *(FERC Related)*	Engineering/ Watershed
Animal/Plant Species		
7-1	Establish a standard GIS layer for noxious weeds. (Refer to Desired Condition 11)	Resource Management
7-2	Eradicate starthistle infestations. (Refer to Desired Condition 11)	Resource Management

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground 1-2truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife
Patch/Site Scale Vegetation Management		
2-1	Evaluate ecological status for all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 21)	Range
2-2	Inventory the frequency and distribution of conifer encroachment in meadows. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-3	Inventory high and moderate risk areas for new noxious weed occurrences (train forest employees and volunteers in weed identification). (Refer to Desired Condition 11)	Range
2-4	Identify locations of elderberry plants during vegetation surveys. (Refer to Desired Condition 17)	Wildlife
Soil Productivity		
3-1	Inventory LWM by Ecological Unit and also in plantations. (Refer to Desired Condition 14)	Watershed
3-2	Survey for status of soil organisms by Ecological Unit and in plantations. (Refer to Desired Condition 14)	Watershed
3-3	Inventory soil porosity in plantations and in multiple entry tractor units. (Refer to Desired Condition 14)	Watershed
3-4	Identify areas within Ecological Units that are subject to mass wasting following severe wildfire and where prescribed burning may reduce wildfire risk in these sensitive areas. Applicable EU's include 201, 204, 206, 212 and 216. (Refer to Desired Condition 15)	Watershed
Aquatic/Riparian		
4-1	Conduct native aquatic species surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology

#	Inventories and Monitoring	Program Lead
4-3	Conduct macro invertebrate surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Complete habitat site assessments for California red-legged frog in areas under 5000' elevation. (Refer to Desired Condition 2)	Aquatic Biology
4-5	Inventory LWD in managed sub-watersheds. (Refer to Desired Condition 3)	Watershed
4-6	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in streams with dams and diversions and in sub-watersheds where roads are not at desired condition. (Refer to Desired Condition 4)	Watershed
4-7	Inventory hydrologically connected road segments in sub-watersheds where road density and/or stream crossings exceed desired condition (see Appendix I). (Refer to Desired Condition 4)	Watershed
4-8	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) in managed subwaterheds (see Appendix I). (Refer to Desired Condition 5)	Watershed
4-9	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed
4-10	Inventory the frequency, distribution and condition of special aquatic features (i.e., springs, ponds, fens, bogs). (Refer to Desired Condition 21)	Watershed
4-11	Monitor applicable parameters of water quality where degradation may exist (see Appendix I). (Refer to Desired Condition 6)	Watershed
Recreation Sites/Activities		
5-1	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-2	Conduct facility condition surveys. (Refer to Desired Condition 27)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Conditions 22, 23, 27, 28, 29, 30)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct furbearer and bat inventories. Conduct additional surveys for goshawk. (Refer to Desired Condition 16)	Wildlife
7-2	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany

#	Plans, Analyses and Guides	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures, in addition to those above, to reduce impacts to the public and high value areas. (Refer to Desired Conditions 9, 10)	Fire
2	Conduct Roads Analysis landscape wide. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
3	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
4	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
5	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering

#	Plans, Analyses and Guides	Program Lead
6	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Condition 21)	Range
7	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
8	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany
9	Prepare a habitat management guide for lava caps, to include fuelbreak designs and strategies that minimize impacts to sensitive plants on lava caps. (Refer to Desired Condition 12)	Botany/Fire

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

Chapter VI.9: Sonora Pass Landscape

#	Potential Projects	Program Lead
Landscape Scale Vegetation Management		
1-1	In the defense zone around developed areas along the Highway 108 corridor, reduce surface and ladder fuels and remove excess crown fuels using primarily hand and/or mechanical treatment. (Refer to Desired Conditions 9, 10)	Fire
1-2	Assess the defense zones in the Long Valley/Eagle Meadow area and implement any necessary hazard fuel reduction. (Refer to Desired Conditions 9, 10)	Fire
1-3	Outside of the defense zones, implement hazard fuel reduction in areas with high fire hazard and/or crown fire potential. Priority is Old Forest Emphasis Area (OFEA), primarily using prescribed fire. (Refer to Desired Conditions 9, 10)	Fire
1-4	Improve and maintain the remainder of the landscape with naturally occurring fire where possible. Hazard fuel treatment may be necessary to facilitate the use of naturally occurring fire in the future. (Refer to Desired Conditions 9, 10)	Fire
1-5	Improve fire station facilities at Brightman Station. (Refer to Desired Conditions 9, 10)	Fire
1-6	Increase late succession habitat in Old Forest Emphasis Areas by reducing the number of small and medium trees in overstocked stands to accelerate growth rate of the residual trees toward late seral condition. (Refer to Desired Conditions 16, 20, 21, 23)	Wildlife
1-7	After checking the vegetation typing in spotted owl PAC TL134 and the Eagle Creek North goshawk PAC, use thinning and reintroduction of fire as needed to reach desired condition. This landscape has lower priority than other landscapes based on the fire/fuels recommendations. (Refer to Desired Conditions 16)	Wildlife
1-8	Increase the acres in the Soda Creek goshawk PAC and decrease the acres in the Eagle Creek North goshawk PAC. (Refer to Desired Conditions 16)	Wildlife
1-9	Reduce density of upland vegetation to restore evapotranspiration closer to its natural potential and to reduce the risk of large and severe wildfire delivering excessive sediment to streams. Utilize prescribed fire, fire use for resource benefits or mechanical thinning as determined at the project scale. Key treatment locations are stands throughout the landscape below about 7,000 where SDI currently exceeds or will exceed threshold values within the next ten years. (Refer to Desired Conditions 4, 8)	Watershed
1-10	Restore and maintain the natural fire frequency in RCA's and uplands where vegetative conditions are at or near desired condition. Key restoration locations are wilderness and other roadless areas. (Refer to Desired Condition 21)	Watershed
1-11	In ecological Unit 331 prescribe burn to maintain Jeffrey pine, cycle nutrients, reestablish nature fire regime, and improve wildlife habitat and diversity. (Refer to Desired Conditions 9, 10, 14, 15, 16)	Watershed/ Fire/ Wildlife
1-12	Reduce stand density by thinning where Stand Density Index threshold values are currently exceeded or projected to be exceeded within ten years. (Refer to Desired Condition 20)	Silviculture
1-13	In areas containing CWHR size class 3 and 4 trees, reduce stand density to accelerate tree growth toward size class 4 and 5 to increase late seral conditions. Identify areas to establish early seral vegetation to increase biodiversity. (Refer to Desired Conditions 19, 20, 21, 22)	Silviculture
1-14	Decrease white fir in mixed conifer vegetation types to meet PNV. (Refer to Desired Conditions 18, 22)	Silviculture
1-15	Revise the Old Forest Emphasis Areas as located in the Sierra Nevada Forest Plan Amendment. (Refer to Desired Condition 16)	Wildlife/ Silviculture

#	Potential Projects	Program Lead
Patch/Site Scale Vegetation Management		
2-1	Improve ecological status of meadow vegetation where it is not at desired condition, using appropriate active or passive restoration methods. (Refer to Desired Condition 21)	Range/ Watershed
2-2	Remove impacts to meadows from disturbances such as roads, trails, OHV's and other recreation use, and keep livestock grazing and trampling to allowed limits. (Refer to Desired Condition 21)	Range/ Watershed
2-3	In meadows in the Upper Montane Meadow PNV Series where conifer encroachment has occurred, increase meadow size to natural potential by thinning or prescribed burning. (Refer to Desired Condition 21)	Range/ Watershed
2-4	In non-wilderness locations where fire or other disturbances remove upland vegetation and regeneration is mostly riparian species, determine whether permanent meadow/riparian conditions are desired. If so, manage toward the potential natural community. (Refer to Desired Condition 21)	Range/ Watershed/ Wildlife/ Aquatic Biology
2-5	Restore aspen stand condition to protect or enhance aspen populations. Key restoration locations are aspen stands with conifer encroachment or livestock grazing of aspen suckers. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-6	Remove or reduce existing noxious weed populations using methods appropriate to the species, location and population size. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-7	Treat new noxious weed occurrences aggressively, using methods appropriate to the species and size/age of the discovered population. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-8	Implement Region 5 noxious weed risk reduction methods to protect against introduction of new weed populations. (Refer to Desired Condition 11) *(FERC Related)*	Resource Management
2-9	Work with local Native American community to identify traditional National American plants of interest and actions that can be taken to maintain and enhance plant populations. (Refer to Desired Condition 13)	Botany/ Tribal Relations
Soil Productivity		
3-1	Restore soil and vegetation conditions at the Juniper Mine site. (Refer to Desired Condition 14, 15)	Watershed
3-2	Fertilize plantations in red fir timber types where available nitrogen is low. (Refer to Desired Condition 14)	Watershed
Aquatic/Riparian		
4-1	Adjust streamflow regime in streams with dams and diversions to restore and sustain proper stream channel morphology, optimize structural and species diversity of riparian vegetation, and maintain viable populations of native and desired non-native aquatic fauna. To restore proper functioning stream condition in the gravel bed segment of the MFK Stanislaus River impaired flows should be reduced to within 10% of unimpaired flows from June through October and managed to within 20% of unimpaired flows from November through May. (Refer to Desired Condition 7) *(FERC Related)*	Watershed
4-2	Where reservoirs have inundated historic amphibian habitat, mitigate for habitat loss as a condition of hydropower relicensing. (Refer to Desired Condition 2) *(FERC Related)*	Aquatic Biology
4-3	Maintain and restore habitat/populations of Yosemite toads and mountain yellow legged frogs to insure species viability. (Refer to Desired Condition 1) *(FERC Related)*	Aquatic Biology

#	Potential Projects	Program Lead
4-4	Restore stream channel morphology and riparian vegetation in candidate locations described in Appendix I, using appropriate active or passive restoration techniques. (Refer to Desired Condition 5)	Watershed
4-5	Relocate, redesign or decommission dispersed and developed recreation sites adjacent to water that are obvious sources of erosion and stream sedimentation. (Refer to Desired Conditions 4, 15)	Watershed
4-6	Retain or increase Large Woody Debris in stream channels. Reduce or relocate LWD only when it is adversely affecting property, stream condition or public safety. The key location is the Relief Reach of the MFK Stanislaus River where recruitment and passage of LWD should be promoted, including allowing LWD passage through Relief Dam. (Refer to Desired Condition 3) *(FERC Related)*	Watershed
Recreation Sites/Activities		
5-1	Upgrade developed recreation facilities to current standard, starting with the poorest condition/oldest buildings, emphasizing heavily visited areas and incorporating soil/vegetation restoration, where needed. (Refer to Desired Conditions 27, 28, 30) *(FERC Related)*	Recreation
5-2	Implement fee Collection at developed campgrounds meeting minimum criteria for collection (FSM 2300). (Refer to Desired Conditions 24, 27)	Recreation
5-3	Increase Forest Service Presence (i.e. FS Employees and volunteers). (Refer to Desired Conditions 24)	Recreation
5-4	Manage day-use campsites and trails adjacent to Relief Reservoir to reduce sense of crowding, increase trail maintenance frequency and reduce resource impacts. (Refer to Desired Conditions 27, 28, 30) *(FERC Related)*	Recreation
5-5	Develop a network of approved and improved dispersed campsite locations. Revise Recreation Opportunity Guide. (Refer to Desired Conditions 23, 24)	Recreation
Trails and Roads		
6-1	Build the Old Mono Road Trail. (Refer to Desired Condition 30)	Recreation
6-2	Route all trails entering Wilderness through established trailheads to ensure dissemination of wilderness information prior to entry. (Refer to Desired Conditions 23, 30)	Recreation
6-3	Provide trails connecting this landscape with adjacent landscapes to achieve a network of non-motorized trails between landscapes. (Refer to Desired Condition 30)	Recreation
6-4	Establish an OHV road and trail system that exists within currently roaded areas, has minimal impacts on other resources and emphasizes loop road opportunities. (Refer to Desired Conditions 29, 30)	Recreation/ Engineering
6-5	Secure Scenic Byway status for Highway 108. (Refer to Desired Conditions 23, 27)	Recreation
6-6	Following completion of Roads Analysis, needed roads should be improved as necessary to minimize effects on water quality and aquatic habitat. Road reconstruction and maintenance funds should be focused on level 2 roads since 80% of roads are in that class. (Refer to Desired Condition 29)	Engineering/ Watershed
6-7	Following completion of Roads Analysis, unneeded roads should be closed or decommissioned. Closed roads should have entrances blocked, water bars constructed and culverts unplugged or removed. Decommissioned roads should have these treatments and may have additional ones (i.e., subsoiling, recontouring). (Refer to Desired Condition 29).	Engineering/ Watershed
Land Acquisition		
8-1	Acquire Sanguinetti and Kennedy Meadows properties when available. (Refer to Desired Condition 26)	Recreation

#	Inventories and Monitoring	Program Lead
Landscape Scale Vegetation Management		
1-1	Conduct stand exams in California spotted owl and goshawk PACs to ground truth vegetation strata data, to establish a baseline on habitat conditions and to prioritize areas for treatment. (Refer to Desired Condition 16)	Wildlife
1-2	Develop improved vegetation data (i.e., stand structure and species composition characteristics) to better assess mule deer and other wildlife habitat. (Refer to Desired Condition 16)	Wildlife
1-3	Collect habitat data for bats at occupied sites. (Refer to Desired Condition 16)	Wildlife
1-4	Assess the habitat condition at the Eagle Meadows PAC. (Refer to Desired Condition 16)	Wildlife
Patch/Site Scale Vegetation Management		
2-1	Determine ecological status of all meadows designated as grazing allotment key areas, and other meadows as deemed necessary. Repeat on a three to five year basis. (Refer to Desired Condition 1)	Range
2-2	Inventory the frequency and distribution of conifer encroachment in meadows. (Refer to Desired Condition 21)	Wildlife/ Watershed
2-3	Inventory high and moderate risk areas for new noxious weed occurrences (train forest employees and volunteers in weed identification). (Refer to Desired Condition 11)	Resource Management
2-4	Inventory the frequency, distribution and condition of Quaking Aspen stands. (Refer to Desired Condition 21)	Watershed
Soil Productivity		
3-1	Test for Nitrogen availability in plantations in red fir timber types. (Refer to Desired Condition 14)	Watershed
3-2	Inventory LWM by Ecological Unit and in plantations. (Refer to Desired Condition 14)	Watershed
3-3	Survey status of soil organisms in plantations. (Refer to Desired Condition 14)	Watershed
3-4	Inventory soil porosity in plantations and in multiple entry tractor units. (Refer to Desired Conditions 8, 14)	Watershed
Aquatic/Riparian		
4-1	Conduct native aquatic species surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-2	Conduct waterfowl nesting inventories. (Refer to Desired Condition 1)	Aquatic Biology
4-3	Conduct macroinvertebrate surveys. (Refer to Desired Condition 1)	Aquatic Biology
4-4	Inventory reference reaches for PSD and pool sediment. (Refer to Desired Condition 4)	Watershed
4-5	Monitor applicable water quality parameters where degradation may exist (see Appendix I). (Refer to Desired Condition 6)	Watershed
4-6	Inventory special aquatic features across the landscape (meadows, aspen stands, springs, ponds, fens and bogs). Of special interest is Kennedy Canyon. (Refer to Desired Condition 21)	Watershed
4-7	Inventory LWD in reference areas (i.e., unmanaged wilderness streams) and managed sub-watersheds. (Refer to Desired Condition 3)	Watershed
4-8	Inventory the frequency, distribution and condition of true riparian trees and shrubs in Riparian Conservation Areas. (Refer to Desired Condition 21)	Watershed
4-9	Inventory stream sediment attributes (i.e., particle size distribution, residual pool depth) in streams with dams and diversions and in sub-watersheds where roads are not at desired condition. (Refer to Desired Condition 4)	Watershed

#	Inventories and Monitoring	Program Lead
4-10	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) at reference locations. (Refer to Desired Condition 5)	Watershed
4-11	Inventory channel morphology in sensitive stream reaches (i.e., low gradient streams with fine grained streambanks) in managed sub-watersheds (see Appendix I). (Refer to Desired Condition 5)	Watershed
Recreation Sites/Activities		
5-1	Conduct visitor use level inventories. (Refer to Desired Condition 27)	Recreation
5-2	Conduct facility condition survey. (Refer to Desired Condition 23)	Recreation
5-3	Conduct visitor preference inventories. (Refer to Desired Conditions 22, 23, 27)	Recreation
Trails and Roads		
6-1	Conduct trails condition inventories on system and non-system trails. (Refer to Desired Conditions 27, 28, 29, 30)	Recreation
Animal/Plant Species		
7-1	Conduct forest carnivore and bat inventories. Conduct additional goshawk surveys. (Refer to Desired Condition 16)	Wildlife
7-2	Conduct peregrine falcon surveys within suitable habitat. (Refer to Desired Condition 16)	Wildlife
7-3	Conduct sensitive plant surveys in un-surveyed potential habitat. (Refer to Desired Condition 12)	Botany

#	Plans and Analysis	Program Lead
1	In the Stanislaus National Forest Fire Management Plan, identify the potential impacts of fire on people, property, and natural resources. Define and prioritize mitigation measures necessary to expand the use of naturally occurring fire for resource benefit inside and outside of the wilderness. Coordinate with the Toiyabe National Forest on wildland fire management along the east edge of the landscape. (Refer to Desired Conditions 9, 10)	Fire
2	Conduct Roads Analysis in the roaded portion of the landscape. (Refer to Desired Conditions 1, 4, 5, 6, 14, 15, 27, 29)	Watershed/ Engineering
3	Develop a Road Closure Planning and Design Guide to reduce recurrence of problems with closed roads. (Refer to Desired Condition 29)	Engineering
4	Develop a Road Decommissioning Design Guide to help insure effective decommissioning. (Refer to Desired Condition 29)	Engineering
5	Develop a Road Maintenance and Reconstruction Design Guide to be able to implement effective methods of minimizing impacts on water quality and aquatic habitat. (Refer to Desired Condition 29)	Engineering
6	Update/revise range allotment plans based on meadow ecological status and other variables. (Refer to Desired Condition 21)	Range
7	Prepare and annually update an Interpretive/Public Information Plan, using Visitor Preference Surveys (Refer to Desired Condition 23)	Interpretive Services
8	Prepare Sensitive Plant Species Management Guides. (Refer to Desired Condition 13)	Botany

#	Land and Resource Management Plan Amendments	Program Lead
1	Establish Streambank Stability standards and guidelines. (Refer to Desired Condition 5)	Watershed
2	Establish Large Woody Debris (LWD) standards and guidelines for streams. (Refer to Desired Condition 3)	Watershed

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Appendix A: Land Use History, 1848-1958

By Pam Connors
Forest Historian

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Preface

This document is an attempt to identify the key historical forces that have operated on the Central Stanislaus watershed between 1848 and 1958 and to explore the interplay of humans and the environment on this landscape. The document's bias is that an ecosystem is an artifact, although one not shaped entirely by human will. It is written from the position that acknowledging the presence and actions of humans is essential to arriving at a more useful understanding of an ecosystem, and that humans are components of the ecosystem as it co-evolves and adjusts. That is, it sees as false any dichotomy between "natural" and anthropogenic causation that venerates a nonexistent "pristine" nature. It also is underpinned by the view that temporal analysis of the watershed is vital to analyzing its contemporary structural and functional properties, and that habits of thought that pit nature against culture and that pit science against history lead to seriously flawed conclusions. The concept of ecosystem equilibrium in terms of constancy and stability is also rejected in favor of a view of variability and resilience. Finally, the bias of this history is that the structural and functional properties of an ecosystem are only partially revealed by its present manifestation; and that studying the past helps reveal more.

This history is organized using a combination of two standard approaches: thematic and chronological, with the chronology embedded in the themes. The themes were chosen because they are broad areas of human endeavor that had significant consequences within the Central Stanislaus Watershed Analysis (CSWA) area. They are:

- Mining
- Settlement
- Travel ways
- Water Manipulation
- Grazing
- Fire
- Forest Products Industry
- Recreation
- Forest Service Administration

Although somewhat arbitrary, four chronological periods are defined by what appear to be major shifts in the general intellectual and material regard for the land and its resources within the CSWA area:

1848 to 1855 The primary objective was to extract gold; other resources subservient to support of gold extraction. Gold mining was generally done on an individual or small scale. Most newcomers to the CSWA area came as sojourners, not as settlers.

1856 to 1895 Development of permanent settlements, lumber, agricultural products, livestock production, water systems, etc. occurred. There was a significant shift toward gold mining as a generally corporate, large-scale endeavor. Trade still occurred by pack train.

1896 to 1930 Technology of large-scale transport arrives, making its resources accessible for exploitation on an industrial scale. Public domain forested land comes under federal administration. A growing number of people view the Central Sierra as a scientific, aesthetic and recreation resource rather than primarily as a source of traditional commodities. World War I intensifies use of forests in support of war.

1931 to 1958 Economic depression and slow down of large-scale forest industrialization is followed by a surge in such use to support World War II and a growing post war economy. Mounting conflict between those viewing the Central Stanislaus Watershed Analysis area as a source for traditional commodities and those viewing it otherwise. Nationally, the “environmental movement” germinates.

Land use history, because it is derived primarily from written accounts that document actions associated with monetary investment, tends to focus on human “disturbances” to the ecology. That is, on actions taken by humans that had the potential to significantly change an area's ecosystem components, structures or processes. But the substance of this land use history is predicated on the idea that, although there is incalculable variability in human thought and action, trends can be detected in the human relationship with the environment, through time. Themes were identified that characterize major human activities in the CSWA area and reflect a changing interplay with the environment. These themes are not necessarily successive nor are they necessarily discrete and, for the purposes of this history, all are intertwined with Forest Service administration.

This history should be used suggestively rather than dogmatically. It is meant to provide clues to the historic range of variability for key ecosystem elements comprising the Central Stanislaus watershed and, possibly, direction for its desired condition. Sustaining the Central Stanislaus watershed ecosystem is the end goal as resource managers, and conserving diversity—biological, physical and social/cultural—is the lynchpin for sustaining ecosystems.

Introduction

The purpose of researching the historic uses of the land within the Central Stanislaus Watershed Analysis (CSWA) area is to suggest linkages between its current condition and its past uses by non-native humans who settled the area. An underlying premise is that people are an integral dimension of ecosystems and that the biological, physical and cultural/social dimensions of ecosystems are constantly interacting and changing. Further, human ideological adaptations often leave their imprint on ecosystems, and ideas often drive other types of behavioral adaptations, such as technological and organizational.

This report is a land use history of the Central Stanislaus Watershed Analysis area from 1848 through 1958: from the onset of the Gold Rush to the dawn of the environmental movement. Prior to the Gold Rush, human history on this land was fundamentally different in scale as well as fundamentally different in character. Just prior to the Gold Rush, an estimated 9,000 Sierra MeWuk lived in their territory. The primary point of view of this history is that the people native to the area, and those who frequented it prior to the influx of non-native immigrants and sojourners, principally manipulated their environment for subsistence.

The scope of native people's environmental management and the depth and sophistication of the ecological understanding that underpinned it has become the subject of investigative scholarship (cf. Blackburn and Anderson 1993). Fire, selective seed collection and sowing, transplanting, pruning and coppicing, weeding and tilling, water diverting and ditching, and other adaptive techniques were used by California Indians, including those groups native to the Central Sierra. All of these practices were employed to encourage valued plants and animals and to nourish the relationship between people and the other components of nature. These customs, coupled with a rich and diverse habitat, sustained what many scholars now believe to be the highest population levels supported by societies characterized as "hunter-gatherers"—that is, societies not based on a highly-developed agricultural subsistence base.

The discussion of how native Central Sierra people adapted to and managed the environment is left to other researchers. What is important to distill from this emergent scholarship and appreciation of Indian tradition is that the Central Sierra landscape that both entranced and challenged the non-native trappers, explorers, immigrants and sojourners was not entirely the product of natural processes and functions, operating in a vacuum without human intervention. Rather, significant parts of it—specific, important biological communities—were the product of hundreds of years of deliberate human attention (Blackburn & Anderson 1993).

Intensive land use on the lands now administered as a national forest largely occurred, coincidentally, with the creation of the Stanislaus Reserve in 1897. Just a generation and a half before establishment of the forest reserve, newcomers had made their way into the adjacent foothills and soon prospected, traveled, and lightly tapped resources in the deeper recesses of the forest. The turn of the century was a time when land use in the new reserve would begin to be affected by the policies and activities of an organization that would become the U.S. Forest Service; concomitantly, this new organization began probing its purpose and defining itself. This act of definition and its interaction with various forces that had strong interests in this land—grazers, water and hydroelectric speculators and developers, homesteaders, ranchers, lumbermen and miners—are part of its present identity (Starr 1850-1915). The history of the land use within the CSWA area reveals itself as a mix of ignorance and insight, greed and grace; of squandered opportunities and aching promise. People are key to this particular story—interplaying with the varied responses to the imperatives of place.

Thus, the history of CSWA land use in the first half of the twentieth century can be organized with strong reference to fundamental redefinitions that the Stanislaus National Forest and the Forest Service underwent—reflecting fundamental changes in the ways society perceived its relationship with its forested environment. The agency's view of and relative vigor in carrying out its mission, in a national context, had a significant effect on what occurred on the CSWA landscape. To use one example, when the operative paradigm of society primarily values wildlife as a source of food for humans, wildlife will be perceived in at least two categories: wildlife that is suitable for human consumption and wildlife that is unsuitable for human consumption. Consequently, systems will eventually be shaped which manage wildlife accordingly. Through time, if the interplay of variables results in a generally accepted regard of wildlife not primarily as a source of human food, the earlier categorizations would, in time, be reconstructed to reflect the transformed value system; institutions would eventually be re-fashioned to better support and perpetuate the revised perception; albeit with lags and imperfections.

Word of California, during the Mexican Period (1822-1848) had sifted through American society, urging a few adventuresome souls to actually immigrate. Boosted by Richard Henry Dana's *Two Years Before the Mast*, published in 1840—2,700 emigrants made the trek overland between 1841 and 1848 (Holliday 1981: 30). Among them, in 1841, the

Bartleson-Bidwell Party became the first emigrant party to travel overland to California across the Sierra Nevada. Having earlier abandoned their wagons, and crossing on-foot and horseback somewhere in the vicinity of Sonora Pass, the bedraggled assemblage picked its way down the boulder strewn Middle Fork Stanislaus canyon. Passing somewhere near the present site of Sonora, the group continued through the site of today's Knights Ferry and eventually arrived at Dr. Marsh's Ranch near Mt. Diablo. From there, the Bartleson-Bidwell Party dispersed: some members settling in San Jose and some in what would become Stockton and Chico; some returned to Missouri and the East coast. But these incursions were dwarfed by the numbers of newcomers who soon swarmed the region, triggered by the discovery of gold.

In sharp contrast to the outlook of Native people, scholars of western history characterize the resource use by non-native newcomers to the Central Sierra as being underpinned by a fundamentally different mind-set. Rather than a deeply rooted sense of interdependence between humans and habitat—indeed, a lack of such a dichotomy—the Gold Rush newcomers generally viewed the environment as an often beautiful yet formidable foe from whose clutches great wealth would have to be forcibly wrested. To "civilize" this habitat, it had to be dominated and reshaped—bent to human will. Through the Gold Rush, rather than softening the dichotomy of humans and the environment, it hardened… with the latter perceived as existing chiefly for the benefit of the former and without a commitment to enduring use.

Though a prevalent frontier point of view, extracting resources with scant regard for future use became a caricature mind-set for Gold Rush newcomers. Nine days passed between John Marshall's gold discovery on January 24, 1848 at Coloma—only about 70 miles from the CSWA area—and signing of the Treaty of Guadalupe-Hildago that ceded to the United States the expanse west of Texas and north to Oregon. Though news of the gold discovery was briefly suppressed, by mid-June 1848, word had traveled sufficiently through the San Francisco press and by word of mouth that three-fourths of San Francisco's male population hurried off to the mines. As news spread and more gold discoveries were made, the course of California's history--heretofore set by the Californios as an isolated, pastoral land--was dramatically and irrevocably altered. By fall, miners had prospected and dug out gold from the Trinity River in the north to the Tuolumne River in the south. In the winter of 1848, with President Polk's authentication and pronouncement of the abundance of this precious metal, gold fever settled into the spine of California: the Central Sierra Nevada and her foothills.

J. S. Holliday pointed out in *The World Rushed In* that, "the frugality of generations gave way to a contagion of optimism and ambition" as newcomers poured into California.

> The 89,000 gold seekers who traveled to California by the end of 1849 were not settlers or pioneers in the tradition of America's westward migration. These people came as exploiters, transients, ready to take, not to build…. [T]hey found themselves surrounded by crowds of hurrying men concerned only with how to make the greatest amount of money in

> the shortest time. With that common motive, they also shared an indifference toward California and its future (Holliday 1981).

First-hand accounts exude this view. *Three Years in California, William Perkins' Journal of Life at Sonora, 1849-1852* recounted this 49er's journey from Ohio to Sonora, via New Orleans, Brazos Santiago, Texas, Mazatlan and San Francisco. Arriving in Sonora in the spring of 1849, Perkins described the scene around Woods Creek:

> Out side the line of tents and houses, and along the edges of the creek, the ground is delved, and dug, and thrown up as if some gigantic Behemoth has been rooting it up with his snout. Work that would have taken hired laborers years to accomplish, the thirst for gold, and the excitement of the search, as consummated in a few months (Perkins 1964).

Moreover, a pattern of direct violence toward native people took root, in addition to the indirect violence of disease and the competition for or destruction of food sources. From his journal entry for February 1, 1850, Perkins recounted the part he took in punishing Indians who—undoubtedly motivated by hunger—had entered Sonora, herded away seven mules, and killed the man tending the stock. Following their track to the north fork of the Estanislao—as the Stanislaus River was then referred to—Perkins and the men he was with found the offenders—Mission Indians harbored by local "root diggers," and opened fire. After killing several of the Indians and driving off the others from their village, Perkins' group collected everything and "set fire to the whole town, in imitation of the warriors of the middle ages." Expressing a disquiet and shame unusual in '49er journals, Perkins lamented :

> After the excitement of the fray had subsided, I could not help asking myself the question as to how far we were warranted in destroying life and property to such an extent; for although the value of property destroyed probably did not amount to much, still it was the whole amount of worldly goods possessed by the tribe. The houses we may believe, have as great a value, comparatively speaking, to their owners, as ours in Sonora. Their baskets, and above all, their supply of provisions, may certainly be placed on a par with our household goods. And we had invaded and destroyed the lives and property of these poor, miserable people, to chastise what in their eyes is no crime (Perkins1964).

The Sierra Mewuk lost more than 90 percent of their population between 1850 and the 1910 census—from an estimated 9,000 people to 670 (Bates and Lee 1990). The hunt for gold had set a course that could not be stayed. As the surface gold played out, the independent miner of modest means gave way to the large mining companies that wrested hard-to-get gold using costly machinery and wage laborers. Whole rivers were turned from their beds to allow miners to work the channels; mountainsides were blasted away with high-pressure hydraulic monitors, and the landscape was riddled with tunnels and adits.

By the time this pattern was emerging, the Central Stanislaus watershed had begun to play a part in agriculture, producing a few specialized crops at the farms and ranches established in her lower elevations. But on the lands that would just more than a generation later become the Stanislaus Forest Reserve, little was grown for market. The use of the lands within the Central Stanislaus watershed, in addition to mining, was primarily for livestock grazing and water supply.

Mining

Through the initial months of the Gold Rush, the Central Stanislaus watershed was only sporadically prospected and mined, the focus being on the adjacent mining centers of Sonora, Jamestown, and Columbia. But soon, settlements on the fringes of that would become the Stanislaus National Forest developed around mines. For example, American Camp, Buchanan, Pine Log, Confidence, Italian Bar, and Jupiter were put on the map owing to their mineral wealth. As a writer to the *San Joaquin Reporter* alluded to in the winter of 1851, many miners believed that the richest gold mines would be found high in the mountains—that the lode that had already been found was simply an offshoot of the real Mother Lode. Remarking about new strikes at Cherokee Diggings near the present town of Tuolumne:

> It is not generally known that this fall the people have pushed further towards the Sierra Nevadas than ever before - such is the fact, and I learn that there is quite a large camp upon a flat in the vicinity of the North Fork of the Tuolumne, called the Cherokee Diggings, so named by being first worked by a party of the Cherokee Indians, who, by the way, are excellent prospectors. I attach considerable importance to the fact of gold being found at that place, as it has hitherto been the common opinion in these parts, that there was no gold above the forks of the river. As this is now found to be an error, it is more than probably that another season, miners will penetrate still further back, with every prospect of success, as it is well known that the richest of the Northern placers have been found but a short distance from the Sierras and why not the same here? (SJR 1851)

Though outside of the lands that would, nearly a half-century later, become the Stanislaus Forest Reserve, many historic-era foothill communities that owed their genesis to gold mining, such as Columbia, Jamestown and Sonora, nonetheless had the potential to deeply affect the forest ecosystem. A prominent example is the development of water delivery systems that tapped high elevation streams within the CSWA and diverted water for use by these lower lying mines and communities. The larger, nineteenth century water delivery systems that emanated from the CSWA area are outlined in the "water manipulations" section of this document. But in addition to the Tuolumne County and the Columbia & Stanislaus River water companies, there were several other, smaller systems that tapped CSWA water for foothill mining ventures. In 1852, Jamestown area miners, dogged by lack of water during the summer, were looking forward to water being delivered from Sugar Pine Creek:

> Water is now becoming scarce in the diggings around Jamestown, but two companies are engaged in bring[ing] a stream from Sugar Pine Creek, a branch of the Tuolumne, a distance of twenty five miles, which it is expected will furnish the placers around Table Mountain, Montezuma, and Oak Springs, with water during the entire year (SJ 1852).

In 1849, the average price paid to the miner by the bank and express companies for gold dust was about $14 an ounce; by 1850 and 1851, the price had risen to $16. James Carson pointed out in about 1852 that the lowest assay of California gold at the US Mint was over $18 per ounce: the difference between its lowest real value, and the prices the miners received was excoriated as the silent tax they paid.

Of the sub-watersheds within the CSWA area, mining activity most directly influenced the American Camp and Basin areas, and probably owing to that, the related townships were the first within the CSWA to be surveyed for settlement and development. The more productive, historic-era gold mines within the CSWA are listed below in Table A-1.

Table A-1. Historic-era Gold Mines within CSWA

Mine	Subwatershed	CSWA Landscape Area
Philadelphia	Eagle Creek	Rose Creek
Volunteer	Five Mile Creek	Lyons
Spring Gulch	Hunter Creek	Duckwall
Contention	Knight Creek	Rose Creek
Gold Crater	Knight Creek	Rose Creek
Basin Slope	North Fork Tuolumne	Duckwall
Buchanan	North Fork Tuolumne	Duckwall
Casa Madera	North Fork Tuolumne	Duckwall
Confidence	North Fork Tuolumne	Duckwall
Excelsior	North Fork Tuolumne	Dodge Ridge
Fair Oaks	North Fork Tuolumne	Duckwall
Gem	North Fork Tuolumne	Dodge Ridge
Green	North Fork Tuolumne	Duckwall
Grizzly	North Fork Tuolumne	Duckwall
Lucky Strike	North Fork Tuolumne	Duckwall
Mammoth	North Fork Tuolumne	Duckwall
Poseidon	North Fork Tuolumne	Duckwall
Providence	North Fork Tuolumne	Duckwall
Ryan	North Fork Tuolumne	Dodge Ridge
Sledge	North Fork Tuolumne	Duckwall
Star	Rose Creek	Rose Creek
U. S. Grant	Rose Creek	Rose Creek
Gray Eagle	South Fork Stanislaus	Lyons
Keltz	South Fork Stanislaus	Lyons
Mountain Lily	South Fork Stanislaus	Lyons
Oro Grande	South Fork Stanislaus	Lyons

Mine	Subwatershed	CSWA Landscape Area
Red Cloud	South Fork Stanislaus	Lyons
Riverside	South Fork Stanislaus	Lyons
Sonnet	South Fork Stanislaus	Lyons

With few exceptions, historic newspaper articles about gold mining were decidedly ebullient. And that confidence soared whenever water—an indispensable ingredient for efficient gold mining—was brought to the diggings by ditch and flume systems. Through most of the 1850s, optimism reigned; fed by scenes and reports such as these from Columbia reported in the *Daily Alta California,* a San Francisco based newspaper:

> The summer campaign may now be considered as fairly opened, and as the miners are amply supplied with the necessary element...water...we may exact a continued yield of big lumps, and the finding of rich deposits, which, in the past few weeks, we have already had reports of (DAC 1854).

> Saturday evenings is [*sic*] a busy and crowding time with the buyers. I have seen at the banking houses of James Mills & Co., Adams & Co, and Wells Fargo & Co., hundreds of miners waiting their turn to have their dust weighed in and turned into coin. We do not exaggerate when we say, we have seen at the house of Mills & Co, a line numbering thirty to forty, this rush generally lasting until after ten at night (DAC 1854).

By the mid-1850s, as placer gold dwindled and hard rock mining began to eclipse placer mining, individual miners or small, loosely organized groups of them gave way to mines operated by highly structured consortiums and capitalists. During this transition, the earlier era was criticized as being populated by transients who had little or no interest in the building of communities or of investing in the area's future. Quartz mining capitalists tended to paint their ventures as making more long-term investments.

The tenor of local newspaper articles reporting on commercial mining ventures that date from the 1860s through the first decade of the twentieth century tended to be exceedingly promotional. Nonetheless, the flavor of the operations and a notion of the level of activity can be extracted from these references. The Excelsior Mine on the North Fork Tuolumne below Sugar Pine Creek was touted in the summer of 1862 as a very profitable operation. The mine owners were reportedly "still doing a log crush business, and their lode is giving out gold in pounds. A few days since they obtained upwards of 1074 ounces, worth $20,000, the result of 10 days work" (TC 1862). In 1870, the productive Confidence Mine—clustered with the Lamphere, Jessie & Edith, and Independence quartz mines—alone took out $7,200 worth of gold in just eight days (UD 1870).

It appears that by the mid-1870s, larger scale mining within the CSWA area was depressed and that it remained in that condition until about 1890. This coincides with a general, national economic downturn that began in the mid-1870s. This may have stimulated increased prospecting by individuals and re-working of abandoned mines like that known to have occurred during the Great Depression a half-century later. The

Confidence and Buchanan mines, for example, which had been stunning producers in their early years, were closed by the 1870s. Rejuvenated optimism for the area's mining industry was evident in 1898 and may have been stimulated by the twin prospects of electrical power and a local railroad that tied into the nation's railroad network. An 1898 article reported that the Tuolumne County Water Company was in the process of extending its "electric line to the mines along the Mother Lode in anticipation of furnishing them with power during the season about to commence and in conjunction with the Tuolumne Electric Light and Power Company will furnish light to Sonora and the lode towns" (MLM 1898). Another article from the same issue of the same paper reported:

> The Eastern Belt Mines have been neglected for years since the closure of the Confidence, Soulsby, and Buchanan mines some years ago. New activity is now taking place in this area. The Confidence is now in active operation with a twenty stamp mill running night and day. The town of Confidence is having a boom with at least twenty buildings going up the past year. Adjacent country is being thoroughly prospected. The Buchanan is rapidly being reopened (MLM 1898).

In 1900, a rich strike at the Confidence Mine was reported and in 1901, the veteran mine was still in operation. The *Union Democrat* reported that:

> The famous old Confidence mine on the East belt is showing up in fine shape, and indications are that it will in [the] future be a heavier bullion yielded than in the past (UD 1900; 1901).

Just a month earlier, another consortium, the Confidence Gold Mining and Milling Company, filed articles of incorporation at the county clerk's office. According to the newspaper, the purpose of that corporation was "to acquire by purchase the following East belt mining properties: the Confidence quartz mine and mill site, the Independence quartz mine the Jessie and Edith quartz mines; and also any and all other mines and mineral or other lands, water rights, reservoirs, ditches, flumes and other property, as the company may see fit, and to manage, control, and operate the same" (UD 1901).

In 1892, the venerable Buchanan Mine had been one of the mines featured in the Tuolumne County section of the *Eleventh Report of the State Mineralogist*. To improve hauling, the mine had built 11 miles of road, and to improve the dependability of water, the operators had constructed 4 ¾ miles of ditch and flume from Hunter Creek (CA 1892).

Scores of gold mines that were located on the fringe of what would become the Stanislaus National Forest secured water from streams within the forest. In Summersville, some examples include the Dead Horse Mine and the adjoining Lady Washington, owned by Haywood and Hobart (UD 1890). The Dead Horse Mine was situated such that water for its operation—including motive power—could be secured from the Tuolumne Ditch and Water Company ditch (CA 1892). In 1895, the old Dead Horse Mine was still operating. Reaching the deposit by means of a 1,360-foot shaft, ore worth $2.50 per ton was being extracted. The mill had 20 stamps and was totally operated by water power (UD 1895). The Lady Washington Mine was “[a]dvantageously located… it can be worked by tunnels on the vein, and has for motive power the North Fork of the Tuolumne River below the mine.” The New Albany quartz mine was fed by its own ditch that diverted water from the North Fork of the Tuolumne, probably near today’s Riverside day use area.

The Providence, straddling the forest boundary on the North Fork Tuolumne about one-half mile below the confluence of Duckwall Creek, is typical of many Southern Mother Lode mines in that its original detection was happen-chance, it produced well, closed, was subsequently re-opened, and was later damaged by forest fire. Discovered by a prospector who had crossed and re-crossed the area for many years as he traveled to other mines in the vicinity, the Providence Mine was aptly named. Soon after locating the vein, he secured a bond and erected a 16 stamp mill, hoist, and other surface improvements. The first cleanup of the stamp mill reportedly paid for the entire cost of developing the claim. By 1900, the mineshaft had reached 900 feet and a drift was being run to the south, and the local newspaper noted that “[t]he tin stamps are kept dropping night and day.” Down to 1,400 feet, the mine produced two million dollars, but at that depth, the shoots seemed to dissipate. The Providence was reopened in 1920 with the firm belief that those shoots were still present, but at a greater depth. Its new operators “intend to uncover them and go on with the golden record that made the Providence famous.” The Providence was reopened with the same combination of management and financial backing that had successfully worked the Dutch Mine: “A vast amount of work will be required to rehabilitate the shaft which is caved in many places by the timbers decaying. It is thought a year will be consumed getting the mine in shape for further development. The property is owned by Mrs. Bluett who has bonded it to the present operators” (UD 1900 and 1920). In 1928, a forest fire that charred over 1,500 acres on the Stanislaus National Forest near the town of Tuolumne destroyed the Providence Mine, along with the Star King and the New Albany mines (SC 1928; SJMH 1928).

Another optimistic 1898 article about the Grizzly Mine, located on the fringe of the Stanislaus National forest near the town of Tuolumne, noted that the shaft was then nearly 370’ deep. A drift was run at 280 to access the ore body. A cross cut was being run to “cut this body of ore which apparently is a chimney. The samples shown the writer by Mr. [Will P.] Henry will work way up in the thousands to the ton” (10/19/1898).

By 1891, the Riverside Mine, located on the South Fork of the Stanislaus River opposite the Keltz Mine, had a mill beside the river. “Above these mines on Rose Creek are a number of mines which on account of their almost inaccessible position, are but little known” (8/15/1898). In 1901, the Riverside Mine was still being expanded in search of reaching a known ore deposit. The newspaper reported that the “tunnel on the Riverside is in 400 feet, leaving 100 feet more to excavate before tapping the ore chute.... There is 700 feet of backs and the ore can easily be stopped” (UD 1900). The Keltz Mine, in 1891, was sold and bonded to an English company. The company was reportedly “well satisfied with the results…. The mine has a good ten-stamp water mill on it. The capacity of the mill will soon be increased by additional stamps. The ores of this mine can be mined or milled at small cost per ton. The ore shoots are reached by tunnel and all machinery is operated by water power" (UD 1891). In 1895, the Keltz was further developed and expanded to a 15 stamp mill (UD 1895).

In 1891, the Star Mine, on both sides of Rose Creek in the American Camp vicinity, was again in the news and alluding to a promising future. Located in the same section as the Last Chance Mine, the Star was producing handsomely from the spurs or feeders, while "the main vein is practically untouched" (UD 1891). An 1898 article about re-opening the Oro Grande Mine at American Camp noted that a tunnel had "been driven a distance of one hundred and thirty feet and an uprise is now being made to connect with the old workings. This mine is situated about a mile and a half from the Gray Eagle in the same quartz belt, and recent developments have shown up a good body of ore. It is the intention of Dr. Hunter to erect a milling plant on the property this winter. The American Camp District is showing up as one of the best quartz sections in the county, and mining men who have visited it predict a brilliant future for the camp" (SJR 1898). The American Camp Ditch served several of the mines in this area. Drawing water from Rose Creek and built sometime between 1856 and 1864, the ditch was 22 miles long. Its period of use was apparently relatively short; though it appears on the 1881 General Land Office Plat, it is not on J. P. Dart's 1879 *Map of the Principal Quartz and Gravel Mines in Tuolumne County, California*. Though this may have simply been an oversight, at least by 1912, the American Camp Ditch was referred to as old and abandoned. This historic ditch, however, is still readily apparent on the landscape and is one of the few intact systems that has not been re-used by later water developments or reincarnated as a road (CA-Tuo-3122H: CRMR 05-16-775).

Though the complaints of miners usually were centered on a lack of water, water could also be a miner's bane. Hard rock mines were frequently plagued with flooded shafts, tunnels, and adits. In 1891 the New Albany Mine, for example, had to remove water from its 800-foot main working shaft preparatory to mining and milling operations that would make use of its new hoisting gear[6] (UD 1891).

Hydraulic mining was one of the most environmentally destructive historic methods of extracting minerals, and it was employed in the heart of the CSWA area at Philadelphia Diggings between Knights and Eagle creeks in the vicinity of Jupiter. To use hydraulic mining and ground sluicing techniques, the Philadelphia Gravel Company had to build a ditch system in order to supply the needed water. By late 1898, the mining company's 16-mile long ditch from the South Fork Stanislaus, near Strawberry, was nearing completion. Called the Philadelphia Ditch, its flow was augmented by water from Rose, Eagle and, probably, Knights creeks as the ditch made its way to the Philadelphia Diggings. A large force of laborers worked on the ditch during the summer of 1898—the ditch measuring four feet across the top, two feet at the bottom and two and one-half feet

[6] By 1898, the flume built on the bridge over the North Fork Tuolumne on the road to the New Albany mine was to be removed by recommendation of the Grand Jury. Leakage from the now defunct flume was cited as the cause of the early decay of the bridge (MLM 1898).

in depth. Its fall was engineered at 13 feet to the mile and its capacity was 1,500 miner's inches (MLM 1898). The water-powered a monitor comprised of a hose and nozzle that was aimed at the gold bearing gravels:

> …the upper end of the hose is much larger than the lower end, the water running in, keeps it full to the very top; and the weight of this water, escaping through a pipe attached to the lower end of the hose, in a similar manner to that of a fire engine, plays upon the bank with great force and effect, washing it rapidly away (Hutchings in Olmsted 1962).

After recovering the heavier gold and pitching aside the rocks, the "slickens" that were left in the wake of hydraulic operations oozed into adjacent watercourses, often with disastrous consequences to aquatic life and downstream users. The excesses of hydraulic mining eventually resulted in the Sawyer Decision that resulted in prohibiting hydraulic mining unless the "slickens" could be trapped and prevented from entering the streams. Trapping this debris was often rather ineffectually attempted by constructing small dams out of brush.

Meanwhile, at the close of the nineteenth century, mining was steady but unspectacular in the western fringe of the CSWA area. The Green Mine was reportedly producing respectable quantities of gold and was moving toward patent. The shaft and drain tunnel had been re-timbered and work in the mine was set to begin in earnest. A large capacity Cornish pump was being used to "unwater" the mineshaft (UD 1900).

In 1907, the Tuolumne Electric Company breathed new life into the Spring Gulch Mine when it extended its power transmission line to the workings (MLM 1907). This company, with its powerhouse on the Tuolumne River, just downstream of the Clavey River confluence, assertively sought contracts with the area's mines and other industrial customers, such as the West Side Lumber Company.

Scores of more modest gold mines were worked within the lower elevations of the CSWA area; many of them dating to the 1850s. Some of these have left a scant paper trail, while the existence of others is detected only by traces on the landscape. Unfortunately, mineral production figures found thus far are aggregated for countywide statistics. In 1911, Tuolumne County produced gold valued at $1,093,484; 75,000 barrels of lime valued at $70,000; 4,319 tons of limestone worth $13,609; 18,966 cubic feet of marble valued at $50,398; and silver worth $13,243. In 1914, Tuolumne County produced an unspecified quantity of gold valued at $950,000. Other important minerals were lime valued at $38,000, Limestone valued at $21,907, marble valued at $38,202, and silver valued at $11,000.

The appearance of the Forest Service seems to have precipitated little conflict with miners within the CSWA area. At least the few surviving documents that address this issue point to early forest officers who were highly sympathetic with miners, working hard to enable mining operations within the new framework that required miners to secure permits for activities heretofore unregulated… like removing timber from the forest reserve. Just a few decades later, however, the situation was strikingly different. Though forest officers viewed mining as a legitimate use, the intensity and multiplicity of other land uses within the CSWA area brewed clashes. Long-festering conflicts between miners and federal land managers over surface rights on mining claims came to a head when, in 1955, a public law was enacted specifying that:

> Rights... shall be subject... to the right of the United States to manage and dispose of the vegetative surface resources thereof and to manage other surface resources thereof.... Any mining claim shall also be subject... to the right of the United States to use so much of the surface thereof as may be necessary for such purposes or for access to adjacent land.

This caused a stir among mining claimants who feared the Forest Service would manage other surface resources on mining claims in a way that opened the door to establishing special use tracts, campground enlargements, or other private or government structures. The Regional Forester clarified:

> It will henceforth be the policy of the Forest Service in Region 5 to authorize no summer homes or other private structures nor to construct administrative or other improvements on mining claims subject to Section 4 of the Act of July 23, 1955. In essence this policy restricts Forest Service administration to harvesting timber and other vegetative resources and to the building of access roads on the claims. Additionally, it places no restriction on the Forest Service regarding the right of the public to pass over (as in the case of hunters and fishermen).

The policy was also to be construed in such a way that activities would not be permitted on mining claims that “endangered or materially interfered with prospecting, mining or processing operations or uses reasonably incident thereto” (NARA 95-93-044, Box 1/2).

Historically, gold mining has left the most evidence on the Central Stanislaus watershed landscape, but mining for materials such as building stone and road rock have also left their mark. For example, in the Deer Creek area, in 1958, one claimant had at least six sand and gravel claims in Sections 21 and 22 of T3NR16E, selling five-yard lots of quarry run material for $10 per cubic yard (NARA 95-93-044, Box 1/2). Another sought after material was volcanic tuff such as that occurring at the Spring Gap Tuff Lode in T4NR17E, Section 24 (Smith 1958). Although prospected and located earlier, it appears that wartime demand and attractive prices for strategic minerals—especially during the Korean War and the Cold War—also left noticeable impressions. Among those minerals were tungsten, uranium, and molybdenum that were mined in the Emigrant Wilderness and Eagle Meadow/Long Valley areas (Smith 1958).

The legacy of mining on the CSWA landscape is spotty, with the lower reaches of the Stanislaus and Tuolumne watersheds being directly affected by extraction and the upper reaches being primarily affected by water developments. Even early foresters grappled with assessing the effects of California’s mixed blessing of gold wealth on the state’s timber resource. In 1889, J. G. Lemmon, a botanist for the State Board of Forestry, reported on the "Timber in Tuolumne County." Although it is difficult to pi oint where on the map his comments related as he reported on his exploration of the upper forks of the Tuolumne River, his remarks are, nonetheless, of interest:

> Perhaps the observations of most practical importance looking to the reestablishment of the forests, are those connected with regions that have been denuded by the devastating sawmill or the hydraulic monitor. We twice crossed that medial belt of the Sierra where once the famous southern mines of California were worked, now a sad picture of desolation. Thousands of acres of spires of red earth and piles of washed boulders with stumps and roots tell where the extensive plains once stretched with their trees and chaparral here and the a rickety flume or a small hovel tell where the poor Italian or the poorer Chinese are left to rewash and glean among the gravel for lost nuggets. But a change is slowly coming over the scene. Trees are springing up in the gulches and upon these moisture spots, but the grass and tender herbs scarcely yet appear in the soil-less waste. It is interesting to note the kinds of trees and other verdure that in all the denuded regions of the state kindly rise up to hide man's destructive footsteps. The comparison with those where only the trees are removed but the soil is undisturbed, is very instructive as bearing upon the question of what to plant (PCW&I 1889:104).

Settlement

Mineral lands, the lower, flatter elevation lands nearer towns, lands adjacent to major travel ways, and meadowlands were the first public domain lands now within the CSWA area to be settled and patented. The Homestead Act of 1862 allowed citizens 21 years old or heads of families to enter up to 160 acres on, primarily, surveyed public land. The entryman had to meet the law's residence and improvement requirements, that is, five years' residence and proof of cultivation had to be proven before title to the land was honored… plus payment of filing fees. Preemption allowed a settler on public lands a preferential right to buy his claim for a modest price, usually a maximum of 160 acres for $1.25 per acre. The Timber and Stone Act of 1878 allowed an entryman to purchase not more than 160 acres at not less than $2.50 an acre of unoffered, unappropriated, and unreserved surveyed public land that was valuable chiefly for timber or stone and unfit for agriculture. The Swamp and Overflow Act allowed for "swamp and overflow lands unfit for cultivation" to be granted to the states by the federal government and, in turn, those lands could be sold to claimants who would drain those lands and develop them. These four provisions were among the laws used to gain legal title to land desired for settlement, development, and grazing. The 1866/1872 Mining Law allowed for the patent of valuable mineral deposits in lands belonging to the United States, and for acquisition of up to five acres of non-mineral land for mill site purposes.

Though riddled with loopholes, veritably inviting abuse, these laws allowed many to settle here and attempt to make a living off the land. The Timber and Stone Act was used relatively sparingly within the CSWA until the railroad was planned to reach the foothills. Agents for what would become the West Side and the Standard lumber companies began a process of acquiring rich timberland—often using strawmen to perfect the claims (Ayres 1916). Early in the twentieth century, company officials also laid claim to valuable timberland in their own names. For example, David H. Steinmetz and Thomas S. Bullock of the Standard Lumber Company each applied for significant land in T4NR17E, applying in 1902 and receiving patent in 1904 (NARA RG49, Box 534, C2270D).

Grazers, would-be settlers, and lumbermen complained bitterly about the Forest Reserves eliminating land from public domain and closing it to privatization. Grazers grumbled because they now had to obtain a permit to graze stock, cut timber for fences, corrals and for building summer headquarters on the forest. Settlers grumbled that they were deprived of making a home on lands suitable for agriculture, thereby undercutting long-standing Congressional intent. Lumbermen grumbled, first, because they believed that the vast timber resources were being "locked-up" from use and, later, that they were forced to purchase timber on forest reserves and to log timber on land administered by the Forest Service under unreasonable strictures.

Attempting to respond in ways that would promote support for the national forests, the first chief of the Forest Service, Gifford Pinchot, hammered home the idea that these lands were not to be frozen in a preserve, but were to be used, wisely, for the benefit for the citizenry. He defined wise use as the greatest good for the greatest number in the long run. Through Pinchot's vision, the "permit" concept was the primary tool for wise use, requiring a permittee to compensate the public for use of its lands and allowing the Forest Service, as the public's agent, to stipulate the conditions of use.

To respond to settlers' complaints, the Forest Service honed the Forest Homestead Act of June 11, 1906. Acknowledging that, in its attempt to designate forestlands for reserves that some lands chiefly valuable for agriculture were necessarily included within the administrative boundaries, settlers were invited to homestead any such lands. The 1907 State Roster outlined the provisions of the June 11th act:

> Homesteading in the National Forests is governed by the Act of July 11, 1906. After selecting a homestead consonant with the terms of the Act, describe it accurately by section, township, and range, or if not surveyed, by natural objects... and consult the Supervisor regarding further methods of procedure. Do not squat on land before it is listed for entry, nor ask to have valuable timber lands listed. The law refers only to lands chiefly valuable for cultivation....[7]

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[7] In 1900, Tuolumne County was 34th out of 58 counties in population with 11,166 people. This compares with 8,351 counted in 1850; 16,229 in 1860; a decided drop to 8,150 in 1870; 7,848 in 1880, and only 6,082 in 1890; climbing tremendously—perhaps with the increased commerce stimulated by the Sierra Railway's connection, in 1900.

There was some excitement on the Stanislaus when land was opened under the Forest Homestead Act, apparently with a lag of about one year from enactment of the law. An August 1907 newspaper article reported:

> Evidently the vacant land within the Stanislaus reservation, that is to be open to entry on the 15th of the month, is to be in demand. Many parties from various parts of the county and other places have been in the mountains for a month or more looking over the ground and presumably making selections. According to the *Sacramento Union* the advance guard of the line that will be formed up before the door of the land office in that city on the 15th has already arrived. Three women and a man from Santa Clara County are now camped on the spot in order to be first in line.

Retrospectively, the 1922 pamphlet, *The Forest*, explained the June 11th Act from a national perspective:

> All land in the National Forests has been classified, and the areas found to be chiefly valuable for agriculture either eliminated or opened to homestead entry. As a result of this classification, some two million acres were eliminated and about 250,000 acres in small scattered tracts were opened to entry under the Forest Homestead Act....[8]

The Stanislaus, however, probably owing to the early settlement of the adjacent lands and, therefore, their exclusion from the 1897 Forest Reserve, did not, ultimately, contribute many acres to potential forest homesteads (USDA 1916). As Assistant Regional Forester L.A. Barrett explained in 1936:

> The reason for this situation is not hard to find, since the facts are that all of the cream of the once great public domain that had any real agricultural value had passed into private ownership before the enactment of this law and only the 'skim milk' agricultural lands remained in public ownership either inside or outside the National Forests (Barrett 1936).

In 1916, Ayres reported that "[t]he total permanent population for the Forest is less than 250, which includes trappers, caretakers at mills, resorts, mines and power company

[8] Administration of the Forest Homestead Act was one of the prompts for a nation-wide effort to classify lands comprising the national forests. Issued in May 1914, "Principles and Procedures Governing the Classification and Segregation of Agricultural and Forest Lands in the National Forests" resulted in land classification atlases for each national forest along with narratives, by townships or township clusters. The narratives included sections on topography, climate, soil, agricultural values, land classification (timbered 5-10 mbf/acre, timbered 2-5 mbf/acre, brush land, barren land, and acreage suitable for intensive cultivation), title to lands, forest values, and a brief description of the classifier's qualifications. L. A. Barrett lamented that, Region-wide, although watershed protection was one of the seminal purposes of national forests, reserving land for that purpose "was frequently overlooked," much land being listed that should have been reserved for watershed protection (USDA 1936).

employees"[9] (Ayres 1916). Indeed, even as of 1920, the Stanislaus included 525 patented homesteads and preemptions totaling 65,000 acres. Seventy-one were occupied by the original entrymen, others occupied 54, and 400 were unoccupied. The total area of such patents under cultivation amounted to only 3,113 acres producing hay and 249 acres producing other crops. June 11th patents accounted for 22 of this total with 13 occupied by the original patentees, six occupied by others, and three unoccupied. Within the CSWA area, the Forest Homestead patents were clustered in T3NR15E, T3NR14E, T2NR16E, T2NR17E, T4NR15E; there was thinly veiled allusion in the description of land titles that many of these entries were made not for their agricultural values, but for their mineral or timber values.[10] Of the June 11th lands, 214 acres were producing hay and 40 were producing other crops, nine claims were pending and were occupied[11] (Wulff 1920). Four hundred eighteen of the total homestead-type entries were used only for grazing, amounting to 59,717 acres (USDA 1916; 1920). These numbers clearly indicate the dominance of land entries on the Stanislaus being made primarily for the purpose of grazing.

In 1920, the Stanislaus was composed, in gross area, of 1,104,412 acres after 837,175 acres had been eliminated through various boundary adjustments. Of those 1,104,412 acres, a slim 2,653 were classified as chiefly valuable for agriculture and 292,080 acres, excluding the land classified as agricultural, was alienated private land within the forest boundary. Forest officials further classified the private land by the authority that granted the alienation. The vast majority—80 percent—of the lands within or within what became the forest reserve boundary was patented through provisions of the homestead-type acts or the Timber and Stone Act (Wulff 1920).

For Region 5 and the Stanislaus National Forest, the Forest Homestead Act, in particular, was viewed as a failure in its primary purpose of providing small, productive, family-sustaining farmsteads. In 1936, Assistant Regional Forester L. A. Barrett wrote a "post mortem" on the Forest Homestead Act. The report—unusually candid—reflected

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[9] Robert W. Ayres was well qualified to comment on the Stanislaus' land classification. A postscript to the township summary in the Stanislaus Land Classification Atlas noted that: "Mr. Ayres entered the Forest Service in July, 1904. He was engaged from February 1906, to November, 1907, on the examination of lands for proposed national Forests, and in the examination for lands under the Act of June 11, 1906, and has been Forest Supervisor of this Forest since that date."

[10] There were, however, a few homesteads within the CSWA area but outside of these townships. For example, in T6NR18E, the land on which Douglas Station operated, on the Sonora–Mono Highway near Eureka Valley. It was acquired as a homestead even though cultivation was never attempted. Abandoned for many years after its original use, it began being used again in the latter teens and 1920s as a summer stopping place for travelers (USDA 1916:T6NR18E).

[11] By 1915, Ayres reported for the Stanislaus that "there have been received only 55 Forest homestead applications, of which 32 were listed, with a total area of 2,502 acres. The reason for this small number can be accounted for by the fact that this country was settled a comparatively long time ago, and the more valuable agricultural lands then taken up. The boundary line of the Forest is at a high altitude, farther above the foothills than many other Forests, which in itself excludes most of the land which is fit for farming" (USDA 1916).

Barrett's personal point of view. He explained that the Act's purpose was "to secure a means to eliminate from the Forests' publicly owned lands lying therein that were chiefly valuable for agriculture. The principal agitation for the Act came from Western members of Congress and from the land-hungry public, egged on by locators, who believed that vast areas of excellent agriculture land had been locked up in the Forests and that some means should be provided for turning it back into private hands." In his cover letter, Barrett explained:

> While exception may be taken to some of my statements, I am prepared to prove that my criticisms are correct regarding the personnel who handled the work and the policy and principles under which it was conducted.
>
> We all live and learn, and I believe that the Forest Homestead Act is a fine demonstration of the fact that man cannot farm successfully where he has to combat poor soil, unfavorable topography and 'old man climate.'

Barrett personally met many homesteaders and observed that:

> One and all they were an optimistic bunch, each believing he could succeed where others had failed. My one regret is that I was not a Mussolini who could have said 'no' and saved a lot of suckers what little they had before they started in to prove that it could not be.

The net result, to Barrett, was dashed dreams and thousands of acres of "submarginal land that in due time will have to be restored to public ownership at public expense." He concluded his photo-replete, 64-page report with the "Homesteader's Song" done (USDA 1936):

> How happy am I on my government claim,
> Where I've nothing to lose and nothing to gain,
> Nothing to eat and nothing to wear,
> Nothing from nothing is honest and square,
> But here I am stuck, and here I must stay,
> My money's all gone and I can't get away.
> There's nothing will make a man hard and profane
> Like starving to death on a government claim
>
> Then come to this country, there's room for you all,
> Where the winds never cease and the rains never fall.
> Come join in the chorus and boast of her fame,
> While starving to death on your government claim.

Barrett's assessment had echoed Ayres' comments made years earlier on homesteading in general. Ayres explained that the settlement pattern on the Stanislaus had been similar to that experienced at other localities on the western slope of the Sierra.

Stock raising followed mining, and agriculture followed the stockmen in the foothills, while the lumbermen followed the stockmen into the mountains where the cattle and sheep grazed. Two generations have combed the country for agricultural land, and as a rule the second generation is not any more prosperous than the original settlers. The small lumber mills scattered along the foothills which supplied the first material for the towns have disappeared and have been succeeded by a few large companies controlling great areas (USDA 1916).

Travel ways

Travel ways through the Central Stanislaus watershed area have had an enormous effect on its patterns of use and development. Travel ways were, by extension, communication and trade corridors. Many of the early trails followed ancient pathways trodden for hundreds of years by native people who traveled and traded extensively in all directions. With the Gold Rush, some of these trails were realigned and reconfigured into wagon roads. Rather than side hilling and snaking up and down steep canyons as foot and pack trails tended to do, wagon roads required wider grades that could keep all four wheels in firm contact with the ground without tipping over.

Sonora-Mono Road

The main travel corridor through the CSWA area is what is now designated Highway 108 or the Sonora-Mono Highway. The history of this road dates from hundreds of years ago, when MiWok, Piute and other native people traveled large sections as they traveled, traded, hunted, and fished the area. The Bartleson-Bidwell Party of 1841 was the first group of non-native emigrants to cross the Sierra in the vicinity of today's Sonora Pass. But it was the influx of newcomers to California during the Gold Rush that opened this route and linked the rich gold fields in and around Sonora and Columbia with the overland trails to the east.

Relative to other trans-Sierra routes, Sonora Pass was not a very popular one during the Gold Rush. Though newcomers on foot and horseback picked their way over Sonora Pass and down the canyon and ridge systems to the foothill gold fields, the first wagon train of emigrants—lured to this route by commercial enthusiasts from Columbia—did not travel this course until 1852. This is when the Clark-Skidmore Party—also known as the Elizabethtown–California Company—straggled over the crest at a location about eight miles south of today's Sonora Pass. After initially abandoning their wagons and then retrieving them, probably at Leavitt or Walker Meadow, the group passed through what is now Relief Valley, behind Dodge Ridge, down through the North Fork Tuolumne area, and finally into Sonora and Columbia. The journey from Elizabethtown, Ohio to Columbia had taken them a tortuous four months and three days. Word of their woes over the challenging route did nothing to promote its popularity in a year when an estimated 52,000 emigrants crossed the plains by various routes into California. When interviewed after the ordeal, Nathan Clark said the distance of the Walker River-Sonora route was estimated at 130 miles, but that: "…to render it at all passable, we were compelled first to move some hundreds of thousands of tons of rocks." The Walker River – Sonora "shortcut," alone, had taken the party a month and four days to traverse. Scholars of the emigrant routes estimated that during the following season, the Walker River – Sonora route was traveled by 593 wagons, 2,375 people, and over 18,750 cattle; these numbers were reduced to a trickle for the 1854 season. Attesting to its difficulty, a graded road was never established over the emigrant road above Strawberry Flat (in Davis 1996).

The push behind maturation of the area's roads can partially be attributed to the lessened dominance of mining in the vicinity and the harbingers of a more varied economy. By the opening shots of the Civil War, a dozen years had elapsed since the 49ers opened the earth with pick and shovel. There was, by the 1860s, more of an inclination toward the building of communities with agriculture, lumbering, and even tourism, standing along with industrially scaled mining.

Major improvements and realignments for a Sonora Pass road did not materialize until the 1860s with the excitement and prospect for sustained mining at Bodie and Aurora on the east side of the Sierra. Anxious to be the leading avenue for trade with this booming region, business interests in the San Joaquin Valley joined forces with those in Tuolumne County to build a bona fide wagon road to the new mining district. A. J. Fletcher, who had worked on the survey of the ditch and flume line for the Columbia & Stanislaus River Water Company in the mid-1850s, first called attention to a route up the Stanislaus River in a long letter to *The American Flag* in September, 1862, crowing the need for a good road to Mono and extolling the virtues of his preferred route. Leaving the existing road to Strawberry Flat, Fletcher's route was to cross the South Fork of the Stanislaus north of the flat and wind to the northeast until reaching the confluence of the river he named the "Clark's Fork" with the Middle Fork of the Stanislaus. Surely hoping to curry favor, Fletcher named the river for William A. Clark, one of the road commissioners from Tuolumne County who was considering the various route proposals for the Sonora-Mono Wagon Road.[12] Running along Clark's Fork, Fletcher's route climbed to the pass he named St. Mary's. From the summit, the route descended to "Indian Valley, or the Big Meadows, on Walker's River," making its way easily to Mono. He deemed the only heavy grade to be the descent into the Clark's Fork confluence. He favored this route over the rival idea through Eureka Valley because of what he judged a "mildness of climate" where "ripe gooseberries and other wild fruits, and lofty sugar-pines grow luxuriantly within two miles of the summit and while the old route at this time is covered with snow for 25 miles, there is scarcely a trace of snow to be seen on this route" (AF 9-11-1862). Fletcher's road was opened to pack animals before winter, 1862.

Unsatisfied with Fletcher's route, the *Tuolumne Courier* reported in early 1863 on the an alternative alignment through Eureka Valley, noting that it was…

> the first paper that broached the subject and urged its advantages to the residents of this county, which we did [as] soon as the representations of reliable men from here made it evident that an immense mineral region lay

[12] Another of the commissioners from Tuolumne County was Henry B. Browne; Fletcher also named a creek in the Mt. St. Mary's Pass vicinity for Browne.

> the other side of the Sierra--in our neighborhood, as it were--to which convenient access might be opened and a profitable trade established. From that time to the present, we have consistently advocated the building of this road and constantly endeavored to awake our merchants and manufacturers to realizing sense of its importance. Yet, but little has been done to forward the measure and but little interest seems to be felt in the subject by our capitalists and businessmen (TC 1863).

The following week, the *Tuolumne Courier* optimistically reported:

> From all accounts, there will be quite a rush in here in the Spring; and many of us are expecting a brisk trade on the Sonora Road. Keep your eye on the main point, --this road must and will be the great thoroughfare through which teaming thousands will wend their way to the gold and silver regions of the Eastern Slope (TC 1863).

The existing roads from Sonora to Strawberry Flat and from Hot Springs to Aurora were deemed good such that the only construction needed was the 54 miles from Strawberry Flat to Hot Springs. The *Courier* led the crusade for this road, brandishing the pen against what the writer termed “political loafers:”

> Why not send out one or two men (not a dozen hired bummers) and ascertain the conditions of the road? This can be done in a few days, by practical mountain men, with their grub and blankets on their backs (TC 1863).

San Joaquin and Stanislaus counties, also anxious to reap the commercial benefits of the road over Sonora Pass were to receive $50,000 in state money for the road upon approval by two-thirds vote of its citizenry in their May elections (TC 1863). As its recompense, Tuolumne and Calaveras counties were provisionally authorized to subscribe $50,000 each to construction of the Stockton and Copperopolis Railroad—a project near and dear to the hearts of the valley counties (TC 1863).

Fearing that the rival trans-Sierra Placerville Road would rob Tuolumne County and San Joaquin Valley counties of lucrative trade with the Bodie and Aurora area mines, boosters of the Sonora road sought to shame the politicians and populous into action:

> A general rush is expected in the Spring and times will doubtless be lively. The Tuolumne Road is much spoken of, and is astonishing to find so much apathy among you. Can it be possible that more argument is warranted to convince you that unless you make this road, your county is done in? San Joaquin assumes somewhat the attitude of the dog in the fable, who, while grabbing at the shadow lost the substance. Now why don't San Joaquin go to work sensibly, and push the Tuolumne Road through? Here is a clear monopoly of all the trade coming through to this section of country. - If, after this is completed, they wish to run an opposing line to Carson Valley,

> let them pitch in -- Placerville and them for it. But I submit to them, would it not be better to bring this road through the mountains, then take the money they wish to spend on the Big Tree Road, and run a branch road to Carson Valley. In either case their real interest is in pushing through the new road from Tuolumne, -- and let a forward movement be made at once. Put the business in the hands of men, and not in the hands of political loafers, for whose bread and butter the county is no longer responsible. Why not send out one or two men (not a dozen hired bummers) and ascertain the conditions of the road? This can be done in a few days, by practical mountain men, with their grub and blankets on their back.
>
> There is no snow on this side of the mountains to give trouble. Wagons are going in all directions. Hark! I hear the jingling of bells and the crack of the whip of the jolly team master - yes, there they come down the street -- four large wagons and teams from Placerville! They've been coming and going all winter.
>
> There is now a great demand here for laboring men and wages are from three to five dollars per day -- four dollars being the average. The principle kind of work is sinking shafts and running tunnels. Men who understand taking out quartz can find ready employment (TC 1863).

The *Courier* was relentless in its campaign for the Sonora-Mono Road and reprinted a long letter from a Sugar Pine resident, Seth Sneeden that had appeared in the *Stockton Independent*. Sneeden and another Sugar Pine resident left Strawberry Flat on 26 March 1863, following the route proposed by John Wallace, the engineer so closely associated with the systems of the Tuolumne County and the Columbia & Stanislaus River water companies. Wallace's route apparently followed the Clark Fork after crossing the main stem of the Stanislaus. The article is repeated here for the place names, the reported conditions, and to convey how the route was promoted as a year-round road—a dream that surfaced again many years later:[13]

> We crossed the South Fork of the Stanislaus River, and thence over to Cow Creek Hill, a distance of about 8 miles, having excellent traveling all the way free from snow. For the next ten miles to the crossing of the main Stanislaus River, it was rather a varigated tramp, made up of patches of bare ground and snow, varying in depth from five to twenty inches. The

[13] In 1965, the State of California began studying alternatives for an all weather highway over Sonora Pass.
While engineering studies showed it was "feasible to physically improve and maintain Route 108 as an all-weather highway across the Sierra," the proposal was not carried further in the planning because of the great expense measured against the projected benefits. Seven routes were studied, with five alternatives requiring a tunnel: they ranged in estimated cost from $27 to $206 million. In 1965 the average daily traffic over the summit was 280 cars per day; for the six winter months, it was forecast that the daily count would be 150 vehicles; for summer, 550. Projected traffic for 2000 was 650, with 1,050 per day in summer (UD 1970).

traveling in the snow was pretty tedious for the day was very warm, and we would go in at every step. We encountered the most snow on and down Castle Hill to the main river, say about four miles; but I do not think the average depth exceeded twenty inches, excepting in a few places where there were some slight drifts. After crossing the river we took our line of march up Clarks Fork on our way to the summit. We traveled eight miles up a valley and over a much better road than the one between Sonora and Jamestown, and entirely free from snow. We traveled to within eight or nine miles of the summit with comparative ease, that distance on snowshoes. I do not think the snow on the summit and a few miles over exceeds from three to five feet in depth. Of course, like Castle Hill in some places it is deeper, but I speak of the average depth, not of drifts.

We were absent over a month and spent the time on the main river, on and over the summit and the greater portion of the time within eight to twelve miles of the summit; and as the result of observations we come to the following conclusions; from Sonora to the top of Cascade Hill or the dividing range of the main Stanislaus River, a distance of about forty-five miles, there is but one hill worth mentioning and that after crossing the South Fork of the Stanislaus; but as the road is now located, the hill being smooth and free from stone, it can be traveled by any of the Stockton and Sonora teams. It is the same hill and road traveled by the water company in transporting their machinery and supplies [Tuolumne County Water Company's dam at Strawberry, etc.] but in fact it looses all dignity of being considered a hill when we take into consideration that a new grade can be obtained around the hill with but little expense, and when completed will enable the heaviest teams coming out of Stockton to travel it as easily as any hill lying between Sonora and Knight's Ferry. Bald Mountain Hill between Sugar Pine and Strawberry I would scarcely mention for the reason that at the point where you commence to ascend there is a natural bench around it and for $l,000.00 I will make a better road than the one now traveled, with a perfect level, and saving a distance of ¾ a mile. Here, now, we have a distance of about 50 miles which, when the road is open, I do not hesitate in saying can be driven most of the entire way on a trot. I know whips in Sonora and Columbia who would delight in holding the ribbons over such a drive—and with a little outlay Morris Dooly would call it a pretty good stage road. The road down Cascade Hill to the main river bears no comparison with the Big Oak Flat hill.

The trail down the hill is about 1½ miles and the route for the road proposed by Engineer Wallace will be three miles in length, making a fine grade, and teams will be enabled to travel it without the least difficulty. The hill is well timbered - earth in abundance - and no blasting necessary. At the crossing of the main Stanislaus and eight miles up the valley, we found on the thirtieth of March, gooseberry bushes in blossom, wild currents in leaf and grass around springs, and in wet places, 3 to 4 inches high. These eight miles up the river can be traveled most of the distance in a buggy and at a good stiff trot. The road up to the summit goes through a natural pass and I do not think there is as good a one through the entire range of the Sierra Nevadas, and when completed travelers will hardly think they are crossing the mountains.

From the summit to Walker's River on the other side, a distance of 12 miles, a better grade can be obtained than on this side, and when at Walker's River the route from there to Aurora is like traveling over the plains at Stockton. Nature designed and intended this route to be a great thoroughfare. She has performed more than her share, and all that is necessary is the application of a little labor and money to make this the best, cheapest, and shortest route to the silver land of any present or proposed road lying in the entire range of the Sierra Nevada. There is only about 45 miles of road to build with hardly any blasting, no deep excavating and the entire route well supplied with timber and earth for the uses of the road, and one which, when built, I truly assure you, will astonish and gladden the heart of the traveler.

…There were three snowstorms while I was absent and an ox team between stations of ten miles apart could have easily kept the road open. On my return the snow was fast disappearing, and a party of six or eight, with mules or horses, can easily break through what snow there is remaining. If there had been beyond Strawberry, stopping places 15 or 20 miles apart, travel would have been going over this route all the winter. I wish some of the citizens of San Joaquin County could have been with me, and I am satisfied that they would have been so convinced of the excellence and practicability of this route, and the advantages Stockton, and the county would reap on its completion, that they would without hesitation advocate and insist that it should be built on the responsibility of San Joaquin County alone... (TC1863).

Despite the *Courier's* buoyancy about the route's lack of snow, a party of nine travelers that Sneeden reported having seen near the summit apparently lost all but two of its members because snow drifts were so high against the trees that blazes were not visible. Unable to agree on the right way, the party split up, with two of the men making their way to the Carson and Aurora Road. Snow blindness and lack of provisions were contributing factors in the loss of the seven other's (TC1863).

Robert Wallace—the principal surveyor for the Columbia & Stanislaus River Water Company ditch, had surveyed part of the route ultimately chosen for the Sonora-Mono Road in 1861 and 1862.After a number of false starts, the route east of the Clark Fork confluence area was re-surveyed in 1863. The Sonora-Mono Wagon Road was completed in November 1864; today's Highway 108 generally follows the wagon road in the upper elevations, along the Middle Fork Stanislaus and Deadman Creek. Wallace had estimated the wagon road's construction cost at $400,000, which proved to be overly optimistic—that sum being spent on the summit portion alone and securing its fate as a toll road. One of the most notable sections of the road was the Patterson Grade, near Dome Rock, [T6NR19E, Sections 20-22, 29 & 30] with its sustained grade and roadbed blasted from granite. A later description of the Sonora-Mono highway explained:

> After passing through the canyon Patterson grade begins just after passing over Niagara Creek. This was built by Dan Patterson in 1862-63 and is today considered a remarkable piece of road construction. The grade winds down to the Stanislaus River at Brightmans Flat. After passing through the canyon of Deadmans and surmounting the last pull of about half a mile, the tourist will find that he has not had an exceedingly difficult trip and that henceforth only gentle little slopes and wide open spaces will give him perfect contentment to continue his journey to the summit (anon. 1923).

By 1870, the Sonora-Mono Road had become an established trans-Sierra route. Over $500 had been collected in tolls for the season only since mid-June (UD 1870). As soon as the road was constructed, maintenance became a major preoccupation. For example, in June 1898, G. C. Baker and his crew worked a couple months on the Sonora–Mono Road and worked on a bridge between Strawberry and Baker Station (MLM 1898). Later in the summer of 1898, Baker—who had leased the upper reach of the road—reportedly "virtually abandoned" his efforts. Tuolumne County stepped in and put Baker's portion of the road "in very good order" (MLM 1898).

By this juncture, interests on both sides of the Sierra pressed for this wagon road to become a state highway, with the improvements to be made "at the cost of the commonwealth." The road had, by the latter 1890s, been sorely neglected and was described as "a hard thoroughfare to travel." Local advocates believed they had a very good chance of bringing this road under the state highway system when Tuolumne County's J. B. Curtain was elected to the Senate (MLM 10/19/1898 & 11/1/1898). Largely as a result of Curtain's efforts, in 1901, the upper section of the Sonora-Mono Wagon Road, from Long Barn to Bridgeport, became part of the State Highway system as Route 13 (Turner and Elliott 1995). In 1905, it was reported that a $20,000 state appropriation was earmarked for bridges, culverts and other road improvements that would enable a "profitable business in fruit and other supplies with mining camps on the other side of the Sierras" (UD 1905). Interestingly, it was the construction of Relief Reservoir, rather than trans-Sierra trade—on the cusp of the availability of mass-produced automobiles—that provided the stimulus that kept the upper Sonora-Mono Road viable. In 1908, as dam related construction commenced—and as Henry Ford offered his Model T to the general public—improvements were made from Sonora to Baker's Station. It was not until 1912, however, that all the bridges along the way were repaired and the road declared fit for general travel (Turner and Elliott 199).

Still the Sonora-Mono Road, especially after completion of Relief Reservoir, struggled to stay on the map. In 1915, a legislative showdown had one state Senate bill on the floor providing for abandonment of the Sonora-Mono Road due to lack of use and another providing for the rest of the road--from Long Barn to the eastern boundary of Sonora—to be declared a state highway (UD 1915). But by 1922, the stretch of highway between Stoddard Springs and Baker Station was described as "unusually good," owing largely to improvements made for construction and maintenance of the various high country reservoirs. In 1925, the road was added to the Forest Highway system.[14]

Today's Highway 108 largely follows the alignment of the old Sonora-Mono Wagon Road. There are a number of places, however, where one can walk sections of the nearly 140-year old road and appreciate the skill and determination in and behind its construction.[15]

Italian Bar Road

Another important historic travel way is the Italian Bar Road through South Fork Stanislaus country. Winding from Columbia, through French Camp, American Camp, Italian Bar, Jupiter, and Twain Harte. Columbia's Bixel Brewery was once considered the gateway to the Italian Bar Road and South Fork area. In the 1850s, this trail had a different alignment out of Columbia than the current one, from Yankee Hill to the confluence of Five Mile Creek with the South Fork and up the South Fork to Italian Bar. Later, in the 1880s, the trail took more the alignment of today's route as far as about 1.5 miles southwest of Italian Bar where "Nervi" supplied that area with "everything from flour and needles to plows and grindstones." Two generations afterward, this road was the recipient of major improvements and widening by the Civilian Conservation Corps with enrollees stationed at Italian Bar Camp.[16]

The Italian Bar Road was the major supply route connecting "the South Fork camps" with Columbia town. American Camp's John Morgan Junior, for example, supplied the south fork mining camps as a packer from 1866 to 1916. Summit Pass on the Italian Bar

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[14] Forest Highways are defined as "...roads of primary importance to the State, Counties, or communities within, adjoining or adjacent to the national forests which have been included in the Forest Highway System. The Forest Highway System is made up of all existing and planned roads in the national forest transportation system which have been designated as Forest Highways by joint agreement between [sic] the State, Bureau of Public Roads and the Forest Service...." By summer of 1957, there were about 2,460 miles of existing and proposed Forest Highways in California, with a large percentage of the existing mileage classified as "unsatisfactory." The Stanislaus had 154 miles of Forest Highways of which 121 miles was classified as "unsatisfactory."

[15] Patterson Grade, above Donnells Overlook; Trail of the Ancient Dwarfs, Deadman Creek.

[16] In 1854, Italian miners settled in this area and composed the predominant ethnic group. Nervi had his store and residence at Italian Bar, but also maintained a home, billiard parlor and saloon at nearby American Camp. Nervi's wife was an American Indian woman named Osceri. There were at least two other stores in the area: John Lent's at Italian Bar and San Diego's, just down river from Italian Bar. In 1934, a CCC camp occupied the site of Nervi's, a.k.a. Joaquin Dalukee's, new storehouse and residence that he'd built in 1870 (Sonora Banner 1934).

Road divides Three Pine Gulch from Experimental Gulch, with the waters from Three Pine Gulch flowing into Woods Creek and eventually into the Tuolumne River and those of Experimental Gulch dropping into the South Fork Stanislaus.

The Italian Bar or South Fork Road was enhanced in about 1920 when the Forest Service improved its 31 mile length to a standard single track, Class 3, road. In applying for the money to carry out this project, Stanislaus officials justified the expense by noting that 50,000 MBF could be brought over this road and further…

[t]here is a large body of timber owned by the Standard Lumber Co. that will be logged by the railroad. There is a large supply of cord wood adjacent to this project that might be developed for the Sonora market. Oak fuel is now selling for $16 a cord in Sonora.

Additional justification was the increased valuation that would accrue on the 15 ranches in the adjacent country; particularly the fact that "[f]ine mountain apples are now grown in this country and there is a large future for this kind of a crop." The half dozen mines in the immediate vicinity that were "making wages" would also benefit by the improvements. The icing on the justification cake was that there were two important ranger stations: at Center Camp and American Camp. The road improvements would put these stations "much closer together in point of time than at present because now one has to reach these two stations via Sonora." Significantly cutting the travel times in this fire prone zone would improve fire protection and general administration. Finally, improvement of the South Fork/Italian Bar Road and better access to Columbia—being the community hub for this area—"is needed to develop a very backward community, giving it better access to town, mail delivery, and a better chance to market its products" (Dort 10-1-1919).

Buchanan Road

Another important travel-way in the CSWA area is in the North Fork Tuolumne sub-watershed from the town of Tuolumne to the Hunter Creek country. The trail to the area was made into a road through the Stanislaus National Forest in 1933, connecting Ralph Ranch with the still active Buchanan Mine. Blasting for the new bridge across Hunter Creek destroyed about 500 feet of old wooden flume that had been part of the Buchanan Mine's ditch system.[17]

Other roads were improved; just one example being the improvement of an otherwise isolated 11-mile stretch of road from the South Fork Mill (T3NR16E, Section 26) to the D-Four Ranger Station (Section 34, T4NR15E). Using Emergency Conservation Work (ECW) funds, the 4.5-mile road to Mt. Lewis was constructed by enrollees at the Tuolumne Civilian Conservation Corps (CCC) Camp, the 11.8-mile road to Jupiter and

[17] Reflecting latitude uncommon for today's Forest Service officers, the owner of the flume, W. Carter of Tuolumne, asked Forest Supervisor Hall: "…in case he lost his job with the Pacific Gas & Electric Co. at Tuolumne, we give him work on the road in consideration of his having to rebuild a portion of the flume. I told [him], I figured we could do this" (Hall 1932).

American Camp Lookout was constructed by enrollees at Italian Bar CCC Camp, the 9.5-mile road from Fiddlers Green to Pinecrest Peak Lookout was constructed as an ECW project, and the road from Hells Half Acre Bridge to Smoothwire Corral was constructed using ECW funds by enrollees of CCC Camp Strawberry (7700:1935 & 1934).

Motor Stage

By the end of the first decade of the new century, many of the primary pack trails in the lower elevations of the CSWA area had matured into roads passable by a motorized stage. Most of these improved roads seemed to owe their enhancement to timber harvest and development of water manipulation systems and the temporary settlements that arose from them. In 1907, for example, a motor stage ran three times a week between Tuolumne and the Union Construction Company's sawmill at Camp 31, via Confidence, Middle Camp, Sugar Pine, Lyons Dam, and Camp Number 1. A newspaper article announcing the service noted that the stages "carry mail and express for most of the Union Construction Camps in the high sierras, and afford travelers the best means of reaching all points this side of the summit" (MLM 6/19/1907). Tuolumne's entry into the motorized and electrified world spawned several interesting transportation schemes. One was a 50-year franchise, granted by the Tuolumne County Board of Supervisors, for a twelve-foot right-of-way over various county thoroughfares, upon which to construct and operate an electric railway system. Construction was to begin within four months and be completed within three years; two percent of the gross annual receipts were to be paid to the county after the first five years. The franchise covered several roads in Tuolumne County; of particular interest were a route from Sonora to Long Barn and Schoettgens, via the Mono Road and Rushings and a route from Long Barn to Sonora Pass and the Mono County line (MLM 6/5/1907).

Trails and Telephones

Particularly on the lower elevation CSWA area lands, there appears to be a strong correlation with early trails and early telephone communication lines. Further, early telephone lines within CSWA are closely associated with the presence of Forest Service administrative sites. Trails linked use areas, ranger stations, guard stations, patrol camps and fire lookout vistas while phone lines tended to follow the primary trails. One illustration of this is on a 1922/23 map that shows how Dry Meadow Guard Station had been planned as the key for communication for fire protection of this area. Trails that crossed the Middle Fork Stanislaus eventually came through Dry Meadow and a telephone line between Center Camp Ranger Station and Dry Meadow crossed the river at Baker's Bridge. Additionally, the trail using the Hell's Half Acre crossing started along the Mono Highway in T5NR18E, SWSW Section 34, about ¼ mile northwest of Cow Creek Ranger Station. It coursed west until, in the extreme SESE of Section 31, it bent north to the NWNW of Section 32, then zigzagged into the canyon to Hell's Half Acre crossing. The trail then continued, generally paralleling Smoothwire Creek, to the northwest. In the NENE Section 25 T5NR17E, a branch left this trail, heading southwest to Dry Meadow Station. Another trail left the Mono Highway in the SESE Section 4 T4NR18E, coursing southwest to Pickering Lumber Company's Camp Bumblebee just north of the center of Section 8. The trail then continued west, crossing the Middle Fork Stanislaus at upper Beardsley Flat in the SWSENE portion of Section 12 T4NR17E. It appears this trail contoured to the southwest, along Beardsley Flat; a branch trail split off in the SESE part of Section 11, heading northwest and joining the trail from Smoothwire Creek, about ½ mile northeast of Dry Meadow Ranger Station (USDA Map 1923). Phone line also coursed the trail from Camp Pickering in the NWNENW Section 24 T4NR17E, running northward and hitting Beardsley Flat in about the center of NWNW Section 13.

Automobiles *enmasse*

Just two generations after completion of the Sonora-Mono Wagon Road, automobile travel had begun to change the face of the CSWA landscape; stimulating a proliferation of roads, not only for trade and woods work, but also for pleasure. The automobile had captured the imagination and leisure time of a growing number of Americans, and California tirelessly promoted itself as one of the nation's most desirable destinations. Along with the roads demanded by pleasure came a system of roadside services: lodges, gasoline and service stations, developed public campgrounds, stores, restaurants, and other necessities and amenities. Incidentally, the first motor vehicle purchased in Region 5 for official use was a Model T Ford bought in January 1913 to do land classification work (Barrett 1936:19).

By 1915, automobiles were firmly ensconced as an agent of profound change on the Stanislaus landscape. Roadways were being planned, campgrounds were being reconfigured, garages were replacing barns, and traffic counts were being made in an effort to quantify and plan for the impending change. Reporting on the four main travel ways transecting the Stanislaus, Ayres noted that travel over them "is very large and is increasingly rapidly each year, due particularly to the automobile….

> An account was kept of the number of autos and persons traveling the roads during the season on 1915, and the results are:
>
> Big Tree Road 1,002 machines; 3,943 persons
> Big Oak Flat Road 2,833 machines; 11,330 persons
> Coulterville Road 945 machines; 3,770 persons
> Mono Road 500 machines; 2,000 persons

Seemingly demonstrating that the Sonora-Mono Road was the one less traveled, Ayres explained:

> This does not count those that passed the stations during the night, and is not all the persons who entered the Forest on the roads, as an accurate count was impossible to keep in the early summer when some of the stations were unoccupied. Besides this, there are the real campers, of whom there is no count, who take a pack outfit and go into the upper country over trails. These are the people who get the full recreation value of the Forest. Many of the auto parties also do this, but probably the

majority are [*sic*] traveling to the Yosemite Valley or across the summit, and they generally stop at some resort. The central part of the Forest, along the Mono Road is probably used more extensively for camping purposes than any other, although the travel is higher here than elsewhere.[18] The attractions incident to camping are hunting and fishing, and these sports are as good here as anywhere in the State... (Ayres 1916).

Change cascaded from the automobile and its rapid popularity, not only altering physical structures such as exponentially increasing the number and quality of roads and replacing barns with garages, but also fundamentally shifting use patterns. By 1918, campgrounds and other public recreational places were being built with the automobile as a controlling design factor (cf. CA 1919).

Motor trucks had not been used within the CSWA for hauling wood products until 1918. In that year, lumber was hauled with trucks from the sawmill at Sammy Merrill Springs to Middle Camp; from there, the rough-sawn lumber was off-loaded onto rail cars. The trucks were Fageols, owned by Charles Goelz and Jack Parsons. Fageol trucks had solid rubber tires and pulled two-wheeled trailers; the trucks were rated to carry only two and one-half tons but, using trailers, loads were commonly in excess of eight tons (Goelz in UD 1967). A little moisture on the roads, such as on Cedar Bark Hill just below Long Barn, made these trucks "utterly useless."

Railroads and Roads

First the domain of packers, lumber hauling stimulated road construction and improvements in the CSWA area. As lumber demands and quantities increased, larger wagons drawn by horses and/or oxen first brought the logs to the sawmills and then were loaded with the rough sawn lumber into town. Traction engines made a brief appearance in the gap between animal and railroad logging, demanding even more improved travel-ways between mills and towns.

By 1902, preliminary surveys were underway to construct a rail system that would ultimately connect Bradford's[19] Empire Mill at Browne's Meadow (T3NR17E, Section 15), the South Fork Mill, Knudsen's Mill on Lyons Creek, and the Sonora Lumber Company's mill near Cold Springs (T3NR17E, Section 1). The Empire City narrow gauge railway built along the North Fork Tuolumne, connecting the Cold Springs and Empire mills, led to a railed tramway that hoisted the lumber on cars, up and over the

[18] In 1916, Ranger Thraves also alluded to the area's popularity for summer camping, particularly for travelers along the Mono Highway who use the flats along the river as camping places. This use "has been steadily increasing each year." Interestingly, Thraves also particularly identified the Wheat's Meadow Ranger Station as a favorite summer camping area, even though it was not accessible by automobile (Thraves in Ayres 1916:T6NR18E & T6NR20E).

[19] After S. S. Bradford died in mid-July 1903, the Standard Lumber Company began acquiring the logging and lumber elements of his estate (Conners 1997).

divide between the North Fork Tuolumne and the South Fork Stanislaus, terminating at the Lyons Creek Transfer near Lyons Dam. Before the Sugar Pine Railway was incorporated and began pushing its rails to Lyons, lumber could be off-loaded onto wagons or traction engines at the transfer for transport to Sonora via the Sonora-Mono Road or to South Fork country via the Italian Bar Road.

It was the coming of the Sierra Railway to Jamestown in 1897, construction of feeder lines to Sonora (1899), Tuolumne (1900), and its extension to Standard (1910) that facilitated the fundamental transfiguring of the patterns of logging and of transportation on the CSWA landscape. Though it took over a decade to mature, the Sierra Railway provided the link between the CSWA area's green gold and a large—even international—lumber and wood products market. Development of the Standard Lumber Company's Sugar Pine Railway, which was incorporated in 1903, and connecting it to the Sierra Railway allowed the sawmills to retreat from the woods; no longer was it necessary to place them as close to the timber stands as possible. More efficiently, rails could be run as close to the timber as possible, where timber could be loaded and brought to the sawmills which were now situated on the edge of towns and at the end of trunk lines; closer to labor, goods, services, and markets. The hardening of railroad logging on the landscape had a profound influence on the transportation network that would follow.

As railroad logging depleted timbered areas and tracks were removed to be used to access adjacent virgin timber stands, the abandoned roadbeds were ready-made for conversion to truck trails. With the emergence of the automobile, the Forest Service began transforming its main mode of transportation from horseback to automobile in the late 'teens, at a zenith of railroad logging activity. Anxious to develop speedy access to the forest, primarily for fire detection and suppression and for administration and oversight of ever-increasing uses of this land, the Forest Service rapidly converted many abandoned railroad grades to truck trails.[20] Conversion to and construction of truck trails surged during the Great Depression owing to the luxury of inexpensive labor provided by the Civilian Conservation Corps (CCC) and Emergency Conservation Works (ECW). In addition to brand new roads, scores more grades were converted, just one example being the Schoettgen Grade. The following is excerpted from ECW Truck Trail Specifications for road project designated #801:

> This being an old railroad grade, the surveying is all done, except, where you will have to build around the old trestles, where you will have to make a connection to the grade near the Shafer place [Section 31, T4NR16E] from the Spaulding Ranch land [Section 7, T3NR15E] and at the Schoettgen end [Section 25, T4NR16E] where Pickering Lumber Company's main line now occupies the old railroad grade—we will have to make a new grade for about a mile to reach Schoettgen. Fixing the old railroad grade should result in a road of standard width and better than the usual standards set up for low duty roads (Hall 1933)

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[20] Attractive to railroad builders because of their even grades and broad curve radii, there are also portions of railroad grades that had earlier been segments of water ditches.

Overshadowing traction engine roadways, the CSWA area has a remarkable legacy of travel ways bequeathed to it from the railroad-logging era. Hundreds of miles of branch grades and spurs were built to get as close to the harvest areas as practicable, connecting to the mainline. Once an area was logged out, the rails were removed and the grade abandoned. This pattern created an enormous, ready-made array of potential opportunities for future road building. A decade before the Pickering Lumber Company discontinued its use of railroads in the woods, forest officials were challenged to direct development of the area's travel-ways into a new era: one where forest products were moved over roads instead of railroads and one where public automobile access and developments for recreation were considered:

> [T]here is need for visualization of the eventual transportation system when the present logging railroads have been abandoned.... At the present time there are a total of 1340 miles of road on the Forest transportation system. To date approximately 1070 miles have been constructed.... The eventual construction of the Sierra Way in the distant future should be a real asset toward the enjoyment of the upper country.... The complicated land ownership pattern on the Stanislaus imposes a number of right-of-way problems. These are further complicated by the fact that large areas are railroad logged, and roads are constructed to serve the railroad rather than the overall transportation scheme of motor transportation... The numerous spur roads build for logging offers opportunity to get lost very easily by the people unacquainted with the area (Byrne 1952).

Sierra Way

By the 1920s, there was a strong push to build roads in the Sierra Nevada that would primarily serve pleasure travelers. A proposed road having an effect on the CSWA was the dubbed the "Sierra Way." More research is needed to flesh-out its genesis, but it is clear that the State Chamber of Commerce—particularly its Stockton and San Joaquin Valley divisions—and the California State Automobile Association lobbied hard for a road that would link Yosemite Valley with Lake Tahoe. The idea was to shave-off travel time for motorists while opening places of spectacular scenic wonder along the way. Sometimes referred to as the "fast highway," the concept had gained such momentum that, by the 1930s, field surveys for alternative routes for this road through the Stanislaus National Forest were underway. The lead agency appears to have been the United States Department of Agriculture's (USDA) Bureau of Public Works (District 2) and, in 1935, Associate Engineer H. A. Alderton Jr. submitted his "Field Study of Alternate Locations for Forest Highway Route 298/88 As Part of the Sierra Way Between Yosemite National Park and Sonora Pass Forest Highway." Partly because it was viewed as a link in the Sierra Way, improvement of the Sonora-Mono Road as far east as Pinecrest Junction—to two-way modern standards—had been completed by 1935.

Another contemplated link was a high standard road along the Clark Fork. In 1931, the Stanislaus National Forest had constructed a low standard road seven miles up Clark Fork from the Sonora-Mono Road for the purpose of developing and accessing recreation opportunities. Local Stanislaus officials saw the road as a gateway to…

> possibilities of recreation and special use [that] are almost unlimited. There is plenty of water, and building sites can be established on very favorable sites which will not be conspicuous from the highway.

Further, because it was to be constructed entirely over Forest Service lands, the Stanislaus…

> will have no difficulties to contend with regarding objectionable roadside developments on private land (Burnett 1934).

Eyeing this route for the Sierra Way, promoters saw it as a highly scenic and recreationally desirable means of connecting the Sonora Pass Forest Highway (#38) and the Ebbetts Pass Forest Highway (#35). In 1933, Regional Forester S. B. Show reflected that the Forest Service was anxious to cooperate with the conversion of this road from a low to a high standard highway…

> as part of a through route to Lake Tahoe to accommodate tourist travel from the San Joaquin Valley, and since such a road would also afford an opportunity to develop many highly attractive recreation sites in a region practically free of fire hazards, we looked favorably on the proposition (USDA 1933).

Not every special interest group favored the Clark Fork Road, either as part of the Sierra Way or in its own right. Fishing clubs, for example opposed it on the basis of increased pressure on the fishery. There were also sideways conflicts with those pressuring Stanislaus officials to designate new summer home tracts; the Forest Service had begun to regularly deny road construction proposals when it was for development of new summer home tracts, citing the unacceptability of construction scars on highly scenic landscapes. Within the Forest Service, there was also dissention. The Forest Supervisor for the Eldorado, immediately north of the Stanislaus, for example, voiced his unequivocal opposition to the Sierra Way and to the Clark Fork section primarily on the grounds of the astronomical maintenance costs for such a high elevation route coupled with its short use season. The cost to taxpayers was unacceptable…

> to provide a route of travel for purely pleasure purposes…. As I see it there is not one sound argument that this road is needed for anything but purely pleasure, and I believe the ticket is too high. In conclusion, though the protestants [*sic*.] whether they be long-haired or not, are part of my people whose arguments should be given consideration and weighed before enthusiastic action towards the start of this construction is made (USDA 1938).

Designated Forest Highway #87, this 21 mile section was to follow the existing low standard road along Clark Fork; from the Iceberg, it would follow the trail along the east side of Disaster Creek, past Adams Camp, through Gardner Meadow to Highland Lakes and Tryon Meadow, hitting the Ebbetts Pass Highway about a mile west of the pass.[21] Re-construction of the Clark Fork Road as part of the Sierra Way began at the Sonora Pass Forest Highway connection in 1937. Alpine County, over which the overwhelming majority of route miles would run, while at first in favor, later disapproved of it, fearing a drag on the tiny county's highway maintenance funds (Thornburg1938).

One of the hurdles to be jumped before construction began was to obtain a ruling that the proposed Clark Fork Road would not jeopardize preexisting proposals to develop the water and hydroelectric potentials of the area. Thus, Stanislaus National Forest officials asked for and received a determination from the Federal Power Commission that the lands withdrawn for hydroelectric power development over which the Clark Fork Forest Highway was to be located, would not be adversely affected by the road (USFPC 1936).[22]

One of the lesser hurdles to be cleared was that, in 1890, forest officials had secured an administrative site at Iceberg Meadow, to the exclusion of other uses. However, with the nearing reality of a high standard road to the meadow, the need for having a station at Iceberg had diminished (USDA 1934).

Alderton's report outlined five possibilities for connecting Yosemite Valley with the Sonora Pass Highway. His parameters were that the roadways were to be 24 feet wide with maximum grades of six percent. The first alternative started at Yosemite's Valley floor, continued through Crane Flat, Ackerson Meadow and Mather, across O'Shaughnessy Dam, Cherry Creek, Crane Meadow, Clavey River, Trout Creek, and Dodge Ridge, to a connection with the Pinecrest Forest Highway near Strawberry/Pinecrest Lake. Another alternative would coincide with the first as far as Crane Meadow. At Woods Ridge, the ridge would be followed northerly to Bear Meadows and then to Coffin Hollow, and on to Belle Meadow where connection would be made to the existing road to Pinecrest Forest Highway.

The third rather extraordinary alternative coincided with the first from the valley to North Mountain ridge. It then headed northerly through Miguel Meadow and northeasterly along the west side of Lake Vernon to the west side of Jack Main Canyon to Dorothy Lake, past Wilmer Lake and on to Bond Pass. From there, the route hit the head of the West Fork Walker River. If this route were to be selected, the Sonora Pass Highway "would probably be relocated via the West Fork Walker River, instead of via Sonora Pass (USDA 1935). This route followed the north side of Emigrant Meadow to Lunch Meadows down the east side of Relief Creek, passing Relief Reservoir and descending to

[21] The connecting point varied with different plans, from about 1 mile west of Ebbetts Pass to about 4 miles west.

[22] This conflict was averted because officials believed that the hydroelectric potential, if tapped, would be by means of a conduit.

Baker Station to the existing State Highway. From there, the route took the highway through Brightman Flat and connected with the Clark Fork Forest Highway.

The fourth alternative followed the third option to the divide at the head of the West Fork of the Walker River, continuing northerly along the Sierra Nevada divide to its intersection with the Sonora Pass Highway at Sonora Pass. From there, it extended 13.5 miles northwest along the west slope of the divide, via the Iceberg, to the Clark Fork Forest Highway.

The final alternative began at Yosemite Valley and headed, via the Big Oak Flat Road relocation, to Buck Meadow. It then continued on the Big Oak Flat Road for 2.9 miles before turning to cross the Tuolumne River Canyon; the route then went up Corral Creek and into the Jawbone country to a connection at "railroad saddle" near Rosasco's.[23] The route then followed one of the other two alternatives that used the railroad saddle control point, continuing to the Sonora Pass Highway.

Even as he wrote, Alderton questioned the wisdom of a "fast road" between Yosemite Valley and Lake Tahoe… a questioning that would gain momentum as World War II loomed on the horizon. The existence and sufficiency of existing, albeit more circuitous routes between Yosemite Valley and Brightman Flat—Yosemite to Carl Inn to Sonora to Pinecrest to Brightman; and Yosemite to Crane Flat to Tioga Pass to Bridgeport to Brightman--"reduces the urgency for immediate and possibly future construction of any of the proposed routes." Whether the $3.5 to $5.5 million price tag to reduce travel time one or two hours for north-south through traffic was "a question yet to be determined." The writer noted, however, that "were these proposed routes to open up additional mineralized or agricultural territory of value, there would be additional justification for the expense" (USDA 1935).

Even as hopes for construction of the Sierra Way dimmed, Stanislaus Forest officials wanted to see the connector built between the Sonora and Ebbetts passes. But the Clark Fork Road never extended past Iceberg, and among the reasons for scrapping the project was the lack of a demonstrated need for the connector; especially considering its limited open season. Probably on this point alone, the Public Roads Administration (PRA) and State Highway authorities were "unalterably opposed to the construction." But the specter of world war also undoubtedly fed their opposition. By 1940, Forest Service officials in Regional 5 were instructed not to award contracts involving recreation enhancement projects that had been programmed with Fiscal Year 1941 money. The PRA and State Division of Highways increasingly pressured the Forest Service to reallocate money in a way that focused on the improvement of "US and state highways which have military value" (USPRA 1940).

Monies were apparently allocated in the early 1950s to complete the Sonora Pass Forest Highway connecting with the Clark Fork Forest Highway. Unhappy with the conduct of

[23] Rosasco's place was in T2N, R18E, NWSW Section 21.

the construction contract, the Assistant Regional Forester for Engineering commented in his 1952 report:

> inadequate attention had been given to the aesthetics of this road. Not only had the Forest permitted extensive cutting of trees in a pre-timber sale, but also large numbers of trees were damaged by destructive blasting.… It is evident that more attention must be given toward the supervision of timber operator and special use permittees to road construction (USDA 1952].

Today, travelers along the Clark Fork sometimes wonder why this road—dead ending at Iceberg Meadow—is built to such a comparatively high standard, complete with bridges designed to harmonize with their spectacular surroundings. It endures as an artifact of the Sierra Way concept.

Most miles of forest roads that spaghetti through the CSWA area owe their genesis to railroad logging. Railroad logging ushered in an entirely new scope and scale to the logging transport systems that had preceded it in the CSWA area.[24] But the earliest logging pattern took place on the lower elevation fringes of the area where people harvested trees for fuel and lumber, doing the labor by hand. Logs to be converted to lumber were cut in sawpits. Mining also consumed significant quantities of timber and frequently generated construction of small—usually portable—sawmills in as close proximity as possible to the mining operation. Larger early sawmills were established straddling the timber source and the potential lumber customer base. Chief among the commercial early sawmills on the forest fringe within the CSWA area were those owned by Hale, Hiatt, Carter, and Bradford & Way (Dart 1879).[25] Occasionally, a specific

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[24] By the late 1950s, the density of roads within the CSWA area, much of which was traceable to the railroad-logging era, had become a many faceted conflict. One rub developed over maintenance collections for roads that were primarily for timber access. In a memorandum to the Stanislaus Forest Supervisor, the Assistant Regional Forester wrote:

> ...It should be pointed out that trucks from Forest Service timber sales are only the smaller part of the problem; according to the Regional Summary of the T.M.A.R. (timber management access road) reports revised this year the current rate of cutting private timber within the forests is over twice that of cutting from government sales, in fact the figures submitted by the Stanislaus were 231 MM private and 41 MM government, or over five times as much private as government (Lawrence 1954).

Toward the latter 1950s, despite the exponential growth of recreation, Region 5 encouraged forest engineers to eliminate trails that were under-used. That is: "If a Ranger District does not keep a trail passable, they must not consider the trail important for protection and administration.... Planned use of helicopters should eliminate the need for many trails now on the system.... Annual reduction in trail mileage should result from timber road construction" (USDA 1959).

[25] From the Dart map, 1879: Bradford and Way T3NR16E, sec. 24, between Sonora and Mono Road and the South Fork Stanislaus, about one mile east of Italian Bar Road; possibly on Lyons Creek. Hales mill was in T3NR16E, straddling the SE of Section 23 and the NE of Section 26, immediately adjacent to the Tuolumne County Water Company ditch and within one-half mile of the junction of the Sonora & Mono Road and the Italian Bar Road. Carter's sawmill was In T3NR16 E, Section 26, between the Sonora & Mono Road and the South Fork Stanislaus, about

demand for lumber would spawn setting up sawmills deeper in the mountains. One example is the immense lumber demand for building the flumes of the Columbia & Stanislaus River Water Company (C&SRWC). Donnell and Parsons, merchants and entrepreneurs from Columbia, built a sawmill at Donnell Flat in about 1857 having the C&SRWC as its only customer. The C&SRWC ditch and flume system also engendered construction of a number of small, portable sawmills. These were strategically located along the course of the approximately 72- mile long system in order to supply the builders with the enormous volume of lumber needed for the project.[26]

Various land uses such as water manipulations, mining, grazing, agriculture, and logging interplayed and had a definite affect on the development and patterning of travel ways on the landscape. For an example, as the woods mills and, later, railroad logging companies expanded their operations, so did the fire risk increase proportionally. The same can be said for such other uses as construction of water and hydroelectric systems and exponential increases in recreational use. Hand-in-hand, to address the increased risk, or to provide administrative oversight of contracts and permits, Stanislaus National Forest officers sought to expand and improve access to the forest, thereby fueling broader and more intensive use. Road building was a major preoccupation of the Forest Service, yet, as if ambivalent about the transition, the official Forest Service term for the ubiquitous single lane roads was: "truck trails." But even, the configuration of Stanislaus National Forest administrative sites metamorphosed with the change from horse transportation to truck transportation, and the ranger, guard and lookout stations transformed to accommodate automobiles with new structures like garages and parking areas.

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one-half mile south of Hale's sawmill. Bradford's Empire Mill was in Browne's Meadow along the North Fork Stanislaus.

[26] Hutchings seemed to be referring to the C&SRWC flume above Donnell Flat when he wrote: "To lift as it were, the waters from these deep canons, or rather to convey them at a fall of from five to twenty feet to the mile, out of them, often requires many miles of flume constructed entirely of wood, because the steep sides have not, in many places, a single inch of earth in which to excavate a ditch; and even the rocky sides often so high and steep as to require the flume to be constructed upon trestle work, a hundred or more feet in height; and even in some instances actually suspended by iron work, upon the smooth face of almost overhanging rock and precipices; the workmen are let down and suspended by ropes from above, while prosecuting their arduous labors" (Hutchings in Olmsted 1962).

Water Manipulation

The first, large-scale water manipulations affecting the CSWA area were for bringing water to Columbia and environs primarily for use in gold mining. The Tuolumne County Water Company was initially formed by miners for the purpose of supplying the diggings of Columbia, Yankee Hill, Shaw's Flat, Senorita, and "the environs of Sonora" with water from the South Fork Stanislaus. Begun in July 1851, the ditch was to be 22 miles long and was calculated to supply 10 cubic feet of water. By October,

> It is already graded and ditched and taking into consideration the surface of the country through which is passes, it may be looked upon as a work of wonderful magnitude. The cost will be about $400,000 and one hundred and sixty men have been at work upon the canal for about three months…. The completion of this work will throw open four thousand acres of land to the miners' shovel and pick. Virgin soil, teeming with the precious metal, as yet untouched by the blind votaries of the blind son of Ceres! (SJR 1851).

A spring 1854 letter from Columbia and printed in the *Daily Alta California* provides a retrospective of Columbia and her inhabitants' restlessness for a reliable water supply:

> Everything at that time was in a chaotic state; a few tents were hurriedly put up; everybody was staking out claims; some for building purposes; others for mining, so as to be ready for business when water should be brought from the Stanislaus River in the Tuolumne County Water Company's ditch; but alas! we were disappointed...the ditch was not completed, so that water could be brought in it, until the fall of 1852 (DAC 1854).

Hutchings wrote in 1859:

> Wordsworth has somewhere said that 'water is the spirit of the universe.' If not so, water may at least be said to be the spirit of all our enterprise. The entire slope of the Sierra Nevadas [sic], from the summit seaward, is pierced and traversed by artificial veins, which bring prosperity and life to every hill and plain. Water is the life-blood of the mines. When its current is diminished, or even delayed, every thing languishes—with its return, all things revive (in Olmsted 1962).

In his 1860 book, *Scenes of Wonder and Curiosity in California*, James Hutchings mentioned the numerous sawmills just east of Yankee Hill. While on a journey to Walker River and Carson Valley, he noted "the quiet little camp of Yankee Hill; beyond which, to the eastward, there are only a few ranches, together with the numerous lumber mills that are scattered through the vast tract of timber country, for a distance of fifteen miles." He traveled the road between the South Fork Stanislaus and the North Fork Tuolumne, remarking that "[I]t is marked by nothing of interest, except being that through which run the monster ditches of the Tuolumne County and the Columbia and Stanislaus River Water Companies, and its vast products of lumber from which Tuolumne county is almost wholly supplied" (in Olmsted 1962).

As the patterns of mining changed, the appetite for great quantities of water increased. There were numerous relatively small-scaled water systems that punched into the CSWA area. The two most extensive of the water systems in the Central Stanislaus Watershed were those of the Tuolumne County and its rival the Columbia & Stanislaus River water company systems (TCWC and C&SRWC). Both endeavored to principally supply Columbia area miners with a continuous source of water, but each went about the task in radically different ways. The TCWC had been in the business since 1851 and had completed a ditch and flume system that directly tapped Five Mile Creek in May, 1852. The quantity of water from Five Mile Creek, however, was inadequate. The *Stockton Journal* reported that "the stream proved to be so small, as to be of but little general utility, and the miners had to leave again for other locations. However, there are immense riches around Columbia, and when a sufficiency of water can be obtained, it will become a flourishing camp" (SJ 1852). Undaunted, the Tuolumne County Water Company continued to develop water sources for mining, developing a ditch and flume system to the South Fork Stanislaus. The first South Fork phase of the project was 20 miles long. A diversion dam was built on the South Fork of the Stanislaus at Lyon's Flat, where water was diverted into the ditch, flume, and tunnel system, and eventually into Five Mile Creek. From there, it was conveyed into the Columbia basin. At the time of its completion in August 1852, this water system was the longest such project in California (Young in Conners 1989). Outstripping demand, by 1855, the "old" company launched a plan to build a chain of reservoirs on the South Fork of the Stanislaus, reaching all the way to the edge of today's Emigrant Wilderness, just southwest of Waterhouse Lake. In 1856, at this location, the TCWC built Upper or Big Dam, impounding Lake Gertrude; about seven miles downstream, the company built Middle Dam; and about one mile below that, Lower Dam was built at Strawberry Flat, now Pinecrest Lake.[27] The

[27] Middle Reservoir was positioned at a reef of granite that extended across the South Fork Stanislaus just below a 50-acre flat. In 1916, Engineer C. E. Grunsky assessed the company's developments on the South Fork Stanislaus and described Middle Dam. He noted that the crest of the granite reef was "irregular and broken, but high enough to serve as a foundation for a dam." Consequently, the log dam constructed there was irregular in alignment, "being fitted into the gaps between the high points of solid rock."

Grunsky reported that the main dam at Lower Strawberry was "supplemented by a short, low earth dam closing a flat depression near the point where the reef of rocks unites with the mountain to the northwest and by an earth filled crib dam closing a narrow gap some 140 feet to the Eastward of the main structure. The dam proper was constructed at the same time as Big Dam, about 1850 or 1857, and in the same general manner, being a log structure throughout. The control of water is as described for Big Dam. Surplus waters ordinarily flow over a selected portion of the crest, but no harm is done when in time of freshets the overflow becomes general over the full length of the crest of the main dam.

The logs of which this dam is constructed appear to be fairly well preserved so that it may be reasonably presumed that the structure will serve for some years longer at a reasonable expenditure for repairs.

Tuolumne County Water Company also built a dam across Herring Creek to augment the water it could store and then take from the South Fork, but this dam was eventually abandoned.

Taking a decidedly different tack, the Columbia & Stanislaus River Water Company (C&SRWC), in a bitter competition with the old Tuolumne County Water Company (TCWC), chose not to use reservoirs but rather, to build a ditch and flume system to capture water from as close to the main river as possible. The C&SRWC began construction of the ditch and flume with miners turned laborers who were paid in script, redeemable for water once the system was in operation. Robert Wallace surveyed the line for the ditch and flume. The water source was a small waterfall of the Middle Fork Stanislaus, just above Donnell Flat. Turned into the flume and carried on the north canyon wall, the flume traversed the river near the location of the present Donnell Dam and continued along the south canyon of the middle fork. At a place that today quietly commemorates the feat—Tunnel Creek—the flume continued through a tunnel, through the lava capped divide separating the Middle and the South Fork of the Stanislaus. Once through the divide, the water was channeled into the South Fork and then again diverted into a ditch and flume system that paralleled the old water company's ditch. Passing by Lyons Reservoir, the C&SRWC ditch, too, made its was to the Columbia mines.[28]

The crest of the dam is at the full height to which storage is practicable at reasonable cost. The reservoir capacity at the present height of the high water line is 52,500,000 cu feet (equivalent to 30,380 miners inches for 24 hours)" (Grunsky 1916).

[28] During construction of the C&SRWC's upper ditch and flume, workers came in conflict with Native Americans, probably Piute. San Francisco and local newspapers reported:

"A party of Indians numbering about fifty, supposed to belong to the Walker River tribes, attacked four men at Donnell's Flat, forty miles from here, at the head of the Stanislaus River and Columbia Ditch Company's works yesterday. Fifteen or twenty of them were armed with muskets and the balance with bows and arrows. A simultaneous attack was made by them, instantly killing two men, one named T. M. Emicks, and the other Jerry Perley. Michael Hill, with another of the party was seriously wounded, receiving two balls in his thigh and one in his hip. Mr. Waldron, the fourth man… [was] slightly wounded by an arrow piercing through his clothes, and a pair of buckskin gloves which were in his bosom, which circumstance undoubtedly saved his life. Heldurth and Waldron fired on the Indians and as they fell they were supposed to have been killed or mortally wounded. They then retreated, leaving the Indians in possession of the ground and arrived at King's Ferry Camp, seven miles below, from which place the news was immediately conveyed to this city. Intense excitement was immediately created and a party is now organized to proceed to the scene of the action, as it is feared that other parties in the mountains have been attacked. The camp attacked is 7 miles from any other and it is supposed they were in search of provisions or revenge for some past difficulty of about a year since in that vicinity."

Another article noted that the Tuolumne County Water Company's activities at Strawberry were also felt to be threatened:

"…Anxiety, is felt that the Indians may have burned the mill at Donnells Flat and destroyed the dam at the New Company at this point...also reserves of the old company at Strawberry Flat. Many were saved in the vicinity. The Walker tribes are superior to the miserable Diggers of this neighborhood. They will hardly be able to escape as their pursuers are old mountaineers and can follow tracks like bloodhounds. They will be unable to cross the mountains as the snows are deep.

The C&SRWC soon lost its gamble of depending on the Middle Fork, with no reservoirs to store water during low flows or mishaps along the ditch and flume system. Amid vitriolic accusations of subterfuge, the C&SSRWC system was in operation for less that a year; ironically being purchased at sheriff's auction by the Tuolumne County Water Company.

In 1858, James Mason Hutchings took a pleasure ride from Columbia to Walker River and Carson Valley. On his way, having heard of the large reservoirs of the Tuolumne County Water Company, he wished to make a side trip to view the dam at Strawberry Flat. Hutchings described the reservoir as covering an area of about one mile long by one-third to one-half mile wide, averaging 30 feet deep, when full. The dam was 60 feet high in the center and spanned 250 feet. Built of "heavy barked timber, platted and graveled, with an inclination of about thirty-eight degrees…. [T]hrown across the mouth of a rugged canon with solid granite for either abutment," Hutchings remarked that it is a "stupendous piece of work, reflecting much credit both upon the company and the superintendent. Since its completion it requires the attention of only two men, who gauge the water and repair leakages, and who live in a cabin near the dam." Hutchings and his companions also saw, from a ridge above, the upper reservoir, nine miles above the dam at Strawberry Flat, remarking on the volcanic formation called the "tooth-picks;" now called the Three Chimneys, and on the marks of the Emigrant wagons that had, just seven years earlier, clamored across the granite (in Olmsted 1962).

In addition to water in liquid form, the Stanislaus River was also a source for water in solid form. Ice harvesting—very important in pre-electrification days--is an industry about which little quantifiable information is known. However, articles such as this occasionally documented the endeavor:

> For several years past, it has been the custom to gather from the South Fork of the Stanislaus River many tons of ice and store it for use at Strawberry, the well known summer resort. The super abundance of water this year and its mad rush toward the low lands prevents the formation of ice on the stream, hence Thomas Conlin, proprietor of Strawberry [T4NR18E, Section 16], was obliged to seek the frozen fluid elsewhere. About a mile and a half from the summer resort at Strawberry, the water company owns a small lake [Strawberry/Pinecrest Lake] and during the recent intense cold weather this body of water was frozen to a depth of nine inches. The ice is now being blocked out and taken to Strawberry. About forty tons will be stored for consumption, and ice cream parties will be a frequent occurrences at Strawberry next season (UD 1901).

The first major hydroelectric project on the Stanislaus National Forest was within the CSWA area, on the Stanislaus River. Initiated by Beach Thompson and the Stanislaus

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At Strawberry Flat, there are twenty pairs of snow shoes which can be used to follow, if necessary…."

Electric Power Company (SEPCo)—reconfigured as the Sierra and San Francisco Power Company—this project was ultimately subsumed under the Pacific Gas & Electric Company. By 1908, SEPCo was in serious financial and managerial straits and a dissenting bondholder group commissioned a report on the ailing company by Galloway and Markwart, a Civil Engineering firm in San Francisco; J. D. Galloway being one of the dissenting bondholders. By the time of Galloway's 1909 report, the incomplete power plant at Camp 9 was still under construction, having begun in 1905. The money for its construction, provided by issue of $6 million par value of five percent bonds sold at 85 percent of their face value, had already been spent… as well as additional sums. In addition to Camp 9, SEPCo's development included Relief Dam (incomplete), Sand Bar Flat Dam, the flume and ditch, the forebay reservoir, pipe lines, transmission lines, telephone lines, and construction equipment, including roads, railroads, and a sawmill. SEPCo interests also owned the San Domingo Mine,[29] the improvements of the Tuolumne Water Power Company (storage dams and extensions, ditches and flumes, Phoenix power station, and transmission lines).

The Sand Bar Flat diverting dam for the Spring Gap power plant was a log crib structure, filled with rock and faced with plank. The entrance chamber was rubble masonry with timber entrance gates. The timber flume was 14.7 miles long and ended in a ditch 1,755 feet long. The water from the ditch ran into the forebay—having a capacity of 13,500,000 cubic feet—formed by two dams. The two pipelines from the forebay reservoir were steel under the dam; leading from the dam, there was 1,300 feet of wood stave pipes that ended in a valved steel header. Two riveted steel pipes of different diameter led down the main hill to a steel header behind the Camp 9 powerhouse. The powerhouse was steel framed and covered with corrugated iron. The power generation equipment consisted of three, 6,700-kilowatt electric generators, each driven by two impulse water wheels.[30]

[29] The 400-acre San Domingo gold mine property was located about 14 miles from the Camp 9 powerhouse. Originally the purported reason for this water development, SEPCo proposed to hydraulick mine the San Domingo. To provide the needed water, a steel pipe had been attached to the bridge that had been built across the Stanislaus River to Camp 9; it continued up the west slope of the canyon to the head of a ditch. The ditch, built in 1907, augmented by a tunnel, and pressure pipes were to lead to the mine. As of 1909, the San Domingo had been operated on a small scale and about 1,200 feet of sluice flume was in-place. Two debris dams had also been built; however, one had washed out during the 1908/1909 winter and the reservoir for the remaining debris dam was essentially full (Galloway 1909).

A slate as 1917, the water line connected to the steel bridge crossing the Stanislaus River at Camp 9 was kept full of water to prevent deterioration even though it did not served the San Domingo Mine (Dunn 1917).

[30] By 1917, the water that was dropped 1,500 feet powered eight Pelton water wheels, each of which developed 6,000 horsepower. These were connected to four 8,500-kilowatt generators that converted the mechanical energy into electrical energy. The voltage was stepped up by transformers and carried over the two transmission lines, primarily to San Francisco where most of the energy was used for streetcars. Various sub lines fed some of the central valley communities along the way including Knights Ferry, Modesto, Oakdale, Stockton, and Tracy. Another line fed the Salinas and Monterey areas. (Dunn 1917).

Transmission lines from Camp 9[31] were strung on Aeromotor steel towers and led to San Jose, 96 miles away. From there, connection was made with the California Gas and Electric Corporation lines. A second transmission line, strung on timber poles, connected with those of the Tuolumne Water Power Company (Galloway 1909).

The Tuolumne Water Power Company was…

> the successor in interest of various companies which have owned the property [the last of which was the Tuolumne Water and Electric Power Company]. Water is taken from the South Fork of the Stanislaus River at a point known as Lyons Reservoir and conveyed in ditch and flume to the mining region around Sonora. There are four storage reservoirs on the river [five: Big Dam, Upper Strawberry, Lower Strawberry, Herring, and Lyons] and several others on the ditches, the largest being Phoenix Reservoirs. There are some 90 miles of ditch in use distributing water to mines and several towns (Galloway 1909).

This system's small power plant near Phoenix Reservoir had a transmission line connecting to the main Stanislaus plant. SEPCo purchased the TWPCo/TW&EPCo and assumed that company's obligation to "furnish the Rawhide Mining Company power and water....

> The Rawhide Mining Company had built the electric plant at Phoenix Lake for the old Tuolumne Company [in 1898] and an agreement had been made by which the cost of the electric plant was to be returned to the Rawhide Company in water and power according to an agreed upon basis plus 15% of the proceeds of the sale of power elsewhere. There is some dispute over this agreement (Galloway 1909).

In itself, the SEPCo flume from Sand Bar Flat to Forebay, a distance of 14.8 miles, was a marvel. An early student of the system chronicled that, strictly for the flume's construction:

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[31] Camp 9 was almost a small city unto itself. In 1917, it was described as consisting of "somewhat less than twenty buildings." Near the powerhouse was the battery house. At the "upstream end of the powerhouse are three houses for dwellings. Then as we follow the track up toward the office on one side of the track are two bunk houses with individual rooms for each person. Then comes the warehouse containing food stuffs and then the warehouse in which are stored electrical articles such as wire insulators, etc. Then on the side of the hill are four residences. Across from the warehouses are located a carpenter shop, a machine ship, the cook house, dining room and club rooms, the office and post office and another bunk house. All who live here are employees of the Sierra and San Francisco Power Company. There are about twenty-five employees located at Stanislaus. The club house... contains a pool room, a card table, a reading room and magazines. Besides the club room, there is a dance hall, for the purpose of dances which are given by the employees." There was also a machine shop with a blacksmith shop in the same building. The cookhouse had an ice plant next to it and could produce 400 pounds of ice per day. A tramway also led from the powerhouse area to the forebay (Dunn 1917).

> a sawmill with a capacity of 60,000 board feet per day was built and from it a railroad run 12 miles along the ridge above the flume. At four places four miles apart, tramways were dropped down the canyon walls to the flume site to supply timber as needed. All of the timber was cut and framed at the mill.... The timber was hauled by two 10 ton, and one 20 ton geared shay locomotives... the maximum curve being 40 degrees and the greatest grade 7 degrees. The flume is 9 x 6.5' in cross section, made of 1.5" materials surfaced on but one side, cut as wide as the timber would permit, with longitudinal cracks closed by 5/8 x 4 inch battens. The capacity of the flume is 470 feet and the grade is 10' per mile. The velocity of the water is about 5 miles per hour.

The flume's overall design was to accommodate water to a depth of 6' 4"; boards on the inside were surfaced and joints were stopped with four-inch battens through which 300 second feet could flow 4' 3" deep and 400 second feet could flow 5' 3" deep. But since the flume was built with but three, 12" boards to a side, the flume, as of early 1909, could not carry the 160-second feet necessary to operate the entire plant. According to Consulting Engineer Galloway, another board had be added on each side the entire length in order to attain the desired water volume." The flume was supported by 5,223 supporting bents spaced at 15-foot centers. Eight by ten-inch posts were set on bearing blocks of pine resting on cedar footings, except where concrete was necessary in the rock cuts....

> The locking and battens are of sugar pine and all other timbers of yellow pine. The flume contains about 18,000,000 board feet. The tramways which were used and now [1917] of which there remains but ruins, were operated in two ways. One was operated by gravity, and the other, or main tramway, at Sand Bar, was operated by a steam hoist. At present on the top of the flume is a narrow gauge track [of 12 pound rail] along which hand cars are operated.... At various points along the flume there are sheds in which lumber is stored to be available for repair work. At C4, approximately at the mid point of the flume, is located the dwelling place and cook house of the flume gang. The flume gang has at its disposal an electric train pulled by a storage battery car, which has but recently been put into service. With the train which runs along the top of the flume on the tracks lumber is continually being hauled during the summer season and stored in the various sheds.

Spill gates were incorporated in the flume at intervals to allow the water to be turned off for emergencies. Ditch tender houses were also built at intervals. The flume consumed about 15,000,000 board feet of lumber harvested from the ridge upslope from the flume.

> About 2 miles below the Sand Bar Dam a tunnel has been constructed to by-pass a section of flume which was built on sliding ground. This tunnel is 1600' long, 8.5' wide, and 7' high to the spring of the arch. The floor and sides are of reinforced concrete. If the flume were entirely replaced by

tunnel the length of conduit could be cut down to about 10 miles and operating expense and such troubles as flume breaks could be entirely obviated (Dunn 1917; Galloway 1909).

In May 1909, the Sierra & San Francisco Power Company was organized and in September 1909 acquired the Stanislaus Electric Power Company and the Tuolumne Water Power Company. It also leased the San Francisco power plants of the United Railways of San Francisco[32] and supplied all of the power used by the United Railways, most of which was supplied at Camp 9 (Huber 1912).

S&SFPCo also proposed to develop a storage reservoir at Donnell Flat and a conduit from there to a powerhouse to be located above the intake at Sand Bar Flat. The Tuolumne Water Power Company system, dependant on Big, Middle, and Strawberry dams, needed upgrading for their new role in hydroelectric generation. None of these reservoirs were able to supply the storage capacity demanded by the system... and this capacity could not be increased by increasing the height of the present dams, because of their poor physical condition. Lower Strawberry was chosen as the place to provide more storage capacity. With the larger dam there, water in excess of that needed by the former Tuolumne Water Power Company's system would be diverted across the divide between the South and Middle Forks of the Stanislaus River to the intake of the powerhouse at Spring Gap. Up to that point the use by the TWPC had been considered a non-commercial use and, thus, no special use charge had been made. With the new development, however, District/Regional Engineer Huber recommended charging for the right of way for the proposed reservoir based upon that portion used for generating electric power (Huber 1912).

September 1909, forest officials granted the successors of the Stanislaus Electric Power Company—the Sierra and San Francisco Power Company (S&SFPCo)—a permit to build a reservoir at Kennedy Meadow. Construction of a 150-foot dam was to begin by September 1910 and be completed by September 1913.[33] Claiming an imperative to increase the water supply for mines on the South Fork of the Stanislaus, the S&SFPCo, successors of the Tuolumne County Water Company, were granted, by agreement supplementary to its main permit for conduits and power houses, a permit to increase the storage capacity of the Lower Strawberry reservoir. Approved in May 1912, this supplementary permit was acted upon immediately. The log and fill dam creating Strawberry Lake was being replaced with a much larger, concrete one. The new, larger dam was to alleviate the seasonal shortages in which, generally after September 1, water was unavailable for general irrigation purposes and was ample for mining only through the middle of October (UD1915). The new dam, to be constructed just a few hundred feet downstream of the old one, was to be wedged between the South Fork Stanislaus canyon

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[32] United Railroads Substations were Bryant Street Station, Turk and Fillmore Street Station, Geneva Station, and Millbrae Station (Dunn 1917).

[33] The survey for a 150-foot dam at Kennedy Meadow was completed in 1906; later, a 125-foot tall dam was proposed . The government portion of the reservoir site was 81.36 acres.

walls. In order to clear the dam site to bedrock and firmly set it's footing, the channel was hydraulicked. Countering some of the local uneasiness about a new company taking over the plant of the Tuolumne County Water Company, the *Union* Democrat lobbied for the benefits of the planned enlargements of the system's storage capacity. The old company…

> will pass into the hands of parties having the means and disposition to put an adequate supply of water into the hands of miners and farmers of the County. Nothing could happen to more speedily alleviate the material welfare of Tuolumne. With a steadily increasing demand for water or mining purposes with an annual complaint of scarcity from every portion of the county, with many thousands of acres lying dry and sere, which need to be [quenched with the] vivifying touch of irrigation to produce orchards and vineyards second to none in the world. With all these things the magnificent opportunities for water storage and diversion are still unimproved (UD 1890).

Because the S&SFPCo had spent over $60,000 on work and Kennedy Meadows and because its resources were being stretched by its diligent work on the new Strawberry Dam, the company applied for and received an extension of time to complete the Kennedy Meadow dam. After completion of the new Strawberry Dam, the company was to move its camp and equipment to Kennedy Meadows.

S&SFPCo's construction of the Kennedy Meadow Reservoir was barely begun the summer of 1911 but was suspended (Fowler 1917). A late 1911 permit application by S&SFPCo—later amended—asked it to cover enlargement of either the Lower Strawberry or Big Dam, both 45 feet tall.[34] The Lower Strawberry dam would be to 105

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[34] Big Dam had been repaired and its breast works increased with heavy timbers in 1900. The six-foot increase in height was to nearly double the capacity of the reservoir. Also, a telephone line was to be run from Lyons Dam at Middle Camp to Strawberry (UD 1900).

The 1856/1857 dam was reportedly 35 feet tall and was, later, increased to 52 feet. The timbers that created the increased height, after about 20 years, decayed and could not impound the additional water. The lower part of the dam was constructed of a cribwork of large logs, two to four feet at the buttes, arranged into cribs about eight feet from center to center. The lowest logs were bolted to the bedrock. The logs were notched flat where they crossed each other and were fastened with toenails. The top log layer was 10 to 14-inches thick and was supported by carefully selected joist logs, hewn to fit snugly. Cracks were chinked with wood and the upper surface of the dam was covered with a layer of gravel and earth. Surplus water flowed over the crest of the dam and modest repairs were made annually.

In 1916, the Tuolumne County Electric Power and Light Company requested Engineer C. E. Grunsky to report on the status of Big Dam and Middle and Lower Strawberry dams. At Big Dam, Grunsky observed that the portion of the cribwork that was exposed to sun and wind was rotten; primarily the downstream ends of the main logs. The logs used in construction of Big Dam were primarily yellow pine and tamarack and were obtained from the reservoir site, however, some were from about two miles north of the reservoir. Given the condition of Big Dam, Grunsky advised against heightening the cribwork structure to 60 feet; he worried about using a log structure 40 years old under a water pressure "considerably in excess of that which it was feet and the Big Dam would be to 95 feet tall. Materials for their construction were to be hauled to Jenness Flat—in 1917, the terminus of the Sugar Pine Railroad mainline (*H0410). Used for mining and irrigation, the additional storage was to be for hydroelectric (Fowler 1917). Hydroelectricity was viewed as not only a boon to urban life—manufacturing, transportation, and households—but also as a new lease on life for rural industries such as mining and lumber production. The hope was that the pumping, hoisting, crushing, sawing, and illumination that could be more cheaply accomplished by electricity would stimulate another resurgence in the area's mineral and lumber production. The Confidence Quartz Mine was just one of many area mines to have its own transmission line.

Construction of the new Strawberry Dam was watched closely, not only by investors and the Forest Service, but also by the new and burgeoning hydroelectric industry. A series of photographs documented its progress and are now part of the California State Library archival collections. An electrical engineering student at UC Berkeley described the construction:

> the canyon walls before construction were cleared with a hydraulic giant…. Water is drawn from the reservoir through an outlet tunnel 600' long, cut through solid rock.... All rocks in the laid section were handled by derricks. The face rocks were selected stone, and a variation of 3" from the theoretical line was allowed. These rocks vary from two to five tons and are well supported and tightly wedged (Dunn 1917)

A 30-mile transmission line from Camp 9 to the dam site provided power for the construction, running via the forebay, along the flume to Sand Bar Dam, then over the divide….

> A telephone line parallels the power line to about 2 miles from [the community of] Strawberry, then leaves the power line and runs to the Strawberry Hotel and thence to the Dam. Much of this line is carried on trees. In the early stages of construction a quarry on the side of the canyon was blasted with 27.5 tons of explosive and 33,000 cubic yards of granite were conveniently thrown into the bed of the river. Thus a great saving resulted for the contractor (Dunn 1917).

Donnell Flat, used two generations earlier by the old Columbia and Stanislaus River Water Company for its sawmill, was eyed many years for its water storage and hydroelectric potential. Among others, proposals of the Main River Water Company, T. J. Patterson, and S&SFPCo vied for the site. As other components of S&SFPCo's system were being completed, Patterson filed for proposed developments that included a storage

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originally planned to withstand. The limit of the life of the entire structure should, moreover, be placed at not to exceed 15 years." Instead, Grunsky advised construction of a loose rock dam with an upstream masonry face since he viewed Big Dam as "the principal source for an increased supply of summer water" (Grunsky 1916).

reservoir at Donnell Flat (capacity 70,000 acre feet; dam 300 feet high of rock fill with concrete facing; 3.5 acre pool), a conduit 24.37 miles long from the dam to the head of the proposed pressure line about half a mile south of the Sierra & San Francisco Power Company's Sand Bar Flat diversion dam, and a powerhouse just above the S&SFPCo intake in Section 19, T4NR17E. At the same time that Patterson's proposal was being considered, the Main River Water Company[35] was objecting to the Department of Interior's denial of its application under the Act of 1891. However, the engineer for the Forest Service's Region 5 believed there was "not the slightest chance" that the Main River Water Company's right-of-way for the project would be granted; after reviewing Patterson's proposal, Fowler recommended that a final permit be granted to him. Fowler was anxious to fully develop the Stanislaus'

> upper mountain meadows… [where there] are many excellent locations for storage, among which are Kennedy Meadows and Relief reservoir sites of the Sierra & San Francisco Power Company and the Sandflat site of the Main River Water company [on the Clark Fork]. At present only the Relief Dam is constructed (Fowler 1911).

At the time of its completion, Relief Dam was the largest of its type in the world, and at the time that this system began operating it was the largest and the most comprehensive in the world. Though its actual construction was begun in 1906, the attempt to work through the following winter ended in failure. Moreover, some engineers doubted the stability and safety of the dam construction techniques used for Relief: facing of the derrick lay stone and rock fill dam with concrete was a new venture. "If it holds the water it will be far a better than the wooden facing of similar dams" (Dunn 1917; Galloway 1909).

As part of a progressive hydroelectric development, there was to be a new power plant at Baker's Crossing/Spring Gap as well as additional storage at Donnells and at either Lower Strawberry or Big Dam. Construction materials were to be hauled via the Sugar Pine Railway to its terminus at Jenness Flat in Section 26, T4NR17E. Also, the Kennedy Meadow Dam was still in the plan (Fowler 1917). The conduit between the Sand Bar intake and the Stanislaus Plant at Camp 9 were already complete as was the conduit of the Philadelphia Ditch; there was a proposed tunnel and pipeline through Sections 23-25 and 14 in T4NR17E. An additional power plant was also to be constructed on the Middle Stanislaus, either 2.5 or 5 miles above Sand Bar Flat intake (Fowler 1917).

Work on the new Strawberry Dam proceeded earnestly and, in early 1919, the power company was authorized to construct the associated Spring Gap power project. This authorization came, however, with the proviso that its Kennedy Meadows Reservoir be in

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[35] The principals of the San Francisco-based Main River Water Company were: Loring B. Doe, Milton Bernard, Andrew McCormick, W. D. Bannister, and W. H. Metson. MRWC was "closely allied" with the California Nevada Canal, Water & Power Company that had been denied certain applications for rights of way on Lee Vining and Rush Creeks on the Inyo National Forest. Bernard was also an official of the Hydro Electric Power Company that had been "the subject of much litigation with the United States (Huber 1912).

operation by December 1, 1920. To that date, the primary hydroelectric developments owned by the S&SFPCo were an outgrowth of the earlier attempt to supply water to Beach Thompson's San Domingo Mine in Calaveras County in Calaveras County. As District Engineer F. H. Fowler explained in his 1917 report on the S&SFPCo's application for a final waterpower permit:

> ...In 1893 Mr. Beach Thompson acquired an interest in the mine, and in the six years between 1893 and 1899 carried on construction work on a ditch system, through which he proposed to supply water to the property, from the North Fork of the Stanislaus River. In the year 1899 it was found that the North Fork supply would be inadequate and a search for an additional supply was begun.
>
> In 1896 Mr. Geo. Batten had filed upon a claim for 10,000 inches of water on the Middle Fork near Baker's Crossing[36] and W. E. Ames had run a conduit line survey from Sand Bar Flat to what is now Stanislaus Forebay. In July 1899, Beach Thompson secured an option on the Batten water rights and on May 2, 1900, a survey from Donnell's Flat down the north side of the canyon was begun.... When it was first decided to generate power, the promoters of the project proposed to transmit to the Electra Plant [on the Mokelumne River], some 20 odd miles to the northward, and then over the Electra line to San Francisco; later on, however, a direct transmission line was run the entire distance to the Bay.

By April 1905, sufficient money was obtained to begin construction; the corporation organized to carryout the project was the Stanislaus Electric Power Company (SEPCo). Incorporated in late 1905, SEPCo became successor to Beach Thompson's rights and construction was to be carried out through contract with the Union Construction Company (UCC), a Maine Corporation, organized in September 1905.[37] Some construction was started in the latter part of 1905 but active work was not begun on Relief Dam until 1906. In 1906, the UCC purchased the properties, but not the stock, of the Tuolumne County Water & Electric Power Company, which had maintained local

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[36] Bakers Crossing was probably named for surveyor Shirley Baker who did the survey work in 1902 for Beach Thompson's filing on the Stanislaus River (Fowler 1917).

[37] The Union Construction Company was comprised of the banking firm of Tucker, Anthony & Company of Boston and the engineering firm of Sanderson & Porter of New York.. Galloway reported, in 1909 that the "work as carried out by Sanderson & Porter has been the subject of considerable criticism. That there were a number of mistakes in the early part of the work in planning there is no doubt." For example, a $10,000 steam shovel was found to be useless on the job; two automobiles were purchased which were unnecessary. The bull-headed attempt to work at Relief through the winter "against the advice of those familiar with conditions" was a $25,000 mistake. Galloway was convinced that at a year was lost "due to an attempt to conduct engineering operations from New York and the selection of men unfamiliar with this class of work. When at last a member of the firm, Mr. Buck, was sent to take charge, who was at the same time ably seconded by Mr. Jackson, the work went ahead in good shape" (Galloway 1909).

transmission in the Sonora vicinity from the Phoenix Plant.[38] The TCW&EPCo was, in turn, a re-incorporation of the old Tuolumne County Water Company, with its system of dams and well-established water rights on the South Fork Stanislaus. Due the financial failure of the Knickerbocker Trust Company, the Union Construction Company suspended its operations, though it was hoped that the "sawmill at Camp 31 will be running again and a crew of woodsmen at work in the adjacent woods once the financial problems are solved." The *Mother Lode Magnet* reported that the Stanislaus Electric Power Company had already spent somewhere between $3,000,000 and $5,000,000 on its project in the Sierra (MLM 1907). Just a few months earlier, the *Magnet* had enthusiastically reported on the scene at the Union Construction Company's mill: "Camp 31 has one of the finest sawmill plants in the state, and it is running full blast. Over three million feet of lumber have already been cut since last season. The planing mill is capable of giving employment to 150 men. Fred Trenkle will have charge of the first floor of the planing department and George Baer of the upper floor. Mr. Baer intends to move his family up to Camp 31" (MLM 1907). In December 1907, the Union Construction Company transferred these properties to the newly incorporated Tuolumne Water Power Company (Fowler 1917; Galloway 1909).

Connected to the financially troubled Knickerbocker Trust Company of New York, the SEPCo and TWPC wound up in the hands of a receiver, ultimately resulting in formation of the S&SFPCo, the entire capital stock of which was held by the United Railway's Investment Company—a corporation vested in the street railways of San Francisco (S&SFPCo. became successor in interest of SEPCo). In addition to reputed mismanagement, the Stanislaus Electric Power Company was dealt a blow by the San Francisco earthquake in 1906, stimulating a 25 percent jump in labor costs due to the huge demand after the fire. Correspondingly, there was a decrease in labor efficiency, especially during harvest time when work hands returned to agricultural labor. Galloway estimated that the errors of the constructing engineers amounted to not over $200,000 and, thus, it should not be construed that the company was "heavily burdened" such errors. However, he insisted that the

> divided control and management of the company deserves the severest criticism. Heavy interest charges, commissions and unnecessary office expenses seem to have eaten the money. The worst criticism of all lies in the fact that after spending years of effort and seven million dollars of money in building a plant they failed to have a single contract for sale of power at the end. This has thrown the company into bankruptcy. The divided control was a mistake and management from New York an impossibility (Galloway 1909).

S&SFPCo later also acquired distribution lines in Modesto and Hughson from the La Grange Water Power Company (Yosemite Power Company) and Tracy and Brentwood

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[38] Phoenix Reservoir had been fitted with a cement culvert in 1898 to help drain off "slickens", sand and slimes which have accumulated to a dept of 18 to 20 feet for the past 38 years." The culvert emptied into Sullivan Creek (MLM 1898).

from the Mount Diablo Power Company, and in and about Sonora from the Gold Mountain Water Company (Fowler 1917).

To keep in immediate contact, the S&SFPCo system was interconnected with eight telephone lines. In 1917 they were:

No. 1 from Camp 9/Stanislaus powerhouse to Angels Camp.

No. 2 from the powerhouse to Sand Bar Flat; it connected with the flume gang's headquarters at C4.

No. 3 goes up the flume to Sand Bar Dam, over the mountains to Strawberry, and then up to Relief Dam.

No. 4 followed the power line to Phoenix on the same pole.

No. 5 was the Stanislaus powerhouse area camp line.

No. 6 was the main line from the Camp 9 powerhouse to San Francisco, via several substations.

No. 7 was the mine ditch line, and was “little used.”

No. 8 paralleled the power line to Salinas; it was on the same towers and poles (Dunn 1917).

Relief Reservoir was a key of the progressive development being constructed by the Sierra and San Francisco Power Company. Its construction contractor, the Union Construction Company, had a very high profile in the area communities and the newspapers were dotted with articles about the hustle and bustle of the various projects. Though many members of the community were skeptical about what the projects would mean for them, there was a general air of interest about the progress of the planned developments. Employment was an important factor as well and was often mentioned in news articles about the projects. One article marveled at the enormous water gate that had been shipped from the East to Angels Camp and which then was transported by a 22-horse team for installation at Camp 9 (MLM 1907). It was also reported that 120 men were working on construction of the diversion dam at Sand Bar Flat, using two large derricks to place rock[39] (MLM 1907). Another article, written latter in the fall of 1907 conveys the tenor of activity:

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[39] In his report to S&SFPCo bondholders, Consulting Engineer J. D. Galloway described the construction of the Sand Bar Flat diversion dam, whose purpose was to turn the water into the flume. “It is of the common log crib type filled with rock. The surface is covered with planking on both sides and the toe is protected by an apron. The dam is reasonably permanent and should last twenty years. It is 30 feet high and 170 feet long on the crest. The water is diverted by the dam into a rubble masonry basin thro [sic] ten openings provided with wooden gates operated by geared lifts. At the lower end of the basin are three additional gates to close the water from the

More than 1000 men are employed by the Union Construction Company in the eastern part of Tuolumne County in the work of constructing dams and ditches, getting out timber and cutting the same into lumber, and building roads, etc... I was told that the company had spent $20,000 on one road [from the Sonora-Mono Road to Relief Camp] that is only used for construction work. At Camp Relief they are putting the gateway in for the discharge of their immense reservoir. This is a solid concrete tunnel with walls about two feet thick and about 300 feet long and is intended to carry two large pipes imbedded in cement. They have here a sawmill with a donkey logging engine that brings logs up to the mill, a railroad with a 20-ton locomotive to haul gravel and stone, and wire cables stretched across the canyon about 300 feet high, with trolleys running upon them that let down the rock wherever desired on the dam. This dam will be 300 or more feet in height with concrete center and a cement wall facing the water. The foot of the dam will be 300 feet thick layed in carefully with dry rock and cement and higher up loose rock is thrown in with the retaining wall.

The wagons coming into the camp loaded with supplies are hauled nearly a mile over a grade cut in solid rock which in one place overhangs the road. The wagons are pulled along by a hoisting engine located at the top. All along we find watering troughs and the roads fixed up, turn-piked and widened and teams and carts along the road improving and repairing the same.

This company [S&SFPCo] also owns a very large dam site at the junction of the Sonora [-Mono] road with the main Stanislaus River. The reservoir will be put in later [Sand Flat? Kennedy Dam?]. They have construction camps all along the road. At two other places they have short railroads operated with small locomotives. They have also two sawmills and a tramway that climbs a 1700-foot mountain, a donkey engine at the top furnishing the power.

They have a fall of 5000 feet in their pipe line and intend to have two power plants eventually. The cost of the one plant now building will be about $10,000,000.

They are putting in transmission lines, using steel windmill towers set in concrete to carry the same (MLM 1907).

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flume. Below the gates is a spillway that automatically regulates the amount of water in the flume (Galloway 1909).

By the time Frederick Hall Fowler wrote his report, the S&SFPCo operated reservoirs at Relief (dam completed in the summer of 1909)[40] and Strawberry, a 15.5-mile conduit from Sand Bar to Forebay, the 40.000 kW Stanislaus Powerhouse at Camp 9 and, off forest, plants at Phoenix and Knights Ferry (Fowler 1917). Many in Tuolumne County resented the influx of hydroelectric companies that claimed rights on area streams and diverted their waters. A 1918 resolution from the County Board of Supervisors focused on the Sierra and San Francisco Power Company's developments on the South Fork Stanislaus and protested against the Forest Service granting any additional permits:

> WHEREAS, the welfare and future prosperity of Tuolumne County depends on its opportunity to obtain water for irrigation of its lands, and development of its mineral resources,
>
> AND WHEREAS, the natural and available supply of water for such purposes is the South Fork of the Stanislaus River, which waters for years past have been used for such purposes,
>
> AND WHEREAS, the Sierra and San Francisco Power Company has heretofore appropriated a large portion of the water supply from said river and is diverting and claims the right to divert said waters from said river for hydro-electric purposes to the detriment of the lands of Tuolumne County and has refused to supply to the inhabitants of Tuolumne County the waters necessary for agricultural and mining purposes and has refused to insure a supply of water for the future needs of Tuolumne County,
>
> AND WHEREAS, said Sierra and San Francisco Power Company has made application to the Government of the United States for a permit to appropriate and use further and additional waters of said river for hydro-electric purposes, which if granted will deprive the County of Tuolumne of its last and only opportunity to obtain sufficient waters necessary for its prosperity,
>
> THEREFORE BE IT RESOLVED, that the County of Tuolumne, through its Board of Supervisors, hereby protests against the granting of any further permit or allowance to the Sierra and San Francisco Power Company, to appropriate or use any further or additional water from the South Fork of the Stanislaus River, unless said company guarantees or agrees that it will in the future furnish to the inhabitants of Tuolumne County at all times, all waters demanded by the residents of said county for agricultural, horticultura[l], mining and domestic purposes,

[40] There were complaints about the operation of Relief not only relative to affects on fishing but also on the main trail in the area. For example, in 1915, the trail from Eagle Meadow to Relief was, again, impassable because of Relief Dam spillway water. Again, a bridge was requested of the company to make the route useable.

> AND BE IT FURTHER RESOLVED, that certified copies of this protest be filed with the proper department of the United States Government (TCBS 1918).

In late 1920, citing war conditions, the company begged-off on its commitment to complete the Kennedy Meadow project that had been linked to the Lower Strawberry dam enlargement. S&SFPCo formally requested and received a further extension for completion of Kennedy Meadow until the end of 1926.

Interestingly, in 1922—the year of the Federal Water Power Act—Stanislaus officials still promoted further hydroelectric opportunities, stating that the Stanislaus offers great possibilities for development of hydroelectric power." The writer of *The Forest* proudly explained that power permits were granted by the new Federal Power Commission and supervised by the Forest Service. Pacific Gas & Electric[41] was developing 84,953 horsepower—Spring Gap generating 10,054 horsepower, Stanislaus at Camp 9 generating 45,576 horsepower within the Stanislaus National Forest, along with 2,513 horsepower at Phoenix Powerhouse in Tuolumne County and 26,810 horsepower at the Electra Powerhouse in Calaveras County on the Mokelumne River. The other hydroelectric projects on the Stanislaus, off the CSWA area were briefly described, including City and County of San Francisco's Hetch Hetchy project on the Tuolumne River. Hoping to generate interest and also oozing pride in the hydroelectric industry, *The Forest* closed its section on water and power with:

> While development has taken place on all the main rivers of the Forest, yet it has hardly started. The Marshal plan, which recently received a great deal of attention all over the State contemplates some 40 reservoirs for storage water flowing our of the Stanislaus Forest. This water would be used to develop power and then be diverted to the irrigation of the San Joaquin Valley (anon. 1923).

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[41] By action of the State Railroad Commission, holding that the "lease is distinctly in the interest of the public," the Pacific Gas & Electric Company was authorized to lease of the Sierra and San Francisco Power Company's properties. The lease was to run for a period of 15 years from January 1, 1921. The S&SFPCo had been unable to sell its bonds and, thus handicapped, had been unable to install essential power plants and transmission lines.

Commissioner Irving Martin who wrote the opinion accompanying the order of approval, called attention to service improvements that would precipitate from the lease: "Considerable preliminary work has been done towards the installation of the so called [Spring Gap] Plant on the Stanislaus River. Material has been ordered for a second transmission circuit from Port Marion to Salinas in order to improve the service conditions in Salinas and other territory served by the Coast Valleys Gas & Electric Company. Material has also been ordered to strengthen the line, from Manteca to Modesto thence interconnecting from Modesto to Newman, with provisions for an additional line to Turlock. Work has already been started by the Sierra Company on an additional pipe line to its Stanislaus Plant. The estimated cost of these projects is excess of One Million Dollars" (UD 1920)

As the water suppliers transformed to hydroelectric companies and began producing electricity, they turned to their traditional customers, the miners, in addition to more recent customer bases. The old Tuolumne County Water Company was slated in late 1898 to take its electric line to the mines along the Mother Lode in conjunction with the Tuolumne Electric Light and Power Company's plan to furnish light to Sonora and the lode towns (MLM 1898). Additionally, a new power line from Phoenix powerhouse to Confidence was been completed in 1907 to supply that group of mines; in 1929, the S&SFPCo obtained a special use permit (SUP) for a transmission line about a mile from Lyons Dam to the Confidence Quartz Mine (MLM 1907).

It can be well argued that, though timber and timber management issues have driven the politics and policies of the national forests in the Sierra Nevada, rather than a tree, what might be the more appropriate image on the Forest Service patch might be a rushing river. The importance of water in national forest management in the West was clearly acknowledged by the early 1920s:

> The water supply upon which a large part of the agricultural and manufacturing industry depends is assured of regulation through the permanence of the Forests at its sources (anon. 1923)..

The importance of these systems to the land use history of the CSWA area lies in their presaging the flurry of water manipulations that would make demands on the Stanislaus' middle and south forks as the hydroelectric age dawned in the early years of the 20th century.

In the early 1920s, the upper Stanislaus watershed was still viewed as possessing untapped water storage and hydroelectric potential. It was, however, becoming ever more complex to sort out water rights, affects of one system on another, and of the collective effects of water manipulations on the physical, biological and social systems of the affected areas. The California Power Board, appointed in 1923 to study and report on problems connected with the Trinity, American and Stanislaus rivers, made recommendations on hydroelectric applications to the Federal Power Commission (FPC). In the board's evaluation of the Stanislaus River and the developments on it to date, the group reported that the principal activities of the mountainous section of the watershed were still mining, lumber production, and livestock grazing. Further, that there were "practically no towns, though there are numerous summer resorts and summer camp sites within this section." The board reported to the FPC that there remained

> two undeveloped power possibilities on the South Fork--one between Strawberry and Spring Gap diversion and one between Spring Gap diversion and Phoenix diversion. There are three undeveloped power projects on the Middle Fork above the diversion of the Stanislaus plant of the Sierra and San Francisco Power Company…. [The upper potential project on the Middle Fork] would divert at elevation 5,500 feet from the Clarks Fork and the Middle Fork just above their junction to a six mile covered conduit on the north bank on the river, returning water to the

stream.… The second project would consist of a dam at the Donnells Flat site, streambed elevation 4610 feet, raising the water to elevation 4900 feet; and a powerhouse returning the water to the Middle Fork at elevation 3190 feet. A head of 1470 feet, forebay to tailrace, would be developed. A dam 290 feet high at Donnells Flat site would be 540 feet long on top.... The third project would begin with the construction of a dam at the Beardsley Flat reservoir site.... [A 200-foot high dam] would impound 62,000 acre feet. A conduit about 5 miles long would lead from this reservoir at elevation 3,080 feet along the north bank. The power house would return water to the Middle Fork at elevation 2,710 feet and a head, forebay to tailrace, of 320 feet would be developed.... Below the location of the third power house water is now being used in the Stanislaus plant of the Sierra and San Francisco Power Company, reinforced by South Fork water delivered to the Middle Fork 4 miles above the Company's Middle Fork diversion by the Spring Gap plant of the same Company.... It will ultimately be desirable to develop at least one project on the South Fork above the Spring Gap diversion which will take the water from the Strawberry reservoir, already constructed, in a conduit about 3.5 miles long to a power house returning the water to the South Fork at the intake of the Spring Gap plant. A drop 660 feet, forebay to tailrace, could be developed.... The Phoenix plant of the Sierra and San Francisco Power Company… diverts from the South Fork at a point about 9 miles below the Spring Gap diversion (Henny 1924).

The advisory board’s conclusions were that remaining hydroelectric potential the Middle Fork Stanislaus could be best developed by means of developing the fall of the river above the Sand Bar Flat diversion through long conduits. Further, power developments on the South Fork Stanislaus could be enhanced by at least one powerhouse above Spring Gap diversion and between Spring Gap diversion and the Phoenix diversion. Further water storage developments were also discussed in the context of irrigation needs in the central valley and foothills. Potential power and storage developments below the Camp 9 powerhouse were also mentioned, noting that “power on the Stanislaus River proper below the [middle and south] forks and below approximate elevation 1050 feet, which is the elevation of the streambed opposite the Stanislaus plant... can best be developed by comparatively high dams impounding large storage primarily valuable for irrigation” (Henny 1924).

Waters were stored not only to produce electricity and to provide a steady supply of water through the dry seasons, but also sometimes to enhance fishing fate. As early as the latter nineteenth century, flows of favorite fishing streams in what is now the Emigrant Wilderness were augmented by a series of small dams. Additionally, milk cans were loaded with fish fry and planted in these streams for the benefit of the intrepid anglers who tramped the high country. Sonora’s Fred Leighton, known in California as the father of check dams, began this work in his boyhood in 1897 while herding cattle for the

Rosascos and lobbied tirelessly for this cause throughout his long, active life.[42] Initially done to enhance the stream fishing, it evolved into primarily a lake-fishing enhancement by regulating and slowing the downstream release of water. Though most of the Emigrant Wilderness check dams—whether they operate as meadow, stream flow, or lake level maintenance structures—are part of the main Tuolumne watershed, some have existed on the Stanislaus and North Tuolumne watersheds for many decades. These dams have also spawned plans for tens of others within the CSWA area. For example, Department of Fish and Game proposed a 10 to 15-foot high check dam at Lunch Meadow in order to "make a nice fishing lake and make a 3-4 mile fishing stream out of upper Summit Creek, which now goes dry each summer." This dam was nixed, however, in favor of more publicly accessible lower elevation proposals such as dams at Herring Creek, Upper Strawberry and Deer Creek (Wilson 1955).

The Forest Service discussed its view of the link among water, forests and power in much of its conservation literature from its inception through the early 1940s. Raphael Zon, while Director of the Lake States Forest Experiment Station, put forward the importance of water as the keystone of forest management in terms that would probably suit today's thinkers on the subject, with only minor terminology changes. Zon wrote in 1927:

Of all the direct influences of the forest the influence upon the supply of water in streams and upon the regularity of their flow is the most important in human economy. Yet so many are the factors which play related parts in this influence, so great is the difficulty of observing them with precision, and so wide the range of economic interests affected, that

[42] Fred Leighton, in 1963, recounted his check dam and fish planting work in the Emigrant Wilderness. Though most of the lakes he stocked and dammed are outside of the CSWA area, his activities both reflected and influenced the fishery thinking of his day. The old Rosasco cow camp, later called Yellowhammer, was his base of operations. Leighton noted that there were "no Rainbow fish in any of these Lakes and Streams at that time, including Buck, Emigrant, Huckleberry, Lakes and none in the streams of Louse Canyon, Buck, Huckleberry or Emigrant Canyon." In 1910, a group of local sportsmen "rescued some Rainbow fish" from Kibby Lake in the Park (then called Granite Lake) and "packed them to Huckleberry Lake for planting.... Before 1900 Mr. Kibby who was camped at Lake Eleanor, rescued fish from Frog Creek and planted Kibby Lake.... 1897 Alvah Shaw assisted by Chas Filiberty [*sic*] who was stationed [Shaw] at Piute Meadows ranging cattle for Dave Rosasco, rescued fish from Coffin Hollow, headwaters of Clavey [and] packed them in coil-oil cans and stocked Louse Canyon, Deer Lake, Buck Lakes and they scattered to Wood Lake & Stream, also Juwelery [*sic*] Lake. He also released a few in Big Emigrant Lake.... After 1910, Guy Scott who was a game warden, packed fish into a few other lakes such as Pingree, Big Lake, but there was no chance for propagation. During the 1920s Frank Tyler, game warden helped Fred Leighton pack fish from Strawberry to Big Lake (No Results) 1920, Fred Leighton rescued fish from Buck Meadows and stocked Yellowhammer Lake.... Between 1920 and 1950 a few fish were packed in from Kennedy Meadows and other places to stock lakes without a stream" but results were generally poor. About 1950, the DF&G "started dropping fish from an airplane. They were planting all lakes in the Basin from five acres up. They are planting all lakes in the Basin that are not supported with a stream for natural hatch. Therefore at this writing and covering a span of 65 years we have advanced from a situation of no fish to a wonderful supply of Rainbow & Eastern Brook trout in about 60 lakes and 100 miles of stream in Emigrant Basin.... Between... 1931 and 1956 some 14 Check Dams were built to store water to be released to maintain streamflow during the dry summer months which saved the natural fish hatch each year" (Leighton 1963).

considerable divergence of opinion has arisen on the subject. This, however, if prompted by a sincere desire to reach the bottom of a complicated and vital problem, can only be productive of results of the highest scientific value.

> There is, perhaps no other problem facing the American people today which demands such care in the scientific accuracy of its data and conclusions as does the relation between forests and water. It is imperative, therefore, that no final conclusions be drawn in regard to this relation until ample, reliable, and critically revised evidence upon which to base them is available. A national policy of timber, [that] fails to take full account also of their influence upon erosion, the flow of streams, and climate, many easily endanger the well being of the whole people (USDA 1927).

Another 1936 tract, considering the forests' relationship "to human progress in the Age of Power" attached similar urgency to the nexus of water and forests:

> The only limit to the power to be derived from our… forest land is their ability to grow trees. To create an inexhaustible supply of fuel is the direct part forests can play in the production of power.[43] Their indirect, indispensable part is a service function; they act like the throttle on an automobile; they are part of the mechanism to even up the flow of streams from which hydroelectricity is produced; they can balk the attempt of water to run too fast downhill. Hydroelectric power need not cost much more than enough to pay the fixed charges on the plant. But this cost is determined by our ability to modify the earth's surface in a big way… (Bruere1936).

During the Great Depression, it appears that large hydroelectric companies such as the Pacific Gas & Electric Company were able to initiate enlargements and improvements to their water developments. For example, the Stanislaus Flume was slated for replacement by a tunnel. In 1936, PG&E was granted a Special Use Permit for a construction camp in connection with that project.[44]

During World War II, the connection was being made between the Forest Service's role in water manipulations and agriculture. Viewed respectively as the blood and the backbone of civilization, the agency was to shoulder a huge measure of the responsibility

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[43] Twenty-eight percent of the timber cut in the nation's forests was burned as fuel (Bruere 1936)

[44] The SUP was for about 7.5 acres in the SE 1/4 of Section 33, T4NR15E for the camp. The permit was issued free and was to become effective upon approval of PG&E's application to the Federal Power Commission for revision of its license for the Stanislaus project. The permit was amended April 13, 1937 to include another acre in the SW 1/4 of Section 33 for the campsite. The amendment required the PG&E to pay $5.43 for the "stumpage value on 1,810 bd.. ft (6 trees) of green Ponderosa pine which was cut in clearing for the tunnel camp and for the tunnel dump" (NARA 95-61-A-424, location 54863, box 2/3).

for creating a situation conducive to fostering “productive farms of family size when many of the farm boys who have gone to war return with the hope of entering agriculture” (USDA c.1943). Former Regional Forester S. B. Show who, during World War II worked for the Department of Agriculture in Washington, D.C., was tasked with defining the department’s role in water policy. By this time in his career, he had a great deal of experience under his belt in brokering water developments among proponents and the Forest Service. He also clung to deeply rooted agency traditions and predispositions such as “wise use” and the basic commitment to small, family farms. In his 15-page report, “U. S. Department of Agriculture Water Policy in Relation to Western Agriculture,” Show inveighed that a core role of the agency was to create new agricultural land through “providing water and controlling its use.” The two fundamental principles” underlying the Department's water policy for the West were...

1. The conviction that the ultimate goal of every irrigation project must be the welfare of the families who make their homes on the land, and

2. The conviction that a water policy, to be fully effective, must be part of a comprehensive policy for wise use of all of the Nation's natural resources.

“It is impossible,” importuned Show…

to separate one use of water from the others, or water policy from agricultural policy as a whole. In the past, irrigation and other water developments have not always done as much as they might to advance the welfare of people and to fit into a nation-wide pattern for wise use of natural resources.... As long as operations remained on a small scale, results of so limited a viewpoint were not so serious as they became when larger projects were planned to take in more territory, use more water and serve more people. The technical advance in engineering skills for storing and transporting water tended to run ahead of gains in the broader fields of agriculture and economics that would have enabled the wisest use of the water made available (USDA c.1943).

Show summarized that:

Basically, the Department's water policy aims at the fullest and wisest use of water by the people immediately affected, with due regard for the present and long-range interests of all agriculture and of the Nation as a whole….The Department of Agriculture believes that top priority for new water developments should go to projects for bringing supplemental water to areas that already are being farmed but have inadequate supplies. Also, the Department is in favor of bringing new land into production when it is suited to agricultural use and when its cultivation offers irrigation farmers a reasonable prospect of success and appears to be in the national interest (USDA c.1943).

In his 1953 inspection of the Stanislaus’ range and wildlife programs, Assistant Regional Forester F. P. Cronemiller noted that the forest was "aggressively following its flow-maintenance dam program" and was tending to raise the level of existing dams before considering adding new ones. "We looked over the Apple Tree dam site in the head of Rose Creek which has been considered as a possible storage reservoir for improving the flow of that stream during the summer period.... This is about the only site available, and it is not a very good one. It would take about a 40-foot dam, and this probably would not store more than 100 acre-feet. However, that would be adequate to keep fish alive at least and prevent their complete loss. The forest has made a survey of the site and is submitting it to the State for study. It is doubted if the project will be found to be feasible"(USDA 1953).

Throughout the period addressed by this overview history, there were numerous diversions for domestic and irrigation purposes, both recorded and unrecorded and on both large and small drainages. For example, in addition to a history of fish stocking in Duckwall Creek (a tributary of the North Fork Tuolumne) at least since the early 1940s, 25 acre-feet per year was permitted for diversion to irrigate 40 acres on the Murphy Ranch (T1NR16E, Section 10) (CDF&G 1953).

The 1950s and 1960s were a period of hyperactivity for development of water manipulation proposals. In the latter 1950s, the proposal for a reservoir at Kennedy Meadow resurfaced, and among the myriad issues related to the proponent's application, the effect of the project on the fishery emerged as a prime issue. One of the proposals to use water from a reservoir at Kennedy Meadow was one by the Tuolumne County Water District No. 2. The district would utilize Donnell Reservoir, the proposed Kennedy Meadow Reservoir, and Relief Reservoir for cyclical storage. The State Department of Fish & Game viewed the project as a clear threat to a premier fly-fishing stream. The department's manager for inland fisheries judged that:

> The proposed Kennedy Meadow Dam will destroy one of the finest fly fishing streams in this section. The flow below the proposed Kennedy Dam should be no less than 25 cfs not including the flow from Deadman Creek (CDF&G 1958).

Another proposal being circulated in 1958 would bypass water downstream through Donnell and Spring Gap powerhouses and then run through a proposed McCormick Powerhouse before being returned to the Middle Fork Stanislaus in the NWNE of Section 27, T4NR15E. Yet another proposal centered on development of a reservoir at Browne's Meadow in T3NR17E. This project would also utilize Relief Reservoir and a proposed storage of 15,000 acre-feet in a reservoir at Kennedy Meadow. Water would then be routed through Donnell Reservoir and then, by direct diversion (capacity 600 cfs), into the South Fork Stanislaus above the Philadelphia diversion. From there, water would either go into Lyons Reservoir via the South Fork of the Stanislaus or through a tunnel and ditch into the upper North Fork of the Tuolumne River for storage in a reservoir at Browne's Meadow. Water from this reservoir would be re-diverted via ditch into the existing ditch and Lyons and Phoenix reservoirs, then down Sullivan Creek to a proposed reservoir at Stent. Storage in Stent Reservoir would be augmented by direct diversion from Curtis Creek through an open ditch about two miles long; the capacity of Stent Reservoir would be from 30,000 to 40,000 acre feet. Storage at Phoenix Lake would be augmented by means of an earth-fill dam. Storage at Browne's Meadow Reservoir would be supplemented by the district's proposed diversions from Lily Creek to Belle Meadow Reservoir, then down Clavey Creek and by direct diversion from Clavey Creek into the upper North Fork of Tuolumne River and Browne's Meadow Reservoir. Included in the proposal were two plans for providing water for the Twain Harte and Long Barn areas: pumping into a ditch above Long Barn from Browne's Meadow Reservoir, then along the general route of Highway 108 and back into Lyons ditch; and a pipeline from Pinecrest Lake to above Long Barn. (Vestal 1958).

In 1957, Oakdale and South San Joaquin Irrigation Districts completed their Beardsley Dam, creating a reservoir 250 feet deep and covering 650 surface acres with 97,800 acre feet of water. Also operating Donnell Reservoir, about eight miles upstream, the power generated at Beardsley and Donnell powerhouses is purchased by the PG&E who, therefore, exercised considerable control over water releases. Beardsley was stocked with trout in 1958; it was not long after that large numbers of "rough fish" began to take a toll on the trout population. Hitch (*Lavinia exilicauda*), in particular, believed to not be native to that part of the Stanislaus River, were thought to have been illegally introduced as bait sometime after construction of the reservoir.[45] In the decade from 1958, an average of

[45] September 23 and 24, 1976, Beardsley Reservoir was treated with rotenone to eliminate large populations of hitch and western sucker (*Catostomus occidentalis*). The proposed draw down for the first inspection since the reservoir had been filled was proposed in 1976 in order to "take advantage of the poorest water season of record in this watershed." FERC approved the draw down; provided Tri-Dam maintained a minimum flow of 25 cfs below Beardsley Dam and that they cooperate with and assist the Department of Fish & Game "in any fish rescue that might be required and in any 'rough fish' control measures that might be necessary. FERC's order also specified that the draw down be conducted in a way that allowed the fish to move from the reservoir into the Beardsley Afterbay and the Middle Fork via the intake and outlet structures." It also specified that the flow at Hells Half Acre be reduced from 32 to 16 cfs to help implement the DF&G's "program to eliminate through chemical reclamation, those rough fish that currently populate the stream and Beardsley Reservoir." The "put-and-grow" fishery in Beardsley had been declining for rainbow trout (*Salmo gairdnerii*). Brown trout (*Salmo trutta*), on the other hand, had been doing better, feeding on hitch. "On the 20th and 21st, the last of the drawdown was apparently very rapid. Nearly all of the remaining trout were killed, we suspect by lack of oxygen. Numerous dead hitch, some suckers and perhaps several dozen trout, mostly brown trout of 5 to 20 lbs. were observed on the recently dewatered areas around the reservoir bottom. Migration of the larger fish downstream into the Afterbay was blocked by the 1 3/4-inch spacing between grates on the two powerhouse inlet structures. (Tri-Dam officials claimed that the Department had insisted on the narrow spacing prior to construction.)... Treatment began on September 23, when... drip stations calibrated to meter about 3 ppm Pro-Noxfish were set by helicopter at three accessible locations on the river above the reservoir. The uppermost station was located between the two assumed barriers above Mill Creek.... Later in the day a fourth drip station... was set at Hell's Half Acre Bridge. Each of the four drip stations on the river consisted of two fill 5-gallon containers with constant-flow siphons set to release the contents over a certain period to maintain 3 ppm concentration n the river. Flow at Mill Creek was estimated... at 18 c.f.s.; increasing to about 24 c.f.s. at Hell's Half Acre bridge.... Smaller drip stations with presumed adequate but unknown metering rates were set... at locations below road crossings on Mill Creek, Cascade Creek and Lily Creek.... Treatment of the reservoir began... shortly after the tunnel gates (to the Afterbay) were closed.... The ponds were treated by slinging a 55-gallon drum beneath the helicopter. The rotenone-water mixture (5 to 10 gallons Pro-Noxfish with remainder of water) was released by a simple hose-rope arrangement.... It was decided to spray all ponds with successive 55-gallon loads with intervals between to observe fish reaction." After the river drip stations

89,100 fingerling rainbow trout were planted annually with rainbow trout from four brood stocks--Shasta, Whitney, Virginia, and Hot Creek strains—and one wild strain, Kamloops (*Salmo gairdnerii kamloops*)[46] (Cordone 1969).

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emptied, the containers were retrieved and "dead fish were observed throughout the length of the treated stream down to just above Hello's Half Acre bridge.... September 24, live fish were observed in the main-channel pond, estimated to hold between 15 and 34 acre fish of water. Dead fish (and no live fish) were observed from Hell's Half Acre Bridge and in the river channel within Beardsley Reservoir gross-pool level down to a few hundred feet above the main channel pool. An unmetered drip station with 2.5 gallons of Pro-Noxfish was set in mid channel a short distance above the lowest point of seeing dead fish. The main channel pond was treated by use of a small boat and siphon pump. Some 25 gallons of Pro-Noxfish were sprayed as evenly as possible over this pond. Incredible numbers of distressed and dying hitch erupted from the water surface when the rotenone mixture was sprayed into coves around the pond's edge. At this time, it was assumed that the average Pro-Noxfish concentration in this pond was probably between 2.3 and 5.0 ppm…. A total of 100.5 gallons of Pro-Noxfish were used in the treatment of Beardsley Reservoir, some four miles of the Stanislaus River above, and five flowing tributaries to the river and lake... "Toxicity tests on September 27 and 28, using hatchery trout... at several points in the main channel pond... showed the water still toxic.... Pro-Noxfish concentrations were estimated to range between 1 and 3 ppm.... After a request on September 28 for 2,000 acre-feet of dilution water from Donnells Reservoir, Tri-Dam agreed to start releasing the water that afternoon.... [Later that day,] tests were conducted at two locations in front of the low-level intake. Toxicities had dropped somewhat... to equivalents of less than 1 ppm Pro-Noxfish.... On September 29, the valve on the powerhouse bypass was opened to allow approximately 34 acre-feet of water from the tunnel and reservoir into Beardsley Afterbay. One hundred pounds of potassium permanganate was metered into the outflow for a concentration of roughly one ppm.... No distressed or dying fish were observed in the Afterbay... [though] numerous dead hitch from the reservoir fish-kill on September 20 [sic.] were in the upper part of the Afterbay.... September 30, the powerhouse bypass valve was opened full to allow some 216-acre feet to fill the nearly empty Afterbay. Three hundred pounds of potassium permanganate [used to detoxify the Pro-Noxfish] metered into the outflow over the period gave an approximate concentration of 0.5 ppm.... No stressed or dying fish were seen in the Afterbay. Live fish, species unknown, were observed feeding on the surface near the lower end of the Afterbay.... [No]rmal outflow from both Beardsley Dam and the Afterbay was resumed on October 8 (anon . 1976:1-4, 6-9). In April and May 1977, Beardsley was restocked with a total of 191,010 catchables and 20,250 fingerlings. Species were rainbow trout/Shasta) and brown trout/Whitney (CDF&G 1976).

[46] As of 1969 the California Department of Fish & Game maintained four domesticated rainbow trout brood stocks in its hatchery system. The department's brood program was initiated "to manipulate the time of spawning by selective breeding so that catchable-sized rainbow would be available at any time during the trout fishing season (generally from May through October). These domesticated stocks apparently all had their origin in rainbow taken at the old U.S. Fish Commission Hatchery on the McCloud River at Baird, California (Dollar and Katz 1964 in Cordone 1969).

Other fish introductions were facilitated by chemical treatments designed to suppress rough fish. For example, California Fish & Game chemically treated a 13-mile stretch of the South Fork Stanislaus, from Lyons Dam to the river's confluence with the Middle Fork. The Pro-Noxfish application was in September 1961 and was done in order to control large populations of rough fish. "A small trout fishery was present in the area immediately below Lyons Dam. The lower portion of the river is best suited to black bass. Because of low summer flows and rather warm temperatures, this stream should be well-suited to redeye bass. Since the stream was treated to control rough fish, it would be in excellent condition for an introduction of redeye bass in 1962" (CDF&G 1961).

In addition to the streams mentioned, long-term fish stocking programs have occurred on many additional drainages within the CSWA area, including: Campoodle, Smoothwire, Silver, Cow, Mill, Herring, Douglas, Deadman, Dardanelle's, Basin Creek (tributary to Middle Fork Stanislaus), Niagara, Soda, Summit, Clark Fork, Arnot, (upper) Eagle, South Fork Stanislaus, (lower) Eagle, Deer, and Hunter creeks.

A backlash developed in the 1940s and continued through the 1950s to Stanislaus National Forest and Department of Fish & Game's apparent emphasis on habitat development and fish stocking in the backcountry streams and lakes where the levels of use were relatively low and where the accessibility was by backpacking or horseback. Pressure was exerted to develop lower elevation, small reservoirs and lake level dams that were accessible by automobile or a short hike. Four of these proposals were within the CSWA area and included alternatives on Rose Creek, Deer Creek, Herring Creek, and just above Strawberry Lake.

Responding to this demand, a report was written within the Bureau of Fish Conservation of the California Division of Fish & Game in 1943. Its purpose was to

> investigate the storage potentialities on the South Fork Stanislaus River above Lake Strawberry with a view to their future development for the benefit of irrigation, power, fishing, recreational, and other interests. This report deals with the fisheries possibilities.... It should be brought out that from the fishery point of view the most important part of this whole area is Strawberry Lake itself. Literally thousands of campers, summer homeowners, and recreation seekers come here each year. A great many of these would enjoy fishing as one feature of their outing if it were available on the lake itself, whereas the number of anglers who are willing to go into the back country is comparatively few. Improvements which benefit the back country lakes and streams are thoroughly praiseworthy and very worthwhile; but improvements which contributed to better fishing in Strawberry Reservoir would bring pleasure more directly to more people. Certain types of improvement, it should be added, could combine both forms of benefit--entirely in addition to their possible usefulness for power or irrigation (CDF&G 1943).

Curtis reported that Strawberry Reservoir furnished good fishing in spring and autumn, but not in summer. A survey party visited Strawberry Lake and its upper watershed to assess the possibilities for fishery enhancements. The party was comprised of Fred Leighton, Chairman of the Stream Flow Maintenance Committee of the Central Valley Council of the State Chamber of Commerce; Jesse R. Hall, Supervisor of the Stanislaus National Forest; Chester Morse, Recreational Director and W. Ray Huber, Engineer, of the Untied States Forest Service Regional Office in San Francisco; A. C. Taft and Brian Curtis of the State Division of Fish and Game; R. E. Hartley, Engineer of the Oakdale Irrigation District; W. L. Maxwell, L. V. Peterson and William Klenert of Stockton; J.

Pitts of Sonora; S. H. Bierly and Emmett Stewart of the State Chamber of Commerce; H. B. Heryford of the Pacific Gas and Electric Company; and Ewing Stewart of Pinecrest.

First proposed by Leighton in 1940, the Upper Pinecrest project would put a dam in the box canyon, about 3/8 miles above Strawberry Reservoir, on the site of the 1856 Middle Dam. The idea was that this new reservoir would provide a natural rearing pond from which trout could be released into the Strawberry Reservoir. To construct a rock-fill dam 25 to 30 feet high, Huber estimated a cost of roughly $20,000; this would raise the water to within four feet of the old level and create a reservoir of 30 to 50 acres, storing 400 to 600 acre feet. During the August 1943 field visit, the party noted that the stream between the proposed "middle" dam and Strawberry Reservoir was short and "so devoid of spawning gravels that it is not important to keep it alive (it was flowing less than 1 CFS in August 1943)...." The group concluded, "[T]he cost seems high in comparison with the benefits. However, if a 'make work' program again came into being, this would constitute a worthwhile project" as a rearing pond (CDF&G 1943).

Moving up the South Fork, the field party visited the site of the 1856 Big Dam. Here, the engineering contingent estimated that at 60-foot dam here with a crest of about 700 feet would store 4,000 acre-feet, while a 110-foot dam could store over 12,000 acre-feet; the cost of such a structure was thought to be prohibitive, running into the hundreds of thousands of dollars. Moreover, a natural barrier at the upper end of the proposed "middle dam" project would prevent trout from ascending the stream to spawn. The officials also noted, however, that water stored in the new "Big Dam" could maintain a constant water level in Lower Strawberry Reservoir, improving fishing there. Not seeing funding for these projects coming directly for fishery enhancements, the group expressed hope that these projects might be achieved as part of future profit-making endeavors in connection with power or irrigation developments. About one mile above the upper end of the proposed new Big Dam Reservoir, the South Fork Stanislaus ran "no more than a brook." The officials proposed a 25-foot dam at a gap about 60 feet wide. Such a dam could store about 200-acre feet; its cost, including wing dams, was deemed "not… excessive." They calculated, by providing one cfs for 80 to 100 days, the flow below the site would be at least doubled. However, the area that would be submerged contained the best spawning gravels in that part of the stream as well as killing numerous trees (CDF&G 1943).

Continuing up the drainage, the field party scoured the entire upper reach into Cooper Meadow for a suitable spawning area and natural nursery for the stream below. About one-quarter mile above the upper end of the meadow, they found a possible check dam site, however, the ground rose so rapidly that a 30-foot high dam, 200 feet across the crest would impound only about 200-acre feet. At best, the estimated storage would provide only one cfs into the stream below the check dam for 80 to 100 days (CDF&G 1943).

The site proposed on Deer Creek called for a seven-acre lake created with a 30-foot high fill dam, 80-feet long. Considered as an alternative to impoundment for fish propagation and angling on Rose Creek, the Deer Creek proposal was viewed as more feasible due to

Rose Creek's scant summer flows.[47] Forest Service officials pitched this development to Fish & Game officials, noting that there would be "considerable public relations advantage as well as practical gain if we could balance the program by including some work at lower elevations where the use and need may be considerable greater" (McCready in Vestal 1955).

An "Upper Strawberry Dam" was also proposed to fulfill a perceived need for a permanent lake-level dam to augment the heavily used and highly fluctuating Pinecrest Lake. In order for there to be the desired automobile access, the officials noted that, if a road were constructed from Herring Creek, the project would be more advantageous and feasible. Redevelopment of the old Herring Creek Reservoir as a recreational impoundment was also discussed and it was agreed that the Upper Strawberry site should take precedence. None of these projects, however, came to fruition (Vestal 1955).

In the early 1960s, fishing pressure at Strawberry/Pinecrest Lake was still a concern. Counts of anglers at Pinecrest Lake (Table A-2) showed the level of use (CDF&G 1962).

Table A-2. Angler Counts at Pinecrest Lake, 1954-1961

Year	Days Counted	# Anglers	Avg. # Anglers/Day
1954	2	900	450
1958	14	2,223	159
1960	28	6,442	230
1961	15	7,175	287

For comparison, Table A-3 shows Department of Fish & Game angler use counts on other parts of the Stanislaus River system (CDF&G 1962).

[47]Recreational gold dredging became a concern on Rose, Eagle, and Knight creeks, at least in the 1980s. Department of Fish & Game issued permits for this activity. Numbering seven permits for all of DF&G's Region 4 in 1986, department officials believed that his level of "dredging activity probably has no more impact on fish life than does dredging activity on other streams that are open all year to unlimited numbers of dredgers" (Childs 1986).

Table A-3. Angler Counts along the Stanislaus River, 1954-1961

Location	Year	Days Counted	# Anglers
Beardsley Afterbay	1961	0.5	5
Beardsley Reservoir	1960	3	900
Beaver Creek	1957	1	4.4
Clark's Fork	1954	1	53.6
Clark's Fork	1959	1	20.7
Clark's Fork	1960	38	17.5
Deadman Creek	1954	1	0.66
Deadman Creek	1958	1	2.3
Deer Creek	1959	1	5 (at one point)
Deer Creek	1960	1	2 (at one point)
Herring Creek	1958	1	6
Lyons Canal	1958	4	73.5
Lyons Canal	1959	2	15
Lyons Canal	1960	20	7.7
Lyons Reservoir	1958	11	124
Lyons Reservoir	1959	7	84
Lyons Reservoir	1960	8	6.3
Rose Creek	1954	2	12
Rose Creek	1959	1	8
Rose Creek	1960	2	0
Stanislaus River	1955	4	4.3
Stanislaus River	1959	3	7.5
Stanislaus River	1960	13	3.9
Stanislaus River, Middle Fork	1954	1	6.7
Stanislaus River, Middle Fork	1958	10	54.4
Stanislaus River, Middle Fork	1960	37	32.9
Stanislaus River, South Fork	1954	8	37.6
Stanislaus River, South Fork	1958	8	23.3
Stanislaus River, South Fork	1960	33	13

As late as the second decade of the 1900s, salmon and steelhead reportedly ran in the Stanislaus River within the CSWA area.[48] Soon afterward, however, they had vanished from these upper reaches of the watershed and, by the time the Tri-Dam system was developed in the mid-1950s, their numbers were severely diminished in the lower Stanislaus as well. Angry anglers usually pointed the accusing finger at water and hydroelectric developments on the river. But Department of Fish & Game representatives usually had faith in the regulation of flows by these very projects—coupled with the

[48] A 1996 University of California, Berkeley report on salmon spawning habitat and rehabilitation in the Merced, Tuolumne and Stanislaus rivers reflected that the spring run, "formerly the most abundant salmon in the San Joaquin system, was extirpated by 1942 because dams cutoff access to cold-water habitat upstream. The fall run has been reduced to a small remnant in the tributaries--in 1992, only 1,250 adults returned upstream to spawn, including returns to a hatchery on the Merced River" (Kondolf, Vick & Ramirez 1996).

Department's planting and other management techniques—to sustain and even enhance the Stanislaus' steelhead and salmon runs. In response to a 1959 letter to the Associated Sportsmen of California, the Department's regional manager stated that the principal reason for the diminishing steelhead population was not so much the Tri-Dam project; after all the king salmon run in the Stanislaus River had been higher in the fall of 1958 than it has been in the past few years, totaling approximately 5,700. Instead, it was the loss of rearing nests: 40 percent of them had been lost to low flows that occurred when the young fry would have emerged from the stream gravels. "The salmon run can be improved if we can secure adequate water releases" (Cloyd 1959). Stocking fingerlings, therefore, would be u roductive since the limiting factor on the Stanislaus was identified as the wide fluctuation of flow releases (Montgomery 1959).

Grazing

A major impetus behind establishing the West's Forest Reserves was entangled in the controversy over grazing. Early Forest Reserve rangers actively sought to regulate grazing, and they were particularly adamant about sheep. Conversely, sheep raisers were particularly adamant in their opposition to the Forest Reserves (Barrett 1935). In his observations about the Stanislaus and Lake Tahoe Reserves in 1899, Sudworth commented:

> Nearly all settlers interested in grazing and wood consuming industries within this territory are opposed to the maintenance of forest reserves. The greatest objection to the reserves is expressed by men concerned in grazing, and of these the sheepmen are the loudest in their denunciation. The past unlimited use of government mountain forest land for a summer range has made it possible for a large number of settlers to engage in stock raising with little outlay for feed. The range of the foothills is sufficient from November to about the 1st of July; but high mountain forest range must be sought from July to October, during which time there is no green feed in the foothills.
>
> As yet the cattlemen are allowed free range in the reserves, but many of these men are opposed to maintaining the reserves, for fear that cattle may soon be excluded. Sheepmen are bitter in their denunciation of the reserve policy for the reason that they are (at least nominally) excluded from grazing in the reserves. American sheep raisers have usually respected warnings to leave the reserves, and not being able to secure sufficient range elsewhere, have, in some cases, been compelled to reduce their flocks or go out of the business entirely. These men see no public good to be derived from the reserves when grazing privileges are denied. Their permanent ranches are so distant from the high mountain watersheds that the idea of protecting water supplies is looked upon as visionary or impractical. Moreover, the fact that snow remains longer on the high, bare mountain peaks than it does in the forest below proves to these men conclusively that forests have no influence in conserving water. The

general feeling is that in reserving forest land the National Government has no sympathy with the settlers, some of whom say that they shall have to leave the country if this policy continues.

Most other settlers also, not directly interested in grazing, voice the protests of stock raisers. (USDA *2200)

In 1899, sheep were prohibited from grazing on public lands in Tuolumne County. Local newspapers reflected a general antagonism toward sheepmen and sympathy toward cattlemen. For example, an 1899 article noted that the US Marshall had traveled to the Strawberry area to arrest P. Beaudent, a Nevada sheepman, who had "invaded the Stanislaus forest reserve with 4,000 muttons" (MLM 1899). However, in 1901 sheep and goats were allowed to graze on Forest reservations after previous rulings had denied sheep grazing in an attempt to protect forage growth and water supplies. Barring sheep may have been rooted as much in the burning habits of shepherds and racial bias toward them as in the eating habits of sheep (Escheveria 199*)

L. A. Barrett summarized the prevailing Forest Service point of view in his review of the history of the forest reserves in California:

Early day boundary files, newspaper items from the days when the Forest Reserves were in the making, and my own observations conclusively show that the greatest opposition to the creation of the Forest Reserves came from the stockmen who used the mountain ranges, and that this opposition was particularly strong from the sheepmen…. From the days when stock was first taken into the mountains until the creation of the Forest Reserves, it was the custom of stockmen to fire the mountains as their stock was driven out in the fall. Sheepmen were by far the worst offenders. This burning was not done with any view to improving the forest, but from the mistaken idea that it was improving the range…. Evidence of these old stockmen fires shows up on the older timber everywhere through the mountains of California (Barrett 1935).

Sheep grazed more closely, often destroying enough of the plant to prevent or suppress its re-growth. Moreover, even more than cattle herders, shepherds tended to resist getting a permit from a Forest Reserve official to graze their flocks on the Stanislaus. They moved their flocks from the valley and into the mountains, pausing at meadows along the way to graze. Added to the inherent conflicts arising from sheep and cattle grazers over prime grazing lands, the nature of sheep grazing ignited the ire of cattle grazers and others who used these same meadows for their stock.

The first decade of the 1900s seemed to be an especially lively period for federal authorities in Yosemite National Park and the Sierra and Stanislaus national forests attempting to enforce the 1891 General Land Law Revision Act; particularly its provisions that outlawed sheep grazing on national reserves. In 1897, the General Land Office, though still outlawing sheep and goats except in specified areas, allowed cattle grazing on forest reserves and served to widen the chasm between cattle and sheep grazers. It was not until 1934 that the Taylor Grazing Act ended open-range herding (Echeverria 1989).

In a 1932 Stanislaus report on grazing and fires, Assistant Forest Supervisor Thomas West[49] took a historical perspective, interviewing old timers in the grazing business. W. J. Lord, an early cattleman, and P. Y. Lewis, a shepherd before he became a ranger on the Stanislaus Forest Reserve, were quoted. Lord clearly mirrored cattleman sensibilities when he remarked:

> In the [18]70s there was a shortage of feed and water on the plains and in the foothills and sheep men crowded their flocks into the mountains in large numbers. Those who came first took the ranges which were easiest to reach and those who came later had to go to less accessible places for feed. They encountered considerable difficulty in herding their flocks and where brush and timber interfered it was common practice to burn. Most of the burning was done as the sheep were taken from the mountains in the fall to the plains to be put on stubble. This was usually in September. Burning at that time became such a practice that people knew when sheep were leaving the mountains by the number of fires set. Smoke from the fires was so thick at times that it was hard to see at midday. No attempt was made to stop fires unless someone's place was threatened, then backfires were set and usually the fire went some other direction. These fires burned thousands of acres almost everywhere where timber and brush grew in the mountains. In the late [18]80s and early 90s the people began to object to such fires and after a few sheep men were rounded up and made to put out fires they set they did not set so many (West 1932).

Although outside the CSWA area, P. Y. Lewis' reflections undoubtedly speak to the general grazing practices:

> In 1876 and 1877 I went to the mountains with sheep and grazed them along the Mokelumne River in Alpine County, spending the greater part of each season on the south side of the river between Hermit Valley and Horse Creek. We fed the early part of the range first, moved up the river to the upper part as feed advanced and then fed back over the same ground as we came down toward the foothills. When we turned back toward the foothills, we started setting fires and continued setting them until we reached the foothills. We burned everything that would burn, such as brush, young timber and grown timber, setting the fires behind the sheep as they grazed back over the range the second time... The sheep men on

[49] West transferred back to the Stanislaus as Deputy Forest Supervisor in 1912. He had, in 1905, been appointed by Supervisor Ellis as a ranger until 1908 when the Mono Reserve was created and he was subsequently appointed Deputy under Forest Supervisor Wells. Like Wells, West's forte at the time of his return to the Stanislaus, was grazing administration (Stanislaus Review 1/1912:1-2).

> the neighboring ranges set fires about the same as we did, and in the later part of the season there would be fires as far as a person could see... it was thought that fires improved the feed and removed the timber which interfered with the sheep (West 1932).

In addition to the Stanislaus Reserve inheriting environmental effects of these practices, sheep grazing also left its legacy in place names within the CSWA area; places like Shearing Camp (T6NR18E, Sections 20 & 21), Bummers Flat (T6NR18E Section 28), Mutton Camp (T5NR19E, Section 30), and Sheering Creek (T4NR18E Section 27).

In some parts of the CSWA area, significant sheep grazing persisted at least through the 1950s. For example, 1,600 permitted sheep and goats were on the Long Valley allotment, in 1959. In an effort to control their movements, Stanislaus officials gave instructions to the permittee that included: "Sheep will begin route at Woods Camp (T5NR19E, Section 6)--spending eight days enroute [to] Lower Eagle Meadow." Sheep were then to graze along a designated route, ending the season in Long Valley. In 1959, these instructions were probably for Ospital's sheep.[50] A sample of instructions from the same period on other allotments in CSWA include a note for the Relief Cattle and Horse (C&H), Niagara, Wheat's Meadow C&H, Kennedy Lake C&H, and Eagle Meadow C&H that: "The government will furnish 2-4D or 2-4-5T weed spray for larkspur eradication and wire needed for boundary fence maintenance." For the Red Peak Sheep and Goat allotment, the instructions provided that: "Sheep to enter allotment at Grouse Creek, moving westerly along the lower portion of the range, thence to Red Peak, Bald Peak, into the headwaters of Clark Fork and out to Sonora Pass..."[51] (USDA *).

Cattle herders also drove their stock over Sonora Pass from the east side of the Sierra Nevada. An 1898 article shows that even the giants of the cattle industry used this pass and the meadows enroute to their destinations:

> A shipment of 25 cars of cattle belonging to Miller and Lux will go out over the Sierra Rwy Friday morning for the lower country. The cattle were driven from the other side of the mountains and are now at Sugar Pine (MLM 1898).

Cattle usually were driven into the forest ranges in May or June and moved back to the valley or foothill range in October. This 1907 newspaper article reported:

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[50] Peter and/or Jack Ospital had a Forest Service Special Use Permit for a range facility on about 36 acres in Lower Eagle Meadow, in the S 1/2 of the SW of Section 1 and the NENW of Section 12 in T5NR19E. The facility consisted of a fenced pasture for holding pack and saddle stock in connection with grazing sheep on the Long Meadow sheep and goat allotment. The permit was issued free and was canceled due to abandonment in 1958.

[51] McCarty, who ran sheep on the Red Peak Allotment, sold his flock in 1960 after a hoof rot epidemic hit his ranch. He dissolved his company in 1961. (Harry D. Grace, Forest Supervisor, to Adelbert Nichols, Tuolumne County Supervisor. 1600 letter, June 4, 1965. Letter undoubtedly written by Robert E. Stokes.)

> Cattle growers are getting stock out of the mountains. This past week the Rushing Land and Cattle Company, Oscar Crabtree, C .O. Drew, Rydberg-Donohue, Murphy Brothers, Conlin Bros. and Shell Bros., drove down their herds while Joe Fahey and Price Bros. have sent down one band each, and are having all their stock of whatsoever description gathered for removal to the winter range on the plains below (MLM 1907). [52]

Poisonous plants, especially those toxic to cattle, were a persistent concern of early forest officials. A program to "out larkspur" was put in motion for the 1914 season. A local newspaper proclaimed the "Forest Service demonstrated that it is practical to stop cattle poisoning from larkspur, as the plant occurs on most of the high summer ranges in California, by two methods: 1. Digging the plant out by the roots and 2. sheep grazing." The article provided instructions for both methods based on experience in the High Sierra (UD 1915).

In addition to land use conflict between cattle and sheep grazers, at the turn into the twentieth century, a new conflict arose; this time between grazers and water power interests. Generally acquired before creation of the Stanislaus Forest Reserve and primarily through the homestead laws, grazers patented the forest's high meadows to control their range. But other high country meadows were acquired or usurped by both bona fide hydroelectric entrepreneurs and by speculators, principally through the Forest Lieu and State School Lieu provisions. Many of the higher elevation townships within the CSWA area, which had earlier been used virtually entirely for grazing, by 1920 had become far more coveted for hydroelectric development. Meadows such as Strawberry, Summit Creek, Donnell, Kennedy, Sand Flat, Iceberg, and Beardsley were either being developed or planned as reservoirs (USDA 1916).

It is not known exactly when the Stanislaus was divided into grazing allotments, except that the system was in place by 1916. The allotments allowed Stanislaus officials to specify the individual grazer's permitted area for his or her stock. In drawing the boundaries, an attempt was made to honor traditional grazing grounds and use landmark topographic features. Permits stipulated the grazing season, based on the characteristics of the specific range allotment: elevation, forage types and abundance, water availability, and similar considerations.

In 1916, Ayres reported that the Stanislaus was "very intensively grazed. Though the CSWA area cannot be disaggregated from his figures, that area was in the heart of grazing country and the Sonora–Mono Road provided one of the forest's main stock routes to and from mountain grazing lands. Ayres calculated that the Stanislaus averaged

[52] Many of the cattlemen in this article have left a place name: Rushing Meadow (T3NR17E, Section 18), Crabtree Camp (T4NR19E, Section 29), Drew Meadow (T1SR18E, Section 16), and Fahey Meadow (T2NR17E, Sections 9 & 16). The Conlins are associated with the vicinity of Strawberry, the Prices with the Hull Meadow area, and the Shells with Schoettgen area.

a startling one animal on every 42.8 acres. “During the season of 1915 it supported 17,079 cattle, 603 horses, 105 hogs, 6,700 sheep and 620 goats on Government land, distributed among 162 cattle and horse permittees, and 10 sheep and goat permittees" (USDA 1916).

In 1922, the Stanislaus boasted ranges supporting 27,911 cattle, 17,286 sheep, 227 horses, and 2,050 goats with an aggregate value of $1,750,000 and requiring nearly 200 miles of drift fencing to keep animals on their respective ranges. Dating to the General Land Office days, grazing permittees who were ranchers, home builders, or who lived on property within or adjacent to the Stanislaus were still given preference in securing grazing permits:

> Most of these permittees are ranchers or homebuilders living on or adjacent to the Forests, and preference rights are so arranged as to give special consideration to the stockman and settler who is actually helping to build up the community....

Between 1933 and 1944—an interesting juncture encompassing the Great Depression and World War II—for Region 5, the volume of authorized range use decreased: livestock permitted on national forest land declined six percent for cattle and horses and 25 percent for sheep and goats (USDA 1944). By the 1950s, the diminishing of permitted cattle was attributed to “livestock economics.” Greater highway speeds and traffic had

> forced most outfits to truck haul to and from their ranges. Modern transportation costs and high costs of competent help have been strong factors in discouraging use of national forest ranges.... During the past ten years 6 permits representing 975 cattle have dropped out voluntarily; an additional 7 (present) permittees have voluntarily dropped another 832 head. During the 10-year period, three permits representing 200 preference and 75 temporary were reduced administratively for range protection (USDA1958).

To accommodate cattle, especially in the face of competition for forage from deer, Stanislaus officials regularly seeded targeted grazing areas. But often, their efforts failed because the seeds sown were unable to gain a foothold. One such instance was reported on from a 1954 seeding project in the Punchbowl area where tall meadow grass, smooth brome, mountain brome, white Dutch clover, tall fescue, birdsfoot, and chewings fescue were planted on six acres. The project failed because of inadequate removal of competing ground vegetation (USDA 1954).

The inspectors for the 1949 Stanislaus General Integrating Inspection dinged the forest for having over-used range and for slow progress in achieving reductions (USDA1953). The 1957 inspection gave the Stanislaus National Forest even worse marks for its management of grazing. Within the CSWA area, the Summit Ranger District had 11 cattle allotments and two sheep allotments and, amounting to the seventeenth heaviest grazing load in the region. Even so, Ranger Reveal dedicated minimal time to range matters due to his "enormous recreation load." In 1957, the Summit Ranger District had 43 campgrounds, 220 family unit camp sites under concession, 225,000 man days of skier use, and heavy hunter and fisher use... not to mention the overwhelming share of Stanislaus' recreation residences. The inspectors found that none of the rangers was putting in the range management time allotted and financed in 1957. After a litany of weaknesses, the inspector summarized: "All this paints a pretty bleak picture and I believe there is an urgent need for the Stanislaus Rangers to put more emphasis and time on range management field work if they are to exercise the minimum controls necessary to properly administer and [halt] proven damage to the range resource" (Bernhard 1957). A draft typescript regarding a Stanislaus General Integrating Inspection in the 1950s underscored Bernard's remarks. The range management job on the Stanislaus National Forest was recognized as "one of the more difficult in the Region." Contributors to this were the "oversized deer herd, a range that was badly abused long before the Forest was created and which has continued to deteriorate, use by recreational saddle and pack stock, and conflicts between permitted livestock and recreational use." Adding to the complexity, the inspector wrote:

Water resource values on the Stanislaus transcend all others. Water originating on that Forest makes a major contribution to the welfare of three million people and over one-half million acres of irrigated land. It is essential that all uses of that watershed are carefully managed and controlled. Past and current level of range administration is not contributing all it should or could to good watershed management. The inspectors feel that attention to the range management activity on the Stanislaus falls considerably below desirable standards and is out of balance to the good work being done in other functions (USDA 1958).

By 1960, the Stanislaus Range Advisory Board was created. Composed of eight elected people who held grazing permits on the Stanislaus National Forest, the group acted as citizen consultants to the Stanislaus on all range matters (USDA 1965).

The deep roots many grazing permittees had with range allotments within the CSWA area are illustrated in a letter by Ranger Murphy documenting a conversation he had with Henry Sanguinetti and Henry's son, Ray. The Sanguinettis had held the Cooper Meadow allotment since 1913. In his conversation with Murphy, the Sanguinettis provided some of the history of the Cooper cabin and allotment in what was then the Emigrant Primitive Area. Henry noted that there was an inscribed tree at Cooper Meadow with Cooper's name and the date—1861. Cooper's cowboys built the first cabin, now used as a barn, in 1865. An employee of Cooper, Captain John Smith, built the second cabin in 1875. The cabins are sited on a slight rise on the meadow's edge and Henry believed that was due to the breeze that constantly blows at this point and keeps the mosquitoes away and the snow melted early. Cooper ran cattle in the area from 1861 to 1900. From 1900 to 1909 Henry Stockel had the range. From 1909 to 1912, a Catholic priest, Father Guerin had the allotment. Sanguinetti got the allotment in 1913 and used it ever since. Cooper had milk cows and made butter for shipment to the Sonora area. In 1969, an old butter churn still remained at Cooper's cabin (USDA 1969).

The diminishing of permitted cattle in the latter 1950s was attributed to “livestock economics.” Greater highway speeds and traffic had…

> forced most outfits to truck haul to and from their ranges. Modern transportation costs and high costs of competent help have been strong factors in discouraging use of national forest ranges.... During the past ten years 6 permits representing 975 cattle have dropped out voluntarily; an additional 7 (present) permittees have voluntarily dropped another 832 head. During the 10-year period, three permits representing 200 preference and 75 temporary were reduced administratively for range protection (USDA 1958).

By the mid-1950s, Stanislaus officials observed that grazing had assumed “a declining position in the local economy, being gradually supplanted by timber activity and development of recreational use. So far as strictly local dependence was concerned, grazing probably reached its peak about 1920” (USDA 1956).

The latter1950s witnessed several established cattle-growing families curtailing or leaving the cattle business. The experience of the Airolas, who had long occupied the Cow Creek Range, appears to be typical. In 1918, Airola had gotten a Special Use Permit (SUP) for 1.179 acres in the SESE Section 4 of T4NR18E for a cow camp and pastures to be used in connection with his grazing permit.[53] But a generation later, many of the families whose livelihoods had been inextricably tied with growing cattle were being drawn to other occupations. By 1956, Sydney "Babe" Airola was pulling out; he notified the Stanislaus that he was tearing down and removing buildings and fences at the Bumble Bee Cow Camp and that he no longer wished to exercise his preference on the Cow Creek allotment. If no further range became available, he would drop out. By February 1960, the cabin and barn were removed (USDA 1908; USDA 1956; USDA 1960). At least through the next decade, Fred and Bill Airola kept their Clark Fork allotment (USDA 1965).

Sheep and goat grazing followed a similar trajectory with the number of permittees and animals dropping in the latter 1950s. Concerned for the health of the county’s grazing industry, in 1964 the County Board of Supervisors, through Supervisor Adelbert Nichols, was asked Stanislaus officials to provide information on its range allotments. With this letter as source, grazing allotments (and associated permittee) within the Central Stanislaus Watershed Analysis area are listed below in Table A-4.

[53] At least since 1908, F. C. Burnham of Copperopolis had held the permit that subsequently was occupied by a “Mr. Manuel” (USDA 1918).

Table A-4. Grazing Allotments and Permittees within CSWA, 1964

Grazing Allotment	Permittee
Beardsley	Cowden
Bell Meadow	Ellingwood
Clark Fork	Fred and Bill Airola
Cooper[54]	Joe Sanguinetti
Cow Creek	Sidney Airola
Deer Creek/Jupiter	Appling & Hess
Herring Creek	Martin
Hunter Creek	Baker
Jupiter	Flood/Brooks/Pitts
Kennedy Lakes	Mitchell
Niagara	Wight Estate
Piute	Ghiorso and Ratto
Provo	Henry Sanguinetti and son, Ray
Red Peak	McCarty (sheep)
Rosasco	Rosasco
Rushing	Kistler
Schoettgen	Sandoz
South Grove	Snyder
Upper Hill	Burgson
West Side	Otis Rosasco

Horse grazing was not a significant part of the local economy. The Stanislaus National Forest did not have figures on the number of horses brought into the forest without a permit by hunters and other recreationists, but McRorey did note a "jump in recent years" due to increased interest in horse related recreation, improvement in horse-carrying vehicles, extension of good roads (such as improvement of the Patterson Grade). They estimated that this type of horse use amounted to 420 horse-months of use. (USDA 1958.)

By 1965, the Stanislaus administered 38 paid grazing permits on 47 active grazing allotments. There were permits covering 113 horses, 2,550 sheep (only three sheep permits; one of which was inactive), and 5,339 cattle on government land (USDA 1965).

The hoof and mouth epizootic of 1924 and 1925 affected the Stanislaus, but no other national forests. The disease reportedly was first discovered on the Casaretto ranch at La Paloma in Merced County. Subsequently found infecting a small number of cattle in

[54] Asterisked allotments are shown on the 1916 Stanislaus grazing allotment map as wholly or partially within the CSWA area. Other allotments within the CSWA area, probably renamed since the 1916 map, are Morgan (American Camp area), Keltz (Keltz Mine area), Gruell (Mt. Lewis area), Cave Diggings (Buchanan Mine area), Jasper (Mt. Provo area), Duckwall, Beal (Long Barn area), Cherokee (Riverside area), Wright Creek, Browne (Browne’s Meadow area), Grohl, Mt. Knight (Schoettgen area), Wheat’s, Clarks Fork, Sonora Peak, Deadmans, Kennedy, and Relief Peak.

Tuolumne County, reports also surfaced of infected deer. The Bureau of Animal Industry began to take control measures, but not before many animals were already on their way to Stanislaus ranges.

Minert "Hap" Nielson, a retired Stanislaus employee recalled that between 700 and 800 of Charlie Kassabaum's cattle…

> were condemned and destroyed in the vicinity of Lyons Dam, about half a mile above the old Rushing house. They were driven into an abandoned railroad cut [Sugar Pine Railway]; each animal was then shot in the head. After all were killed, they were cut in the belly to prevent formation of gas and quick lime was placed in the cut. The entire slain herd was then covered with dirt by horse-drawn Fresno scrapers (USDA1960).

Other herds were also destroyed. Tony Pedro's (Pedro Flat on the slope above Beardsley Reservoir) herd of 300 to 400 cattle was similarly dispatched in a railroad cut at Fraser Flat. Antonio Airola's herd of 200 to 300 was slaughtered near Bumblebee. The cattle owners were compensated about $40 a head, causing extreme losses to owners of high quality animals.

Deer were shot and poisoned under direction of the Biological Survey. "Deer were shot at every opportunity," and strychnine-laced salt was placed in salt logs in key dear areas. According to Nielson, shooting and poisoning deer was even more controversial than the measures taken with cattle, noting, "even today [1960] there are some people who are rancorous about that phase of the control." Interestingly, Nielson reported that through 1924, for several years, the estimated deer population was 10,000; but in the fall of 1925, an estimated 22,075 deer were slaughtered due to the hoof and mouth disease threat while another 15,000 deer formed the residual population. This meant that either the deer population had been severely under-estimated or that the number of slaughtered deer had been severely over-stated (USDA1960).

No infection was ever found north of the North Fork Stanislaus River, so Calaveras County was spared these drastic control measures. Livestock were completely excluded from the Stanislaus during 1925 except for a small, experimental herd belonging to the Cuneo Brothers brought onto their range late in the season. By 1935, the Sonora Ranger District reported significant increases in its post-epizootic deer population:

The population of California Mule Deer are on the increase in the District. There were more deer signs since the deer were killed off during the hoof and mouth eradication. There were more fawns and fawn tracks seen this summer than have been seen in years. Most does seen with fawns were seen with two. Deer concentrate during the winter on the Jupiter, Jaw Bone, Cave diggings, Basin Creek, and Hunter Bend ranges (USDA 1935).

State Department of Fish and Game estimated, before the hoof and mouth disease epidemic, that there had been about 40,000 deer on the Stanislaus National Forest. In 1925, the year after the closure, it was estimated that 22,075 were killed and another

15,000 remained. Stanislaus officials, by the latter 1950s, believed that the wide fluctuations in deer populations that they were seeing were largely due to effects of such factors as “drastic re-routing of traditional migration routes because of new reservoirs and other man-made culture” (USDA 1958).

In the latter 1930s, there was significant concern among officials in California’s national forests that there were far too many deer that were killed and left. For 1938 and 1939, county and forest calculated the “kill factor”, and the Stanislaus National Forest figured close to the average of 15 killed for every deer taken out by hunters. The deer kill for Tuolumne County, based upon returned deer tags was 767 in 1939 and 733 in 1940. For comparison, the Shasta National Forest had the highest kill factor, averaging 26 killed and left for each taken out; Humboldt County deer kill based on returned tags was 912 in 1939 and 1,769 in 1940 (USDA 1940).

By the time of the 1949 Stanislaus GII, deer populations were judged to be excessive in relation to the available winter range. The ratio of summer to winter range was calculated at 10 to one (USDA 1953). F. P. Cronemiller of the Regional Office headed a 1952 and 1953 functional inspection of the Stanislaus wildlife and range programs. Cronemiller had a rather legendary reputation as well as a long association with the Stanislaus regarding wildlife and range. He had directed a range survey crew in 1925, in the late 1930s and in 1945 and 1946 made functional range and wildlife inspections.

Providing a perspective on a relationship between forage and fire, Cronemiller stated that, historically:

the high country of the Stanislaus was badly depleted by nomadic sheep bands prior to the creation of the forest. Up to a quarter of a million sheep crossed from the East side of the Sierra's [*sic*] across the forest to the San Joaquin Valley in the fall each year.... Fires and logging encouraged the growth of shrubby and herbaceous vegetation, particularly deerbrush. This is a short-lived species, seeding in thickly following a fire and to quite an extent on the disturbed soils of logging operations. It furnished abundant forage in the third to tenth or twelfth year, deteriorates or grows out of reach thereafter, or is overtopped by pine reproduction. At the twentieth to twenty-fifth year it is of little value and thins out; and soon after the thirtieth year the plants remaining in the openings die out and disappear. Except for the Wrights Creek burn and two or three other areas, burned-over acreage on the Forest has not been great. With the absence of fire the volume of deerbrush has reduced markedly.... In many of the logging operations, the impact of cattle plus deer has prevented this invasion. The total result at the present day is that over most of the ranges in the pine belt the grazing capacity is far below what it was twenty or more years ago (USDA1953).

Cronemiller offered the Rushing Allotment as a good example of this phenomenon where deerbrush, which had invaded after logging, had all but disappeared. As at Rushing, grazing capacities dropped faster than permitted numbers at Beardsley, Rosasco, and Deer Creek allotments due to this disappearance of deerbrush. He cited gophers as the “most serious obstacle to range recovery on dry sites” (USDA1953). On Pickering cutover areas in South Grove, Grohl, and Smoothwire maintained high numbers of livestock grazed immediately after harvesting. Cronemiller observed that: “This seems to have resulted in the inability of desirable forage species to invade the area.”

Regarding game ranges, the McCormick area was cited as the most serious situation, where all browse was closely cropped, even on steep slopes. Eight to 10,000 deer are concentrated here on a few sections in severe winters and heavy losses occur. Overall, there appeared to be competition between deer and cattle along the lower edge of the ponderosa pine belt. The consensus in 1945 was that four deer months were equivalent to one cow month (USDA1945).

In the American Camp area, the ranger and local game manager worked on "a few hundred acres of manzanita in what should have been an oak-grass type" and "skinned off" the vegetation "in patches and seeded with Burnett Clovers and grasses. Quail guzzlers were installed and quail are coming already. The work should increase the winter capacity for deer and have major wildlife benefits.... This work is now being continued in the vicinity of Sugarloaf lookout."[55]

By 1957, the Stanislaus’ deer population was far outstripping its forage base. F. P. Cronemiller complained in his 1957 inspection report that “the greatest difficulty in forage management is the refusal of local sportsmen to accept deer management or any of the facts developed from intensive deer studies in the area.” He also recommended that the forest “make no effort to reactivate type conversion work to enhance deer browse and cover. Without deer management, little permanent betterment would result.” Cronemiller also declared that “all key [range] areas are in very poor condition” and “withdrawal from livestock use is therefore indicated." He rather sharply editorialized that: “The sportsman leadership in this area is the poorest of any place in the State, at least in regard to deer management. It will be a long uphill job in public education to overcome this and start management” (USDA1957).

An archival document that apparently was Cronemiller’s notes on the Stanislaus wildlife program for the GII provides some figures and added perspective:

Since 1949, the herd has grown from about 17,000 deer to an estimated 42,000 in 1957. This expansion results in a number of problems, not only on the critical winter range but also on summer ranges, where there is a conflict with permitted livestock. The problem is compounded by large numbers of deer that spend the summer in Yosemite park and migrate to winter ranges on the Stanislaus.... Type conversion and efforts to manipulate vegetation for wildlife purposes under these conditions is comparable to trying to grow a

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[55] Later in the report, Cronemiller noted that the State Department of Fish and Game was clearing and seeding "several hundred acres of national forest land in the Sugarloaf area for the purpose of improving deer winter range. The work is proceeding without an approved plan and there has been no on-the-ground discussion of this project" with Stanislaus officials…. This... goes beyond work priorities and becomes a proposition of having a bear by the tail. Do we redeem our responsibilities for land management, or don't we?" (USDA 1953).

new lawn with the neighbors' kids playing on it.... [Further], sportsmen groups in and adjacent to the Stanislaus have traditionally been opposed to any form of herd control (USDA 1957)

Fire

Few 19th century references have been found about Indian burning or fires in general that can be specifically identified to the Central Stanislaus watershed area. Native people throughout North America had intensively used fire for centuries to manipulate major features of their environment. For example, they encouraged new plant growth and controlled plant disease and insect infestations with fire; they created tessellated vegetation patterns to encourage biodiversity and maintain pathways for hunting, animal movements, and travel; they promoted earlier plant succession stages to get more desirable plant characteristics for fiber used for baskets, arrow shafts, and other important plant-derived items. It was a common tradition for various occupational groups to deliberately start fires, sometime over large expanses.

Miners, for example, were known for setting fires to clear away dense brush in order to expose mineralized rock outcrops. Cattle and sheepherders habitually set fires as they left mountain grazing lands in the fall to encourage young shoots for next season's forage. Come spring, shepherds moved their large flocks from California's Central Valley up and over the crest, lingering at large mountain meadows along the way. In the fall, the cycle was reversed and the fattened sheep could be shipped to markets by railroad.

Shepherds were regularly blamed for fires. In 1889, for example, information credited to Edward Jenness noted that:

> A fire started in the late summer of 1889 on the trail between Strawberry and Old Strawberry. It ran to the Stinchfield place, up the North Fork Tuolumne River above the Bells Meadow road, around what is now Pine Crest, south towards Dodge Ridge, to Shearing Camp Creek and down the North Fork Tuolumne to the first wet gulch above the present site of the Cold Springs Mill. It was about 30,000 acres in extent and was caused by sheepmen (in Barrett 1935).

Local newspapers were keen to report on fires when a valued resource was burned or when its destruction was narrowly averted. Bemoaning the carelessness of hunters, prospectors, and campers in connection with forest fires, shepherds—many of them Basque—seem to have been targeted for the most severe recrimination. Even before the Forest Service presence in area, there was increasing attention to forest fires and opposition to deliberate fires. One typical 1890 *Union Democrat* article read:

> Probably in most instances the causes of fires in the Sierra can be traced to shepherds wishing to improve the feed for the next year, it being generally believed that the feed will be more abundant where the fires have been. It is quite proper that these people be made to understand the country needs timber as well

as wool and mutton. And that the destruction of our forests is not necessary to the raising of sheep (UD 1890).

Fires in sparsely populated areas were less likely to be reported upon in the newspapers, but some of them did find their way into the historical record. In 1935, L. A. Barrett, a tireless Forest Service employee, wrote *A Record of Forest and Field Fires in California From the Days of the Early Pioneers to the Creation of the Forest Reserves*. Because the press did not regularly report much of the land area of interest to him—land administered by the Forest Service—he turned to accounts by old timers. Edward Jenness of Cold Springs was one of his informants. Table A-5 provides a sample of references from newspapers and Barrett's report about early fires within the CSWA area.

Table A-5. List of Fires within CSWA, 1878-1907

Date	General Location	Description
1878	Cold Springs	A fall fire burned over 3,000 acres of forest. It started about three miles west of Cold Springs and was caused by sheep herders.
1887	Hales Mill at Lyons Creek	In August, the *Tuolumne Independent* reported that "Forest fires are raging in the mountains above Hale's mill, 30 miles above Sonora - they are burning toward the river. These large fires come at intervals of five years, when the accumulation of dead timber, brush, etc, cause the flames to get beyond control."
1887	Buchanan Mine	A late summer fire burned over 10,000 acres, extending from the Buchanan Mine and extending across Hunter Creek to the Ingall Ranch. This fire may have been started by mine machinery.[56]
1888	Empire Mill at Browne's Meadow	In autumn, the fire was ignited when lumberman B. F. Way burned a log out of a road. The blaze charred 1500 acres as it burned toward Cold Springs .
1889	Donnells Flat	Jenness reported that: "In the fall of 1889 a fire burned the territory above Donnells Flat. It burned around Long Bridge and down the Patterson Grade, covering about 1000 acres of timbered land" (in Barrett 1935).
1889	Strawberry	In late summer, a 30,000 acre fire was blamed on

[56] As a measure of the wood consumed by mines, in 1886, the Buchanan used eight cords of wood per day, amounting to nearly 3,000 cords each year. The *Pioneer Western Lumberman* journal reported, "It was not unusual for a quartz mine to consume three million feet of timber in underground operations within a year." The journal also reported that a mile of railroad required a minimum of 100,000 board feet of lumber for constructing level track, without culverts, bridges or trestles (PWL 1914).

Date	General Location	Description
		shepherds on the trail between Strawberry and Old Strawberry: "It ran to the Stinchfield place, up the North Fork Tuolumne River above the Bells Meadow road, around what is now Pine Crest, south towards Dodge Ridge, to Shearing Camp Creek and down the North Fork Tuolumne to the first wet gulch above the present site of the Cold Springs Mill."
1891	Vicinity of the Sonora-Mono Road crossing of Cow Creek	An intense fire "completely destroyed matured trees" in a dense forest; this fire was ¼ of a mile wide and several miles long (in Barrett 1935).
1891	American Camp and Experimental Gulch Mine area	In August, a fire began north of the Stanislaus River in Calaveras County, jumped the river at the old Abbey Ferry and headed toward Columbia from the north. Workers at the Experimental Gulch Mine successfully back-fired to save the mill works. The town of Columbia was also spared but the article noted: "A very large extent of territory has been swept bare…. At present the fire is rushing up the Stanislaus River and there is no hope of saving American Camp."
1891	Belle View Mine	Another August fire was at the mine. It was fought and extinguished by mine workers and the Mountain Fire Brigade (UD 8/22/1891).
1899	Cow Creek	A fire even hotter than the 1891 blaze swept through the same area: The crown fire and completely destroyed mature trees. Forest was very dense. Extent was 1/4 mile wide and several miles in length. It skipped areas of various sizes.
1901	Rose Creek territory	The fire was reportedly five miles wide and 10 miles long.
1901	Jupiter	Destroyed the sawmill and stored lumber at Philadelphia Diggings: "Nothing could be done to save the buildings or 50,000 feet of lumber, all of which burned to ashes".
1901	Pine Log	Reported as "was one of the largest in a long time…" The fire confined itself between the South Fork of the Stanislaus River and Rose Creek; burned over a territory five miles wide and ten miles long.

Date	General Location	Description
1901	Jupiter	This fire "destroyed the sawmill and much lumber at Philadelphia Diggings [T3N, R15 & 16E]. Nothing could be done to save the buildings or 50,000 feet of lumber, all of which burned to ashes."
1902	Lower North Fork Tuolumne River	A "big forest and feed fire has been raging on the east side of the North Fork of Tuolumne ever since Monday evening, destroying much feed and timber. A high wind is blowing. Hard Tack and New Era mines are in the path of the flames."
1905	Middle Camp	A hot fire broke out in early August and "burned everything in its path. One side of Mt. Elizabeth was swept clean, clear to the Stanislaus River."
1905	Sand Bar, Confidence, Fraser Flat, and Twain Harte areas	In November, several fires simultaneously raged in the heart of the CSWA area: one at Sand Bar below Baker Bridge (T4NR17E, Section 21); another near Confidence; and on the Fraser and Miller tracts then held by the Standard Lumber Company near Fraser Flat. A portion of the Indian rancheria at Bald Rock was also destroyed (*H0711). The Stanislaus Forest rangers "sent out a call for help" to aid in checking the fire at Sand Bar to keep it from racing up the Middle Fork Stanislaus canyon.
1907	Long Barn and Browne's Meadow	An August fire raged between Long Barn and the Empire Mill; it burned for several days and much valuable timber was destroyed (MLM 1907).

Establishment of the Stanislaus Forest Reserve in February 1897, though apparently not having a noticeable impact on most people living in or adjacent to the CSWA area, did foster a change in behavior toward fire. Championed by Gifford Pinchot, first chief of what would be called the Forest Service unequivocally believed that such practices were responsible for the incineration of hundreds of thousands of acres of timberland each year. This timberland, he argued, was important not only for its value as lumber but also for the protection of watersheds. This clash sparked a debate over what was called the "Indian burning" or "light burning" controversy.

Within state government, by the turn of the century voices were getting louder over the loss of California's resources due to fire; particularly forest fires. A 1903 act of the Legislature empowered the State Board of Examiners to enter into a contract with District/Region 5 to "investigate the forest resources of the State, determining the best means of conserving them, and formulating a State forest policy." In July 1905, a State Forester was appointed, marking the juncture when forestry work, by the State, began.

The paramount tool of this work was fire prevention and control; without "relative security" against fire, forestry was deemed "infeasible." In addition to direct losses by fire, the indirect losses due to excessive erosion also spurred the creation of the State Forester's office and its partnership with the Forest Service.

Making the connection between forests and water, the State Forester, in his first biennial report wrote, in 1906:

> It might be possible, although perhaps prohibitively expensive, to import forest products from other states; but water must be had at home, and it is unnecessary here to dwell upon either its paramount part in the life of California or its dependence on forest-covered sources. Although there is great divergence of opinion among laymen regarding the importance of forests in regulating run-off, general opinion is unanimous in conceding that the removal of forests is followed by the disturbance of water levels (CA 1906).

Echoing sentiments of the Forest Service, the State Forester sought to persuade the timber industry to modify its practices and to convince the general public that logging could be done in a manner that did not despoil the land. "Practicality" was the watchword for industrial logging concerns; the Forest Service and its State Forester counterpart were anxious to demonstrate that the forest practices they encouraged were also businesslike and practical in the framework of a long-term logging industry. As with the Forest Service, the State Forester viewed fire prevention as a key to forestry in California and watershed protection as a primary objective of forestry practices. After a year, the State Forester was pleased with the headway made with loggers and their traditional burning practices:

…Believing in the object sought, they waited to see the methods employed. They knew the need for checking fires, but feared State forestry meant something less practical, if indeed, not a direct attack on their own freedom. Some enthusiastic nature-lovers, who call their tenets forestry, are not charitable to lumbermen, so the latter waited to see the State's interpretation. A few months showed a visible change, and [in] a year a most decided one…. The temporary reduction of the merchantable area, caused by lumbering, becomes permanent when lumbering is followed by successive fires, which prevent the reproduction of tree species and cause the invasion of chaparral. The sale of forest products produces immense annual revenue, hence forest protection, so that complete utilization may accrue, is imperative. The denudation of watersheds is always followed by floods and drought. This matter is particularly vital in California, where every other industry is directly dependent on a cheap and abundant supply of water. The State is the arbiter of present and the guardian of future generations (CA 1906).

A repetition of Forest Service doctrine, the State Forester, in his third biennial report, also endeavored to change the folk practices of individuals who lived in or off of California's forests. With the zeal of a missionary, the State Forester used farming as a simile for forestry:

> Man has carefully sorted out the species in the vegetable kingdom which are of most value to himself, and has exerted his energy in protecting them from the inroads of enemies at the expense of those species which are of lesser value. He is endeavoring to make these chosen species produce to their maximum through the use of the laws of nature. The chief product of the forest is lumber, and from the standpoint of forestry it is considered the crop of the forest. The crops of the farmer are harvested—that of the forests lumbered, and so, since the object of the farmer is to protect his stands of corn and wheat from the inroads of weeds, fire, and other enemies, and to make them produce to their maximum—the forester has the same object with reference to his forest….
>
> The inhabitants of the mountains accept new ideas slowly and as a class are not enthusiastic regarding fire protection. The agitation of recent years and the enforcement of national forest regulations has changed their point of view somewhat, but there is still a widespread feeling that fires are inevitable and that protective measures are not worth while. There is also an expressed sentiment that occasional fires to clean up the forest floors are a good thing, and in some quarters a return to the old Indian custom of annual burning is strongly urged. In the foothills the use of fire is advocated to kill the brush and improve the grass. The natives of the mountains need careful watching, and should be made to feel the force of the State and Federal laws….
>
> The safe and economical disposal of slash is the most essential question on private timber lands in northern California.... For lumbermen have often been regarded by unthinking persons as enemies of the public. Their property is as a rule so situated that it really does make a difference to the public whether it is handled well or ill. And because conditions of markets and transportation have hitherto been such as to almost compel wasteful methods the lumberman has received the name of vandal… (CA 1910).

In his fourth biennial report, the State Forester reviewed the operation of the Standard Lumber Company, along with that of eight other large lumber concerns. The report noted that the Standard Lumber Company's holdings in Tuolumne County were in Townships 2 through 6 North and Ranges 15 through 18 East, comprising 30,980 acres of timber; the company owned the land and timber of 15,661 acres, and the timber only on 15,259 acres. To the reporting year of 1912, the Standard Lumber Company (SLC) had cut over about 5,000 acres. At that time, the company was running three woods mills: South Fork, Empire, and Cold Springs. Interestingly, of all the lumber operations studied in the fourth biennial report, this woods mill pattern was an oddity.[57] The State Forester noted that the

[57] For comparison with the SLC, by 1912, the West Side owned 54,670 acres land of which 39,590 acres were timbered; 15,080 had been cut over. The West Side Lumber Company's predecessor,

SLC "cuts a great deal of Government timber, of which there is quite a quantity on the Stanislaus National Forest, and also buys timber on adjoining lands. It will take about two years to finish up the operations in the Empire Mill—Gold [*sic*] Springs locality—then cutting will be commenced on the properties farther north and west." Addressing both the fire and scenic issues, the State Forester described the logging scene along the Sonora–Mono Road in 1912:

> This company has no fire protection system of patrols and no attention whatever is paid to the disposal of slash excepting in the case of Government timber, where the Forest Service regulations compel them to pile brush and in general clean up the area. In this region where the company cuts so much timber belonging to others, one could not very well compel them to pile brush. However, a little foresight on the part of the owner when issuing a contract for timber, inserting a clause to have brush piled, would change an area which is now a fire menace to one where the danger from fire is reduced to a minimum.
>
> The company is very careful, and every measure within reason is taken to avoid large fires. Prompt action is taken to extinguish all fires, especially in the vicinity of the mill and logging operations.... This was amply proven on August 22, 1912, when the whole mill force at Empire Mill turned out to fight a fire of 30 acres.... Another important feature in the prevention of fires is the practice of watching logging donkeys. When it becomes necessary to move donkeys, each is followed by six or eight men to put out any fires which may be started. This is an extra precaution... for all donkeys as well as locomotives are equipped with modern spark arresters of the forced draft types. 'Log trails' coming down a chute oftentimes start fires due to friction, but men are always either riding the 'trails' or going back up the chute in a 'boat' and thus usually detect and put out fires so started. But logging operations in this locality will cease in two years and the slash on the entire logged area is in a bad way for future fires. All the way from Longbarn [*sic*] to Bridgeport, along the beautiful Mono road, this menace is particularly noticeable. More especially does this apply to the area extending one half mile on each side of the road from Bald Mountain to Niagara. The leaving of the logging-over area in this condition not only makes it very dangerous in case of fire, but also spoils the beauty of the road. The Government requires that a strip of timber 100 feet wide will be left on each side of the road on its timber sale areas in this locality. The Standard Lumber Company has cut all its timber near the Mono highway, leaving a desolate waste that one, riding or driving, cannot forget until reaching the summit. Trees could have been left, with very

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the Westside Flume and Lumber Company, began "cutting in 1900 and continued until the new company took over in 1903. The camps, at this time, were about 28 miles from the mill in the town of Tuolumne; the mill capacity was 250,000 board feet per day" (CA 1912).

> little expense, at least 30 to 50 feet on each side of the highway. In its present state the whole scene is an eyesore (CA 1912).

The West Side Lumber Company, also operating in the CSWA area during 1912, just east of Merrill Spring, started a significant fire. The State Forester reported that:

> Several bad fires have occurred on this tract in recent years. The most serious one burned over 600 to 800 acres near 'Little Chicago' about five years ago.... Another bad fire broke out this summer [1912] near Camp No. 22 [T3NR17E, Section 28] burning over an area of 500 to 600 acres. The soil cover and reproduction were entirely destroyed and three or four inches of ash cover the ground in most places. Unless this area is planted it will undoubtedly remain a waste and be taken possession of by chaparral (CA1912).

As late as 1919, the State of California appropriated no funds "for controlling the many fires which annually destroy its grain, range and timber." In contrast, the federal government appropriated money specifically for fire and maintained a system for the protection of federal forestlands. Outside the national forests, however, there was general agreement that State and private forestlands received inadequate protection: the state depended upon voluntary fire-wardens who served without pay. In Tuolumne County, the Board of Supervisors appointed G. W. Price, a "public-spirited citizen of Sonora, as County Fire Warden, at a salary of $1.00 per year, and authorized the expenditure of $500 for fire fighting tools and fire notices to be posted throughout the county.... No grain was destroyed during the summer, but over 4,000 acres of brush and grassland were burned.... Five Mexicans were arrested in June and jailed in Sacramento upon the charges of setting seven forest fires between Strawberry and Camp Lowell"[58] (CA 1919).

Soon after organization of the Stanislaus Forest Reserve, the landscape was combed to find vantage points from which fires that had high potential for destroying human life and property could be detected. Desiring to view any point on the forest from two observation points, patrol routes were also designated so that rangers could ride on horseback and signal others with a mirror or heliograph for reinforcements if a fire was detected.

Within the CSWA, by 1927, there were at least nine designated lookouts. Many others came and went with changes in values to be protected or were less formal. The lookouts included: American Camp (T3NR14E, Section 25), Mt. Elizabeth (T3NR16E, Section 32), Duckwall[59] (T1NR17E, Section 4), Pinecrest Peak (T4N18E Section 1[60]), Crandall

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[58] Camp Lowell was a Standard Lumber Company logging camp located at the end of a spur track on the north bank of the South Fork Stanislaus River in T4NR17E Section 25.

[59] Duckwall was also known as Big Canyon Lookout. It was re-built in 1935/36. It had an associated residence that was built in 1933 but which was destroyed by fire in September 1950. A 1952 inspection report from the regional office chastised the Stanislaus for its priorities and its misuse of employee skills in the replacement of the residence at Duckwall, according to plans prepared by the Forest Engineer.... "This appears to be a waste of time on the part of these men in view of the higher priority job of road construction that necessarily will be neglected. Also this is

Peak (T4NR17E, Section 31), Thompson Peak (T2NR17E, Section 26[61]), Forebay (T3NR15E, Section 6[62]), Slash Disposal (T4NR17E, Section 1), and McCormick (T4NR15E, Section 24[63]).

Telephone wires linked the lookouts to Stanislaus administrative stations such as Middle Camp, American Camp Station, Cow Creek and Dry Meadow Station, improving the suppression response to fires. Moreover, the forest officer could tap into phone wires with a portable, albeit clumsy, handset.

The Stanislaus National Forest emphasis on fire prevention and suppression had an enduring impact on the CSWA landscape. While reducing the number of extremely high intensity burns, the forest also reduced the number of low intensity fires that are now better recognized as having beneficial ecological effects. The dedication to fire can be seen in the 1922 Stanislaus workforce. While the Supervisor's Office had seven permanent staff and the four ranger districts had nine, during fire season, there were 27 additional employees dedicated to fire duty: four lookouts, three secondary lookout/firemen, and 20 fire guards:

> The lookouts are situated so that practically any portion of the Forest can be seen by two of them, which allows an accurate location of fires and the guards are stationed at strategic points where experience has shown the fire danger is greatest, and their sole duty is fire prevention and suppression. In addition to this force, timber sales keep seven scalers busy during the logging season from April 15 to November 30 (anon. 1923).

The Forest pamphlet noted that, during 1921 and 1922, the Stanislaus experienced 120 fires "caused by careless or unthinking individuals." Sixty percent of these fires were attributed to tourists, hunters, and fishermen—this loss being translated to a loss in board

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the type of work that may be better done by skilled architects rather than by these men. This building was being built of concrete blocks with steel sash and steel doors. Evidently the fact that this building was burned by fire influenced fire proof construction.... It should be admitted, however, that a building of this type should result in very low maintenance" (USDA 1952).

[60] Pinecrest Peak lookout was built in 1934 from a Region 6 standard design; the cab was 14' x 14'. The associated cabin and garage were built in 1942 by the AWS.

[61] Thompson Peak Lookout was built in 1935; it was removed in 1958.

[62] Forebay Lookout was built in 1936/37. It was a Region 5 design having a 14' x 14' cab on a 20' tall, enclosed garage tower. It was dismantled and removed in 1958 (1937:). [*H0794] The 0.75-mile access road to Forebay Lookout, designated as 4N22, was built in 1936 by CCC enrollees at Italian Bar Camp, F-214 using ECW funds. In 1936, J. R. Hall planned to "move the Contention Guard from the present location on Knights Creek to this point [Forebay] as he will then be of some value as a Lookout as well as a Fireman" (Hall 2/11/1936). [*H0795]

[63] McCormick Lookout was built in 1934. It was a Region 5 design with a 14' x 14' cab on a 10' tall, enclosed garage tower. A note in the 1937 Development Plan and Inventory read that this lookout should be moved to Liberty Hill and put on a 30' tower.

feet of over one million and "waste" of $6,000 of public money used to suppress these fires that did not need to happen.

While on one side of the coin, the Stanislaus actively encouraged increased camping and hunting in the 1920s, the other side of the coin was the acknowledged exponential risk of fire. In California's national forests—and the Stanislaus being no exception—for 1910, through 1920, nearly two-thirds of all forest fires were human-caused, and the greatest percentage of human-caused fires were started by hunters and campers (anon. 1923). Fire prevention efforts reached a crescendo during World War II, including concern about Japanese incendiary balloons reportedly targeted for West Coast forests.

The ranger districts tallied the incidents of fire and their causes, using the data—among other applications—to develop fire prevention plans. In 1958, Summit Ranger District listed the following fire history, noting that, by far, most fires (40) were caused by smokers and by camp fires (18) (Smith 1958).

Initiatives to prevent man-caused fires seemed to upswing in the latter 1950s. And for the CSWA area, the apparent leading cause of human-caused fires was tobacco smokers (Westmoreland 6/14/1959). During the 1950s, the Stanislaus appears to have hired several employees during the summers as "smokechasers," with the aim of promoting the prevention message and providing initial attack on fires with the hope of keeping them very small. Stanislaus officials were pleased with the results: the Sonora Ranger District in 1955, for example, experienced six human-caused fires that amounted to only 20 acres burned (Westmoreland 1956).

As the CSWA area became more intensively used, forest road systems, recreation, water manipulation, and wood products, in addition to grazing, the frequency of reported fires rose. But because of the value placed on timber and watershed protection, the aim was to extinguish the fires as soon as possible. Insurers of mountain-based companies exacted higher premiums because of the high fire risk and required the insured to take protective measures in order to reduce the cost of insurance. As examples, in 1907, winds fanned a forest fire along the Sonora-Mono Wagon Road…

A forest fire, reported to have commenced at an abandoned fire left by campers, got started last Wednesday night above Bakers Station. A brisk wind swept the flames on to Relief Camp, where all the U.C. Company's [Union Construction] buildings, with one exception, were destroyed, inflicting a loss of about $20,000. The buildings destroyed were of a temporary character. The machinery of the company was not injured, nor any of its permanent work (MLM 1907).

Union Construction Company's sawmill and lumber yard were all that was spared from the flames (SDU 1907).

It was common practice to enlist the local citizenry and travelers into forest fire suppression. In fact, a person could be arrested and fined for refusing to assist a forest officer in fire fighting. For example, after the 1907 fire at Relief Camp, Supervisor S. N.

L. Ellis swore to warrants for the arrest of two young men for refusing to assist a Forest Reserve officer. This fire, where the Union Construction Company was at work on Relief Reservoir for the Sierra & San Francisco Power Company, was reported to have burned an area 15 miles by eight miles before burning itself out.

Fire frequency in the CSWA area also increased with railroad logging. Until about 1922, steam donkeys and locomotives were fueled with wood, which was well known for sending sparks into the air. Friction from brakes and from wheels on rails also were a source of ignition along the rails—wooden trestles were particularly vulnerable. To add to the risk, many woods workers were smokers, with cigarettes, pipe tobacco and cigars being a not infrequent source of fires.

It was not only in the economic best interest of the railroad logging companies to take actions to prevent and suppress fires, but Stanislaus National Forest officers were zealous about it. At least on sales of national forest timber, they had a means of assuring that the logging company's woods equipment had spark arrestors and that fire suppression tools were at the woods job sites. Not only were company personnel enlisted to suppress fires on timber operations on their own lands and on timber they purchased on the Stanislaus National Forest, they were also sometimes required to lay down their misery whips and pick up their pulaskis to suppress fires on neighboring forests. This became a source of dispute between Stanislaus and lumber company officials.

Even after the locomotives, steam shovels and steam donkeys were converted to burning oil instead of wood, logging operations continued to ignite fires on a regular basis. Billings by the Stanislaus National Forest to the Pickering Lumber Corporation's Sugar Pine Railway for suppression of fires along their right of way were a common summer occurrence in the CSWA.

While the Standard Lumber Company mills buzzed, sawing at least 10 million board feet for the season, its main camp was destroyed by fire in mid-September, 1914. In addition to burning timber on 3,000 acres, 28 buildings at Camp Fraser on the South Fork Stanislaus River were lost, along with five steam donkeys, two railroad bridges, and seven train cars. "About 150 men employed about the camp barely escaped with their lives." The fire had been ignited by Standard Lumber Company woods operations...

It jumped to the tops and started up country before a heavy wind toward an enormously valuable body of government timber. The Forest Supervisor assembled men from Columbia, Tuolumne, Angels Camp, Jamestown, Sonora and Murphys by automobile, covering distances of 8 to 56 miles and started line construction by 5 P. M. The fire was held by midnight after 1640 acres of company land and 280 acres of government timber was burned over, at a cost to the service of $3,002. The government's loss was $2,960.

The timber trade journal, *Pioneer Western* Lumberman was more optimistic than the local press, noting the losses at Camp Fraser, but that:

The small timber and brush were also wiped out but it is believed very little of the big timber is injured. Preparations are being made to rebuild Camp Frazier at once. There are about a million feet of logs down which will be taken care of but no more will be out this season.

The lower elevation of the North Fork Tuolumne within CSWA also had a number of reported fires. Late in the summer of 1856, a man burning brush at the point where the Confidence to Basin Mine trail crossed the North Fork started a fire. The fire reportedly burned 2,000 acres.

A monster fire, in 1926, broke out at the Basin and swept…

with unabated fury through brush land and forests of this section of Tuolumne county, [and] continued uncontrolled at the old town of Nashton, six miles above Tuolumne today. The fire has spread over a tract of 4,000 acres, covered by young trees, set out 25 years ago by the West Side Timber Company, when the tract was cleared of old timber. The flames have crossed the [North Fork of the] Tuolumne River.

The next day, a Fresno newspaper reported that this fire had been controlled but that: "The big trees were saved," indicating that the fire had either been a lower intensity blaze, burning the understory and sparring the large trees, or had burned through the new, second growth, but was quelled before reaching the un-logged virgin timber.

1914 saw 65 reported fires on the Stanislaus. Just over half were very small, confined to one-quarter acre; 13 fires were 10 acres or less, and 12 were over 10 acres. Campers, responsible for 19 of those fires, were the leading cause; lightning and sawmills ranked second. Other fires were attributed to railroad logging, brush burning, and miscellaneous causes. The total acres of Stanislaus land burned over were 2,895 and 2,631 acres of private in-holdings.

A 1948 public information pamphlet on California's national forests summed up the agency's perspective on fire. Viewing the history of the agency as "a story of conservation through wise use," with California suffering 7,500 fires each year that burned over 300,000 acres, "no real conservation" was possible (USDA 1948).

In 1955, estimates were made of the timber loss attributable to fire over the past 50 years. Forest officials tallied a total loss of timber production on 30,000 acres and a partial loss on an additional 90,000 acres as a result of fire (USDA 1956).

It was not until the latter 1960s that the old idea of prescribed fires began being reinvestigated and favored for specific needs. One of these needs was fuel break maintenance. One of them is one of the most well known in the nation: the Ponderosa Way. Fuel breaks, created by the mechanical or hand-grubbed removal of a swath of vegetation in fire prone areas and designed to provide a defensible gap in continuous fuels/vegetation, had endless maintenance requirements. Harry Schimke, a former Stanislaus employee who joined the Pacific Southwest Forest and Range and Experiment

Station in 1962 as a research technician, worked with Lisle Greene in studying various ways of achieving fuels reduction. One outcome of their work was a study of methods for using prescribed burning to maintain fuel breaks, periodically removing accumulated dead and live fuels. They studied various scenarios of wind, temperature, humidity, fuel moisture, ignition index, burning index, and other conditions to determine when and how burning could be safely and efficiently done and at what cost. Though they undoubtedly knew that use of prescribed fires for fuel break maintenance would be more palatable to forest officials who had long resisted "light burning," Schimke and Greene also noted that it could also serve "other wildland management purposes" such as broadcast burning for reducing fire hazard in recently harvested areas and preparing sites for regeneration, thinning and reducing fuel hazards, and for range improvement. They observed that: "Among forest land owners, prescribed burning has been less widely used. But the Forest Service officially recognized prescribed burning as a land management practice for the National Forests in California"[64] (Schimke and Greene 1970).

Forest Products Industry

1848 to 1895

Wood products for construction, fuel and other uses, including not only lumber and cordwood, but also for products such as shakes and charcoal[65], were procured from lands that later became the Stanislaus National Forest. With a few notable exceptions, however, the timber came from the fringes of the mixed conifer forest, as accessible and close as possible to the mining centers and the towns that developed to serve them. As the voracious appetites for wood outstripped the more available sources, sawmills were set in the higher elevations. Bancroft's Scrap files dating from 1879 note that the

active demand for lumber in Tuolumne county commenced in 1850-1851. It gradually increased, until 6,000,000 or 7,000,000 feet were required for the neighborhood of Columbia and Sonora alone. In 1854 the first fire occurred in Columbia, which destroyed the greater part of the town. At this time the demand for lumber became most active, and it continued till about 1860, when placer mining was on the decline. At this time, 5,000,000 feet of lumber was required to supply current demand... (Bancroft 1879)

In her 1935 book, *The Saga of Old Tuolumne,* Edna Bryan Buckbee wrote that Charboniell (sometimes 'Charbonnel') of Sonora built Tuolumne County's first sawmill.

[64] This approval of prescribed burning as a management tool was contained in Region 5's 1968 manual supplement 16, in title 5100, chapter 5151.
[65] The scope and intensity of charcoal production as it relates to the Stanislaus National Forest has not yet been studied; though it is known that charcoal production occurred here, such sites have not yet been identified. Sources like the 1905 transactions of the California State Agricultural Society noted that, along with other forest products of Tuolumne County, 6,800 sacks of charcoal were produced; in 1906, that number had risen to 7,250 (CA 1905:267). [*H0730] Roy Brooks also related that his father, who had homesteaded 160 acres about two miles up the road from the old Calder Ranch—near the junction of Middle Camp and Longeway roads—made his living raising potatoes, cutting wood, and making charcoal (Chispa 1974).

It was located in the western part of town and erected in 1850. Soon after, Heslep & Manning established a sawmill on Woods Creek. Next, Caleb Dorsey built one below Springfield, later moving his machinery to Sawmill Flat. By 1856, there were 24 sawmills in operation in Tuolumne County, of which 7 may have been operating in the CSWA area. These were the: Nye (steam[66] mill located 15 miles east of Sonora;), Major Provost (steam mill located 15 miles east of Sonora), Davis and Company (steam mill located 15 miles east of Sonora), Mountain Pine Mill (steam[67] mill located 10 miles east of Sonora), Bailey & Morgan (steam[68] mill located15 miles east of Sonora), Sugar Pine (water[69] mill located 18 miles east of Sonora), Enterprise (water[70] mill located 11 miles east of Sonora).

Other early mills that probably operated within the CSWA area were those serving the Tuolumne County and the Columbia and Stanislaus River water companies. The *State Register and Year Book of Facts* for 1859 noted that the "Stanislaus River Miner's Canal" sawmill was in operation and had cost $6,000 (CA 1859:300-301). As early as 1866, foreshadowing the region's supplying of the fruit packing industry early in the twentieth century, in 1866 "[l]arge quantities of sugar pine staves for syrup barrels are manufactured in Tuolumne County, east of Sonora, and shipped to San Francisco. The business promises to become an important branch of industry" (M&SP 1866). Additionally, the 1882 *History of Tuolumne County, California* documented that, in 1879, George W. Hale[71] established a new sawmill having a capacity of 20,000 board feet of lumber in 12 hours; he also had a shingle mill there that produced 40,000 shingles per day. Located on the South Fork Stanislaus on the ranch once owned by "the notorious" Jim Lyons, the sawmill was described as measuring 24 by 100 feet and housing two circular saws as well as the shingle machine. The author also editorialized

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[66]A *Union Democrat* article from September 15, 1877 (Vol. XXIV, no. 12, p. 1, c. 3), noted that the Nye Sawmill was located 11 miles east of Sonora and "was running sash and edger saws." This observation was made in 1856.

[67]A *Union Democrat* article from September 15, 1877 (Vol. XXIV, no. 12, p. 1, c. 3), noted that the Mountain Pine sawmill "ran a sash and saw."

[68]A *Union Democrat* article from September 15, 1877 (Vol. XXIV, no. 12, p. 1, c. 3), noted that the Bailey & Morgan mill "ran a sash saw. This mill was destroyed by fire in 1855 but was rebuilt." This observation was made in 1856.

[69]The waterpower source was probably Sugar Pine Creek. A *Union Democrat* article from September 15, 1877 (Vol. XXIV, no. 12, p. 1, c. 3), noted that the Sugar Pine mill "ran two sash saws." This observation was made in 1856.

[70]A *Union Democrat* article from September 15, 1877 (Vol. XXIV, no. 12, p. 1, c. 3), noted that the Enterprise "ran a saw mill and edger." This observation was made in 1856. In 1867, the Enterprise Mill was located on Five Mile Creek and had a daily capacity of 3,500 board feet (Langley in USDA Vol. 1: 92).

[71] Hale, for his mill on the South Fork of the Stanislaus, was saluted in a 1914 article in the *Pioneer Western Lumberman* as "among the names of well-known pioneer sawmill men" (PWL 1914).

that, though the "pine forests of this part of the county are extensive, and for three decades men have been plunging into their depths and utilizing those stately trees... and although [m]illions of feet are cut annually… the source seems practically inexhaustible (Lang 1882). Apparently selling part of his lumber operation, the *Pacific Rural Press* reported in 1884 that George W. Hale had "disposed of his large lumbering interests to parties in Oakdale and the planing mill etc. will be removed to that place (PRP 1884).

The location of the Bradford & Way sawmill was not disclosed in Lang's 1882 history except to note that it was about 15 miles east of Sonora[72] and was the largest sawmill in the county; at least by 1867, Bradford & Way's mill was at Brown[e]s Ranch and had two saws and a daily capacity of 20,000 board feet of lumber per day (Langley 1867). S. S. Bradford's woods mill—the Empire Mill—supplied his steam-powered plane mill in Sonora with rough milled lumber that was manufactured into millwork, including moldings, sash, door blinds, and boxes in addition to lumber (Lang 1882).

By 1892, the Empire Mill Company reported a capacity of 40,000 board feet of lumber per day (Inyo Independent 1881; Lewis 1892; SRU 1881). Still primarily supplying Bradford's plane mill in Sonora, in 1897 the trade journal *Pacific Coast Wood & Iron* reported that demand for lumber was 40,000 feet per day (PCW&I 1897). Two years later, the *Union Democrat* reported that S. S. Bradford's Empire sawmill was still the largest in the county.[73] The mill's output for the season has been about 5,000,000 feet, all sugar and yellow pine that is rated in the market as the best in the State" (UD 1899). By the turn into the twentieth century and with the new connections to world markets afforded by the Sierra Railway, Bradford's Mill was reported as shipping its first installment of 2,000,000 board feet of lumber contracted to a firm in Australia (UD 1900).

1896 to 1930

Like the single purpose sawmills connected with construction of the major ditch and flume systems in the CSWA area, there were also many that were constructed with the single purpose of supplying mining timbers. One such operation was a sawmill erected in 1898 on the Duckwall Ranch for the Providence Mining Company. With a capacity of 8,000 board feet of lumber per day, the local newspaper reported that: "Everything being gotten out is for the Providence mine. The company has leased the meadow and timber on the Duckwall Ranch which comprises an area of 480 acres." Highlighting the new potential problems of trespass on national forest timber, the article continued by noting

[72] Probably a typographical error; Browne's Meadow is about 25 miles from Sonora.

[73] Bradford, was saluted in a 1914 article in the *Pioneer Western Lumberman*: "One of the Sierra lumbermen best known to the past generation and well known to many of the present day, was S. S. Bradford, one of the largest operators of this time, building his first mill with a capacity of 35,000 feet per day in Tuolumne County in 1868; later he increased the capacity to 50,000 daily. He was the first one in the state to manufacture his sawmill product to any extent, into finished material and sash and doors. He was also one of the first shippers of sugar pine to Australia and other foreign ports" (PWL 1914).

that: “Lines have been blazed for the entire distance around this tract, thus doing away with even a remote possibility of trouble with the government over the cutting of timber” (UD1898).

Another such single purpose mill was that of David Kenney who operated a portable sawmill between Knights and Eagle Creek to supply the lumber needs of the Philadelphia Diggings. A local paper reported in the summer of 1902 that: “The activity in the mining industry in that section has created a demand for lumber. There is a fine growth of timber in that locality. Mr. Kenney thinks that he can turn out five or six thousand feet per day” (UD 1902). The Contention Mine at Knights Creek also had a portable sawmill dedicated to sawing mine timbers (PCW&I 1909). A substantial sawmill was also apparently built in connection with developments by the Tuolumne County Electric, Light & Power Company. Reportedly having a capacity of 40,000 board feet per day, this mill was to be built in 1907 along the South Fork of the Stanislaus River, near the Rushing place (T3NR17E, Section 18) (PCW&I 1907).

Though substantial timber harvest had taken place in the 19th century, as sawmills were established in the mountains as close as possible to the stump, it was the maturation of railroad logging that made a more profound impact. With a railroad, the logging operation was not limited by being rather tightly tethered to the sawmill. Instead, hundreds of temporary spur lines could shoot off the mainline to put the rail as close to possible to the stump. The two railroad logging companies that operated on the CSWA area were the Standard Lumber Company and its Sugar Pine Railway and, marginally, the West Side Lumber Company and its Hetch Hetchy and Yosemite Valleys Railway.

First, the West Side Flume and Lumber Company set-up its mill in Carters, now the town of Tuolumne, and began to lay rails from the terminus of the Sierra Railway at Campbell’s or Ralph Station into its holdings to the east. This operation advertised the availability of “wood and mining poles” by March 1, 1900 with delivery “made anywhere on the line of the Sierra Railway” (UD 1900). The principals behind the Sierra Railway clearly had designs on the area’s green gold. The *Union Democrat* reported in early 1897 that:

A number of years ago, on the recommendation of John Hays Hammond, the Crockers purchased seventeen sections of timberland east of Sonora. None of the timber has been cut. It is the intention to construct a railroad from Oakdale to Sonora with three short branches. One to run east to the timber lands mentioned another north to Mokelumne Hill and the third south to Coulterville (UD 1897).

Early in 1898, Charles F. Gardner, agent of the West Side Flume & Lumber Company arrived in Sonora to “straighten matters out and determine the exact lines of every location” of the several thousand acres of timberland owned by the West Side. The *Union Democrat* reported that Gardner was endeavoring to help the company “hit upon some method of turning their pine timber into lumber and to get it out.” Gardner conveyed that the company had…

considered every means from a V flume to a narrow gauge railroad, which the probability that the latter mode will in time be accepted should this prove the case, the logs will be hauled out to Summerville, and there put into marketable shape by a large sawmill that will be constructed near town. Mr. Gardner says that four thousand acres of their lands have already been included in the government park [Stanislaus Forest Reserve], and apparently fears that unless something is done at once the elastic reserve will gobble up the rest (UD 1898).

The *Union Democrat* followed the developments of the West Side with great enthusiasm, reporting in 1899: "Three years ago the most extravagant prophet of Tuolumne's industrial march of progress never dreamed that Summerville, now known as Carter, would ever be the scene of gigantic enterprise that furnish employment to a thousand men, and directly support probably twenty-five hundred people" (UD 1899). A season later, the newspaper reported that:

> The choicest, finest and most valuable timber that grows anywhere on God's green earth will be taken from the forest to meet the needs of man. In addition to the sawmill with a capacity of 50,000,000 feet of lumber per annum now being constructed, the close of the year will mark the completion of a box factory, machine shop and dry kiln…. The West Side Flume and Lumber Company are the promoters of this great enterprise.… When run to its full capacity 200,000 feet of lumber per day will be the output" (UD 1900).

To help herald the coming of railroad logging in general and the West Side Company in particular, the *Union Democrat* reported in the spring of 1900 that:

> On Friday afternoon of last week the officials of the Sierra Railway Company and twenty-five invited guests visited the scene of the great lumbering industry just being inaugurated in the vicinity of the Basin country by the West Side Flume and Lumber Company. The evidence of the mammoth lumber industry was unmistakable. Thousands of huge pine logs, stripped of their bark [limbs?] lay on the ravines and on the steep mountain sides. Henry J. Crocker, who received the visitors at the permanent camp [Camp 8 in The Basin] informed us that over 1,600,000 feet of lumber had been felled, a million feet own which was strewn along the track and ready for shipment to the mill at Carters. The narrow gauge is still building further into the forest from the permanent camp, and the vast amount of timber on hand insures a long and continuous run of the big, modern mill, which will be put in operation sometime next month (UD 1900).

With the coming of the West Side Flume and Lumber Company and, especially with the Standard Lumber Company, there began a pattern of consolidation. These larger companies, with greater financial resources, were able to buy land, purchase private land stumpage rights, develop transportation for moving logs and lumber out of the woods, and develop broader markets on a scale that was out of reach by the smaller operators. Further, as the West Side and Standard lumber companies developed their logging railroads, these companies were able to buy stumpage from land administered by the Stanislaus National Forest on land accessible to no one else. The Standard Lumber Company, operating in the heart of the CSWA area, began purchasing the entire output of existing mills and, eventually, purchased those mills, associated lumberyards and their land holdings. The *American Lumberman* reported in 1904 that the Standard Lumber Company, in addition to operating its mill 25 miles from Sonora—presumably the former Bradford Mill at Empire…

> also bought the yard of N. L. Knudson at Sonora and contracted for the output of this mill twenty two miles east of town for six years.... The company has also contracted for the cut of the Manuel Estate Company's mill.... In 1902 the Standard Company took the cut of the Amador Lumber Company, whose mills are located in Amador County, and the output is hauled into Ione on the S. P. [Southern Pacific].... It also bought the cut of J. Bryan & Son mill at Diamond Springs, El Dorado County.... In addition the company purchased over eight billion feet from the West Side Lumber Company in Tuolumne. The Standard Company has in all 23,600 acres in Tuolumne County and in the near future will erect a single band sawmill on the South Fork of the Stanislaus River.… [The Sierra Railway] is now building into the site of the mill from Campbell's station.... This plant will have a capacity of about 60,000 feet daily (AL 1904).

In 1902 *Pacific Coast Wood &* Iron reported the crowning deal of the Standard Lumber Company's domination of the lumber industry within the CSWA area:

A big lumber deal has been made... by which Bradford-Blois Lumber Company has combined with the Standard Lumber Company of San Francisco to work big timber tracts on the South Fork of the Stanislaus River. The former company has acquired the Fraser-Miller tract of 2,000 acres of thick and superbly grown timber. It is estimated to contain 100,000,000 ft. of lumber.... The Standard Lumber Company is to construct a railroad into the timber region so that the product can be hauled to Sonora. T. S. Bullock of the Sierra Railway is heavily interested in the Standard Company, and the railroad extension will connect with the mountain line. Large sawmills are to be erected and the lumber industry will become among the most important in the county (PCW&I 1902).

A local news article from the summer of 1904 reported that:

The Standard Lumber Company is daily receiving heavy loads of lumber from the Empire and Knudsen sawmills. The company has put on a sixteen horse team in order to keep ahead of the demands. It is expected that the Sonora yards of the company will receive upward of 6,000,000 feet of lumber from the two mountain mills. In addition it has purchased the product of five or six mills in Shasta county, the estimate cut of which is 14,000,000 feet (UD 1904).

At least through 1905, the Standard Lumber Company continued to acquire sawmills within the sphere of influence it had carved-out for itself. For example, Alfred H. Hiatt's mill that had earlier been near Sonora and which, in 1903, was move to the South Fork of the Stanislaus River, was deeded to the Standard Lumber Company in 1905, becoming known as the South Fork Mill. The deal included Hiatt's sawmill with a capacity of 50,000 board feet per day, all the buildings and improvements, 500,000 feet of lumber, and all the machinery (PCW&I 1903; 1905; UD 1906).

The Sonora Lumber Company also briefly operated in the heart of the CSWA area before being taken-over by the Standard Lumber Company. Building its sawmill on the bank of the North Fork Tuolumne River below Cold Springs, the Sonora Lumber Company was an endeavor headed by E. I. Rehm and E. J. Lander. It is unknown whether the Sonora Lumber Company was truly an independent competitor of the Standard Lumber Company or simply operating as a pawn. In July 1903, it was reported that: "The officers of the Sonora Lumber Company are getting things in trim for business. They have contracted for the product of the Hiatt Mill and have also bought the Jenness tract above Sugar Pine, containing 1,120 acres of the finest pine lands in the mountains. A conservative estimate of the timber places it at 70,000,000 feet. The site for the sawmill in the center of the tract has been selected" (PCW&I 1903). Construction of its Cold Springs Mill was completed before anticipated, as reported in the November 1903 issue of *Pacific Coast Wood & Iron*, and the 2.5-mile access road from the Sonora – Mono Road was graded (PCW&I 1903). In 1905, the *Union Democrat* reported that the Sonora Lumber Company at Cold Springs had cut 3,000,000 for the season, one-third of which had already been hauled to Sonora (UD 1905). Soon after, the mill at Cold Springs burned in a forest fire; Rehm and Lander immediately began preparations to replace it with a "modern sawmill" that would put about 100 men back to work (AL 1905). In January 1906, Standard Lumber Company officials announced that it had "just closed a deal for the purchase of the Sonora Lumber Company's plant, lumber and 1,200 acres of timberland."

In 1906, the Standard Lumber Company built a 2,200-foot tramway from its South Fork Mill to the Sugar Pine Railway line near Lyons Dam. The *Union Democrat* also reported that the company's narrow gauge railroad connecting its newly acquired Cold Springs Mill and the Empire Mill was now complete. Construction was in progress on the track being laid two miles beyond the Empire Mill toward Knudsen's. From there, the plan was to continue the rails down to Lyons Dam, connecting with the Sugar Pine Railway (UD 1906). Following closely the developments of the Standard Lumber Company, a local paper also reported in 1906 that the company was in the process of constructing a new mill at Empire Valley, a.k.a. Browne's Meadow.

> The Empire and five other mills which the company is now operating will continue to turn out lumber as usual even when the big plant is completed and started up, so that next season the product of the six mills can confidently be estimated at from 350,000 to 400,000 feet of lumber every ten hours. As the Sugar Pine railroad has been absorbed by the Standard Lumber Company it will be seen at a glance that the latter owns absolutely

everything from its vast forests of fine Sugar and yellow pine, fir and cedar to a point on the Sierra railroad within ten miles of Sonora. The manufactured lumber will thus be hauled on its own cars over its own rails from its one big and auxiliary mills to Campbell's, from where it will be hurried down to the yards and door and sash factory in this city.

A year hence one local factory will turn out 1500 doors per day with a corresponding increase in sash and turned work with increasing lumber shipments to outside market. The Standard Lumber Company will gain recognition as a power in the pine trade of the West[74] (UD 1906).

Though the principal owners were the same for both companies, the Standard Lumber Company had also announced its purchase of 19 miles of the Sugar Pine Railway (between Campbell's Station and Middle Camp) from the Sierra Railway (AL 1906). Middle Camp became an important location for operations of the Standard Lumber Company. All of its lumber produced at the South Fork, Empire, and Knudsen mills was hauled there. At Middle Camp, the lumber was loaded onto rail cars; from there, much of the lumber was "shipped straight through without change to coast points;" the remainder was unloaded at the Sonora factory. In 1906, the Standard Lumber Company constructed several buildings at Middle Camp, and the scene there was described as "a busy one till the winter snow drives the mill hands, loggers and other employees out of the mountains" (UD 1906). In addition to its growing development and dependence upon its railroad system, the Standard Lumber Company also used traction engines at least to about 1910. Generally used to move rough sawn lumber rather than logs, traction engines could run on specialized roads. One such route was from a portable sawmill near Long Barn to the rails at Middle Camp (PCW&I 1907).

By 1909, the Standard Lumber Company operated four large mills within the CSWA area: Cold Springs, cutting 90,000 board feet per day; Empire, cutting 80,000; South Fork, cutting 4,000; and Knudsen's or "Lyons Creek" Mill, cutting 30,000 board feet per day (PCW&I 1909). On a roll, the Standard Lumber Company had rebuilt its newly acquired operation at Cold Springs and, in the spring of 1909 publicized that it had:

…secured 56 million feet of timber from the forestry dept. of the national government [Stanislaus National Forest] and the plant at Cold Springs will be run night and day this year with the cut expected to reach 28 million feet during the season.

The company's Empire mill... has a capacity of 80,000 feet per day... the output will be about 12 million feet this season.... From [Lyons Reservoir] extends the Empire City R. R., a narrow gage road running to Empire City, Lyons Creek and Cold Springs. This road has about 20 miles of track and also belongs to the Standard Lumber Company.

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[74]The sash and door plant also made wooden window blinds.

> The South Fork mill... with a capacity of 35,000 feet a day, will turn out about six million feet this year.
>
> The company's factory and door plant in Sonora is running time and a quarter making about 1,200 doors per day and the same number of windows. The company is working on a contract for one million oranges [packing crates] a year which started August, 1908 and will run five years. At present, shipments on this contract are being made at the rate of 200,000 per month (AL 1909).

As of 1910, about 40 percent of the Standard Lumber Company's cut was sugar pine; in addition to regional markets, some it was exported to Europe and some to eastern states. Sixty percent of the cut was white pine (AL 1910). A very large percentage of the Standard Lumber Company's product appears to have been reduced to fruit packing boxes, particularly for citrus. One of its clients, for example, the Orange Growers' Association specified the SLC would deliver 12,500,000 boxes made of white pine over eight years (AL 1911).

Reputedly owing to a dearth of level land for piling lumber, in 1909 the Standard Lumber Company purchased a large parcel, four miles east of Sonora. Establishing the company town of Standard City there, preparations were made to relocate its main sawmill and to gradually abandon its woods mills in favor of this major plant on the outskirts of Sonora. Though there is some conflicting information, it appears that the Cold Springs Mill was moved to Standard City late in 1910 (PWL 1911). For the 1911 season, the combined output of the Cold Springs, Empire, and South Fork mills was 35 million board feet. Plans for the new sawmill at Standard would dwarf these figures, with the modern double band mill capable of sawing 200,000 board feet per day: "This will enable lumber to be sawed throughout the year as the company's other mills are at such a high elevation, they are compelled to close during the winter on account of snow."[75]

Unnecessary at the woods mills but essential in the warmer, drier clime of Standard City, a log pond was also being constructed (AL 1911). Nearly as soon as the sawmill at Standard City was completed in 1912, plans were in the works for enlarging it (AL 1913). By 1914, the Standard City Sawmill was running summer and much of the winter and night and day; it turned out 220,000 board feet of lumber every 24 hours. The *American Lumberman* reported early in 1914 that, with "the output of the company's mill on the south fork of the Stanislaus River and that of the Standard mill, a total of thirty-two million feet was cut last season. The Standard Lumber Company has about 46,000 acres of timber holdings containing approximately 1,700,000,000 feet of timber" (AL 1914). In 1916, the company also finished constructing its new box factory at Standard (TT 1916).

[75]For indirect comparison, in 1910, the WSLC cut about 40,000,000 feet a year, from May 1 to January 1 (AL 1910).

In addition to all of these developments, the Standard Lumber Company had its eye on prime timber located between the middle and north forks of the Stanislaus River. Early in 1910, the SLC "closed a deal" in which it bought the Mackey & Day tracts. Aggregating 12,000 acres averaging from 40,000 to 50,000 feet an acre, the timberland reportedly constituted "some of the finest sugar pine timber on the Pacific Coast." Provocatively, this article also noted that, several years previous to this deal, "an attempt was made to procure permission to use the Stanislaus and Tuolumne rivers to float the logs to the San Joaquin River but the franchise was refused" (AL 1910). Ten years later, the SLC secured an additional 10,262.16 acres of the Mackey & Day timberlands in Tuolumne County from Mrs. Lavinia Day of Riverside, California (WCL 1920).

Though the Standard Lumber Company and, to a lesser extent, the West Side dominated logging activities in the CSWA area, smaller enterprises came on the scene and, relatively quickly, left. One such enterprise was reported in 1909 when Harry McCandless of Sonora and J. C. Simpson, a Fresno contractor connected with the Madera Lumber Company, bonded a 640-acre timber tract at Sammy Merrill Springs owned by James Burns of Soulsbyville:

> This property is situated on the Empire Mills road, twenty two miles east of Sonora and comprises one of the finest bodies of virgin forest in the country. It is estimated to contain twenty six million feet of timber, of which about one half is sugar pine and all of which is accessible. There is a good mill site and plenty of water. The promoters are endeavoring to interest capital for the speedy erection of a sawmill on the land.

In March 1916, it was reported that this new mill at Sammy Merrill Springs would begin cutting lumber that year (AL 1909 PWL 1911; 1916). Another example of a logging operation within the CSWA that functioned during the Standard and West Side lumber companies' heyday was that of the Clark Brothers of Sonora. Owning a tract of timberland on the south side of Mt. Elizabeth composed principally of sugar and yellow pine, within the boundary of the Stanislaus National Forest, the Clarks organized the Enterprise Lumber Company. With their portable mill having a capacity of 20,000 board feet per day, they began logging their estimated 4,000,000 board feet in 1914 (PWL 1914).

Also on the flanks of Mt. Elizabeth, T. H. Kewin, a Modesto banker, built his 10,000 board feet per day sawmill in 1920 (WCL 1920). Both Kewin and the Clarks were in business to supply boxes for fruit companies in the Central Valley. As reported by the trade journal, *West Coast Lumberman*, the Clark Ranch and Kewin tract were examples of "the several tracts of timber which have been sold this year to people for the erection of small mills which will be operated by fruit companies" (WCL 1920). This was probably also the genesis for the Nowell & Sylvester mill built in 1920 at Confidence that was reportedly equipped with a circular saw with a capacity for cutting 30,000 board feet per day (AL 1920). Even Charles Goelz and Jack Parsons, after using their Fageol trucks to haul lumber for other companies, tried their luck at logging. Early in 1919 it was reported that the two business partners secured an option on the Stinchfield timberland near Strawberry and intended to engage "in the manufacture and sale of timber next season (WCL 1919). Apparently contracting with the Standard Lumber Company, Goelz and Parson's mill was running in 1920 and was operated by the Standard Lumber Company. Goelz and Parson's trucks were then used to haul the lumber to the SLC's railroad, probably to Middle Camp (TWR 1920). A similar situation wherein the SLC ran a small, short-lived woods mill was its operation, at least for the 1920 season, of the new mill built for the SLC at the D. S. Williams Ranch near Jupiter, on Dry Creek in T3NR16E, Section 20 (WCL 1920).

To that date, 1916 marked an all-time high for timber cut in Tuolumne County. When the actual figures were tallied for 1916, the West Side had cut 55 million board feed (mmbf), contrasted with 40 mmbf in 1915; the Standard Lumber Company's cut of 40 mmbf in 1916 compared with 30 mmbf the previous year (AL 1916). By 1917, the SLC's box factory had a cutting capacity of about 75,000 board feet of lumber per day. The West Side's lands were stocked more heavily in the preferred sugar and Ponderosa pine, being about 80 percent pine, and equally divided between sugar and white pine (TT 1917). For the 1918 season, the SLC cut 24 million board feet of white and sugar pine lumber (AL 1918). In 1919, the SLC was projected to significantly increase its output, compared with the previous year, to 42 mmbf (AL 1919). But tragically for the company, the Standard Mill burned to the ground on November 20, 1919; the lumber saved amounted to about 20 mmbf, with the fire loss primarily limited to the sawmill (AL 1919). With a window of opportunity provided by its fire insurance, the SLC soon set out to rebuild its sawmill to a capacity one and one-half times larger than the one destroyed by the November fire (WCL 1919).

During this period, the Standard Lumber Company was undergoing great change. Bought in 1920, along with its subsidiary Sugar Pine Railway, by the Pickering Lumber Company from Pickering Parrish, Louisiana and with its corporate offices in Kansas City, Missouri, the new owners embarked on a series of strategic moves. One was to begin modernizing its field equipment; another was to push its railroad across the Middle Fork Stanislaus River. It also, like the SLC, pursued large timber sales on government land from the Stanislaus National Forest. Another such sale was consummated in 1920 when the company bought 3,000,000 feet of timber in a 120-acre tract, close to the logging railroad which the company had built in 1919 across the ridge from Jenness Flat, between the south and middle forks of the Stanislaus (WCL 1920).

U repared for administering industrial logging operations on this scale, early officials on the Stanislaus National Forest struggled. Reading correspondence from that period on this subject makes it clear that these officials were aware of being on the knife's edge: working with these large companies was seen as both a great opportunity for demonstrating the benefits of forestry as well as a great potential abuse by big business on land owned by the public. For at least a decade after the Stanislaus Forest Reserve was created, guidance to field officers was scant on how to regulate timber harvest. An interesting letter from the Chief Forester to an early Stanislaus Forest Supervisor, S. N. L. Ellis, reveals that the guiding principal for timber harvest was silvicultural considerations, watershed protection, and present and future demand. Apparently an answer to an inquiry from Ellis, the Chief Forester Pinchot stated:

So far as is expedient no sale of timber should be made unless the reasons for the sale are based on sound silvicultural grounds. After the Forest Officer decides that the timber should be sold, then the correct marking of timber is of the greatest importance. It is planned to have marking rules prepared for all Forests where they will be of practical benefit....I suggest that you have the marking taken up by Forest types. The rules should be brief and thoroughly practicable. Please consider, in detail, the silvical condition of each type, the location of seed trees, and the present and future demands upon the Forest. I need not remind you that the protection of the watershed, and the continuity of the Forest are of the utmost importance.... In order that these rules may be put into effect promptly, please submit them to the Forester at your earliest convenience (USDA 1907).

Defensible timber sales—sustainable and protective of forest resources—was a preoccupation with early twentieth century direction from the Washington Office. Acting Assistant Forester, William T. Cox, in a 1908 letter to Stanislaus Forest Supervisor R. W. Ayres made it clear that Ayres was personally responsible for achieving conservative forest management on the Stanislaus. Apparently in response to complaints that good forestry practices were not being put into action, Cox implored:

The necessity for conservative marking in timber sales has been called repeatedly to the attention of Forest officers, but the results thus far obtained in very many cases are not satisfactory either to the officer in charge of the Forest or to the Forester. It is seldom that a timber sale is found in which the character of the cutting has been such that we would care to show it to the general public as illustrating the conservative forest management for which the Service stands. The National Forests were created primarily for the perpetuation of the supply of timber.... The most important work in any timber sale is the marking of the trees to be cut.... [T]he one thing which for years to come will remain to show the character of the work and whether or not the cutting was a credit to the Service, is the marking.... Since the Forest Service has undertaken the administration of the National Forests the policy in regard to marking timber has steadily grown more conservative. As a rule, which while not applicable in every specific case, should control the cutting on each Forest as a whole, not less than one-third of the present stand of merchantable timber, exclusive of all young growth below merchantable size, should be left on the sale area. In a great majority of cases we should mark now with direct reference to a second cut within 30 or 40 years, when the demand for National Forest timber will be greatly increased....

I want you to mark personally a portion of the timber which is cut in every important sale on your Forest, and in this connection to thoroughly instruct the Rangers on the ground in the methods necessary to accomplish the desired results....You will be held strictly accountable for the proper management of the timber sale business on your Forest, and by your own participation in and close inspection of the timber sale work.... I want you to consider this question: Is the condition of the sales on your Forest such that you would welcome a personal inspection by the Forester? If not, it is essential that you direct the utmost energy of as large a part of your force as may be necessary toward improving these conditions, even to the detriment of less important work. I shall expect a reply to this letter not later than October 1, stating briefly what you have done to improve the timber sale work on your Forest in accordance with this letter (USDA 1908).

Fortunately, Ayres' response to Cox' letter survived and shows that the Standard Lumber and West Side lumber companies, though in full swing, at this juncture were primarily harvesting their own lands. Instead of complaining about the workload set in motion by these two, large, lumber companies for national forest timber sales and rights-of-way over national forest lands, Ayres calmly and tersely replied:

During the past season we have had only six timber sales, most of which have been dead timber for the purpose of cordwood, posts, etc, and nearly all of them have been for $50. or less.... I do not expect to have a sale of any size for green timber for the next five years. In the meantime I am planning to clear up the Forest by free use and by selling shakes, posts and other dead merchantable material to the axe and wedge men. We can accomplish good results in many ways by such sales, especially to the condition of the Forest and to the benefit of the local sentiment. Here big timber companies control the local markets and have enough timber to last them about twenty years longer. At present we could only sell them the timber from a few forties or eighties which are scattered among their own holdings, but they will not pay our prices (USDA 1908).

In 1909, the District/Regional Office had ruminated on figures provided by local forest officers and District Office examiners and calculated an allowable harvest for the Stanislaus that was thought to be a sustainable level. A letter from the District Office's T. D. Woodbury stated that:

The limitation of annual cut of green timber on your forest has been provisionally placed at 85,000,000 [board] feet. This figure represents 1% of the estimated stand of green timber on your Forest. No limitation is placed on the cut of dead and down timber (USDA 1909).

Though reluctantly, the Standard and West Side lumber companies both saw it to their benefits to pay for the privilege of logging national forest timber land through which their logging railroads necessarily had to pass. Just a dozen years after Ayres' response to Cox, the Standard Lumber Company, alone, was logging 60 million board feet from the CSWA area, requiring 150 man-days just for marking the timber to be cut from national forest land (USDA 1922).

The earliest reference regarding working circles found in the course of this research was by the District/Regional Office's T. D. Woodbury in 1909. In a letter to Stanislaus Forest Supervisor R. W. Ayres, Woodbury stated that the goal is for each forest in this District [Region] to have a detailed working plan and timber sale policy. Woodbury explained that one of the major aims is for each forest to be divided into "Blocks or Working Plan units, each of which presents its own problems and will eventually supply the demand for timber from a given limited area." The final step is "[a] complete detailed, scientific plan of management." Timber sale provisions could then be tailored to the conditions presented in each block (USDA 1909).[76]

In accord with Regional/District Office direction, the Stanislaus carved itself into six "blocks." Primarily designated in order to facilitate timber sale management, these large areas were designated the Cow Creek, Tuolumne, Merced, Jawbone, Calaveras and Mokelumne blocks. In 1910, the characteristics of the Cow Creek Block within the CSWA area were described as…

closed to exploitation by a great tract of alienated timber lands lying just within the boundary. Timber cutting has been carried on here for the longest period of any part of the Forest and the lumber companies are now at the outer edge of a solid body of timber which is the chief asset of this Forest. A large part of this body contains mature and over-mature timber which should be removed as soon as possible. Unfortunately there is only one company to whom we could sell this timber [Standard Lumber Company]. However, there is no reason why the Forest Service should not make sales to this company so long as the business can be transacted in a satisfactory manner (USDA 1910).

The timber sale business on the Stanislaus was clearly throttling up and the District/Regional Office was putting on the pressure to increase timber sales. In a 1910 letter to Forest Supervisor R. W. Ayres, Swift Berry—a name to become well-known for his 1917 study of lumbering in the sugar and yellow pine region of California—took a decidedly more aggressive position regarding the level of timber harvest than the more conservative approach urged by William Cox just two years earlier. Berry wrote:

It is very desirable that the sale of timber from the Stanislaus National Forest be increased during the coming fiscal year. A revision of stumpage rates for the fiscal year 1911 has resulted in a general cut, which should remove one difficulty of making sales. It should be borne in mind that although we are charged with the protection and husbanding of the National Forest resources upon each Forest, it must not be overlooked that these resources should be made as productive as possible. At present a great deal more timber is rotting in the woods that [*sic*] we are cutting and it is important that an effort be made to dispose of this surplus. In attempting to increase the amount of sales, the necessity for proper timber sale management should not be overlooked (USDA 1910).

Interestingly, Berry's statement was made given a drastically reduced limitation on the annual cut of green timber for the Stanislaus National Forest, provisionally placed at 47,000,000 feet board for fiscal year 1911, compared with 85,000,000 board feet for 1909. Because the large timber companies were, at that time, still logging primarily on their own lands or on privately held lands on which they purchased stumpage, Berry predicted "At the present rate of demand for timber upon your Forest, it is doubtful whether this limit will be even approached. No limitation of the cut of dead and down timber is made" (USDA 1910).

[76] Cow Creek Block appears to be the first such unit on the Stanislaus to be identified and timber data collected for it.

Possibly responding to criticism from the District/Regional Office regarding the Stanislaus' blocks or working circle designations, forest officials had lumped the six into one, explaining that its "Stanislaus Working Circle…"

comprises the entire Stanislaus National Forest. So far there is only one outlet for this Forest, the railroad from Oakdale to Sonora, and for some time to come all development will be tributary to it. Therefore it does not appear advisable to split the Forest up into more than one working circle at present.... Protective forests occur at the headwaters of the Mokelumne, Stanislaus, and Tuolumne Rivers. These stands contain at least 400,000,000 feet board measure, which cannot be considered in calculating the average annual growth.... Conditions for growth are quite good upon the Stanislaus and it is estimated that the annual rate is equal to 1 % of the growing stock. The merchantable growing stock yet below maturity is estimated to be 2,365,037,000 feet board measure.... The present local consumption is about 10,000,000 feet B.M. per annum. Practically all of this is purchased from the mills cutting on private land. Due to the fact that all of the more accessible timber is privately owned, this condition will continue for some time. The amount cut under timber sales this fiscal year will not exceed 500,000 feet. During the fiscal year 1910 the amount of free use material given was 164,000 feet.... The total estimated stand within the Stanislaus Forest is 4,776,377,000 feet B.M. Of this amount 400,000,000 feet is comprised within the protective areas, 437,640,000 feet is over mature and 1,571,700,000 feet has reached maturity. The remainder of the stand or 2,365,037,000 feet is considered to be below maturity (USDA 1912).

In 1912, the state conducted a study of cutover lands and utilization that appeared in the *Fourth Biennial Report of the State Forester*. In this investigation, the logging practices of the Standard Lumber Company were described in detail, just before its new mill in Standard City was up and running:

> Trees are felled, limbed, bucked into logs and yarded to the chute by means of donkey engines. From here the 'log trail' is pulled down the chute by the bull donkey to the landing, and either rolled directly to a car and pulled up an incline to the log dock in the mill and sawed into lumber, as at the Cold Springs mill, or is loaded onto a narrow gauge car, hauled to the mill landing and rolled into the mill on the log deck and sawed, as at the Empire mill. The company has no log pond, but washes the logs by means of a 2-inch fire hose. A minimum diameter limit has been established, below which no trees shall be cut.
>
> Pine is logged exceedingly close, but white fir and cedar is generally left unless special orders are received for cedar ties. A second cut is not contemplated, so no rotation of crops has been established, and the annual cut is made without reference to the increment. The chief waste noted on this tract was that of the chute poles. No effort is made to choose non-commercial species for these poles. Many good sugar and yellow pine logs are used and then left to decay in the woods when operations cease....

> [T]he timber is being closely utilized. Trees are carefully felled in order to smash as little as possible and the tops are taken down to a diameter of ten inches. Very few merchantable sections have been left in the woods. Stumps are cut down to a height of 18 to 20 inches. As would naturally be expected with steam logging, this area is considerably torn up by snaking the logs from the woods to the chutes. On their own lands, the company pays no attention to second growth or reproduction. Yarding lines are strung with the view of reaching the greatest number of logs from a single setting. This practice naturally causes considerable unnecessary damage to seedlings, saplings and poles.... [N]othing smaller than a tree 10 inches in diameter is looked upon in the nature of an obstruction. This form of damage can be practically eliminated by a more judicious selection of donkey sites and by more frequent settings (CA 1912).

Remarking on the quality of the timber and reproduction in the area logged by the Standard Lumber Company, the State Forester observed that:

> No extensive body of fungi killed timber was found.... Cedar, however, is in bad condition, but this is a general defect that exists pretty much throughout its natural range in California.... Forest insects, detrimental to standing timber, have destroyed no timber worthy of mention. Various species of bark borers were noted in individual trees....

A study done on SLC lands found that from 50 to 75 percent of the reproduction was destroyed during logging operations. A table in the fourth biennial report summarized these findings. In summary, the State Forester's review of logging by the Standard Lumber Company on its own lands critiqued that:

Forestry is not practiced by this company. The cut is made without reference to yield. The lands are not adequately protected from fires, and no rotation of crops is carried on. No attention is paid to the producing of a second crop, and no seed trees left to reseed the land. Natural reproduction is excellent in this locality, and an adequate system of protection would be sufficient to insure at least a fair future stand of timber (CA 1912).

In a review of the West Side Lumber Company, the State Forester observed that the West Side was leasing its cutover land to ranchers for grazing purposes. Reporting that the company had about 10,000 acres leased for grazing, it was also noted that there was now an alliance between the stockman and the forester who opposed burning cutover land and assisted in fire detection and protection. Noting that West Side's operations were now proceeding north into Townships 2 and 3 North, Range 17 East, the State Forester reported that up to 1905 or 1906, the company logged under a selection system whereby only the largest and best trees were logged. This left a "good pole stand, with an abundance of reproduction." Since then, the company adopted cutting smaller diameter trees and as a result, "in a region where white fir and yellow pine are about on a par for predominance in the forest type, white fir and cedar are forming the principal components of the second crop" (CA 1912).

In 1916, the Stanislaus Land Classification Atlas noted that the forest's resources, with the exception of grazing, were not fully utilized. This applied…

> especially to timber, there being large bodies of private land lying nearer to the market, which will first be exploited before the Government timber becomes an important economic factor. The estimated stand of timber on this Forest is 7,504,300 M. ft. B.M. At a conservative average stumpage valuation of $1.50 per M., this represents a resource of about $11,256,500....
>
> The private timber in the north and south has not been touched, and it is difficult to say when this or any other private timber will be entirely used up, owing to the fact that timber from Oregon and Washington can be brought down very cheaply by water and comes into competition with the Sierra timber in the San Joaquin valley. At present the local companies depend a good deal upon foreign markets for their best trade. This fact may retard the cutting of local timber (USDA 1916).

By 1920, Stanislaus officials obliged District/Regional Office timber management leadership and again hewed working circles or blocks.[77] One of these was the Mt. Elizabeth "small working circle." An early 1920 description of the activity within this area provides a window into the character of the landscape and the timber sale workload in this vicinity during this period:

> [o]nly a small amount of this business is transacted, permits being issued to a few local settlers for posts and a small amount of shakes. This contains timber that is tributary to a community of ranches, the town of Soulsbyville and several mines.... Two small [saw]mills have been operating in this region.... [This area is] in the southern part of T.3 N., R. 15 and 16 E., on the north slopes of Mt. Elizabeth. It does not extend quite to the South Fork of the Stanislaus as the slopes are too steep and the timber is of poor quality. About 3200 acres are included in this working circle. A cruise of it shows that the species run:

Sugar Pine	33 per cent
Yellow Pine	57 per cent
Douglas Fir	6 per cent
Incense Cedar	4 per cent

[77] Later, the Stanislaus was divided into seven "working circles." Those within the CSWA were Rose Creek, Stanislaus, and the Tuolumne. By 1955, the seven working circles were consolidated into four, individual working circle plans were nearly complete, and all were expected to be approved by January 1956 (USDA 1956).

> It is probable that the percentage of sugar pine is too high and that of cedar too low. Also, a small amount of white fir is present but of no commercial importance. The general average would be 15,000 feet per acre (USDA 1920).

From the top, down, Forest Service officials were highly concerned with what was believed to be imminent timber famine. Indeed, the genesis of the agency was underpinned with this fear and a resolve to take action to prevent it. The Forest Reserves were to be places where scientific management brought a bounty of perpetual timber resources for the public. California, moreover, was viewed as a key ingredient of this redemption. Forest Examiner Edward Munns, in 1920, outlined a plan for implementing tree culture methods in California that would work toward that end. Munns warned:

We will, in a very short time, be face to face with the timber shortage of which a great deal has been said and written but to which we have given relatively little concern until the past few years. The part that California will play in tiding over the country in this crisis and what we will be called upon for, is no longer a mythical or an intangible thing.... [W]e should have some basic knowledge of what we can expect from our stands.... The yields from thinning at different stages in the life history of the stand are needed to help determine the area to be set aside for the operation, the size of the working circle, the length of the rotation, the system of roads, and methods of logging (USDA 1920).

Munns' 26-page paper laid out a plan for using thinning as a cultural method. It involved choosing the study stands, knowing their history, noting the site condition, mapping, photographing, marking and measuring the stand before harvest. After a harvest method has been determined and the cut completed, periodic examinations and re-measurements, cost-benefits, reports, and plan revisions should be made... much like today's "adaptive management." Local forest officers were to select the locations best suited to the study (USDA 1920).

As various timber-marking methods were put into practice and the outcomes observed, they were adjusted to local characteristics. Forest Assistant M. R. Brundage had been invited to the Stanislaus to assess the post harvest conditions on old timber sales to the Standard Lumber Company harvested from 1913 through 1916, all within the CSWA area. In his memo to the Stanislaus Forest Supervisor, Brundage stated that all the areas he looked at were prime timber growing land and had been marked using the rules for 1905-1909 and 1910-1918. He stated:

The most striking feature on all the areas examined was the leaving of mature and even over-mature trees for seeding purposes. So far as I could observe, the reservation of these veterans was not justified in any instance by the reproduction which followed. In every case, the ground surrounding these seed trees was more or less densely covered with bear clover and seedlings which could be credited to the trees left were exceedingly rare or entirely absent. As a general conclusion, based on the conditions noted above, I would say that it is useless to leave an individual mature seed tree when the area of bear clover surrounding it extends for a radius of 100 feet or more from the base of the tree. In other instances I noticed that it would have been possible to plow up certain areas of brush and bear clover through the judicious thinning of groups which had been left in their original crowded condition, that would have resulted in the preparation of a larger area of good seed bed. Each of the areas examined affirms the much argued statement that new reproduction cannot obtain a foothold on areas thickly covered with bear clover and I believe the timber marker can combat this evil to some extent. Thinning of blackjack groups would also have resulted in an increased increment per cent, tho I believe we must proceed with great caution in this thinning process where heavy [steam] donkeys are used for skidding (USDA 1922).

Clearly struggling with the disjuncture between direction to the field officers and field realities, Brundage also noted that Regional Forester S.B. Show and Research Forester Duncan Dunning were mindful that pine production should not be the only object of silviculture:

As Show and Dunning have pointed out, markers have been too prone to attempt an increase in percentage of pines and in so doing have produced an unnatural condition which has resulted in no reproduction whatever (USDA 1922).

A year later, Brundage examined several more old sale areas within the CSWA area that had been logged by the Standard and the Madera Lumber Companies as well as sales logged by the California Peach and Fig Growers in what is now the Camp Mather – Middle Fork Tuolumne area. Referencing his earlier visit to the Stanislaus, he cited many of the same faults that inhibited good, post harvest tree reproduction: leaving over-mature trees for seed and favoring pines by removing cedar and fir that were needed for seed and shade. Brundage optimistically believed that the “mistakes of early timber sale marking have all been corrected by the latest rules.” The bear clover dilemma, however, still vexed him, and he saw no way that the situation could be significantly changed through sound marking procedures alone. Brundage also noted areas where a lack of reproduction was due more to a lack of soil cover than to lack of seed trees that, in turn, he attributed to improper slash disposal.

In some forties, especially the poorer sites on south exposures, the logging debris, if scattered and laid close to the ground, would have offered the necessary shield against too rapid evaporation in the spring and as a consequence the seedlings would not have been cooked by the early summer sun. The Kewin sale [near Mt. Elizabeth] is a striking example of this seedling loss due to lack of mineral soil cover.... On some of the old Standard areas... no reproduction has come in because of absence of a protective covering tho' dead seedlings may be found and good seed trees are nearby (USDA 1924).

The Stanislaus officials to whom Brundage’s memo was addressed apparently thought little of his conclusions, believing them to be an over-simplification. A handwritten note at the bottom of the memo read: "Doubt if failure of reproduction in such sites is as simple as this."

Inspections by District/Regional Office specialists of the national forest operations (and by Washington Office specialists of District Office operations) were the primary means of assuring that the intent of agency policy was being implemented on the ground and that there was a semblance of consistency in administration among forests. Some earlier inspectors' notes have survived and provide a more informal view of some of the issues that were being debated. One such set of notes is by an inspector from the District/Regional Office by the name of Eldredge. In spring of 1922 he inspected timber operations on the Stanislaus, working with Forest Supervisor J. V. Wulff.[78] Eldredge wrote:

Woodbury, Wulff and I discussed management plans from time to time during my stay on the Stanislaus, and later in Fresno Wulff and I spent the greater part of one night on the subject. I was preaching the doctrine of simplicity and practicability. Wulff, I thought, was inclined to make a great bugbear of management plan work, very largely because he didn't know exactly what we wanted, and, furthermore, had not sifted out of the mass of details involved the few simple essential factors that really are the basis for the proposed line of action....

> A most interesting plan... is the one for the [Cow Creek] working circle in which is located the holdings of the Standard Lumber Company. Wulff had proposed to sell to the Company as needed all intermingled Government timber, about 2,000,000,000 feet, on condition that the timber owned by the Company be put under management and thrown in with ours for sustained yield. I suggested, in lieu of this plan an exchange proposition, the Government buying the Company's cutover lands with our timber on a sustained yield basis, the Company to leave their cutover lands in condition for a second cut in from 30 to 50 years. I believe that Wulff finally agreed that the second plan was perhaps the better one (USDA 1922).

Wulff and Eldredge's ideas were prescient, with pre-harvest exchange agreements implemented for considerable land acquisitions on several national forests at least by the 1930s. But for the early 1920s, this bold idea was stifled. In a letter from Assistant Forester E. E. Carter to the District Forester, Carter cautioned:

It is the Forester's policy at present to develop the exchange work cautiously, working chiefly for the aquirement [*sic*] of low-priced Federal land bearing natural reproduction; and while he would undoubtedly consider specific cases of proposed exchanges which involve timber rights with provision for the leaving of the area in good condition for future production, it is my guess that it will be some years before he would want to undertake exchanges of the size premeditated in Captain Eldredge's discussion… [The

[78] J. V. Wulff was supervisor of the Stanislaus National Forest from 1919 through 1926. In about 1927, Wulff left the Stanislaus to work as the Pickering Lumber Company's first forester at Standard.

Forester] feels that the start should be made in exchange work on clear-cut cases involving the acquisition of restocked cut-over lands, without complications (USDA 1922).

This pre-harvest exchange agreement idea, nonetheless, gathered a measure of momentum. In a July 24, 1922 letter from M. R. Brundage, acting for Wulff, to the District Forester, it was suggested that the Forest Service requirements for such cutover lands be obtained through exchange, stipulating that "the main features should be cutting nothing below a certain diameter limit, probably 18"; removal of snags; cutting of mature fir and cedar as well as mature pine; piling of brush and limitation of lead to 35 feet" (USDA 1922).

Sustained yield timber management and its connection with possible land exchanges with the large timberland owners on the Stanislaus National Forest continued to occupy the thoughts of local and District/Regional officials. Each national forest was required to set and keep its course by reference to a "policy statement" that was to be, periodically, revised. The policy statement would articulate the desired general direction for various aspects of forest management, and also meld the general principals into more detailed goals specified by working circle or block. Though the Stanislaus National Forest's actual policy statements for the mid-1920s have thus far not been located, correspondence responding to the policy statement hints at its content and flavor. Assistant Forester John Presto, reviewing the Stanislaus policy statement for the District/Regional Forester, questioned the Stanislaus' contention that in "only one working circle is there a real prospect of sustained yield management in cooperation with the operating lumber company."[79]

Naming the Stanislaus River Working Circle, Stanislaus officials apparently identified the Standard Lumber Company, as the only timberland owner with whom they worked that was "favorably inclined towards cooperation with the Forest Service to put the entire working circle under sustained yield management." Preston sympathized with the difficulties Stanislaus officials expressed concerning logging engineering and the complications interjected by an unwieldy land ownership pattern. He also appreciated the Stanislaus officials' contention that economics and logic suggested, "the Government and private timber should go out together." But, responding to the apparent suggestion that an ambitious stumpage for land exchange program be initiated along the lines promoted by Wulff and Carter, Preston balked; suggesting that a stand pat policy might go farther toward the goal of sustained yield. He worried that the direction promoted by the Stanislaus would give the Forest Service…

[79] In a February 24, 1927 memo to the District Forester, Forest Supervisor J. R. Hall remarked: "The present policy of the Yosemite Lumber Company is not to consider a future stand at all. Its logging is usually entirely destructive...." The YLC operated in the Merced River watershed and was one of the three large-scale railroad-logging companies that operated on the Stanislaus National Forest.

no guarantee that the private owners would actually cooperate in working out a sustained yield management, but only to the extent of logging the Government timber as it is reached in the course of exploiting the private timber (USDA 1924).

Additionally, the policy statement for the Stanislaus River and Cow Creek Blocks proposed to cut Government and private timber at the rate of 75,000,000 board feet per year for 24 years of an estimated volume of over 1,000,000,000. After that period, it was expected that the Standard Lumber Company would "remodel its mill and continue operating on a sustained yield basis at the rate of 35,000 M feet." This presupposes, reasoned Preston, that:

the cutting of private lands [would be done] in a way to keep them productive and to permit… a second cut. However, the plan also contemplates the removal of all or nearly all of the Government timber in the two blocks during this first 24-year period, leaving the Company to operate at the reduced rate in its own timber following this period. Is not this a rather slender thread to depend upon? When the Government timber is gone, is there any real reason to even hope that the Standard Lumber Company will voluntarily reduce its output at a time when its own timber, with accumulated carrying charges and silvicultural deterioration, is demanding a rapid cut? (USDA 1924)

Preston was willing to entertain the Stanislaus' proposal to sell government timber in the Cow Creek and Lyons Dam Blocks, but urged officials to "withhold the Stanislaus River Block unless or until the Standard Lumber Company furnished the Forest Service with a real binding guarantee that it would manage its own lands in accordance with some standard of silviculture approved by the Forest Service." Preston's twist to the approach proposed by Wulff and Carter was to add that the lumber companies make a public oath:

As I see it, this guarantee should take the form of some such exchange as you have mentioned... of a sizable block of its holdings, together with a public announcement committing the company to the policy of cutting its lands with a view to a second cut operations (USDA 1924).

In closing, Preston warned against emphasizing land acquisition over attaining sustained yield:

If the lands privately owned are cut so that they will produce another crop of timber, it matters little whether the ownership is in Government or private hands (USDA 1924).

The District/Regional Forester took Preston's corner, sending his comments on the Stanislaus' policy statement to Forest Supervisor Wulff. Wulff wasted no time in responding to the rather limp idea that a public oath would have the intended outcome:

I cannot see that this guarantee would be strengthened any by a public announcement by the company of their intentions to manage their lands according to practice approved by the Forest Service. The present company may live up to this announcement and their successors might repudiate it, therefore, I much prefer some guarantee which is more tangible and binding in itself, such as land exchange.... [Further,] I cannot see how the government would benefit by withholding the Stanislaus River Block from sale, the most isolated and difficult one from a transportation standpoint, and placing the Cow Creek Block on the market (USDA 1924).

Wulff argued that the government land in the Stanislaus River and Cow Creek Blocks totaled 56,520 acres and that if the Stanislaus acquired, through exchange, the private lands in the Stanislaus River Block, it would have a total of 62,640 acres. Allowing for growth of 250 board feet per acre per year, it would have a total of only 15 million feet allowable cut per year from this block. It was questionable to Wulff whether that was a sufficient annual cut to profitably operate these two areas. Wulff implored that Preston and the District/Regional Forester reconsider their position, illuminating the fact that the Stanislaus National Forest's holdings merely augmented the Standard Lumber Company's operations…. "On the other hand we do need the cooperation of the company to log the private lands under proper management if we are to place the area under sustained yield management.... I believe that the major portion of the lands in this working circle should be under one administrative control, namely the Government, and that the acquisition of patented lands within this working circle is very essential for future management purposes" (USDA 1924).

Wulff had an ally in the District/Regional Office in the person of T. D. Woodbury. He agreed with Wulff that reaching pre-harvest exchange agreements with the Standard Lumber Company were the way to go for achieving sustained yield management in the area instead of informal agreements and assurances by the company. Woodbury also said that an essential step was a management plan that comprised both the privately and Government owned lands...

> The Standard Lumber Co. needs the remaining National Forest timber in the Cow Creek Block very badly. This timber should be used as a lever to get silvicultural practices in effect in the Company's lands in accordance with an exchange agreement. After the Cow Creek Block has been cut, the next natural development will be in the Big Trees Block if the Company goes across the middle fork of the Stanislaus River as they contemplate.... To allow for offering this timber for sale, it might be well to provide that not over 10% of the timber in the Stanislaus River Block will be offered for sale until the cutting in the Big Trees Block has been completed.

A January 17, 1925, letter to the District Forester finally approved the revised Stanislaus Policy Statement approved by the Forester. This cleared the way for developing management plans geared to achieving sustained yield management in the working circles. By a January 28, 1925 letter to Wulff from the District Forester, Paul G. Redington sought to both rein in and encourage Wulff's charge toward a large program of pre-harvest exchange agreements by directing that:

> Management plans should be prepared for these working circles before any negotiations are undertaken for large sales. Future large sales will be

> contingent upon such land exchange agreements as are determined to be necessary to insure sustained yield in these working circles.... As you have pointed out, the Punchbowl sale offers an opportunity to negotiate a land exchange agreement with the Standard Lumber Company. I trust you will make every effort to consummate such an exchange (USDA 1925).

Assistant District Forester Kneipp, a few days tardy in providing his review for the District Forester of the Stanislaus general policy statement, nonetheless provided perspective on this question of pre-harvest land exchange agreements. Kneipp wrote that the general policy for managing timber on national forests, which contained large bodies of alienated land, was…

to start with the possible sustained yield from the Government lands and then to try to reach amicable agreements with the private owners under which the advantages of sustained yield, both to the public and to the owners, will be secured, on the basis of all the land in the working circle. The consolidation of the Government's holdings by exchanges is often a logical part of such a program and has advantages of its own to the private owner who, by this means, can cash in on an often otherwise frozen asset (USDA 1925).

If such agreements are made, Kneipp counseled, the placement on the market of specific national forest timber was all in the timing. If national forest timber was adjacent to private timber planned for logging and which could be easily adapted to the operator's logging developments, they would be more inclined to be induced by a sustained yield pre-harvest agreement. But, Kneipp cautioned, if those advantages were insufficient to secure such an agreement, the Forest Service must protect, through its own land and timber ownership, the public's interests, particularly the local or regional public. Kneipp further explained that, within a working circle, the point was to keep abreast of what was happening on all the land—including private holdings—and to adjust harvest on national forest land in order to assure "continuity of output" and, when appropriate, to consummate land exchanges.

Stanislaus officials had been frustrated by verbal assurances from the Standard Lumber Company that were set aside when unforeseen contingencies arose. Assistant District Forester Woodbury reported one example in a memo for the files while the pre-harvest exchange proposal idea was being bandied about. The contract with the Standard Lumber Company for the Punch Bowl area had allowed three years for removal of the timber. The understanding was that "not over 25 or 30 million feet a year would be cut" in order to align with the principles in the Stanislaus policy statement. The company, running two camps in the area, reneged on its agreement and was, instead, projected to cut about 35 mmbf for the season. Wulff met with Standard's General Manager, D. L. Steinmetz to argue for reducing its harvest. But Steinmetz simply countered that it was necessary for the company to harvest heavily and to remove its railroad steel after also harvesting its upper Herring Creek unit, just east of the Punch Bowl.[80] The steel was to be used to cross

[80] In his "Report on Timber Inventory of Herring Creek Logging Unit," Forest Examiner Everitt stated that the Herring Creek Logging Unit was in the Cow Creek Block of the Stanislaus

the Middle Fork Stanislaus; the steel to Camp Fraser was to be left so that the company could go up the South Fork Stanislaus into the southern portion of the Cow Creek Block. Underscoring Wulff's earlier position that the company was not at all dependent upon timber in the Stanislaus River Working Circle, Woodbury anticipated that, overall, the total cut from Government land in the Stanislaus River Working Circle would be less than that outlined in the Stanislaus' policy statement (USDA1925).

In a December 1, 1925 memo to the District Forester from J. V. Wulff, Stanislaus Forest Supervisor, it was reported that, at the end of the 1925 season, 16,410 acres had been cutover on the Stanislaus National Forest. Referring to the West Side Lumber Company as the W. R. Pickering Lumber Company and to Pickering's Standard operation as the Standard Lumber Company, during the summer of 1925, Stanislaus forest officials had completed fieldwork for proposed sales to the W. R. Pickering Lumber Company for the next two years, for the Standard Lumber Company, Yosemite Lumber Company for the next three years as well as reappraisal data on the W. R. Pickering Lumber Company Hull Creek chance (USDA 1925).

As directed by the District Forester's approval of the Stanislaus policy statement, the Stanislaus took steps to consummate an experimental pre-harvest exchange agreement with the Standard Lumber Company involving one section in the Camp Crandall area of the Lyons Dam Block. In a letter to the Forester from District/Regional Forester S. B. Show who was closely tracking these developments, Show reasoned:

If they are unwilling to leave the necessary reserve on their lands, voluntarily or through land exchange inducements, then very evidently sustained yield on the basis at present contemplated cannot be brought about (USDA 1926).

Although Show reported to Forester William B. Greeley that he could not thoroughly endorse the Stanislaus' management plan due to "weak stand and growth data," the plan was nonetheless adequate as a basis of discussion for various objectives. He further noted that cutting on both private and Government lands should not exceed 65,000,000 a year,

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Working Circle. The merchantable timber acreage in the unit was 1,381. The timber sale, designated 1/20/26, was to the Standard (Pickering) Lumber Company. The estimated volumes in the contract were:

Sugar pine	10,100 mbf
Western yellow pine	14,500 mbf
Fir	7,200 mbf
Incense cedar	2,800 mbf

Logging commenced April 1926 and was completed September 1927. A jack-line system of donkey logging was used on the whole area. The sections in the sale were 2, 3, 9-11, 15-17. In Section 11, for example, on its 303.5 acres, an average of 7,330 board feet per acre were left, primarily in fir and cedar.
There was an overrun in the cut that was due either to problems in the original cruise or to cutting 181 acres designated as optional in the contract. The total cut was 44,735,000 board feet.

which has been the approximate annual cut of the Standard Lumber Company mill during the past few years (USDA 1926).

Forest Examiner John S. Everitt reported upon the experiment in the Camp Crandall area of the Stanislaus River Working Circle in January 1928. Titled "Report on Modified Forestry Practice on Private Land, Experiment Tried by the Pickering Lumber Company," Everitt explained that, in order to prevent a heavy reduction in the annual cut on the Stanislaus Working Circle at the end of the first cutting cycle, an attempt was made to encourage the Pickering Lumber Company to institute a few essential forestry practices on their own land. The original plan, worked out by Brundage in 1926, contemplated an experimental exchange on 320 acres of Pickering Lumber Company land. On this Pickering land, the following forest practices were to be used: 20-22 inch diameter limit; marking for leaving residual trees 20" diameter for seed or reserve stand; leaving a reserve stand after logging of about 2,000 board feet per acre; snag and brush disposal; and protection of the reserve stand during logging. The results were disheartening. "For various reasons the exchange did not go through," though the PLC indicated a desire "to give the forestry practices a trial." After marking was done, Everitt judged that "by the appearance of the area after logging no precautions were taken to protect the young growth or reserve trees during logging.... It is the announced policy of the Company to protect the young growth in logging. In actual practice in the woods the carrying out of this policy seems to be left to the hooktenders. Certain hooktenders protect young growth where they can without falling down in production. There are few if any settings that are left in such shape that they will produce any cut for the second cutting cycle."

The result was that a reserve stand of 1,407 board feet per acre was left, brush was piled and burned, and snags were felled. Further, the "management plan for the Stanislaus Working Circle calls for an annual cut of 75,000 M ft. for the first 15 years. The management plan has been in effect for two years. The average annual cut for the two years is a little over 82,000 M ft." Though disappointed in these results, Everitt consoled himself that the effort was a step in the right direction (USDA 1928).

Everitt also conducted a post harvest examination in the Punch Bowl sale area logged in 1926 by the Standard Lumber Company. Running a strip 100 chains long to determine the losses to residual trees following logging, it was apparent that Everitt had incorporated some of Brundage's 1922 advice—that is, to leave non-pine to help shade reproduction—was taken to heart:

Fir formed over 50% of the stand and the marking policy was modified somewhat so as to leave all the fir possible.... The total stand left per acre after logging was 11,675 board feet. The composition of the reserve stand was: western yellow pine 26%, sugar pine 14%, white fir 47%, red fir 12%, and incense cedar 1%.... Losses in volume amounted to 2,046 board feet per acre, or 17.5% of the stand. Ninety per cent of the loss was found in the fir species.... Windfall accounted for 87% of the total loss.... The loss due to windfall occurred during the winter of 1926 and 1927... (USDA 1929).

The correspondence regarding the Stanislaus' efforts to win the Standard/Pickering Lumber Company over to practices it calculated would result in sustained yield forestry shows a distinct pattern of hope, disappointment, flickering hope, and resignation. By 1929, a memo to the Forester from Assistant Forester E. E. Carter regarding the management plan for the Stanislaus-Tuolumne Working Circle, heartily recommended approval:

I regard this as one of the most important management plans which has been presented to the Forester for some years. The outstanding features of the plan are the combination in one working circle of the areas tributary to the two logging operations of the Standard Lumber Company, the abandonment as impossible at this time of all attempts to get the Company to reduce its total cut to the sustained yield possibilities of both the Government and private holdings within the working circle, and a plan for holding the best block of Government stumpage, east of the main body of private holdings north of the Middle Fork of the Stanislaus River, while the Company operates in the almost solidly privately owned lands to the westward. As the plan states, we shall undoubtedly be under severe pressure to sell to the Company in the near future that portion of this reserve area which contains a high percentage of pine (the lower portion of the Smoothwire subcompartment).... I feel that the recommendations of the District should be approved and that this pressure should be resisted (USDA 1929).

The Forester responded with his approval of the plan and noted:

The refusal of the Standard Lumber Company [Pickering] to consider reducing their cut leaves us, to my regret, with no alternative but to do the best we can with the Government owned timberlands in this working circle, in the hope that the Company will either become more cooperative or that land exchange will ultimately give the Forest Service control of more of the productive area of the working circle. Your plan for prolonging the cut of Government timber meets with my approval (USDA 1929).

1931 to 1958

Prized for its qualities including large size, scarcity of branches, straight grain, minimal taper, and beauty of the wood, sugar pine from the CSWA area was a well-known commodity. Land administered as the Stanislaus National Forest was recognized for its fine stands of sugar pine. Although not nearly as abundant as yellow pine at the lower elevations and firs at the higher ones, from 4,000 to 7,000 feet, "the sugar pine reaches its best development both as to size and quality of lumber, although it never equals yellow pine or fir in amount in the stand. The incense cedar has also been found to be of better quality here than elsewhere" (USDA 1916).

During the Great Depression, the Stanislaus hosted dozens of Civilian Conservation Corps camps. In addition to firefighting, fuel break and road construction, and a variety of other tasks, enrollees were also used in timber stand improvement projects. One, under the auspices of the Emergency Conservation Work program, used CCC boys from

Strawberry Camp.[81] The purpose of the project was to release sugar pine seedlings from competition from white fir and incense cedar and to produce as many well-spaced, dominant sugar pines as possible in the Old Miner's Ditch Sale logged by the Standard Lumber Company in 1921-1923 using high speed steam donkeys. The project started August 1933 in the SW of Section 4 and went into the NW 1/4 of Section 9 in T4NR18E. The original stand was estimated to have been 40-50,000 board feet per acre; the residual stand was 10-12,000 board feet and was 75 to 90 percent fir and cedar with a maximum of 10 to 15 percent sugar pine. Some reproduction had come in since it was railroad logged before 1923, but primarily this was in the old grades and cuts. Slash was lopped and scattered at the time of logging. Under Brundage's study, the area had been intensively protected since logging resulting in no fires; additionally, no insect infestations were observed.

At the conclusion of the work, 223 acres were covered and 6,733 sugar pines were released. In doing so, 44,333 trees were cut, or 198.8 per acre. The majority cut were white fir and incense cedar. Disappointed in the production aspect of the work, the project leader complained: "In the main, the CCC boys were just out of high school and did not consider the work seriously. They were inclined to be careless on their work unless watched continuously" (USDA 1934). Several other stand improvement projects and studies were conducted through the 1930s in the Old Miner's Ditch Unit, including one to determine the effectiveness of stand improvement work done in young even-aged, mixed conifer stands of advance growth that had become established in the larger openings of the virgin stand before logging and to determine whether the intermediate and suppressed trees were neutral in their effect on the thinned stand. (USDA 1934). Another 1934 study in this same area released sugar pine, ponderosa pine and incense cedar seedlings and saplings from competition with each other or white fir and to stimulate the growth of dominants of all species by thinning. Brush had come in on the upper and dryer slopes of the area logged during 1920 through 1923. Under groups of large trees the reproduction was growing slowly. The Standard Lumber Company logging had destroyed some of the advance growth and reduced the size of the groups. The overall results of this project on 560 acres was the release of 77,775 trees: 20 percent of these were sugar pine, 11 percent were ponderosa, 40 percent incense cedar and 29 percent white fir (USDA 1934).

By 1940, the Stanislaus National Forest was acquiring large tracts of cutover land from the large timber companies. Supervisor J. R. Hall conveyed that timber management and land acquisition should be correlated... "the attempt should be made to connect each timber sale with a land exchange. The ideal would be to confine sales and exchanges to the same working circle especially in the case of the large lumber companies whose lands adjoin blocks of Government timber." The working circles in 1940 were: San Andreas

[81] A CCC camp closer to their work area is depicted on a map accompanying Gibbs' 1934 report. Plotted in the SESESE of Section 32, T5NR18E—on the north bank of Cow Creek between the creek and the road—this may have been a spike camp to set up in response to the many studies and timber stand improvement projects occurring in this area of the Old Miner's Ditch Unit (Gibbs 1934).

(combined Calaveras and Moore Creek), Stanislaus-Tuolumne, Stanislaus Block, West Side Block, Rose Creek, Groveland, and Merced. By 1940, a 16,300-acre land exchange in the Stanislaus-Tuolumne Working Circle had been consummated with the Pickering Lumber Corporation. For that year, out of a list of 14, the top priority land exchanges were with large timber companies. For example, a 14,469-acre exchange with the Yosemite Sugar Pine Lumber Company in the Merced working circle and a 30,000-acre exchange with the West Side Lumber Company in the Stanislaus-Tuolumne working circle were the next in line. Credited in large part to its policies outlined in the 1920s, the Stanislaus was achieving a goal of significantly adding lands to its base, which were to be logged under the principles of sustained yield.

Even the California Forest and Range Experiment Station, having seen the handwriting on the wall in 1939, had proposed to withdraw 8,800 acres for creation of a “Middle Fork of the Stanislaus River Experimental Forest. This area contained a gross stand of about 275,000,000 board feet, of which about 62 percent was pine. It was also desirable as an experimental forest because it was the only available virgin area of suitable quality, species, and site combinations within operating distance of its established work center at Strawberry." The Regional Office’s T. D. Woodbury was a proponent of this new experimental forest and enumerated a number of considerations. Foremost was that the Stanislaus and Region 5 had to prepare "for eventual sustained yield management of the Stanislaus Block of the Stanislaus-Tuolumne Working Circle…. [I]t seems important to be prepared to acquire some 64,000 acres of privately owned timberland within this area in as satisfactory condition as possible. About 21,000 acres of this is now cut over and the balance probably will be within 12 years.... About 50,000 acres of this area desirable for acquisition is thought to be in Pickering Lumber Corporation ownership" (USDA 1940).

Woodbury provided insight into the issues entangling this important piece of CSWA landscape at an interesting pivot point of history: with the Great Depression a recent memory and the US entry into World War II on the horizon. The Pickering Lumber Company,

in recent years, has so far been unwilling to cut anything but pine in connection with National Forest land transactions or timber sales. This creates a difficult situation since our silvicultural policy at present requires the cutting of some fir. It would appear that until such time as the lumber market for inferior species improves or a favorable change of policy develops, either on the part of the Forest Service or the Pickering Lumber Corporation, we cannot look forward with optimism toward acquiring the land of this company in return for our stumpage with this Block…. Presently the PLC... is the only market for National Forest stumpage in this Block since the Company's railroad furnished the only practicable transportation outlet (USDA 1940).

Partly because of the company’s pine policies, Woodbury saw little hope for nudging the company toward different practices on its own lands, even with the carrot of pre-harvest exchange agreements. But he insisted that the "application of sustained yield to at least a portion of our timber is of importance. This cannot be accomplished through sales or exchanges involving the Pickering Lumber Corporation. Their operations appear to be firmly fixed for some years to come on the basis of a heavy unregulated liquidating cut."

Woodbury believed that the Stanislaus could redeem its responsibilities for sustained yield in this area through implementation of the forest's all-purpose transportation plan, which included a suitable road between the proposed Experimental Forest and Avery. This would provide the Stanislaus with an independent outlet for the timber in that Block. Woodbury recommended that "to attain sustained yield and free ourselves from the present Pickering Lumber Corporation control we [must] arrange, as soon as possible, for a further study of the feasibility of undertaking the construction of a Forest Service road to serve this timber." If the road is feasible, Woodbury enthusiastically recommended that it be completed as soon as possible. If the road was deemed infeasible, Woodbury recommended holding the Experimental Forest in abeyance.... [W]ithout an independent road system, it would be impossible for the research men to utilize the Experimental Forest as they desire." Woodbury also noted that, if the Experimental Forest came to pass, "…the type of administration which we might apply to it, while perhaps not ideal, would be of distinct benefit and much better than none at all. During our recent inspection of the area, I noted a considerable insect loss in the most valuable class of sugar pine trees. This should be checked soon by cutting or by special treatment" (USDA 1940).

World War II and the immediate post war boom brought u recedented demands on the Stanislaus for its timber resources. In 1946, the Stanislaus submitted a report to the Regional Office that was, in effect, a revision of its Policy Statement approved January 17, 1925. The reviewer, apparently taking the stance that the new policy was not ambitious enough, commented: "...It seems unlikely that we will ever have a more active demand for lumber than were have right now, or a better opportunity to move marginal chances. Perhaps this is an opportunity to step up production and help to relieve the shortage of building materials, and at the same time put these stands in good silvicultural condition as rapidly as possible." Among the changes opportune by the enormous demand for wood products was the Stanislaus plans to make fir areas available for harvest on a risk-marking basis (USDA 1946; 1947).

If the nation's appetite for wood seemed insatiable, California's was ravenous. As of 1948, Californians used about 560 board feet per year compared with 275 per capita for the rest of the nation. This was attributed to not only an expanding population and economy, but also to the huge fruit and vegetable industry that consumed remarkable quantities of board feet for packing boxes. On a statewide basis, lumber production had remained relatively stable from 1926 through 1946, with the exception of drastic the downturn during the Great Depression: in 1926, 2,190,000 board feet were harvested while in 1946, 2,680,000 board feet were harvested (USDA 1949).

Among the "summary of management problems" from the 1949 Stanislaus GII was the quandary about the appropriate level of harvest. Observing that the cut had been "very heavy" over the past few years, the writer judged that the level of harvest could not be maintained given present utilization practices and markets.

Pine preference logging on practices on Pickering lands prompted some public concern. Often these concerns expressed in the 1940s and 1950s were provoked by conflicts with recreational hunting and fishing uses. One 1953 report of pollution in Soap Creek was investigated and found to stem from Pickering logging that had occurred in 1940. Field correspondence from a Fish & Game official noted that, at that point in time, very little fir was removed, and the dense stand adjacent to Soap Creek was

> …broken into to harvest the various pines which grew here. A very messy procedure and after the pine had been taken out the weakened fir fell every which way due to winter winds and storm. Looks bad but I do not feel that any great amount of damage has resulted to fish life in that stream, certainly not doing any great number of sportsmen any damage. In conversations with the officials of the Pickering Lumber Corporation I learn that at some indefinite time in the future the fir in the Soap Creek water drainage will be harvested and no doubt the stream will benefit in some small way (USDA 1953).

By 1958, Pickering Lumber Corporation's Soap Creek Camp at Soap Creek Pass had been discontinued and the adjacent rails removed (USDA 1959).

The aftermath of the 1950 Wrights Creek Burn presented colossal challenges to the Stanislaus. Covering over 25,000 acres, the fire torched many areas that had been logged in the teens and 1920s by the West Side Lumber Company and which had restocked in pole-sized stands. An early, cursory survey of the area revealed that:

perhaps 6,000 acres in burned young growth, largely complete kill, to be cruised for salvage estimate. These stands are dense and many are borderline as to operable cut. The pole size usually predominates and it is difficult to judge the sawlog volume occularly. The volume may average around 3 M [thousand board feet] per acre in trees 16" dbh [diameter at breast height] and over, including scattered old growth trees. On 6,000 acres this would amount to 18 million b.f. [board feet]. ...There are perhaps an additional 2,000 acres in burned old growth that is salvageable, excluding the Duckwall area. Salvageable volume may average 10,000 b.f. per acre or 20 million b.f. total (Hasel 1950).

Assisting in the salvage and replanting efforts, roads and railroad grades were well distributed over most of the burned area.

By 1956, the Stanislaus had most of the Wrights Creek burn area replanted. By 1957, some of the Wrights Creek plantations were struggling—broad-leafed plants out competing the planted conifers. Harry Fowells and Gil Schubert of the California Forest and Range Experiment Station visited these areas and suggested a trial application of 2 pounds of acid equivalent of either 2, 4-D or 2,4,5-T esters in oil-water carriers up to 5 gallons per acre without serious damage to conifers. From a map in the file showing two plots for Aerial Spray Project, Brush Control, July 15, 1957, Wrights Creek Burn, it appears this spray was carried out near the site of Camp 19 in sections 4 and 5, T2NR17E (USDA 1957).

In his “Administrative Report [on the] Stanislaus Brush Control Project," Carl Fowler explained the magnitude and difficulties of reforestation following the disastrous Wrights Creek fire:

> Since the burn several species of brush have taken over control of the ground. The two most common species are *Ceanothus cordulatus* (white thorn) and *Ceanothus integerrimus* (deer brush). The brush varies in height from 3 to 10 feet. Because of its vigorous height growth *Ceanothus integerrimus* is the worst species for suppressing the plantations.... Under the brush the planted stock is badly suppressed and unless active measures are taken we are faced with the complete loss of these plantations. This season an experimental attempt was made to release plantations from brush from competition by aerial application of herbicides (USDA 1957).

To combat the conifer competitors, two 20-acre plots were selected. On plot Number 1, 2, 4-D only was used. On plot Number 2, a 50-50 mixture of 2,4-D and 2,4,5-T was applied. The spray mixture consisted of three pounds of acid to 9 3/4 gallon plus one-gallon diesel oil in 8 1/4 gallons of water. It was applied at the rate of 10 gallons per acre. The material was mixed in 20-gallon batches, and the spraying took place July 15, 1957 (USDA 1957). A follow-up on the helicopter spray of July 1957 noted that the brush was “well defoliated as a result of the spray job. The trees showed evidence of damage to the leaves and needle bundles were loose. The terminal buds appeared to be in excellent condition” (USDA 1957).

A 1952 Report to the Regional Forester provides an interesting window into Stanislaus timber sale practices in two important and diverse regions within the CSWA area: the Wrights Creek burn[82] and the Deer Creek areas. The report from an Assistant Regional Forester J. J. Byrne made the observation that from:

a water resource standpoint, the most important job of Forest management is to keep vegetative cover and soils in place.... However, there has been a tendency in the Region generally, and this Forest is no exception, to place emphasis on the silvicultural phase and on forest receipts rather than on keeping soils in place.... It was a surprise to the inspector

[82] Reforestation after the Wrights Creek Burn was a Herculean undertaking. A tree nursery at Oakdale was established on leased land in 1951 with the purpose of growing tree stock for this burned area. The Oakdale Nursery had a capacity of 1.5 million trees per year. By the time of a 1955 inspection, the “best portions of the burn have now been planted (5,264 acres successful and 550 acres yet to plant).” Larger tree stock than usual was apparently grown at the Oakdale Nursery since that was cited as one of the reasons for discontinuing this facility, i.e., growth of larger stock translating to fewer trees to the crate, along with higher costs due to relatively low production requirements. Trees from this nursery were also being used to reforest after the Spinning Wheel burn of July 1954. After closing of the Oakdale Nursery, the Stanislaus planned to use stock from the Mt. Shasta nursery (USDA 1955)

that the timber sale contracts for salvage of timber cut on the Wrights Creek Burn did not contain provision for erosion correction measures, or a cooperative deposit for erosion correction by the Forest Service. These contracts do contain a clause regarding correction of roads and trails inasfar as erosion is concerned. This clause would have enabled the Forest to have gone further than it did in requiring reestablishment of drainage on existing roads and the correction of newly built roads to reduce erosion.... In direct contrast to the Wright's Creek sales, the current sale on Deer Creek is being supervised in such a manner that the area may be used as a demonstration area to indicate good and bad practices in timber sale management.... It was observed that some skid trails were located in water courses, and the Forest plans to study the effect of this practice in connection with soil movement.... Tractors generally should not be permitted on slopes in excess of 40% from either an erosion or safety standpoint. It was observed on a portion of this Deer Creek sale that tractors were operating on very steep ground and were creating an erosion hazard. There had been no plantations [sic] of grass or other vegetative cover on burns on the Stanislaus. The writer did not observe any opportunities where this could be done with funds available for this use...(USDA 1952).

In addition to efforts to reestablish conifers after harvests and fires, there was also considerable effort in the latter 1950s and 1960s at type conversions. In addition to areas on Calaveras Distict, outside of the CSWA, several, relatively small areas were attempted. In all these cases, the offending brush was removed and burned prior to planting. On the Sonora District 17 acres of brush land in the mixed conifer type were cleared and planted. A total of 18,000 sugar pine seedlings were planted on cutover lands within sugar pine management areas. This job consisted of inter-planting on recently cutover areas deficient or lacking in reproduction. Though 1956 was an excellent seed year, the cone crop for all species in 1957 was very poor. Taking advantage of the excellent seed year in 1956, one project of five acres on the Star Ridge Sale in the Sonora District was stripped of bear clover. Poison bait was put out on this and other re-planting areas to help control rodents (USDA 1957).

Recreation

The general abuse of native people, the landscape, and wildlife that dominated the period from 1848-1855 began to give way in the latter 1850s to a somewhat different regard for nature. Tourist literature about California in general rolled off the presses, and some of it addressed the CSWA area and adjacent lands. The late 1860s saw development of holiday migrations by upper middle class Californians, especially urbanites, expanding to the middle-class in the 1880s. Special horse drawn coaches were outfitted for pleasure travel and camping and became more common. James Hutchings and his *Illustrated California Magazine* did much to “help reverse the frontier relationship of Californians to their landscape.” As Starr points out, life in many parts of California, by the 1870s, had become “settled enough to be savored, not just compulsively gotten through” (Starr 1973).

Since its beginnings as a forest reserve, the Stanislaus National Forest was a magnet for those seeking to recreate. The large numbers of people traveling to the area specifically for recreation is directly linked with transportation access and larger social patterns of leisure. Hunting and fishing, for example, have become more sport than subsistence activities; skiing and snowshoeing have overwhelmingly become a sport rather than a transportation necessity.

Within the CSWA area, hundreds of activities were pursued from 1848 through 1958 as recreation and many of them have engendered substantial alterations of nature in order to support them. Stocking native and non-native preferred fish while suppressing non-preferred natives; introducing non-native fowl and animals while suppressing "undesirables;" creating tracts for summer homes; constructing and maintaining trail systems; developing downhill skiing opportunities, are just a handful of the noteworthy adaptations made to accommodate recreation. Before the CSWA area was a forest reserve, little was done to systematically manipulate the environment for recreational purposes. Though some significant 19th century examples can be cited—such as stocking streams and lakes otherwise barren or not self-sustaining as a fishery and even installing small "check dams" to prolong downstream flows for a sustainable fishery—most recreational attractions of this early period were a by-product of more "practical" endeavors.[83] For example, grazing trails used for accessing forest meadows were also used for accessing camping areas and early reservoirs were also used for flat-water fishing and boating.

At least as late as 1914, it was Forest Service national and regional policy to "soft pedal" recreation. It was that year when the Forest Service promulgated its "land classification" directives. While the classification principles acknowledged the need to reserve areas for public camps, insufficient attention was paid to this when the classification work was being done. There were, at that time, no forest recreation plans (USDA 1936).

Early forest officers were particularly mindful of keeping the Stanislaus National Forest a place for those of modest means.

> The wide distribution and extent of the National Forests and their proximity to thousands of cities and communities make them natural centers of summer recreation, particularly for the masses of people whose vacation must be inexpensive (anon. 1923).

Even if staying in a resort rather than a tent, the Stanislaus prided itself on its lack of pretense and egalitarian principles:

While Pine Crest is a resort hotel, it does not in any way cater to those policies which have given the term 'Resort Hotel' such an obnoxious sound in the ear of the average traveler. It is more of a home hotel, where the guests are free to enjoy the luxury of

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[83] Thus far, the earliest written reference found to significant numbers of planted fish within the CSWA is 1899. The *Mother Lode Magnet* newspaper reported that 25,000 trout fingerlings received at Carters were to be planted in Hull and Basin creeks and the Middle Fork of the Tuolumne River (MLM 1899).

restraint from social custom, where they can make their own pleasures and go their own way unmolested (anon. 1923).

By the early 1920s, only a generation after creation of the Stanislaus Forest Reserve, a powerful trend had come into sharp focus. From a national perspective and with the Stanislaus firmly in-step with that trend, recreational use was beginning to overwhelm the more traditional uses such as grazing:

A few years ago the majority of [special use] permits was for ditches, drift fences, pastures and similar uses in connection with farming and stockraising. Now fully 50% of all permits are for resorts, hotels, stores, summer homes, and similar permits of a recreational nature (anon. 1923).

Despite this solid shift, Congress did not allot the Forest Service funding specifically for development of recreation. As explained in *The Forest*:

it is only through cooperation with individuals, local communities, counties, automobile clubs and Chambers of Commerce that so much has been accomplished to date...(anon. 1923).

The Stanislaus and the CSWA area in particular, has been the traditional playground of the Bay Area, with that nine county region consistently outnumbering recreationists from other areas in the visitor counts at developed campgrounds and special use areas from the 1950s to present. For example, one 1958 survey of paid receipts for Pinecrest Campground revealed that 64 percent of the campers came from the Bay Area, about 21 percent came from San Joaquin and Stanislaus counties, and about five percent came from the metropolitan counties of Southern California.

A functional inspection on the Stanislaus regarding its I&E program (information and education) acknowledged the phenomenal multiple use demands and resulting complexities experienced by the Stanislaus and its sister Sierra Nevada forests, noting that:

Of all the uses–recreation is increasing at a much greater rate. It is far ahead of existing improvements and our ability to properly manage the activities (USDA 1956).

Inspector Ball's 1956 visit to the Stanislaus also made him keenly aware of a new recreational use that forest officials were grappling with: one that was attended by an entirely new set of demands: travel trailers. "Use of trailers is pyramiding… and getting on top of the trailer parking problem" was identified as an emergent shortcoming (USDA 1956).

Ball's inspection was followed by a recreation and lands functional inspection in 1957. One of his prime discussion topics was the feasibility of easing some of the recreation pressure from Pinecrest by adding opportunities in the Herring Creek and Niagara Creek areas. In his discussion about the potential for winter sports development in the Herring and Niagara Creek areas, Inspector Davis cited difficulties in road maintenance and snow clearing in light of the rather minor developments that would be appropriate for the area. He then talked about the summer recreation development potential there and noted: "Such development would center around the Herring Creek reservoir, which was started as a CCC project in 1939 but never completed. Mr. Lawrence of the Division of Watershed Management and Engineering inspected the dam... [and concluded] it is entirely feasible to complete the project as originally planned. This would raise the present reservoir level another 6 feet, and would establish the recreation lake that was originally intended." Davis recommended that the Stanislaus work with State Department of Fish & Game to consider taking on completion of the dam as a streamflow maintenance project.[84]

By the latter 1950s, the gap between recreational demand on national forest land and the agency's willingness to make recreation a funded priority had become a divide. The core issues actually threatened the agency's existence, as a growing number of voices called for national forest lands to be removed from the Department of Agriculture and, instead, be put under the Department of Interior's National Park Service. These threats had become so rampant and disruptive for employees that Chief Forester McArdle sent a memo on the subject to all forest officers:

I know that many of you are aware of current alleged differences between the National Park Service and the Forest Service concerning possible transfers of national forest lands to national park status.... How did the present situation arise? Basically, it is a question of competition for land in the face of rapidly rising populations, increasing leisure time, improved accessibility, and a great upsurge in the demand for outdoor recreation. A considerable number of hiking, climbing, camping, and other outdoor recreation organizations are vigorously and in all sincerely advocating a large number of new national or State parks, monuments, or recreation areas. We know of more than three-dozen such proposals that would transfer national forest lands to other administrative jurisdictions.... As you know, the Forest Service has felt acutely, and will continue to feel, the greatly increased demands for outdoor recreation in the administration of the national forests. We are endeavoring to respond to these needs through our Operation Outdoors, through the recreational and fish and wildlife phases of the 'Program for the National Forests,' through increased appropriations for recreation, through the recreation survey for the national forests which is now under way, through our cooperation with the Outdoor Recreation Resources Review Commission, and through increased research on forest recreation problems.

> I believe the best course of action for the Forest Service in the present situation is to do a good job of multiple-use management on the national forests and to vigorously explain and advocate our multiple-use program (USDA 1960].

[84] The Tuolumne County Water Company had, in about 1856, built a small impoundment on Herring Creek. The Civilian Conservation Corps project in 1939 may have eliminated traces of the earlier dam.

> This was a springboard for beginning to take steps toward multiple use management. In March 1960, the regional forester wrote in his cover letter to *USDA's Servicewide Plan to Gear Multiple Use Management of the National Forests to the Nation's Mounting Needs*: "This is the green light; this is the go ahead signal. This is the time to integrate this plan with your operating plans for next fiscal year to assure that these priority activities are carried forward in a planwise manner." The introduction to the booklet noted:
>
> The National Forests are no longer the inaccessible and distant hinter-lands they were when first established. Barriers of time, distance, and inaccessibility are fast fading. The American people have 'found' the National Forests; an expanding economy and a growing population are demanding goods and services in quantity and quality far exceeding anything dreamed of a few short years ago. More people want more from their National Forests.

The best hope to meet the people's needs is through MULTIPLE USE Management, the most effective form of forest management yet devised in terms of producing maximum overall benefits from these public forest lands. This concept of National Forest management has been a guiding principle of the Forest Service since its beginning. Now MULTIPLE USE Management assumes new significance and stature, calling for greater emphasis and more intensive application, backed by stepped-up research effort, than ever before (USDA 1960).

The plan focused on three items: (1) Do a better job of multiple use management. (2) Better anticipate the public's future needs and prepare to meet them, and (3) Better explain the public's stake in multiple use.

In 1923, local officials teamed up with local area boosters who were attempting to attract more visitors and more homemakers to the area. Sometimes a source of aggravation and sometimes of appreciation, local boosters of the area understood that much of Tuolumne County's land area was national forest and that the county's and the Stanislaus' fates are linked. The tangible product of this marriage was an illustrated booklet titled *The Forest, Describing and Illustrating the Recreational and Other Features of the Stanislaus National Forest in Alpine, Calaveras, Mariposa and Tuolumne Counties*. Published in 1923 by the Sonora newspaper, *The Banner*, in cooperation with the Stanislaus National Forest, its primary underwriters were local bankers. In turn, the bank directors were a who's who of locally prominent men and women in commerce and timber holdings: names such as C. H. Segerstrom, G. W. Johnson, J. B. Curtin, J. E. Baer, G. Mundorf, G. T. Barron, etc. The frontispiece map is telling of the intended audience for the pamphlet—certainly not primarily communities adjacent to the Stanislaus but, instead, the Bay Area. The pamphlet's topical headings reveal what the writers believed were the most important for promoting the area: a mix of industry, outdoor activities, and places of interest.

The pamphlet radiated with the Stanislaus' recreational potential. Noting that, in 1922, 1.5 million Americans "on pleasure bent" visited California's national forests, the writer concluded that it was "a good indication that the American pubic believe in recreation and that out-door recreation in particular is popular….

> Thousands of tourists are attracted every year between the months of May and October by the wonderful scenery and delightful climate of the higher country.... The Forest Service imposes no restrictions upon where, when or how long tourists camp with the exception of the all important slogan—'Help Prevent Forest Fires' and the observance of proper sanitary measures in the mountains... (anon. 1923).

Recreation Residences

Among the earlier recreational landscapes in the CSWA area was establishment of summer home tracts, authorized by the Term Permit Act of 1915. But even before summer home tracts were laid out under the 1915 act, forest visitors clamored for permits under the 1899 Terminable Permits Act. This 1899 act authorized the rental or lease of national forest lands adjacent to mineral, medicinal, or other hot springs for sanitariums or hotels, and tents or temporary dwellings for the convenience of people visiting such springs for health or pleasure. Within a few years, this provision was apparently stretched to include modest summer dwellings such that by 1906, terminable annual permits for summer homes was common on the Stanislaus. As the number of summer residences increased—proportional to the improvement of mountain roads and the popularity of the automobile—pressure mounted on forest officials to provide a type of permit that better secured the forest home owners' investments and encouraged the quality of their summer homes. Before Congress arrived at the term permit, forest officials grappled for ways to handle the demands.

On the Stanislaus National Forest, the earliest known, written policy regarding summer homes was in 1914. R. W. Ayres, Supervisor of the Stanislaus since 1908, wrote a circular to his rangers, dated January 29, 1914 titled "Instructions in Issuing Permits for Camp Sites." Ayres provided the background that during the summer of 1913, "applications began to come in for summer camp sites along automobile roads in the Forest." He further noted that: "This class of application is liable to increase." After corresponding with the District/Regional Office on the matter, he arrived at the following rules:

> All of such uses are classified as residences regardless of the kind of house erected by the permittee or if only a tent is used.
>
> The limit is three acres, but in localities where there is a possibility of a large number of applications on account of especially favorable conditions, such as flats along streams, etc., areas should be restricted to one acre to provide for as many permittees as possible.

> The charge will be $5.00 for the first acre and $2.50 for each additional acre or fraction thereof up to three acres. Each permit will stipulate a re-adjustment of prices after three years to provide for possible increase in demand and the consequent increase in value.
>
> In addition to areas for residences it is possible to issue permits for pastures under instructions… [in] the Use Manual for the purpose of pasturing saddle horses or milch cows. They may be adjacent to or separated from the residence, dependent upon the location of the feed areas. Great care should be taken not to allow these permittees to monopolize forage used by travelers in this way or to injure the interest of the regular grazing permittees. As a general rule, this class of permittees should not be encouraged to take out pasture permits. Barns or garages built on the same land as the residence should be included in the residence permit with no extra charge.
>
> If you have any localities where there will be demand for residences in the near future you should survey the tract, making a plat of it, to facilitate the issuance of these permits. In surveying out the tract the area should be laid out so as not to allow a monopoly of the best part of the land. For instance, town lots always provide for a greater depth than frontage along streets. In all localities you should provide for camping places for transients (Conners 1993).

Many of the provisions in Ayres' circular were incorporated in the national Term Permit Act. Part of a national program spawned by a national impulse often referred to as the "back to nature movement," the agency ultimately endeavored to create unique neighborhood environments in the forests. These were to be places where cabin owners could immerse themselves in appreciation of the offerings of the out-of-doors. People who toiled in the cities could leave the helter-skelter of urban life for a few weeks in summer and restore their humanity by contact with places of high scenic qualities. Key in this formula was accessibility by automobile and a level of convenience not offered by camping.[85]

Through the Term Permit Act of 1915, the Forest Service as an agency was authorized to establish tracts and lay out summer home lots within the tracts. For the agency and reflected in Stanislaus documents, summer home tracts had the promise of instilling an ethos of appreciation for the forest lands—an ethos that would perpetuate values the agency believed were critical for the country's survival. Moreover, on a less moralistic level, the seasonal population centers created by recreation residence tracts would constitute a ready-made cadre of fire lookouts and firefighters. The reverse side of the 1916 Stanislaus Forest map advertised that:

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[85] Summer home cabins, at first mere shelters, have increasingly become more elaborate. PG&E, for example, began distributing power to the Pinecrest tracts in 1942.

> Application can be made to any Forest officer for the rental of permanent summer home or resort sites. Sites surveyed and mapped in various parts of the Forest are rented for short or long periods. Timber for the construction of homes can often be granted free of charge. Occupants may erect their own camps and houses. The annual rentals for summer home sites range from $5 to $25 a year; for hotel and resort sites, from $25 to $250 a year and up.

In 1926, the Forest Service Manual expounded that:

> The use of national forests as places of residence should be especially encouraged if not in conflict with other more important uses or with good administration. A residence occupied under the restrictions imposed by a permit not only reduces the fire risk as compared to transient camping, but makes of the permittee a volunteer fire fighter whose interest in forest problems is increased by reason of close contact with them and financial investment in a forest (Conners 1993).

Pinecrest, nestled around Strawberry Reservoir—now Pinecrest Lake—is the Stanislaus' most densely occupied cluster of recreation residences. Located in a tree-studded granite basin carved by the South Fork Stanislaus River, Lower Strawberry Tract was the first to be established under the Term Permit Act on the Stanislaus National Forest.

In 1923, while describing the beauties and attractions of the Central Stanislaus area from the Sonora–Mono Road and the attraction of summer homes in California, *The Forest* pamphlet portrayed Pinecrest as:

> the first point which offers private summer home sites. There have been 78 such sites surveyed and thrown open for public occupancy. They are generally of half an acre in area and are leased for nominal sums, and are not revocable except for infraction of Forest rules or through disuse.… (anon. 1923).

But after a generation and an explosion in recreational use of the forest, officials tried to apply the brakes on recreation residence permits. In 1949, a General Integrating Inspection (GII) for the Stanislaus wrote bullet-style do's and don'ts concerning its administration and noted that:

> -Camp and picnic ground needs greatly exceeded available development.
> -Summer homes should gradually be eliminated in areas favorable to use by general public.
> -Encourage resort & summer home developments on private land (USDA 1953).[86]

[86] Another issue raised by the 1949 GII was that the Stanislaus was dealing with mineral claims that were thinly disguised summer home sites. Litigation over this type of fraudulent mining claim

By the mid-1950s, administration of recreation residences was a consuming operation and frictions between it and other uses increased. Supervisor Russell McRorey commented in a letter to the regional forester, under the heading of "anticipated problems" that:

Summer home requests - an endless task is making suitable reply to the steady stream of requests. The recent G.I. [general inspection] report has advocated closing the Forest to further consideration of residences. There should be some suitable method of reducing a recurrent job that gives satisfaction neither to the applicant nor the Forest.

By the mid-1950s, the Stanislaus was overwhelmed with demand for recreation uses and attempted to reverse its earlier direction regarding summer homes. Now, instead of encouraging tract developments, studies were being conducted to identify tracts and residences that should—according to the new realities—be eliminated and the space they occupied be assigned to another, more openly public, use. For example, the Dardanelle summer home tract was so identified, as were specified cabins on the Shore of Pinecrest Lake. The inspector duly noted that these terminations were a good objective, but that: "If history repeats itself, the job will not be as easy as it was to put down on paper" (USDA 1956).

A 1957 functional inspection alluded to summer homes at both Pinecrest and Lake Alpine that were under 1963 and 1967 tenures. Inspector Davis reported that the permittees were generally resisting, despite having been offered lieu lots, and he admonished Stanislaus officials to hold the line:

…it is vitally important that... the land which will be vacated by the tenures ... be immediately... put to public use as soon as the special use improvements are removed. Supervisor McRorey's attitude on summer homes conforms to the Chief's policy and a new tract is tentatively being considered above the proposed Cherry Valley campground (USDA 1957)

Today, recreation residences have become one of the most visible and controversial recreational land uses in the CSWA area. The Stanislaus has 26 recreation residence tracts with the number of lots ranging from one to 379. Of the 740 permits for recreation residences on the Stanislaus, the vast majority of residences are located in the Central Stanislaus watershed (Conners 1993:2). Through the permit system, the Forest Service

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continued at least through the 1950s. In a functional inspection for Stanislaus recreation and lands programs, Inspector Davis reported: "The long drawn-out Avery Moore case is slowly approaching a climax. This involves a scattered group of mining claims along the Sonora Pass highway which has been sold by Mr. Moore to private purchasers for purposes other than mining, mainly for summer homesites. The case was referred to the Department of Justice on 2/17/54. It asked for an injunction against Mr. Moore and 33 others for the purpose of (1) to restrain them from refiling on the claims after they had been declared null and void; and (2) to restrain them from occupying the land or maintaining any structures thereon.... The case has not yet been set for trial but will eventually be tried in the U. S. District Court in Sacramento" (Davis 1957).

attempted to retain the intent of modest, second homes, complementing the natural environment and instilling appreciation of nature and her beauty. However, the challenges are legion and, with changing social values regarding what constitutes “highest and best use, “ these tracts persist as a monument to a past circumstance and vision for these highly prized lands.

Hiking

Many recreationists, especially hunters, hired packers; historically, there were a few more pack stations within the CSWA area than exist today. One was Bert Reed’s adjacent to Leland Meadow (T4NR18E, Section 3). A popular station for accessing the Cooper and Eagle Meadow areas, Joe Sanguinetti purchased Reed’s packing permit in 1943. Joe Sanguinetti, with J. W. Martin and J. C. Garaventa, also purchased the pack station improvements from Reed and used the place as a headquarters for grazing operations in the Herring Creek Range Allotment and as an overnight stop en route to their allotments in Coopers an Eagle Meadow (USDA 1948). [87]

As late as the 1920s, hiking for pleasure was viewed as somewhat of a past time for the upper crust. In 1923, for example, *The Forest* pamphlet extolled the beauty and personal strength Stanislaus trails offered:

Trail trips are the grand privilege of those fortunate persons who possess either the time or the means to partake of them. They lead into the unknown sections of the Forest, where animal life is more plentiful, where streams are still sufficiently unknown to be called virgin, where the great areas of uncut timber tower in all their godly majesty, and where the bare granite cliffs and jagged serrated ridges will impel admiration, where the rounded domes rear their huge bulk with a smoothness impossible to imagine. In these portions of the forest the nature lover is at his greatest peace. The all-disturbing clatter and honk of autos is left far behind, business cares are forgotten in the contemplation of nature with no touch of man-made mimicry to draw odious comparisons.... Practically every trail is well cared for by the Rangers and so well posted with signs as to protect the city novitiate in his forest wanderings. Nature, beauty—solitude, peace—freedom from the bonds of civilization are the portions of those who follow the trail (anon. 1923).

Moreover, one could also appreciate the more work-a-day, utilitarian aspect of the Stanislaus National Forest by hiking logging trails. Particularly suggesting those around the settlement of Strawberry, the writers encouraged that “anyone interested in logging operations can take a day's trip to the camps of the Standard Lumber Company” (anon.

[87] Martin and Garaventa owned the Palace Meat Market in Sonora (Spargo 1948). The Sanguinetti’s are a well-known cattle-raising family. Henry D., Sr. had an older brother, Joe Sanguinetti (Joe was a bachelor). Henry D. Sr. had three sons: Henry D. Jr., Ray, and Marion. Amelia Gardella is a sister of Joe and Henry D. Sr. One of her children is Jack Gardella (USDA 2230 Files).

Other CSWA area pack stations included one at Fence Creek, Brightman Flat, Douglas Flat, and Kennedy Meadows (Smith 1958; anon. 1923).

1923). Suggested recreational trails in this pamphlet were virtually all in the CSWA area, including Upper and Lower Relief, Leland, Herrin Creek,[88] Cooper Meadow, Cow Creek to Pikes Peak, Upper Cow Creek to Hells Half Acre, Eagle Meadow, Patterson Grade to Donnell's Flat, Brightman to Wheat's Meadow, and up the north side of Clark's Fork to Sonora Pass or back to Brightman. "All of these trails are in good condition, and with signs the entire distance so that no one need get lost. They pass through the finest of fishing and hunting country, with plenty of feed for animals, and being practically on top of the Sierra Nevadas, they offer magnificent scenery." Pack animals, guides, and supplies could be had at Brightman Flat, Douglas Flat, or Kennedy Meadows. "Every one should go to Kennedy Lake. A road goes within 5 miles of the lake then a good trail continues. This lake has enjoyed for many years the record of producing the largest fish in the mountains (anon. 1923)."

Snow Skiing

Snow-based recreation has also left a legacy on the CSWA landscape. While snow shoeing and skiing occurred in the area as both basic transportation and recreation since the last half of the nineteenth century, it was not until the automobile that snow play and, in the 1950s, skiing induced significant landscape allocation and alteration. The largest ski development within the CSWA area was Dodge Ridge—located at the headwaters of the North Fork Tuolumne River—which opened in 1951 with "a few rope tows;" soon, a double chairlift was added on the 425-acre site (T4NR18E, Section 24). The Forest Service encouraged such developments, especially on forests such as the Stanislaus National Forest that were near and served large, metropolitan areas and were traversed by major highways. After studying several different alternative locations, the Stanislaus National Forest opened the opportunity to develop a ski resort to prospective bidders at Dodge Ridge. The original lodge was replaced with a larger one in 1969. On the bowls serving chairs 1 and 4, 23 million board feet of timber was cleared. Starting with a parking lot designed for 150 cars, by 1962, the main parking area was designed for 1,500. As of 1998, Dodge Ridge had 12 chair lifts (UD 1974; MB 1962).

Other ski areas were planned and even partially developed, such as the Bald Mountain Ski Area. The Stanislaus National Forest had issued a Term Permit for that venture which, by 1949, the permittee wished to develop a year round resort. In addition to developments for skiing, for summer use, the permittee wanted to maintain a portable dormitory, erect a few cabins, install a water system and have saddle stock for use by guests. The Forest Service did not consider the location suitable for resort purposes and questioned its feasibility as a downhill ski area. Operated by Sonora Pass Ski Slopes Corporation, this corporation was also a competitive bidder for the Dodge Ridge prospectus.

In March 4, 1950, Sonora Pass Ski Slopes was issued another Term Permit for 20 years to operate a small, 56.5-acre, ski area at Bald Mountain (T3NR17E, SWSE Section 3). The purpose of the permit was to construct, maintain and operate ski area facilities and

[88] Most historic references to this stream spell its name "Herrin" rather than today's "Herring" Creek.

services that would include a T-Bar lift about 1,350 feet long, a rope tow, ski lodge, flush toilets, service building, water tank and system, ski school, and first aid room (USDA 1949; USDA 1949). With a minimum of services in-place for the 1950/51 seasons, Sonora Pass Ski Slopes' Mile-Hi ski area served 709 skiiers (USDA 1951). By 1953, Ranger Spargo reported on several permit compliance issues and that there had been "no use whatever of the area this season." Though the Constam Lift had been erected, the building housing the motor for it was not up to standard, and "there is junk and trash pretty much scattered around and the outfit looks shiftless" (USDA 1953). Mile-Hi's fortunes went from bad to worse with the opening of Dodge Ridge ski area and, by 1957, after several transactions, the permit was abandoned and the permit formally terminated in 1959 (USDA1958).

Fishing

Gold was the magnet that drew the onslaught of newcomers to California, and the Gold Rush was undeniably hard on the regional ecology: no means to get at the gold was off-limits. Rivers were moved and mountainsides were exfoliated in a headlong charge and a headstrong determination in which any means were justified by the desired outcome of quick riches. Likewise, extirpation of species by conscious actions or as unforeseen consequences occurred in the CSWA area. Creatures common to the Central Stanislaus watershed before the Gold Rush, such as grizzly bear and salmon, were gone in a matter of less than two generations.

A major though relatively invisible change within the CSWA area has come about through planting fish—primarily trout: German brown, rainbow, and Loch Leven. Though most of the fingerlings were reared in more distant hatcheries, in about 1932, a hatchery was established on the North Fork Tuolumne within the CSWA area at Basin Creek, using water from a five-foot high diversion dam on Basin Creek[89] (CDF&G unk. date). Not only were other fish suppressed or exterminated within the CSWA area in order to favor trout fishing, but animals that preyed on trout were also affected. For

[89] References dating to 1935 call this stream "Basin Slope Creek." Water diverted was not to exceed 0.71 cubic foot per second from December 1 to September 1 each season. The diversion was 1,400 feet from the about 1/4 corner of Section 25, T2NR16E, within the SESE of section 26. A letter written in the fall of 1938 noted that the diversion works and pipeline was complete. It also noted that in years of insufficient rainfall, when the volume in Basin Creek was insufficient for the operation of the hatchery, "additional water is used from a diversion on the North Fork of the Tuolumne." An undated, associated letter to the Division of Water Resources noted that the "water will be returned after passing through the hatchery into the North Fork of the Tuolumne River, approximately 150' above the junction of Basin Slope Creek with the North Fork.... This pipe and diversion works are already in place and in use for the present hatchery, which is to be abandoned on construction of a new hatchery on the opposite side of Basin Slope Creek. The present hatchery returns water into the North Fork... approximately 50' below the aforesaid junction of the two streams." (Vogt 1938).

California Department of Fish & Game, in 1958, was seeking to enter into a lease-sale transfer of Basin Creek Hatchery to Tuolumne County. DF&G was abandoning its license for 0.71 cfs from Basin Slope Creek for fish culture purposes (Gordon 1958).

example, the Stanislaus' Report to the California Fish and Game Commission for 1916 noted that:

> The fisher or 'otter' is a great menace to trout, and a few of these animals will clean a stream of fish in less time than it could be fished out under average conditions. Fisher are easily caught, but the trapper must not neglect his traps too long, because the animal will chew off his foot and make his escape (USDA 1917).

Also of concern were the numerous, large-scale water manipulations that prevented or seriously impeded the movement of fish in the forest's streams. The Stanislaus National Forest's "Report to the Fish and Game Commission" for 1916 lamented that none of the dams and diversions on the South Fork Stanislaus River were outfitted with fish ladders:

> On the South Fork of the Stanislaus, there are Lyons Dam, diverting dam at the head of the Philadelphia Ditch, Lower Strawberry Dam, and upper dam, all of them being impassable for fish. On the Main Stanislaus there is the diverting dam at Sand Bar, over which the fish cannot pass. The Relief Dam also is not provided with a ladder, although there it is quite probable that the fish could not get to the base of the dam on account of the natural falls, etc. (USDA1917).

In addition to dams and hydroelectric diversions, the area's many ditches that fed off of the Stanislaus and Tuolumne river systems were a hindrance to fish. Precious few of these ditches were fitted with screens that would have kept fish in the streams. Offering a list of screen-less ditches, the official conjectured that "it is probable that quite a number of fish are destroyed when all of them are taken into consideration."

Coordination of fish stocking between the California Department of Fish and Game and the Stanislaus National Forest was, historically, disconnected. In 1917, a forest official wrote to the department:

> ...if we were notified when the [stocking] fish car would arrive, we might be of a little assistance in arranging for pack trains etc. to plant the fry in streams inaccessible to motor trucks--some of these 'inaccessible' streams are favorite fishing grounds and need re-stocking badly. Also if we were told where the fish were put each year, it might aid us in submitting recommendations to the Commission.... I am not bringing this up in the nature of a kick, for the fish were no doubt placed to good advantage (USDA 1917).

Fish stocking programs continued in-force through the Great Depression, perhaps to contribute to an available food source for people. For example, with fish from Basin Creek Hatchery, Basin Creek—a tributary to the North Fork Tuolumne River—was stocked with 20,000 brown trout in 1933 and 3,135 rainbow trout in 1937. Basin Creek continued to be stocked with rainbow trout through the World War II years, getting over 33,000 rainbows between 1941 and 1945 (CDF&G 1946).

Table A-6 provides an example of fish stocking in the Middle Fork Stanislaus watershed for Niagara Creek from 1930 through 1943 (CDF&G 1943):

Table A-6. Fish stocking in Niagara Creek, 1930-1938

Date	Hatchery	# Fish Stocked	Trout Species
6/10/1930	Mormon Creek	5,000	Eastern Brook
7/09/1930	Mormon Creek	5,000	Rainbow Trout
7/10/1930	Mormon Creek	5,000	Eastern Brook
8/25/1931	Mt. Shasta	5,000	Rainbow Trout
7/10/1932	Basin Creek	6,000	Rainbow Trout
6/25/1933	Basin Creek	5,000	Rainbow Trout
7/04/1934	Basin Creek	4,400	Rainbow Trout
7/16/1935	Basin Creek	3,200	Rainbow Trout
7/28/1935	Basin Creek	12,000	Rainbow Trout
6/02/1936	Basin Creek	14,000	Rainbow Trout
6/18/1937	Basin Creek	10,000	Rainbow Trout
6/21/1938	Basin Creek	5,075	Rainbow Trout
5/30/1940	Basin Creek	4,935	Rainbow Trout
7/25/1941	Basin Creek	4,950	Rainbow Trout
7/08/1942	Basin Creek	3,000	Rainbow Trout
7/28/1943	Basin Creek	3,000	Rainbow Trout

Post World War II fish stocking on the South Fork Stanislaus, at least through 1949 was done at Old Strawberry, the South Fork Highway Bridge near the Sonora Pass Highway, the Strawberry Experiment Station, between the Experiment Station and Fraser Flat, Fraser Crossing, Jupiter Road near Twain Harte, the Italian Bar Road, and in Section 30 of T4NR18E with rainbow trout from Basin Creek Hatchery. Stocking ranged from 6,000 to 23,000 fingerlings at each location, with most numbering 15,000.

Through the 1950s, the Stanislaus National Forest—with its 715 miles of fishing stream and 3,720 acres of fishing lakes and reservoirs—viewed itself as “the logical hunting and fishing ground for the populous counties of San Joaquin, Stanislaus and Merced and also is the mountain area nearest to the heavily populated Bay Region.” By the mid-1950s, Tuolumne County was working closely with the Stanislaus to create recreation developments “to tide over [its] economy after the great bulk of private timber, the largest source of tax revenue, is cut out” (* 1956).

At least by the early 1950s, with the licensing to the Oakdale and South San Joaquin Irrigation Districts for construction of Beardsley and Donnells power projects, the Stanislaus was successful in securing water releases for the express purpose of benefiting downstream fishing. Stating that, overall, "[t]here has been no formalized water management planning on the Stanislaus..."

> in the case of the Donnells and Beardsley Flat projects provisions were made for water releases which have been accepted by the licensee. Arrangements were also made with the PG&E Company to release uniform flows from the Relief Reservoir when the Donnells project is constructed. This will greatly improve fishing along the stream. The Beardsley Flat Project threatened to block the railroad constructed by the Pickering Logging Company (under special use permit) and the eventual construction of a road to the north from the Sonora Pass Highway to develop forest resources in that area. Provision was made in this license for the construction of a railroad across the dam and for the eventual provision for a road and bridge across the dam and spillway. In all of these projects the effect on recreation use was studied and adequate provision made in the licenses to allow the fullest practical utilization of the adjoining areas for recreation (Byrne 1952).

Hunting

The earliest persistent call for regulation of hunting appears to be in 1900, deer and quail being targeted for some sort of protection. Already, there were more references to hunting being for sport rather than for subsistence. Although hunting seasons had already been established, sportsmen, some of them organized into groups, began calling for the quail season to be shortened due to rapid decreases in the birds' numbers. Conceived as "the only game birds in the county," many hunters believed quail were on a trajectory of extinction (UD 1900). Not only excessive hunting, but also natural predators were viewed as enemies of the sport of quail hunting. The Stanislaus National Forest's Report to the California Fish and Game Commissioner for the year 1916 editorialized that

> ... it is quite probable that a great many more [red fox] were captured along the ridges between Leland Meadows and Relief, which is a popular trapping ground. About 10 fishers, 20 marten and 20 ring tailed marten were caught. These animals are all night prowlers, and prey on wild life and domestic fowls. Foxes live on quail and other birds, squirrels and chickens, and according to information received from some of the settlers, they were a great menace to poultry raising at one time, although they have not caused much trouble in later years.... A silver gray fox was taken at Relief a few years ago by a trapper… but no more have been seen since that time…. Mountain quail are getting very scarce in all parts of the Forest, and at the rate they are disappearing, it will be a matter of a few years only until they are extinct. Very little hunting is done for this species alone, but quite a number are bagged during a season by hunters in pursuit of other game… Valley quail were very scarce the past season, more so than last year—and at the rate they are going, they will be gone entirely within a few years. The disappearance of valley quail is due to the increased number of hunters, two or three hard winters in succession, and to the inability of one warden to watch several towns and camps where

> Dagoes and Mexicans, who hunt without licenses at all seasons, are employed (USDA1917).[90]

Skunks were also viewed as a menace to quail because they destroyed the eggs, nests, and young birds; but hawks were singled-out as the greatest factor in the decline of game birds: "[I]t is believed that more grouse and mountain quail are killed by these birds than by hunters" The report also mentioned grouse, noting that they were "very scarce in all districts, with the possible exception of the higher parts of District 31.[91] Here they seem to be on the increase, quite a number being killed each year by hunters." The Stanislaus National Forest chief deputy who penned the report, who only signed with the initials "LAB" had, in a previous report, recommended opening and closing deer season a month later. In the report for 1916, he hesitated to…

> bring this question up again, and only do so since it is the opinion of the good sportsmen of this vicinity that a great deal more unlawful killing is done by summer tourists than would ever be the case when a few settlers are considered.... I believe my argument is strengthened further but the fact that several of the valley hunters at Brightman Flat are said to have given out cold deer meat before eight o'clock in the morning of the day the season opened (USDA 1917).
>
> The Tuolumne Fish & Game Protective Association also pointed an accusatory finger at a relatively new menace to hunting in general and to deer herds in particular, stating:
>
> We feel that our association is a very necessary feature at this time, as our game for the past 10 years has been on the decrease, especially since the State highway [108] was built to Sonora, and on account of the coming of the automobile, which, in reference to fish & game, is termed the deadly automobile (TF&GPA 1917).

Among other recommendations, the association lobbied for mandatory jail time for infractions of fish and game laws. Other calls were made for more protective laws that

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[90]This anti-foreigner sentiment was echoed in the Tuolumne Fish & Game Protective Association's letter to the California Fish & Game Commission that accompanied the Stanislaus' 1916 report to the state. Their letter noted that part of the reasoning for the association's interest in curtailing hunting season was that "a great many foreigners who hunt without a license, they figure that, as a license cost $25, and a fine also $25, the cheapest way would be to hunt without a license; if they get caught it cost them $25 as that is the usual penalty imposed by judges, and if they don't get caught it cost nothing" (TF&GPA 1917).

[91] In 1911, District 31 was what is now primarily the higher elevation portion of Summit Ranger District; District 1 was administered from the Tuolumne Station; District 2 was administered from Jawbone Station; District 21 was administered from Basin, Buchanan and Indian Springs stations; District 3 was administered from the American Camp Station; District 5 was through the Calaveras Station; and the headquarters for District 41 had not yet been determined (Stanislaus Review 1911).

would result in increased deer herds (UD 1900). As with trout and quail, natural predators of deer were targeted for suppression, and mountain lions were seen as a particular threat. Most numerous on the southern edge of the Stanislaus National Forest bordering Yosemite National Park, mountain lions were also reported in the CSWA area as a peril to the deer population. The Stanislaus National Forest's Report to the California Fish and Game Commission for 1916 testified, "lions are about the most serious problem to contend with when the whole forest is considered…. Coyotes also do away with a great many fawns in connection with their depredations on other species of game." Forest officials also reported that well-known mountain man Gordon McGrew—who was a faller for the Sugar Pine Lumber Company during logging season and a trapper who wintered in the high country—found five deer carcasses which had been killed by a single lion[92] (USDA 1917).

To promote the interests of hunters and anglers, the Tuolumne Fish and Game Protective Association was formed in about 1915. Stanislaus officials reported for 1916 that:

> The sportsmen are beginning to realize that game is fast becoming extinct, as is shown by the recent organization of the Tuolumne Fish and Game Protective Association. This association had its origin at a venison dinner given by Fred Leighton, one of the representative citizens of Sonora, to which were invited about fifteen of the best sportsmen in the County.... [The declining deer population] is accounted for by the number of people in the mountains, there being from five to ten times as many as in other years, and it is expected that this number will be doubled in 1917, owing to the building of State highways and increased use of the automobile. Two or three years like the past will clean the deer out entirely (USDA 1917).

Notes from a January 1917 meeting of the Tuolumne Fish & Game Protective Association recounted various reasons for its recommendation to State Fish & Game to push deer season from August 15 through October 15, to September 1 through November 1. Among them were to improve the condition of the deer; to keep the meat from spoiling, since the last 15 days of August were too hot to keep deer meat; and to improve the chances of bagging a lion (USDA 1917).

By 1940, the Stanislaus deer population was reportedly "holding its own," despite an increase in hunting for the 1940 season. The Summit District alone counted 758 deer

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[92] Through the years, there have been other crusades to eradicate or suppress "problem" species. In 1950, a concerted campaign to drastically decrease the porcupine population was in full swing throughout California's national forests. Posters were tacked to campground bulletin boards throughout the Stanislaus giving hunters the green light to shoot porcupines on sight. A recipe of salt and strychnine was distributed to foresters throughout Region 5 along with instructions for placing poison in porcupine resting trees and dens. Besides eating signs and occasionally quilling pets, they had an extraordinary taste for Jeffrey Pine. The porcupine eradication program was particularly aggressive on forests such as the Inyo, where Jeffrey Pine was more commercially important (INF 1952).

killed in the 1940 season and the number of hunters being 3,986 with an estimated number of hunting effort man days at 12,411. The tabulation sheet for the Stanislaus for 1940 showed the estimated number of deer killed as 1,688 the estimated number of hunting effort man days was 19,469. Among the Stanislaus officials' recommendations to the State Department of Fish & Game were a one buck limit and "more stringent regulation as to what constitutes a legal deer;" many deer coming through the check station being very small fork horned. The individual fish and game report for Sonora District attributed the increase of deer on the district to better law enforcement, better predatory animal control by State trappers and hunters, and a reduction of burned over area in both summer and winter range (USDA 1940).

At least through the 1930s, the Stanislaus reported its observations on the counts and status of key species to the State Department of Fish and Game. Although the records found thus far have large gaps, they provide glimpses into preferred and non-preferred species and the relative effort expended to enhance the preferred ones. Within the CSWA, census was kept on marten, otter, mule deer, bear, coyote, wildcat, mountain lion, and fox. Counts were also, though more intermittently, kept of skunk, ermine, mink, beaver, badger, and raccoon. Various exotic introductions were mentioned, such as Mongolian Pheasant released in 1937 in the Yankee Hill area—and tantalizing comments were made on observations of other animals, such as the marked increase in gray and tree squirrels in 1937 when they were "considered extinct a few years ago;" and reports of mallard duck nests in the Emigrant Basin, and of six wolves seen at Summit Ranger District in 1935. Table A-7 summarizes the information from those reports from 1935 ("I" indicates a relative increase; "D" indicates a relative decrease):

Table A-7. Summary of Wildlife Records for Sonora, Summit and Calaveras Ranger Districts, 1935-1937

Species	1935	1936	1937
Bear	300	1,075	1,125
Wolf		12	6
Mountain Lion	25	41	41
Coyote	2,200	3,700	2,890
Fox	2,200	2,600	2,600
Lynx/Wild Cat	1,600	2,100	2,150
Skunk		12	600
Quail	I	Few	I
Grouse	I	8 (D)	Few (D)
Pigeon		Few	Few
Deer	8,500	6,700	22,400
Badger	25	125	100
Ermine		1,000	500
Mink	360	775	700
Beaver		14	10
Otter		250	190
Marten	375	725	725

Beaver were not known to be native to the CSWA area in particular or to the Sierra Nevada in general, but they were introduced; one of the locations centering at Wheat's Meadow.[93] The main impulses for these efforts were to facilitate income production through the sale of fur, to aid in erosion control, and to reduce rapid run-off.[94] The national forests in the Sierra Nevada were seen as a place possessing the most extensive potential habitat for beaver in California. In cooperation with the Stanislaus National Forest, 1934 appears to be the first year that the California Division of Fish & Game introduced beaver onto the Stanislaus. In that year, two pair of Snake River beaver, *Castor canadensis taylori*, from Blaine County, Idaho were released behind a man-made dam at Wheat's Meadow; a dam that had been specifically constructed for beaver habitat by the Forest Service. The next summer, the beaver had migrated about a half-mile upstream and had built several dams. In 1936, they were still active in Wheat's Meadow Creek, but some had also migrated about one and one-half miles south to Dome Rock Creek where their presence was marked by several dams and "considerable cutting on aspens, willows and alders." By the end of 1937, their number had increased to at least eight at Wheat's Meadow. By the summer of 1939, however, after walking the Wheat's Meadow area streams for two days, the only active colony was one on Wheat's Creek; the Dome Rock colony had been abandoned. In 1939, fresh cuttings were noted on Highland Creek; about six miles from Wheat's; beaver had also been reported at the main trail crossing of Shoofly Creek. In 1938, thinking that the "Wheat's Meadow planting was doomed to failure," the Forest Service released two pair of beaver from the Crooked River in Oregon into Dardanelle Creek, at an elevation of 6,700 feet. This release, located about two miles southeast of the Wheat's Meadow release, was aided by a habitat enhancement that consisted of a four-foot square box set into the bank of the stream for each pair as well as a small dam to make a pool. After release, the beaver cut the dam, but one pair used its box; the other box was abandoned. By 1940, along one mile of the creek, over 200 felled aspens were found along with four dams; both boxes had been abandoned and the two colonies apparently merged (CDF&G 1942; 1937).

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[93] Three areas in California have native beavers: Northeastern where Shasta beaver occur; the San Joaquin and Sacramento valleys that were home to the golden, and the Colorado River and Imperial Valley where Sonora beaver live (Tappe 1942:13-14). [*H0782] The Sierra mountain beaver subspecies, *Aplondontia rufa californica*, is not a true beaver. It was confirmed in 1983 at Mammoth Lakes, Donner Lake, Hoffman Meadow, Butte Reservoir, Deadman Pass, and Diamond Mountain. Specimens had been earlier collected (in the late 19th and early 20th centuries) as close as Chinquapin, Lyell Canyon, Porcupine Flat, and the East Fork Indian Creek in Yosemite National Park (Steele 1989).

[94] The "Licensed Fur Trappers Report - 1968-69" stated that there were 466 trapping licenses sold statewide in 1967-68 and an estimated value of sold furs of $43,042. By the 1968-69 season, there were 469 trapping licenses sold statewide; reported revenue from sale of furs was $63,986. For 1968-69, muskrat represented 90.6 percent of the total fur catch. A table showed the statewide number of furbearers taken and average prices paid by season, statewide (1967-68 and 1968-69); figures are not broken out by county. Species listed were: badger, beaver, bobcat, coyote, fox, mink, muskrat, opossum, raccoon, striped skunk, spotted skunk, and weasel. Sample prices for 1968-69 included: badger $2.40, beaver $11.41, bobcat $13.93, muskrat $0.76, raccoon $2.70, and spotted skunk $1.01. The trapper revenue for beaver was $16,219; for mink was $3,979; for raccoon was $2,501.

In the 1940s, the California Department of Fish and Game, Bureau of Game Conservation embarked on a beaver trapping and transplanting program using beaver native to California. For the state in 1949, a total of 328 beaver were live-trapped: 34 beaver died; 4 were released prior to transplanting; and 290 beaver were divided into 54 groupings and planted in good condition. A 1945 project labeled 18-D trapped two golden males and one female in Stanislaus and Merced counties that were planted in Sullivan Creek at 2,100' elevation. Three golden males and one female were trapped in Merced County and planted at Moccasin Creek, below the powerhouse. One golden male and one female were trapped in Stanislaus County and planted in Turnback Creek two miles from Twain Harte. Two golden males and two females from Stanislaus and Merced counties were planted in the lower portion of Woods Creek at 1,050-foot elevation. One golden male and one female were trapped from Merced County and planted in Curtis Creek; two golden males and two females were trapped from Merced County and planted in the North Fork Tuolumne in Browne's Meadow. Two golden males and three females were trapped from Merced County and planted at Bloomer Lake.

A 1947 project, labeled 18-D-1, trapped two golden males and two females in Stanislaus County and planted them in Hull Creek, a mile above Hulls Meadow. Two golden males and two females were trapped in Stanislaus County and, appropriately, planted in Beaver Creek on Pickering Lumber Company property. Five golden males were trapped in Stanislaus County and planted in Sullivan Creek. A 1948 project, labeled 18-D-2, trapped a golden female in Stanislaus County and planted her in Phoenix Lake. Two golden males and two females were trapped in Stanislaus County and planted in Dardanelle's Creek. Two golden males and two females were trapped in Stanislaus County and planted in Wheat's Meadow Creek (CDF&G 1949).

Two other beaver plants during the 1940s were in Bell Meadow (outside the CSWA area) and at Niagara Creek (Sections 4 & 10, T5NR19E). A 1968 Department of Fish & Game record indicated that, during the 1950s and 1960s, there had been an air drop of Idaho beaver into Huckleberry Lake in August 1952 and another of Idaho beaver into Eagle Creek below Eagle Meadow. It was also noted that beaver had become established in the Emigrant Basin and that recent sign had been reported at Buck Lake. Beaver were also reportedly "well established in the Kennedy Meadows, Deadman Creek, Clarks Fork of the Stanislaus complex." Moreover, 16 beaver had been taken under depredation permits from Kennedy Meadows in 1965; another six were taken under permit in 1966. The following areas were listed as places where beaver had been planted in Tuolumne County: Dardanelle's Creek, Wheat's Creek, Curtis Creek, Beaver Creek, Bell Meadow, North Fork Tuolumne River, Chain Lakes, Bellview Creek, Six Bit Creek, Herring Creek, Turnback Creek, Ackerson Meadow, Moccasin Creek, Woods Creek, Hull Creek, North Fork Merced River, and Bull Creek[95] (CDF&G 1968). By 1970, many forest

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[95] Beaver were introduced into Alpine County by the Department of Fish & Game in 1942. The beaver population became excessive and caused flooding damage of riparian areas between 1955 and 1960. A 1970 survey recorded 32 beaver colonies (minimum of 128 beavers), and over-populations were recorded on Silver King Creek, Wolf Creek, Silver Creek, Markleeville Creek, and Highland Creek drainages. Complaints were received about beaver damming irrigation ditches, cutting trees in residential yards, and falling trees across maintained trails. In addition to

officials and members of the public believed the introduction of beaver in the Stanislaus had been far too successful. Though the MiWok district ranger reported in 1968 that the beaver planted on the district had either moved to more suitable habitat, died, or been killed off, the ranger for Calaveras district, responding to a habitat management plan for beaver, recommended that beaver be eliminated or their numbers drastically reduced in many areas, "unless they could be trained to subsist on lodgepole pine" (USDA1968; USDA1970).

Forest Service Administration

President Grover Cleveland proclaimed the Stanislaus on February 22, 1897, creating a 691,200-acre Forest Reserve**.** The boundary of the reserve, after 1907 called a "national forest," changed many times. The proclamation of 1897 (29 Stat. 898) established a basic outline for the Stanislaus; the proclamation of 1905 (34 Stat. 3133) excluded certain lands from the southern part of the forest (and from Yosemite National Park) and added those lands to the Sierra National Forest; the proclamation of 1906 (34 Stat. 3229) extended the boundary to the northwest, adding 669,020 acres;[96] the 1907 proclamation (778) extended the western boundary, adding 348,570 acres; the July 2, 1908 Executive Order transferred almost 471,000 acres to the Mono National Forest and almost 268,000 acres to the Tahoe, while adding nearly 211,000 acres from the Sierra National Forest; the 1910 proclamation (1095) added some isolated parcels along the west-central part of the forest, including the section containing American Camp Lookout, and eliminated nearly 3,100 acres. By 1911, the total acreage for the Stanislaus National Forest was 1,136,500 acres. Various additions and deletions in 1915, 1927, 1930, 1940, as well as major land exchanges and special laws (such as the Raker Act, providing for the water and hydroelectric developments of the City and County of San Francisco) created a forest with 1,096,085 acres as of 1944.

Over the forest, since about 1910, land ownership patterns of Forest Service administered and private lands have remained relatively fixed. However, in at least two townships in the heart of the analysis area T3NR17 E and T4NR17E, this pattern changed substantially. Both of these townships had also been in the heart of the Standard/Pickering railroad logging operations where some of that company's private land became Forest Service land when the company traded or sold its cutover land for stumpage on Forest Service land. When the company was digging itself out of debt after the Great Depression, it was particularly motivated to liquidate cutover land for the

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detrimental effects, it was noted that: "Properly located colonies have had a beneficial effect upon erosion and meadow formation and have enhanced trout and waterfowl habitat" (Rogers 1970).

[96] Ayres wrote, in 1916, that in June 1906—prior to Roosevelt's proclamation adding to the Stanislaus and bringing its total acreage to 1,296,800, "the portion of the Sierra Reserve lying between the Merced River and the township line between ranges two and three north was transferred to the Stanislaus for administration, but was still known as the Sierra North." The 1907 addition brought the forest's total acreage to a high of 1,645,370 (USDA 1916).

privilege of cutting virgin national forest timber.[97] And by this time, the Forest Service anxiously eyed some of Standard/Pickering's land for its recreational potential. One such exchange gave the Stanislaus National Forest 2,923 acres of prime recreation land, primarily in Townships 3 North, Ranges 16 and 17 East and Township 4 North, Range 17 East in exchange for 11,369,000 board feet along with scatterings of additional stumpage. The equivalency figure settled upon between the company and the Stanislaus was $2.00 worth of timber for each acre of cutover land. The 1939 Land Exchange Report sheds light on the exigencies of the moment:

> …The Company is retaining fee title to all forties crossed by their mainline railroad from Standard to their operation on the north side of the Stanislaus River…. If this land is ever abandoned the lands withheld at this time will without doubt be available for acquisition. Negotiations for the exchange have been going on for a period of at least 10 years and have only been brought to a close now because of the financial distress of the Company and the continual pressure from the Reconstruction Finance Corporation for every dollar that can possibly be realized to satisfy its loan.
>
> In the transaction we are acquiring some five miles of the South Fork of the Stanislaus River which is an area of high recreation potentiality. In fact, it is our firm belief that had the company realized the recreational possibilities in this area, they would not have considered disposing of this property for anything like $2.00 per acre (USDA 1940).

A physical imprint of the Forest Service lies in the various structures it built in order to manage the public's lands: headquarters (Supervisor's Office), district ranger offices, fire guard stations and lookouts, experiment stations, phone lines, roads and trails, fences, barns and corrals. After becoming the US Forest Service under the Department of Agriculture in 1905, a national organizational structure took place. Confusing in today's context, what we now refer to as Regional Offices (RO) were District Offices, with the head person being the District Forester (today's Regional Forester). The individual national forests were subdivided into districts. On the Stanislaus, the districts were Tuolumne, Sonora, Summit and Calaveras[98]—the district boundaries were similar to today's Groveland, MiWok, Summit and Calaveras, though with considerable administrative boundary differences between Sonora and Summit districts.

In addition to its primary Ranger District Offices, there were a number of outlying stations that served as offices, temporary quarters and fire guard-stations. Early 1900 administrative stations for the CSWA area listed in Table A-8 (NARA 95-93-044).

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[97] Compared with the West Side Lumber Company, however, the Pickering Lumber Company was not in as great of a land-liquidating mode.

[98] At least through the mid-1950s, Calaveras Ranger District's primary office was in the town of San Andreas (Bernhard 1957).

Table A-8. List of Early Stanislaus National Forest Administrative Sites

Site	Location	Acres
American Camp[99]		119
American Camp Add-on		165
Bear Meadow	T3NR19E, Section 29	60
Big Buck	T4NR17E, Section 12-14	240
Black Rock	T4NR18E, Section 14-15	400
Basin	T2N417E, Section 19	50
Blue Jay	T5NR19E, Section 30-31	120
Brightman Flat	T6NR19E, Section 24-25[100]	170
Center Camp	T3NR16E, Sec. 33[101]	80
Clark's Fork	T6NR19E, Section 15	160
Cottonwood	T5NR29E, Section 11, 13-14	240
Cow Creek	T5NR18E, Sec. 34[102]	160
Cow Creek Add-on	T4NR18E, Section 3-4	37.5
D Four	T4NR15E, Section 34	80
Dry Valley	T1NR19E, Section 29-30	80
Eagle	T5NR19E, Section 6	10
Eureka	T5NR21E, Section 27	40
Falls	T1SR18E, Section 22-23	320
Fisher Creek	T3NR20E, Sections 13-14	160
Gooseberry	T3NR20E, Sections13-14	165

Later, other administrative withdrawals were made—for example, Pinecrest,[103] Dry Meadow Guard Station, Wet Meadow, Iceberg Meadow,[104] Wheat's Meadow,[105] Middle

[99] American Camp Guard Station was built in 1908. The old station was replaced by Civilian Conservation Corps labor; both the barracks and the garage/warehouse were built in 1939. American Camp Lookout was built by State of California 1929; the lookout residence was built in1928 and a garage at the lookout, built under the auspices of the Aircraft Warning System (AWS), was built in 1942 (USDA 1937).

[100] Brightman was at a slightly different location than today's station. After the CCC replaced buildings at the old station, it consisted of an office/cabin (1905; refurbished in 1927), residence (1933), garage (1933/34), barn/garage (1927), and woodshed (1933) (USDA 1937).

[101] According to a 1937 Development Plan and Inventory, Center Camp had two residences (30' x 30' and 16' x 24'), a 4-stall barn, a two-car garage, a tool house (12' x 20'), and woodshed (10' x 12'), all built in 1907. The development plan listed this station for abandonment "on completion of detection planning system."

[102] Cow Creek Ranger Station was begun in 1903 and was apparently complete by 1907. The four-stall barn was built between 1907 and 1912; the J-style, CCC era garage at Cow Creek was built in 1933; it was moved to Pinecrest in November 1950 (USDA 1937).

[103] Pinecrest Guard Station, while part of the old Sonora Ranger District, was on the Shore of Strawberry/Pinecrest Lake. The complex, after reconstruction by the CCC, consisted of an office, guard residence, garage, and woodshed. It appears that, in the early 1950s, this site was abandoned

Camp, Riverside,[106] Horse Meadow and the Strawberry Forest and Range Experiment Station—and other administrative sites were released. There were also a number of stations planned in 1937, probably because of the availability of Civilian Conservation Corps labor, that were apparently never built; these include Hunter Creek Guard Station, Ruby Hill Guard Station, Smoothwire Guard Station, and Hunter Bend Lookout (USDA 1937). Long-term, single purpose administrative buildings were also constructed, sometimes in partnership with cooperators; these included snow survey cabins, such as the one at Herring Creek built in 1940 (USDA 1937). In addition, there were shorter-lived, single purpose spike camps at Nashton/Camp 8, Cold Springs Mill, and most assuredly, many other temporary locations whose names have not yet surfaced in this research.[107] Cow Creek Ranger Station was the first known station established within the Stanislaus Forest Reserve. Used as the summer headquarters for the Stanislaus Reserve, it later functioned as a ranger station. It was also known for its garden—unusual for that elevation. In his land classification report for T5NR18E, Ranger Sears reported that there were no patented lands within the township, but that:

Cultivation in the form of a summer garden has been attempted at the Cow Creek Ranger Station. It has been found that strawberries will grow here, and during certain seasons potatoes can be raised successfully. This particular piece of land is the most favorable known in the township, the soil being deep, the land level, and the area protected from frosts. The spot where this garden stands was formerly covered with a very heavy stand of excellent timber (USDA 1916).

Effective December 1, 1908, the Forest Service decentralized much of its Washington, D. C. organization. Having significant implications to California issues, the State Roster reported on the National Forests in California:

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in favor of the intersection of the Sonora–Mono Road and Pinecrest Road and that some of the Pinecrest Lake buildings were moved to the new ranger station development (USDA 1937).

[104] The Iceberg station was a one-room, shake clad cabin built by the Forest Service in about 1912. It was also used for many years by grazing permittees. The 1937 Development Plan and Inventory listed Iceberg Cabin as built in 1920.

[105] Wheat's Meadow was listed on the 1937 Development Plan and Inventory as an "overnight cabin" measuring 14' x 16'; it was built in 1910. The four-stall barn was built in the same year.

[106] Riverside Guard Station was in intermittent use at least as late as 1952. Inspections report for that year commented that it was " the only substandard improvement visited" on the Stanislaus. "This is an old obsolete building and will probably be replaced when funds are available" (USDA 1952).

[107] By 1920, the Stanislaus had 37 administrative sites totaling 5,163 acres (USDA 1920:statistical summary). The practice of temporarily locating Forest Service officials as close as possible to areas where administrative needs were intense is reflected as late as 1957. In a letter to Supervisor McRorey from Pickering Lumber Company's general supervisor, the Stanislaus had approached PLC about building two of its "Pickering type family cabins" for administrative use and putting one each at PLC's Soap Creek Pass Camp and Camp Curry (Abraham 1957).

> Their area has become so great by reason of recent proclamations and their importance to local interests so vital because of their fuller utilization that they, with the National Forests of western Nevada, have been placed in a separate inspection district, the headquarters of which are centrally located in the Merchants' Exchange Building, San Francisco. The inspecting and advisory functions of this recently established office will maintain complete harmony between the administrative forces of the forests and the many who use them. The personnel of this office and the list of the national Forests administrative officers follow... (CA 1907).

California's National Forests were, at this juncture, Diamond Mountain, Inyo, Klamath, Lassen Peak, Modoc, Monterey, Pinnacles, Plumas, San Bernardino, San Gabriel, San Jacinto, San Luis Obispo, Santa Barbara, Shasta, Sierra North, Sierra South, Stanislaus, Stony Creek, Tahoe, Trabucco Canon, Trinity, and Warner Mountain. After this reorganization, users of the national forests were directed to pay a visit to their local Forest Supervisor or Ranger…

> To secure the use of land within a National Forest as sites for stores, hotels, residences, and other similar purposes, or for the construction of wagon roads, trails, tram-roads, canals, reservoirs, telephone and power lines, etc., consult with the Supervisor or nearest Ranger.... Timber and wood are given free to settlers, farmers, prospectors, and others for domestic use, and to school and road districts. It must be purchased for any commercial use. In purchasing, if not more than $50 worth of material is wanted, apply to the nearest Ranger; if more than $50 worth is required, apply to the Supervisor. To secure a permit to graze livestock on a National Forest apply to the Supervisor. Every year before grazing season opens, notice is given of the date on which all applications must be in.... No stock may be grazed on a National Forest without a permit, except the few head in actual use by campers, prospectors, and travelers. Prospecting and mining may be followed within a National Forest exactly as elsewhere. Timber and wood on a patented claim may be cut and disposed of in any way desired. On a valid unattended claim, timber and wood may be cut and used for purposes connected with the actual development of the claim, free of charge and without a permit... (CA 1907).

By 1922, the Stanislaus' workforce numbered 16 permanent staff: Forest Supervisor, Forest Assistant Supervisor, Lumberman, Ranger, Chief Clerk, and two stenographers in the Supervisor's Office; plus four ranger districts with nine rangers in the field. During fire season, June 1 to October 15, the ranks swelled by four lookouts, three secondary lookouts/firemen, and twenty fire guards. From about April 15 to November 30, there were also seven scalers to measure and account for the logs from Stanislaus timber sales (anon. 1923).

By the latter 1950s, administration of the Stanislaus had become considerably more complex. With the press of population and competing demands, it was becoming even more difficult to reach consensus on what constituted the greatest good for the greatest number in the long run. In 1958, a general inspection of the Stanislaus recommended reducing the size of the forest ranger districts. Analysis of the rangers' daily diaries showed that the bulk of their time was overwhelmingly absorbed by timber management, while fire duties ranked second; all other duties, decidedly, took a back seat. There were also difficulties concerning the power relationship between the District Rangers and the Supervisor's Office… issues that came to a point in the 1954 functional inspection of the Stanislaus. The inspector stated:

In my opinion appraisals, surveys, insect control, nursery, KV [reforestation] and BRC [blister rust control] activities belong to the respective rangers. These functions are an integral part of his unit management and should not be projected out of the supervisor's office. The Stanislaus has not gone far enough in this direction; there is still too much centralized control. Let's train the rangers then give them their jobs. (USDA 1954).

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Appendix B: Description of Ecological Unit Inventory

Introduction

Development of Ecological Unit Inventory (EUI) was completed through a series of steps beginning with mapping physical characteristics of the landscape that are considered stable over long periods of time (e.g. geology, geomorphology, soil type, and potential natural vegetation). Potential natural vegetation is the vegetation that would occur on a given site if natural fire regimes were reintroduced onto the landscape and natural succession allowed to progress.

The polygons contained in the EUI map were then grouped to (a) reflect areas of similar characteristics and (b) to simplify the map for planning purposes. For example, the generalized map unit "Canyons and Steep Slopes" groups finer scale Ecological Units such as units 101, 201,206,212, and 216. Ecological Unit 101 is a low elevation, canyon unit dominated by chaparral vegetation and thin, rocky soils. The generalized map unit is sometimes referred to as an "integrated terrestrial unit" or ITU. These land units are important because they help characterize the biophysical landscape. They reflect common attributes of fire behavior or attributes important to terrestrial wildlife species.

The final product is a map of ITUs and Ecological Units. A map (B-1 at the end of this appendix) and description of the Ecological Units (EUs) are included here.

Canyons and Steep Slopes Site

Chaparral-Interior Live Oak Canyon Type—Unit 101 (5,008 NF Acres)

General Description

The Chaparral-Interior Live Oak EU is scattered throughout the western edge of the forest boundary at the lowest elevations, generally on southerly facing slopes. This unit is entirely within the thermic temperature regime. The metamorphic parent materials in this unit make for fine-grained soils with high rock fragment content (colluvial materials) and low water holding capacity. The droughty nature of these soils is reflected in schlerophyllus (waxy leaved) vegetation that includes shrubs like white leaf manzanita, mountain mahogany, yerba buena, and wedgeleaf ceanothus. Rocky outcrops and openings are common and become dominant on steeper portions of canyon inner gorges.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Chaparral was among the first ecosystems where ecologists recognized the importance of fire in the ecosystem. This was because native chaparral species are highly adapted to periodic stand replacing fire. Chaparral shrubs usually grow close together and once ignited, chaparral fires spread very rapidly. In chaparral fires, volatile organic compounds released from the burning foliage increase the intensity of the fires and literally fuel the fire to spread. Chaparral burns primarily under extreme weather conditions and only as a stand-replacing fire. Fire return intervals are difficult to estimate in this LTU because stand replacing fires prevent the application of standard techniques used in tree dominated vegetation types (dendrochronology). Therefore, studies in chaparral types are limited to fire records from this century and previous anecdotal accounts (Parsons 1981). Estimates are that fire return intervals (FRIs) depended upon local site conditions, proximity to areas of aboriginal human use, and elevation. FRIs were probably from twenty to fifty years with ranges of approximately ten to more than a hundred years (Keeley 1982; Kilgore 1987; Barro and Conrad 1991). Studies in blue oak-gray pine types found a historic median fire return interval of 29 years (McClaran and Bartolome 1989). Fire regimes in the Sierra Nevada chaparral have not changed greatly from conditions before European settlement.

Vegetation Composition and Structure
Variations in FRIs differentially favor the various species, depending upon their method of response to fire. Variations in FRIs and species responses over time can lead to diverse patterns of vegetative communities, whereas short FRIs with little variation may lead to a reduction in vegetative diversity (Keeley 1991). Regular fire regimes increase the clumpiness in shrubland landscapes by forming smaller patches than would be formed during longer fire free periods. Conversely, longer fire intervals are expected to push the chaparral landscape toward a more uniform distribution. Minnich (1987), for example, noted that shrubland fuels in the San Gabriel Mountains are more continuous than they were decades ago. Similar findings have been noted for the shrublands of the Sequoia National Park, where instead of a mosaic of different succession stands, old-age stands were found to be dominant across the landscape, and reduced fire frequency was suggested to be the cause (Vankat 1970; Parsons 1976; Vankat and Major 1978).

Approximately 21% (1,046 acres) of this mapping unit is productive forestland. With the harvest of conifers, insect/drought-related mortality, and the absence of periodic disturbance by fire, ponderosa and sugar pines are much reduced, as compared to several decades ago. Oaks and woody shrubs dominate sites that once supported varying levels of conifer stocking. Current trends will lead to even lower conifer stocking levels.

Ponderosa Pine-Hardwood Canyon Type—Units 201, 206, 212, 216 (30,502 National Forest Acres)

General Description

The Ponderosa Pine-Hardwood Canyon ITU is located in the central and western portions of the planning area between 2500 and 6000 feet. Slopes are generally steep to moderately steep with all aspects represented. Much of this unit falls into canyons with inner gorge positions a dominant feature. Soils in this unit are often moderately deep and, or rocky, and usually have some limitation to their ability to hold water. The soils in this unit are subject to drought in summer months. The steep nature of this unit means that debris sliding and debris flows are common features on the landscape. This high amount of disturbance and droughty soils help maintain a high proportion of hardwood species (interior live oak, canyon live oak and to some extent California black oak), even in areas where soils have developed strong surface horizons.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
There are no published fire histories of this type in the Sierra Nevada. Fire frequencies were probably similar to, if not longer and more variable than, those of more conifer dominated areas. They would tend to have less fuel accumulation and less continuous fuels because of the large amount of debris sliding and rock outcrops in the unit. However, this is not always the case. Where conifers are well represented in the stands, a more consistent fuel bed can accumulate. The characteristic fire regime of this type of forest was probably one of relatively frequent, spatially variable fires of low to moderate severity. In a fire-history study from the Klamath Mountains, median FRIs of eleven year (with a range of 3 to 55 years) were found on three sites by Taylor and Skinner. In the planning area fire behavior in this type has changed to one of high intensity stand replacing fires.

Vegetation Composition and Structure
Changes in fire regimes in this type have caused structural changes, primarily the loss of conifers from these stands. Historically, ponderosa pine was likely more prevalent, particularly in drainages, toward the tops of slopes above canyons, and in pockets of more stable soils. Stand replacing fires in this type and historic droughts have contributed to the loss of conifers in this type. Hardwood species are relatively more drought resistant and are highly resilient to fire because they sprout following a stand-replacing event. This ability, has allowed them to persist in the landscape even when conifers were removed through fire, drought or in some cases logging.

Approximately 50% (15,153 acres) of this mapping unit is productive forestland. With the harvest of conifers, insect/drought-related mortality, and the absence of periodic disturbance by fire, ponderosa and sugar pines are much reduced, as compared to several decades ago. Oaks and woody shrubs dominate sites that once supported varying levels of conifer stocking. Current trends will lead to even lower conifer stocking levels.

Upper Montane Shrub—Unit 331 (approximately 11,000 Acres)

General Description

The Upper Montane Shrub ITU is located in the northern portion of the landscape at higher elevations. Slopes are steep and primarily south facing. Soils are excessively well drained, and shallow. Rock outcrop may make up to 30 percent of the unit and even the deepest soils have boulders. Vegetation is dominated by montane chaparral species, though pines may be present in pockets of deep soil.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Fire frequency is probably high due to the high number of lightning strikes at this elevation. Fire spread was probably patchy because of the fuel continuity provided by shrubs. Fires starting at the bottom of these slopes likely raced to the top where they dropped to the forests floor at the slope break. Impenetrable conditions in this unit may be relieved through application of prescribed fire for wildlife benefit.

Vegetation Composition and Structure
Montane chaparral species, predominantly green leaf manzanita, *Prunus* and huckleberry oak are interspersed with rock outcrops and pockets of deeper soils that may support conifers like Jeffrey pine and sugar pine. Mixed conifer stands will be most prevalent in drainages at lower elevations where soils with higher water holding capacity have accumulated.

Low Elevation Fire Influenced Uplands

Chaparral-Mixed Oak-Ponderosa Pine—Units 202, 204, 211 (15,447 NF Acres)

General Description

The Chaparral-Mixed Oak-Ponderosa Pine ITU includes large areas of mixed hardwood dominated vegetation with some areas of transition to hardwood-conifer forests or chaparral. It is located below 3,700 feet at the western side of the planning area. Slopes are moderate to steep with all aspects present. Soils tend to be in the warm mesic temperature class and are often shallow or rocky. Rock outcrops and pockets of deeper soils occur throughout the area. Vegetation is dominated by hardwood species (interior live oak, canyon live oak and California black oak) and gray pine, with ponderosa pine prevalent on deeper soils and in drainages, particularly at the higher elevations and on more mesic north facing slopes. Chaparral species (white leaf manzanita, wedgeleaf ceanothus, and chemise) may dominate on rocky areas and south facing slopes.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Similar to the Chaparral EU discussed above, fire return intervals are difficult to estimate for this ITU because of the stand replacing nature of the fire regime. However, this transitional unit between the montane ecosystems and chaparral was likely subject to higher fire frequencies than the adjacent chaparral systems because of its greater association with ponderosa pine and hardwood forests. The ecotone between this ITU and its neighbors was probably very dynamic, varying with fire frequency and intensities.

Vegetation Composition and Structure
This unit is dominated by hardwood species like interior live oak and canyon live oaks. Much of this ITU will behave similarly to chaparral ecosystems, though higher fire frequencies will tend to favor more open canopies and support trees where soils allow. Within canyons, interior live oak tends to favor warmer, south facing slopes, while canyon live oak occupies wetter, north facing slopes. Decreases in fire frequency and trends towards stand replacing fires tend to favor sprouting hardwood and chaparral species over conifers. The presence of conifers in this ITU was likely highly dynamic, varying with fire and drought cycles.

Approximately 38% (5,897 acres) of this mapping unit is productive forestland. With the harvest of conifers, insect/drought-related mortality, and the absence of periodic disturbance by fire, ponderosa and sugar pines are much reduced, as compared to several decades ago. Oaks and woody shrubs dominate sites that once supported varying levels of conifer stocking. Current trends will lead to even lower conifer stocking levels.

Ponderosa Pine Types

Ponderosa Pine-Hardwood Upland Type—Unit 205 (15,185 National Forest Acres)

General Description

The Ponderosa Pine-Hardwood Upland EU is located at the low elevation end of the ponderosa pine belt from 2800 to 4500 feet in elevation along the western side of the planning unit. Slopes are moderately steep with generally moderately productive Josephine soils. Vegetation is dominated by hardwood species, (black oak and canyon live oak) under a generally open canopy of ponderosa pine. At higher elevations and on high site soils, this unit grades to more productive ponderosa pine stands with fewer hardwoods.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
This unit experienced significantly more fire than found at lower elevations. Pre-1850 fires burned quite frequently with fires generally of low to moderate severity. Two factors contributed to the general fire regime: the ease of ignition and fire spread due to the relatively loose fuel bed of long needles and oak leaves (e.g. Rothermel 1983) and the regular use of fire to manage this forest type by the native tribes of the Sierra Nevada (Lewis 1993). Historical fire return intervals in these forests were generally from two to twenty-three years, commonly being less than ten years. Surface fires were most common in this type with occasional flare-ups occurring in brush patches. Crown fires were unlikely in most stands (Husari 1980). Landscape patterns were generally fine grained, that is, at the 1-acre scale small to moderate sized openings were created generally by fire, into which seedlings became established. When looking at the landscape as a whole, (100's of acres) the pattern was overall fairly homogeneous.

Currently, fires are infrequent and are generally of high severity and stand replacing. Landscape patterns at all scales are generally homogeneous where similar environmental conditions prevail. It is estimated that from 5 to 10 fire cycles have been missed in this type.

Vegetation Composition and Structure
Frequent fires in this type tended to thin understories and allow pine and hardwood establishment in areas of flare-ups. Under the pre-settlement fire regime of frequent, low intensity fires, the hardwood and ponderosa pine forests canopies were kept open with spaced trees in an uneven-aged structure (Weaver 1943, 1967, Husari 1980, Andrews 1994). Multi-layered stands existed but were less extensive than today (Andrews 1994). Fire exclusion has allowed these forest types to become denser with un-thinned seedlings and brush. Effects to the herbaceous layer are unknown, but in areas of dense forest, loss of species associated with open growing conditions is likely.

Stand replacing fires favor species that regenerate through sprouting like many hardwood and shrub species over conifers. Historically, conifer cover may have been as high as 35 percent in this vegetation type, based on data collected in the San Pedro Martirs of Mexico that have experienced little to no fire suppression in a similar vegetation type (Stephens, personal communication).

Historic logging in this type was intense, and most of the older larger trees were removed for use as building materials, firewood, and mine supports. These large trees played an important role in the landscape by providing shade and moderating environmental conditions.

Approximately 58% (8,841 acres) of this mapping unit is productive forestland. With the harvest of conifers, insect/drought-related mortality, and the absence of periodic disturbance by fire, ponderosa and sugar pines are much reduced, as compared to several decades ago. Oaks and woody shrubs dominate sites that once supported varying levels of conifer stocking. Current trends will lead to even lower conifer stocking levels.

Ponderosa Pine Uplands—Unit 208 (approximately 12,016 National Forest Acres)

General Description

This Ponderosa Pine EU occurs on gentle to moderately steep slopes in the southwestern and central portion of the planning unit from 3,000 to 5,000 feet in elevation. Geology and parent material is mixed, including granitic, metamorphic and volcanic origins. The dominant feature that holds this unit together is the high productivity of these sites and their support of large areas of "classic" ponderosa pine forest.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
The characteristic fire regime of much of the Sierra Nevada (frequent fires of low to moderate severity) favored the development of ponderosa pine-dominated forests on many different types of sites where the species is seral to other conifers. Ponderosa pine, being a shade-intolerant species is rarely a late-successional dominant. Exceptions exist where the sites are continually disturbed (usually by fire) or are warmer, are dryer or have limited soil development compared with other mixed conifer sites. Studies conducted in ponderosa pine vegetation types are not differentiated from studies conducted in the lower mixed conifer of the Southern Sierra. Fire return intervals were found to range from 8 to 10 years on 1 hectare plots (Kilgore and Taylor 1979) and from 5 to 7 years on 15 to 35 hectare plots (Wagener 1961). Surface fires were most common with occasional flare-ups occurring in brush patches. Crown fires were unlikely in most stands (Husari 1980). Long loosely packed pine needles and herbaceous species maintained frequent and mild surface burns. Landscape patterns were generally fine grained, that is, at the 1-acre scale; small to moderate sized openings were created generally by fire, into which seedlings became established. When looking at the landscape as a whole, (100's of acres) the pattern was overall fairly homogeneous.

Vegetation Composition and Structure
Historic frequent low severity fires created openings for pine seedling establishment, thus maintaining its persistence. These fires also thinned saplings and maintained the relatively open understories documented by early settlers (Muir 1894; Sudworth 1900; Leiberg 1902; Cooper 1961). The recent increase in understory density has been attributed to the current longer fire intervals. Lack of fire in these systems has allowed for the forests to become denser with shade tolerant species like white fir and incense cedar. Through this process, much of this type has been converted to mixed conifer forest. Denser stands that have resulted from the exclusion of fire cause more competition for available water and, therefore greater moisture stress. Extensive mortality thus results from droughts, either directly from drought stress or from stress-induced bard-beetle outbreaks (Weatherspoon et al. 1992). Densification of forests in this ITU have also

increased occurrence of stand replacing fire events which favor sprouting species such as hardwoods and chaparral. Following large, severe fires, shrubs occupy sites for very long periods before the pine can again attain a superior position (Husari 1980; Andrews 1994). But instead of giving way to pine, these brush fields may also maintain a continual cycle of fire, therefore maintaining itself (Andrews 1994). This ITU has trended toward extinction through catastrophic fire favoring shrub fields and fire suppression allowing in growth of shade tolerant conifers.

Open Lava Cap

Low to Mid Elevation Lava Cap--Unit 203 (12,148 National Forest Acres)

General Description

The Chaparral-Herb-Conifer EU is located in ridgetop locations in the central-western portion of the planning unit where lahar flows (ancient volcanic mud flows) act as a capstone. Elevations range from 3,000 feet to 6,000 feet. Vegetation attributes are contrasting within the unit because of the sharp divisions between moderately deep soils and shallow soils with abundant rock outcrops. Tree cover is sparse to patchy and dominated by California black oak though pockets of ponderosa pine may be found. Grassy and shrubby areas dominated by wedgeleaf ceanothus and mariposa manzanita are abundant and form greater than 50 percent of the unit's cover.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Fire frequency in this unit was probably high due to its location on the landscape. However, fires were likely small and total area burned was probably low due to the discontinuous nature of the fuels. This unit may act as a natural firebreak for the surrounding more forested units.

Vegetation Composition and Structure
Vegetation composition and structure is likely similar in this unit to historic conditions because of the strong relationship between soils and vegetation in this unit. The primary change in this unit is the replacement of perennial grasses with annual grasses that took place in the mid-1800s. Annual grasses tend to form a more continuous fuel bed and provide a longer fire season thus altering fire regimes toward larger fires that may occur earlier in the season.

Approximately 72% (8,741 acres) of this mapping unit is productive forestland. With the harvest of conifers, insect/drought-related mortality, and the absence of periodic disturbance by fire, ponderosa and sugar pines are much reduced, as compared to several decades ago. Oaks and woody shrubs dominate sites that once supported varying levels of conifer stocking. Current trends will lead to even lower conifer stocking levels.

High Elevation Lava Cap—Unit 403 (approximately 35,000 acres)

This EU is the high elevation version of unit 203. The elevation range of this lava cap unit ranges from 6,000 feet to over 9,500 feet. Vegetation is characterized by Emergent Persistant forbs and grass dominated by Mountain mule ear, subalpine forbs, and Western juniper scattered. Jeffrey pine on sout facing slopes. There are inclusions of Mountain Hemlock on north aspects. Shallow soils, volcanic rock, talus slopes, and snowfields dominate this Ecological Unit.

Mixed Conifer

Lower Mixed Conifer--Units 217, 219, 227, 307 (approximately 67,000 National Forest acres)

General Description

The Lower Mixed Conifer ITU occurs throughout the central portion of the planning area generally between 4000 and 6500 feet in elevation. The common themes to this ITU are generally deep soils on moderate to gentle slopes that are considered productive for growing conifers. Generally, soils are high in water holding capacity and are less subject to drought than previously discussed ITUs. Vegetation is dominated by mixed conifer forest. Areas of shallow or moderate soil depths are also present, though they generally support more open mixed conifer forests with higher percentages of shrub species and pines. This unit is largely contained in the mesic temperature regime, but portions at higher elevations may also be considered frigid. Snow line is often found in this ITU during winter months.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
In the southern Sierra, the fire regime was generally one of frequent fires of mostly low to moderate severity, with occasional, typically small, patches of high-severity fires (Kilgore 1973). Fire return intervals generally increase with increasing elevations. Study results in this type are similar to those in ponderosa pine, but it may be appropriate to include studies from Sequoia groves in this group as well. Giant Sequoia groves are not contained within the study area, but many occur in this ITU to the south. Mean fire return intervals in this type were found to range from approximately 3 to 8 years. Importantly, fire scars used to document these fires were found generally in late wood, that is wood laid down during late summer or fall. The longest fire free interval in five groves was 30 years.

Vegetation Composition and Structure
Mixed conifer forests in this ITU are highly variable in composition (Eyre 1980) and the proportion of each species in different stands is thought to be determined by soils,

elevation, precipitation, and fire frequency: more frequent fire favors a higher percentage of fire adapted ponderosa and Jeffrey pine; less frequent fire favors less fire tolerant white fir and incense cedar. White firs in Sequoia National Park have been observed to increase in density during dates that correspond to the onset of reduced fire frequency (Vankat and Major 1978). Periodic fires before European settlement were thought to maintain uneven-aged stands (Weaver 1974), which were dominated by larger, older trees as compared with today's predominantly smaller, younger trees (Andrews 1994). Consequently, stands have become more complex vertically, but less complex and more homogeneous in terms of aerial arrangement (Weatherspoon et al. 1992).

A prolonged period with intense stand-destroying fires is thought to convert the habitat to a montane chaparral (Husari 1980). Before European settlement, these ecosystems were probably more open than they are today (Weaver 1974) and sufficiently open to support a well-developed herbaceous-layer community of forbs, perennial bunchgrasses, and dispersed shrubs. These understory components are now lost for the system and impossible to describe in detail from available historical data.

Upper Mixed Conifer—Units 303, 306, 319 (29,000 National Forest acres)

General Description

The Upper Mixed Conifer ITU occurs on moderate to steep slopes in the central and eastern portions of the planning unit. This unit falls mostly in the frigid temperature regime and occupies elevations from 5,500 to 7000 feet. Soils are generally productive, though steeper units may experience frequent debris slides or avalanches. Vegetation is mixed conifer in

nature with high proportions of the species composition in white fir and sugar pine. Red fir may be present at upper elevations and in cold air drainages.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
In the southern Sierra Nevada, the fire regime was generally one of frequent fires of mostly low to moderate severity with occasional, typically small patches of high-severity, fires (Kilgore 1973). In areas where white fir is well represented by large, old trees, the FRIs were likely to have been longer and more variable than those in areas where larger, older white fir are found only occasionally. Studies in the southern Sierra Nevada found pre-1850 fire return intervals of 7 to 20 years. Ignitions in this ITU were likely higher than in the lower mixed conifer zone (Vankat 1983), however, fire spread less readily because (1) biomass accumulates more slowly; (2) the fuel is more compact; and (3) weather condition that will support a fire occur less often. Fire suppression actions are though to have had less effect on this and the red fir ITU below because fewer fires would have been expected even without fire suppression. Stand-replacing fires occasionally occur in these zones, and they initiate large cohorts of red and white firs, but

lower-severity fires that create smaller canopy openings and consequently smaller patches of thinned saplings are most common (Kilgore 197l; van Wagtendonk 1986; Taylor 1993).

Vegetation Composition and Structure
This type of mixed conifer forest is differentiated from lower mixed conifer forests by its dominance of fir trees. The cooler and more mesic conditions found in this ITU allowed the generally fire sensitive young white fir to reach large size classes. Lower-severity fires that created smaller openings also allowed for this ITU to support a large contingency of sugar pine. Much of this component in the ITU was removed during the railroad logging days and more recently, as part of the white pine blister rust campaign.

Red Fir and Jeffrey Pine Types

Red Fir—Unit 310 (5,399 Acres)

General Description

The Red Fir ITU is located in the central, easterly part of the landscape at generally high elevations (6,000 to 9,500 feet) within the frigid and cryic temperature regimes. Slopes are generally moderately steep. Soils in this unit tend to be deep to moderately deep with conifer production limited mostly by temperature and exposure. Ridge tops generally have shallow or less productive soils. The red fir and the upper mixed conifer ITUs are part of the upper montane vegetation zone, one of the least altered and most contiguous forested types in the Sierra Nevada.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Fires occurred historically less frequently in these forest types than in lower elevation forests because the fire seasons are shorter, the environments moister, and the fuels are more compact and less continuous. Because fire regimes are more variable, and generally long in duration, and lightning ignitions are abundant, fire suppression is believed to have minimally affected the ecology of red fir and other upper montane forests. Red fir trees are considered intolerant of fire and large stand replacing fires are rare in this type. However, the small openings that lightning fires create in the forest canopy play an important role in allowing germination of new trees, and in maintaining a mosaic of trees of different ages.

Vegetation Composition and Structure
Red fir stands dominate this forest type, but white fir will be present at lower elevations. Jeffrey pine may also be abundant on poorer soils and more exposed locations. Lodgepole pine is often present. Wooly mule's ears and high elevation grasses may dominate shallow soils and openings in this unit. Regeneration in this ITU is limited by temperature and exposure. Soil temperatures at approximately 8000 feet elevation in the planning area never exceeded 44 degrees Fahrenheit when measured throughout one

summer. Red fir trees do not initiate root growth until soil temperatures are above 40 degrees, so the growing season is very short. Past clear-cutting in this unit has seen unsuccessful regeneration; whereas shelter wood or seed tree retention have had greater success.

Jeffrey Pine-Rock Outcrop Type and Red Fir-Jeffrey Pine-Lodgepole Pine Types—Unit 335 and Units 312, 402 (approximately 49,000 acres)

General Description

The Jeffrey Pine-Rock Outcrop & Red Fir-Jeffrey Pine-Lodgepole Pine EUs are spread throughout higher elevations in the landscape (6,000 to 8,500 feet). The unifying theme of this ITU is moderately productive to poor soils in upper montane vegetation. This unit occurs frequently on side slope positions and ridges, and all slope aspects are represented. Slopes tend to be moderately steep.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Historic fire frequencies in this ITU were high, with many lightning caused ignitions. However, similar to the red fir ITU, spread of fires was limited and fires were generally small. This unit also has a certain amount of inherent patchiness due to its high proportion of rock outcrop and poor soils. Fire suppression has had little effect on this unit and stand replacing fires are still not common because of this unit's patchiness and cool temperatures.

Vegetation Composition and Structure
Much of this unit contains soils with low site productivity or rock outcrop that generally support montane chaparral such as huckleberry oak, *Prunus* and bitterbrush. Vegetation is highly variable reflecting the mosiac of mixed soil productivities and aspects. Red fir will dominate more productive sites with Jeffrey pine on rockier and more southerly facing slopes. Lodgepole pine will be present in drainages and on flatter terrain. At the lowest elevations in this type, white fir and sugar pine may become important.

Subalpine Lodgepole Pine Mixed

Lodgepole Pine-Whitebark Pine-Rock Outcrop and High Elevation Red Fir-Lodgepole Pine—Unit 401 and 405 (approximately 28,000 acres)

General Description

This ITU occurs at high elevations (8,000 to 9,500 feet) throughout the landscape. It is in the subalpine zone and includes pockets of upper montane vegetation and upper montane meadows. The temperature regime is predominantly cryic. Deep snow packs are likely to occur in this unit. Soils in this unit occur in a mosaic of soil depths ranging from deep to shallow. Slopes are steep to moderately steep and include all aspects. Many of the low lying soils will have udic moisture regimes, that is the soil profile remains moist well into the summer. Unit 401 is volcanic and unit 405 is granitic.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Although lightning strikes are disproportionately high in sub-alpine forest, because of the discontinuous fuels, fires in the sub-alpine zone tend to be small and brief. These vegetation types are not generally adapted to the regular occurrence of fire. The ITU is naturally discontinuous and patchy due to the high degree of variation in soil depths and rock outcrops.

Vegetation Composition and Structure
This ITU includes patchy forests of Western white pine, white bark pine and lodgepole pine along with sub-alpine shrublands, upper montane meadows and associated riparian corridors. Areas of Western juniper, bitter brush and sage occur near the Sierra Nevada crest. At lower elevations, areas of red fir and Jeffrey pine can be found.

Open Glaciated Granite

Open Glaciated Granite—Unit 407

General Description

The type location for this unit is the Emigrant Wilderness. Rock outcrops and areas of shallow soils dominate this ITU. It is typically found at elevations above 7,000 feet, but drops lower in the Pinecrest basin area. Slopes are generally moderately steep and all aspects are represented. Inclusions of forested areas are present, but cover less than 10 percent of the unit. Much of this unit is in the alpine vegetation zone and cryic temperature regime. Stringer meadows and riparian corridors are important for biodiversity in this type.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Fire is rare in this ITU. While lightning strikes are many, ignitions are few and small. Alpine vegetation is not adapted to the regular occurrence of fire. Vegetation in this unit is patchy and highly fragmented.

Vegetation Composition and Structure
Vegetation forms discontinuous patches throughout the unit. The unit includes large areas of rock, talus and snowfields. Vegetated areas typically support cushion plants, heathers and willows. Dry and wet meadows may also be found in these extreme environments. Forested patches are found in areas of deeper soils below tree line. Trees include Western white pine and lodgepole pine. Lodgepole pine occurs in the drainages, where soils have developed in the granitic bedrock fractures. Sparse stands of Jeffery pine are common at lower elevations and on southfacing slopes. Inclusions of red fir can be found on gentle sloped, northwest aspects and protected sites.

Riparian Influence

Conifer-Alluvial Flat—Unit 304 (approximately 7,000 Acres)

General Description

This Conifer-Alluvial Flat ITU is located throughout the montane and upper montane portions of the project area, and is restricted to riparian positions on the landscape. Elevations range from 6,000 to 8,000 feet. Slopes tend to be gentle and aspects vary. Soils are deep to rocky and inclusions of meadow soils and vegetation are common. Vegetation varies from mixed conifer to Lodgepole pine and red fir. Aspen may be present at higher elevations, cottonwood at lower. Willows are also present.

Historic and Current Conditions and Trends

Fire and Landscape Patterns
Although lightning strikes are disproportionately high in subalpine forest, because of the discontinuous fuels, fires in the subalpine zone tend to be small and brief. These vegetation types are not generally adapted to the regular occurrence of fire. The ITU is naturally discontinuous and patchy due to the high degree of variation in soil depths.

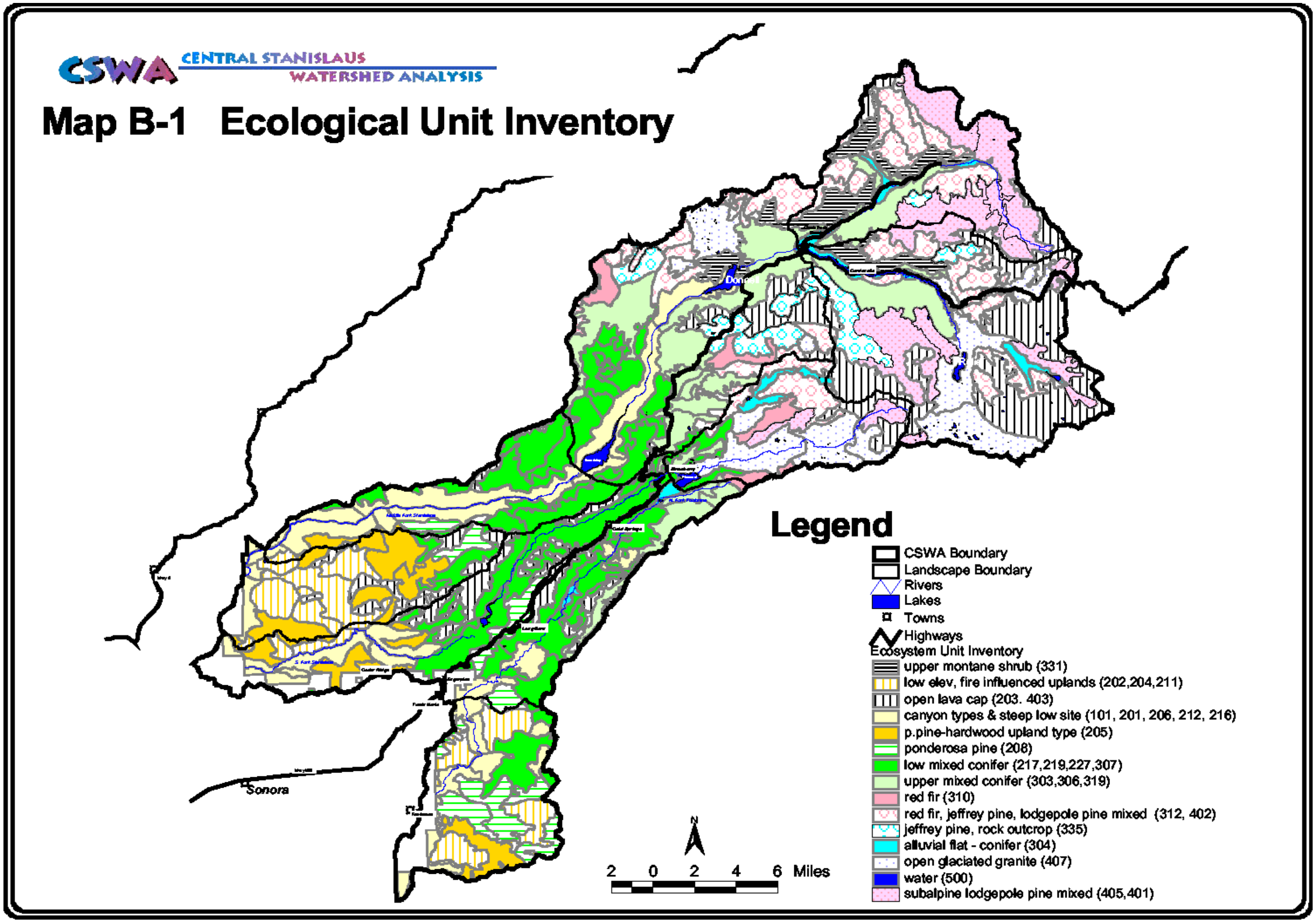
Vegetation Composition and Structure
Lodgepole pine is considered a pioneer species and is adept at regenerating in openings created by fire, avalanche, clear-cut, or wind throw. Because of this ability, lodgepole pine typically occurs in clumps, seldom larger than 900 square feet (Schoenherr 1992). This differs from lodgepole pine populations in the Rocky Mountains that typically occur in large even-aged stands resulting from widespread fire. Lodgepole pine will be maintained on the landscape in areas where disturbance regimes are recurring at relatively frequent intervals.

References

References cited in the discussion above can be found in:

Chang, C-R. 1996. Ecosystem responses to fires and variations in fire regimes, Chapter 39. In: Sierra Nevada Ecosystem Project, Assessments and scientific basis for management options, Final report to Congress, Volume II. Wildland Resource Center, Davis California.

Skinner, C.N. and C-R.Chang. 1996. Fire Regimes Past and Present, Chapter 38. In: Sierra Nevada Ecosystem Project, Assessments and scientific basis for management options, Final report to Congress, Volume II. Wildland Resource Center, Davis California.


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map B-1 Ecological Unit Inventory
Sonora
2 0 2 4 6 Miles
N
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Ecosystem Unit Inventory
upper montane shrub (331)
low elev, fire influenced uplands (202,204,211)
open lava cap (203. 403)
canyon types & steep low site (101, 201, 206, 212, 216)
p.pine-hardwood upland type (205)
ponderosa pine (208)
low mixed conifer (217,219,227,307)
upper mixed conifer (303,306,319)
red fir (310)
red fir, jeffrey pine, lodgepole pine mixed (312, 402)
jeffrey pine, rock outcrop (335)
alluvial flat - conifer (304)
open glaciated granite (407)
water (500)
subalpine lodgepole pine mixed (405,401)

Appendix C: Public Involvement

Public Involvement Activities

1998:

October	Initial outreach letter went out to 2650 people, including all homeowners within the CSWA boundary, permittees, Pinecrest Pathways, and EA Quarterly mail list. 745 people responded, requesting to be put on the mailing list.
November	First public meeting. 71 attendees. Subject: Overview of CSWA process. Collected comments regarding interests and any information they knew about the watershed. 71 people attended.
December	Second public meeting. Over 650 comments received from first two meetings. 52 people attended.

1999:

January	Set up web site, http://www.r5.fs.fed.us/stanislaus/mgmt/index.htm
January	Sent first CSWA Update to 745 people on mailing list.
February	Information meeting in Modesto. 37 attendees.
February	Information meeting in San Ramon. 29 attendees.
March	Public meeting. 55 attendees. Subject: Past watershed conditions. Public and Forest Service brought information to share regarding past watershed conditions. Scanners and xerox machines were made available to capture information for the record.
March	Field trip to Deer Creek & Ruby Fire area. 60 attendees.
May	Sent second CSWA Update to 745 people on the mailing list. Coordinated with Tri-Dam & PG&E and included their newsletter regarding Stanislaus River Hydropower Relicensings.
May	Public meeting. Subject: Present watershed conditions. 51 attendees.
June	Field trip to Beardsley & Spring Gap, coordinated with TriDam. 57 attendees.

June	Public meeting. Subject: Desired conditions. 23 attendees.
July	Field trip to high country. Subjects: recreation, meadows, aspen grazing. Visited Herring Creek Campground, Three Meadows, Groundhog Meadow. 26 attendees.

2000:

January	Sent third CSWA Update to 745 people on the mailing list, describing activities to date: link between CSWA and Sierra Nevada Forest Plan; link between CSWA and Stanislaus Planning and Action Team (SPLAT); collaboration efforts occurring related to FERC relicensing.

Some Public Comments Received

Aquatic Animals

- Observation by someone who has fished the Middle Fork since the 1960's—mayflies & caddisflies have dropped dramatically in number.
- Otters seem to be impacting the fisheries.
- I am interested in keeping trout in our rivers.
- What's happening to the declining frog populations?
- Is there spawning gravel for fish above dams?
- Important to maintain native fish populations.
- Lets think of future generations to have the potential for native trout fisheries even though it's not feasible at the present.
- How can we return red-legged frogs; stop decline of foothill yellow-legged frogs?
- Since increased sedimentation rates have degraded fish spawning habitats, how will you mitigate this?
- How can we help population of endangered Chinook salmon?
- Manage exotic fish so that frogs and other invertebrates may return.
- Amphibians are fading or at the brink within the CSWA area. Restoring them or preserving them should take high priority in all decisions/recommendations about aquatic resources.
- What is the history of beavers in the analysis area? Were they naturally here, or only introduced?

Economics

- My interest is in economically healthy communities in the area. This should include sustainable use of forest resources, which means logging in appropriate areas in ways that work economically—not just brush & small logs that require subsidies.

- There are economic benefits to the County when my friends and I use this area for snowmobiling.
- Pay the most attention to local economies, as they will be most affected (more impart locally than regionally, nationally).
- Interest in maintaining resource uses/commodity uses to keep economic viability.
- Spreading out economic opportunities throughout year.
- Valuing recreation for it's positive personal/economic benefits.
- I'm concerned about availability of firewood.
- Regarding water resources, I am interested in county of origin rights as to the regulatory process and licensing of the projects, both monetary and availability to local residents.
- Should subsidize "Ultrapower" to thin the forest. Would be cheaper than fighting forest fires and would be a good source of energy.
- Sustainable resource use—balanced with a healthy forest—has an economic impact on Counties whose boundaries include National Forest lands.
- Water has a super high economic and social value for this area. Protecting that value should be a priority, especially compared to the full costs of resource extraction.
- Tourism is the highest economic use/value of the Forest. Protecting ecological values as a highest priority makes good sense.

Fire

- Interested in better fuel reduction on the forest.
- The primary areas for treatment should be areas down slope from subdivisions and urban areas.
- It is important to treat small biomass fuels within this area, even if there is not a strong market for such fuels.
- There is complete, unanimous support from those discussing fire and fuels that the Forest Service should greatly increase burning, even if it means more smoke and air pollution at times.
- I support an increase in controlled burning if it will reduce fire risk and damage from wildfires.
- How can we reduce fuels, minimize smoke, and maximize organic layer and optimize soil productivity?
- In the day and age of fuels reduction with fire, how do we keep good air quality i.e. less smoke and more fuels reduction?
- Defense of Cold Springs/Peter Pam/Strawberry from the effects of a wildland fire—people-caused in particular.
- I am interested in opening up Sierras to pre-historical forest densities. I believe that is healthy for forests and society.
- Pre-treatments/co-treatments with burns to provide a better end result.
- What can be done to improve the burn window and desired burn conditions (logging, thinning, grazing, etc.)?
- Use prescription fire to keep recreation opportunities.

- Protect campgrounds by treatment of adjacent fuel hazard areas. That is the FS responsibility.
- Would like to see low fires to help aspen, meadows, and some grass species and remove fuel buildup.
- Protect private property from high fire hazard.
- Keep wildlife ecosystems intact and diverse with prescription fire.
- Fire to clean forest and meadows.
- Because devastating fires harm tourist, watershed, timber, and wildlife values, there needs to be sufficient prescribed burning across the lower and middle elevations to greatly reduce the potential for such conflagrations.
- Can forest communities such as Cold Springs be incorporated into adjacent fuel treatments via firewood cutting or Christmas tree collection?
- Fuel hazards should not be used as an excuse to over cut the forest. Focus on ecosystem process and stability.
- Try alternatives such as firewood sales in vicinity of housing. Zig Zag yarder for small trees.
- Fuel hazard reduction should minimize ecological damage; air pollution, erosion, wildlife kill, water quality.
- Burning of forest is preferable to logging, and much more of a natural ecological process.
- How about using some sort of mobile chipper to reduce thickets and treat lower limb wood.
- Interests: Low intensity fires kill back the brush that causes conflagrations
- What do you know about the area? Return to conditions where lightning fires don't burn it all.
- I believe low intensity prescribed burns could be an extremely beneficial alternative to aerial application of herbicide use. Although maybe not more cost effective in the short term, the health benefits to the ecosystems could prove financially rewarding in the long run.
- I am concerned that widespread herbicide use on brush creates an increase in fire fuels. I have witnessed the increase south of Hunter Creek on forest road 1N01.
- Highway 108 corridor has high permanent occupancy level with private/government land necessitating strong fuel treatment measures in order to avoid catastrophic property/life losses.
- Utilize all tools to treat/reduce fuel hazards, i.e. fire, timber harvest, livestock.
- Treatment of a large enough scale to be effective.
- Make vegetation management projects for fuel treatment self supporting.
- Seeing pattern of less management resulting in more negative attributes, like more fuel loading/fire hazard.
- Would like to see mechanical treatments around houses.
- Trees in forest around Wright's Creek seem to be largely single age, size, and species, and much too close together. This makes poor wildlife habitat and fire danger.
- I support the use of low intensity prescribed burning as a way to reduce fire hazards. I also support the use of biomass reduction of small trees when needed to thin out overcrowded thickets of trees, as is the case with many of the pine plantations.

While I am opposed to pine plantations, I believe that many of the existing ones need to be thinned out to reduce fire hazard and promote growth among the remaining trees.
- Keep visitors in clean air during summer.
- I realize that there are trade offs, but would like to see better air quality by appropriate fire timing.
- Would like flexibility based on local conditions to minimize air quality problems and maximize days to burn.
- More education of affected communities, help for folks with breathing problems, work more closely with air boards in order to get more prescribed fire.
- Control burns as far as air quality needs to be seen as pay-me-now or pay-me-later. Less short term smoke now vs. large long-term smoke later that can't be controlled. We have to think long-term benefit vs. short inconvenience.

Information & Education

- Provide better public information regarding control burns vs. California air quality burn days.
- Educate the public about how an ecosystem works.
- Educate public regarding "problem" animals. Is FS providing information on how to live with mountain lions?
- Want public education on fire/fuels issues.
- Would like public education to show necessity of prescription fires.
- Need more "eyes"/enforcement in the forest rather than on highway to have the resources protected.
- Like to see more communication between community, FS, and the MiWuk people in regards to knowledge and usages of local natural plant life.
- I am interested in increased education for forest users regarding necessities for care in use of the land
- Teach people that shooting a lion won't rid of lions, others move in, probably younger, less experienced who'll cause more problems.
- Education of public in regards to trade-offs in fuels reduction methods. Prescribed burns can be controlled and positive effect on forest health, however, fall (prime prescribed burn time) can leave smoke hanging longer BUT more control, less intense fires than summer when air might show less effects.
- More interpretive programs.

Land Use

- I would like the FS to maintain check dams to enhance vegetation, wildlife and fisheries.
- Like the fact that density of housing is kept around Pinecest Lake. Seems like projects in a dense area like that could be approved more quickly. What are the processes, and why do they take so long?
- Perhaps pull permits on hydroelectric and tear down dams.

- Interested in preserving the benefits of hydropower generation while maintaining high environmental standards.
- Existing water use for water companies in Forest should be protected.
- Interested in protecting Cold Springs Water Company water rights.
- Cold Springs Water Company has a water right on Forest property on a small creek of the North Fork of Tuolumne River, near Camp High Sierra. It is extremely important that this use continue for us to serve for homes in the Cold Springs area, due to the fact it is our major water supply.
- Increase in resource use—timber harvest, hydoelectric projects.
- Grazing cattle take out vegetation along the creek that serves as cover for wildlife. Fence off creeks from cattle.
- We need to log more so the loggers will assist in road maintenance. We should put only the barest minimum of roads to sleep.
- The past effects of dams and diversions need to be compensated for through ecological restoration projects. The FERC 4(e) process should find the Forest Service focusing on asking utilities to fund such compensatory projects.
- Recreation maintenance backlog needs mucho $ in this watershed area.
- What are conditions of recreation sites? Many may be in unacceptable conditions under Forest plan & or FS manual direction.
- Have there been any OHV studies in concentrated sites versus dispersed sites?
- Encourage management of vegetation to accomplish sustainable yields to meet the needs of the people.
- Utilize all tools to manage resources including the tools of fire, timber harvest, livestock and herbicides.
- Encourage biomass utilization to accomplish resource sustainability.
- I am concerned with the ill effects of aerial [applied] herbicides on non-target vegetation. A site-specific usage would be preferable in the event that herbicides are the chosen method of reforestation.
- Recreation demands must not be underestimated, for restrictions tend to create over concentration of recreation activity and environmental damage. There must be ample opportunity for dispersed recreation of all types. Demand should be based on forecast; so future outcome of the watershed analysis will reflect future recreation demand as well as future water/power demand.
- Consider effects recreation has on the whole ecosystem and open and close areas as appropriate.
- My main concern is to keep the forest open to ALL user groups.
- When more areas are closed off to the people the areas that are left open will be more impacted (flora and fauna).
- Increase OHV areas.
- Snowmobiles really have little direct effect on the water issue. Only if the bridges are not replaced in the Eagle Meadow area are we going to contaminate the water in the streams by having to cross them by actually driving through the stream (water). Allow the bridges to be put back in.
- Recreation use should be #1 priority
- Snowmobiles should be high priority.

- Pressure for more tourism and recreation opportunities: How to balance or allocate among types?
- Recent popularity of off-road vehicle & snowmobile—pressure to open to them more areas and roads, but: (1) OHV's and snowmobiles impact large areas on travel, damage, noise and are detrimental to quiet users (hikers, etc.) in nearby areas; and (2) OHV & S-M users can be considered greedy in sense of "needing" many more acres & miles per user than hikers.
- Concentrated recreation use concentrates damage.
- Snowmobiling are part of off-highway recreation picture.
- Campgrounds should be open at all times and not closed.
- [Need] areas that don't have OHV uses for peaceful camping.
- Camping areas with showers.
- Camping around Herring Creek areas without dogs.
- More out houses repaired.
- More picnic tables.
- Ranger present in campgrounds.
- I don't like going into the Pinecrest Campground and seeing the sign: "We reserve the right to refuse service to anyone." I thought it was a Forest Service campground?
- More areas available for recreation opportunities.
- Spread out uses to decrease impacts.
- Forest should present and promote more opportunities (recreation, economic, etc.) instead of shutting down, restricting, excluding.
- Want hunting opportunities.
- Want grazing opportunities.
- Would like to see a mix of no recreation, limited recreation and plenty of recreation.
- Increasing popularity of OHV's, OSV's, motorcycles, jet ski's and other mechanized recreation is taking increasing toll on the forest—habitat fragmentation, erosion, vegetative damage, decline in wildlife and other habitat degradation. Immediately do baseline studies on above and monitor carefully, the increasing degradation. Then when justified, severely limit mechanical recreation.
- Base ORV/OSV use on good science.
- Limit them [ORV, OSV] by good science.
- Don't let them [ORV, OSV] damage and destroy the environment. Sure they are fun, but we have too much to lose here.
- A supply and demand attitude on recreation may not necessarily promote sustainability.
- Hikers, mountain bikers, all users, are increasingly being concentrated into smaller areas, thereby increasing potential for heavier damage.
- Mining must include complete reclamation.
- Decrease logging; decrease road building.
- Stop spraying herbicides.
- Extend boat launch at Beardsley to accommodate for low water.
- Do a better job of maintenance (clean-up) of Pinecrest Lake.
- Off highway recreation is a political target, and criticism of OHV activity is often based on biased ecosystem studies. There is a need to obtain balanced information,

and to find ways of making more OHV opportunities in ways consistent with other objectives.

- I strongly oppose aerial application of herbicides. I also strongly oppose the use of the herbicide hexazinone.
- Concerned that the use of Tranoline on noxious weeds may not have been weighed against consequences or that studies of this herbicide is adequate.
- I am interested in increased opportunities for non-motorized recreation.
- I am interested in keeping the quiet places where I hike, camp and cross-country ski free of the sight and sound of motorized vehicles.
- Concerned about over use and forest management practices as the population increases.
- Please don't let the local folks in the rural counties surrounding the Forest mislead you into thinking that the general public wants commerial logging, grazing, OHV use, or so-called "wise use". We in Modesto and in the Valley, we in the Bay Area, and we across the country are each owners of this public forest, and account for the majority of visitor-days. Please remind the logging, OHV, and grazing interests that Stanislaus National Forest is NOT Tuolumne County Park, and protect the land, the water, and the wildlife not just for us, but also for the generations of our children and grandchildren to come.
- Your area has been a home away from home for my family and myself. A place to find peace and enjoy nature and beauty and meaning so that we may find those things in ourselves.
- I can't sit by and watch the destruction of something so valuable. I'm sure there are many others who feel the same as I do.
- I prefer to see more development in the area that will provide more recreational activities. Examples are lakes that permit water skiing, golf course, and expanded winter skiing areas. A limited amount of careful development should be possible without posing a substantial threat to the region. We have had a vacation home in Long Barn for over 25 years and have noticed economic decline of this area. Thoughtful use of the area's resources can reverse this.
- One of the biggest threats to roadless areas and wild places is OHV use. I understand that they are using the forest for recreation, but they interfere with the enjoyment of the forest by other recreators. There needs to be restrictions on where OHV's are allowed to go within the forest. They should only be allowed in areas where they cannot cause any damage, such as in already logged areas and along skid trails.
- I take Honda Trail bike tours of the history of the Stanislaus National Forest. I would like to see more successful trail bike tours.
- The logging of large trees is unacceptable, especially with so few groves of healthy old growth remaining. All of the remaining old growth in the forest needs to be preserved.
- This was submitted to CSWAT in a form of a petition. 115 people signed it. Stanislaus National Forest is not Tuolumne County Park. Thank you for reaching out to us to get our input concerning Stanislaus National Forest's Central Stanislaus Watershed Analysis (CSWA) project, and the overall management of Stanislaus National Forest. We join the majority of the American public in requesting more

environmental protection, and a de-emphasis on logging, grazing, off-highway vehicle use, mining, and commercial use of the Forest. Especially, we request the highest level of protection for all the remaining roadless areas, and for all areas of old growth or ancient forest, both within the huge CSWA section and within the rest of the Forest as well.

- We acknowledge that OHV's are permitted in this area, but urge you to limit this use to designated routes. Indiscriminate OHV use can seriously disrupt and damage the wildlife and its habitat and aquatic resources. As Mike Dombeck, Chief of the Forest Service, stated in a speech in Missoula, Montana on February 3, 1999, "Nothing should ever compromise public ownership of public lands. Our overriding objective must be to maintain the health, diversity, and productivity of our lands and waters—recreation use must occur within those ecological sideboards." Many trails and routes have already been designated for OHV use, providing ample opportunity for motorized recreation. Need challenging OHV routes.
- The FS really should look into having more 4-wheel drive clubs; ATV clubs & motorcycle clubs adopt trails. This would help keep trails open and the clubs could do most of the maintenance instead of having the FS close off access due to lack of funding.
- Timber stands in the mixed conifer forest zone i.e. around Long Barn all the way up to Donnell Reservoir are overstocked and have lots of potential for commodity production while sustaining other values. Make timber sales!!
- I'm concerned about reforestation of areas logged and burned.
- Timber sales within this area should only be done for ecological/fire/fuel purposes.
- We don't want a monoculture of "timber only" type trees!
- No commercial logging in the forest, except thinning where absolutely necessary near homes.
- I feel that reforestation of burn areas should happen quickly, before the induction of brush to eliminate the necessity for brush removal and herbicide use.
- Logging of large trees is totally unacceptable. ALL old growth groves need to be protected!!
- Using timber harvest to reduce fuels—fire is not a fix all tool by itself.
- The whole watershed needs to be thinned. (Should I even suggest, log, and then burn?)
- Need more facilities for visitors—roads, garbage, campsites, parking, picnic.
- No further loss of roads and trails, including un-managed logging roads that provide access for OHV'rs, hunters, horsemen, etc.
- Obliterate non-essential roads.
- Alternative access to Donnells Reservoir for safety and maintenance purposes. Reopen road from 108 to Donnells.
- USFS should go out and check culverts & roads with all the trucks they have in the yard, employees should take responsibility for their jobs. Use a shovel; it won't hurt you.
- Decommission all the roads that can be (at least 40% of existing roads).
- While there are too many roads in many places, there are a few remaining roadless areas and wild patches in the forest that need to be preserved. All of these remaining

undisturbed areas, including the small "patches", need to be managed for preservation, not for use, to keep them as wild and natural as possible.

- There seems to be too many unneeded and unused roads. I am very upset to hear that new roads are being considered for OHV use.
- No net loss of roads! Adopt a trail program. Voluntary user fee.
- Some roads already closed year round are eroding badly—obliterate them.
- Some roads, which need to remain open, are eroding because they're shaped wrong—reconstruct them.
- Road system behind Cedar Ridge is heavily eroded. Lots of ruts—seems like it's contributing to poor water quality and ugly environment. Can't more be done to maintain or improve the roads so there is less erosion?
- River crossings and roads/trails? Possible river crossings that have no vehicle contact with water? Best possible dates for least amount of damage to soil around rivers and stream crossings. Build a permanent (not a one time use) bridge. Keep sediment out of streams & river.
- As a snowmobiler, I am interested in clean streams. I would like to build bridges over streams that are open. We do like going through them if possible. The main two streams in mind are Eagle Creek and Niagara Creek.
- The maze of skid trails and Level 2 roads constantly contributes to sedimentation and degraded water quality.
- Restoring healthy watershed values should be a high priority, accomplished through road obliteration and deep tilling of skid trails or landings.
- Would like to see Merced Dirt Riders get help to lower erosion so they can still be able to ride in the forest.
- I would like to know what roads are causing damage to streams and wildlife habitat and cause disturbance to wildlife, and how many can be removed or if necessary, refurbished or rerouted?
- I have traveled extensively throughout the watershed area (and the rest of the forest) and am disturbed by the extent of rutted and eroded roads, both open and closed.
- [P]rotection of roadless areas—All roadless areas, including those 1,000 acres and larger, need to be protected from development. Few roadless areas still exist, which means that those that do are priceless and deserve protection from disruption. In addition, we feel that existing roads should be inventoried and assessed as to their purpose, environmental integrity, and need. More roads in a watershed decrease the biological integrity of its streams by increasing sedimentation. No new roads need to be built and those that are causing environmental damage should be obliterated.
- Close some OHV roads in amphibian and sensitive furbearer (martin, fisher) areas. Also benefits the human constituency who want to hike, ski, [and] be in tranquil places.

Plant Species

- Improve forage for wildlife, livestock.
- I'm concerned with the rapid invasion of exotic flora (weeds: e.g. star thistle, knap-weed, thistles, etc.) into the higher part of the watershed. I assume that they come up Highway 108 with hay and stock trailers. What will keep these plants from

converting the natural flora of our wilderness areas? Are we tracking the extent and rate of these changes? What are the effects of spreading weeds or native plants and wildlife?

- I'm interested in policies and projects that sustain native biodiversity of flora and fauna, and that can control the spread of exotic species.
- Utilize vegetation under proper management for grazing and wildlife.
- White Fir taking over stands. Overstocked stands. Fire potential.
- Worried about public safety from snags.
- I am concerned about noxious/exotic weeds.
- I am concerned about preservation of rare native plants.
- I would like to see an increase in the management of Black Oak.
- Control exotic weeds.
- Exotic weeds such as star thistle are invading new areas at an alarming rate, replacing native plants.
- How can we maintain and restore native flora communities in the watershed and wilderness areas?
- Encourage herbaceous growth underneath the trees.

Soil Productivity

- I would like to see the Forest Service do as much as it can to conserve the soil resource. Without soil, we don't have trees & other vegetation cover, clean water, wildlife habitat, etc.
- Soil is the basis for all life in the forest. Steep slopes should no longer be managed for timber management due to ecological impacts.
- I am concerned about soil erosion levels.
- I am very upset by the vast clearcuts in the Dodge Ridge expansion into the pristine upper South Fork Stanislaus River. The FS should set up thorough studies of erosion and sediment transport from these and other Dodge Ridge ski slopes.
- Some forest litter/organics are good for forest health.

Stream Channel Morphology

- Streams within the bulk of the area outside of the wilderness generally have damaged streambanks and reduced levels of willows. Restoring natural, healthy conditions should be part of the desired future condition.
- Many of the streams and rivers of the Sierra have problems such as limited or absent riparian vegetation, large headcuts, and crumbling banks. These sensitive riparian areas can be restored if we restrict all activities that may be contributing to their degradation, such as cattle grazing, logging, roads, and skid trails. I believe there should be a buffer zone of AT LEAST 200 feet in each side of all rivers and streams that will be protected from such disturbances.
- Upper North Fork Tuolumne watershed (Wrights Creek) doesn't look good. No vegetation on streambanks. What's really happening?

Terrestrial Animal Species

- I have a very amateur list of birds observed at Pinecrest since 1972.
- What are the effects of OHV's and OHV traffic on fishers, martens, wolverines, goshawks, spotted owls and other sensitive creatures? Do they limit or disrupt their hunting, dispersal or other activities?
- What can OHV users do to lessen impacts on animals without loss of trail system?
- Are there any non-biased studies that prove OHV use is detrimental to wildlife?
- Willow flycatcher meadow habitat—meet needs of willow flycatcher.
- Is hunting ban on mountain lion increasing numbers and take of other species?
- We've been seeing more bobcat and mountain lion in Crandall Peak Area, Lyons Lake and Deer Creek area. Seen in spring and fall. Deer are also present.
- Tribal concerns regarding rare species that are culturally significant. Interest in reintroducing species that were once common in this area.
- Like to see a complete food web, reintroduce Sierra Nevada red fox, fisher. Pay attention to what we do have.
- My concerns regarding Sierra Nevada red fox is the movement of the eastern red fox that may destroy the genetic diversity of the Sierra Nevada red fox.
- We need animal corridors and they can't live on "islands"
- Needing science before taking action. Can't always wait—species will disappear.
- My observations and journals from the past 37 years noting wildlife and changes.
- What are the effects of snowmobiles and snowmobile traffic on fishers, martens, wolverines, goshawks, spotted owls and other sensitive creatures? Do they limit or disrupt their hunting, dispersal or other activities?
- Study on how prescribed burns affect protected owl habitat.
- How can grazing and loss of riparian habitat be mitigated to help restore Willow Flycatcher?
- Closed canopy dependent species have minimal habitat across the Paper, Hamm-Hasloe, Rogge, and Ackerson fire areas. Maintain "extra" canopy closure within CSWA areas for at least 2 - 3 decades may provide balance.
- Migratory songbirds are in decline on the forest. Managing for diversity through low intensity burning may benefit such species while reducing the risk of habitat loss.
- Many species are affected by human disturbance. Large "refuge" areas should be established to ensure that there's a balance between use and refuge needs. Refuge needs to include more than high-elevation wilderness areas.
- Old growth-dependent species are depleted within many previous habitat areas. A desired future condition should be to maintain all existing old growth values and to provide connectivity between them.
- Interested in increasing fauna biodiversity forest-wide.
- Create early succession areas to create habitat for specialists of early succession areas.
- I would like our multiple use of the forest to maintain and restore ALL of the native species of this area.

- Habitat for all wildlife enhanced and protected, particularly those that seem to need old growth and old forest characteristics (down logs, snags, canopy cover, big trees and connectivity to other appropriate habitat).
- Wildlife is a critical issue that needs special attention during this analysis. Not only is an abundance of wildlife key to attracting recreationists to this area, but also biodiversity is the key to a healthy forest and needs to be preserved at all costs. Many of the habitats that will be looked at in CSWA such as riparian, meadows, and old growth appear at risk. Preservation of these areas as habitat for wildlife needs to be considered when making management decisions.
- Furbearers such as fisher, marten, Sierra Nevada red fox, and the wolverine need greater protection. Their habitat needs to be identified, and there should be no disturbing activities allowed (OHV, logging, grazing, road building, etc.) where they are found.
- My interests are to let people know about the changes that I have observed. I collected butterflies in the late 1960's under the direction of the UC Berkeley entomologist Dr. Lungren (who has since passed away). There has been an enormous decline in the number and variety of butterflies. Dr. Lungren and I privately decried a study a few years ago saying that there was as many as the past. We both know that there are fewer spices by personal observation. Once again I have observed that as Twain Harte has paved and cut into the hillside the water table has dropped and trees have died.

Vegetation Mosaic

- We know what stands can carry (yield tables), let's use this information to meet our Desired Future condition.
- Biologically we know what will happen to stands, display it.
- More open forest; look to maintain visual quality.
- Interest in maintaining viable ecosystems, especially riparian.
- Meadows in upper North Fork watershed are in bad shape, apparently due to grazing and trampling by livestock, especially Wrights Creek area.
- Many meadows of this area are in poor condition. Through school and my volunteer work this past summer, I worked to inventory and assess forest meadows. Even though this was a wet year and many of the meadows appeared to be lush and in good condition, it was clearly obvious that overgrazing of cattle is a problem needing our attention.
- Some areas needing the most attention are Bell Meadow, Bloomer Lake, and all of the Cooper, Kennedy, and Clark Fork allotments. All of these areas need reduced grazing, especially in dryer years.
- I'm concerned about meadow vegetation health, invasion by conifers, willows and weed species.
- I'm concerned about reforestation of areas logged and burned.
- I would like to offer my comments regarding your Central Sierra Wasteland Watershed Analysis. I have been a long time visitor to the central Sierra area and I am deeply saddened by the changes I have noticed there. I can see the damage done

to riparian areas by cattle grazing, logging and skid trails. Many meadows are also in poor condition as a result.

- [P]rotection of Old Growth forest in the area—This ecosystem is extremely limited and fragmented and therefore must be preserved. Logging and road building should be prohibited in all Old Growth forests, including polygons ranked 4 and 5 in the Sierra Nevada Ecosystem Project (SNEP) Report as well as all smaller Old Growth patches and stands. SNEP, commissioned by Congress in the early '90's is a comprehensive scientific assessment of ecological and economic conditions of the Sierra Nevada. The SNEP report states that by retaining all Old Growth that currently exists, you can keep options open pending the completion of the Sierra Nevada EIS.
- Protecting riparian areas & streamside zones. Move roads and campgrounds away from riparian/streamside zones.

Water Quality

- Interested in high water quality and soil sediments in control; toxics absent including herbicides.
- Interest is how the resources, especially water and soil, can be sustained to provide for the future and how long of a future?
- Water quality, ground water contamination from old mining operations, i.e. floating sediments in well water.
- I live on 80 acres within the boundaries of the study and get my water from a well. I am interested the continued good quality and flow of water to my well.
- Protect and utilize in a modified glacial reservoirs such as Lyle Canyon and Kennedy Canyon.
- Interested in maintaining water quality into the future (maintain our human and ecosystem health for the long term) while maintaining the uses of the forest.
- How do we improve the management of the landscape to sustain healthy soils and water for my great-great-great grandchildren?
- I feel that the water quality of our streams needs to be monitored more closely! What kinds of chemicals are in our water? How is it affecting the riparian environment? Are the levels unhealthy? A river and stream ecosystem needs to have healthy water first.
- I am concerned about turbidity level in our water source.
- I am concerned with water quality in the NF Tuolumne River (my watershed address) from Dodge Ridge and Pinecrest sewage and Boy Scout and Jenness Camp septic.
- As a swimmer in the North Fork, I am uneasy about the water quality and I do not see many fish.
- I am interested in seeing all watercourses protected, including those that run only sporadically.
- Sewer treatment facilities at Pinecrest—relocate away from the river.
- Why don't you have the sewer treatment plant at Pinecrest moved to enhance water quality?

- Study 2-cycle use on reservoirs. These shouldn't be used in areas that provide drinking water due to severe pollution (MTBE).
- No sewage or other pollution in North Fork, particularly as it nears the main stem, because of great swimming hole.
- Protecting wildlife and water should be the highest priority, and this means no use of herbicides or pesticides.

Water Quantity

- Historic and current flow regime: Rose Creek—old timers talk of great fishing and good water flows year round in Rose Creek. In the 1980's flows seemed to dry up to just standing isolated pools during the summers. After the Ruby fire it appears that flows have increased and I hear the fishing is dynamite! Does removal of vegetation from the fire have anything to do with the increased flows during the summer and improved fish conditions? Can some management activity less damaging than a big fire be done to make such improvements in all fish streams?
- Good flows in rivers for fish, amphibians, animals and plants. Plan for re-operation to provide water in both wet years and dry years.
- Flows below Sand Bar Flat are insufficient to meet ecosystem needs.
- I have been associated with the South Fork of the Stanislaus around Old Strawberry since the late '40s. There has been serious degradation of the water flows in the river there since the middle 60's. It used to be a wonderful fishery for native brown trout, but because of the extremely low flows during the hottest months of the year, namely July and August, it is almost impossible for the population to remain healthy and in fact it is disappearing.
- I would like to see some "natural" or even non-natural check dams to promote silting and back fill on the Twain Harte Creek. It does go through private property—would still like public money to work on problem.
- What is the effect of dams on rivers, habitat and creatures?
- Do we have adequate water available for future projected growth?

Appendix D: Fire Assessment Process

Introduction

The CSWA area was evaluated in terms of condition class, fire risk, fire hazard, and crown fire potential to determine relative susceptibility to and consequences of wildland fire. The process used for evaluating these components is described below. The data associated with each factor are outlined in the next section. Each component stands alone to provide managers with relative ratings over the area, or the components can be combined to assist in prioritizing areas for treatment.

Fire Assessment Process

Condition Class

Condition class, defined as the degree of departure from the historic fire regime characteristics (below), is an important factor in assessing the consequences or effects of fire. Condition class for the CSWA area was estimated by comparing current conditions with historic fire regime characteristics and potential natural vegetation of ecological land units (ELU) within each landscape. Current conditions were determined using the vegetation layer, potential fire behavior characteristics, fire return intervals, and fuel conditions. In general, a higher condition class indicates a larger departure from historic conditions and requires more intensive fuel treatment to restore those conditions.

Fire Risk

Fire risk is a measure of the relative probability of a fire occurring in a particular area based on where fires have occurred in the past. Point locations of fires occurring in the CSWA area between 1970 and 1998 were collected into a GIS data layer. A spatial analysis of those fire records was performed to determine the fire occurrence rate (number of fires/1000 acres/year) for each 30-meter cell in the data layer. Results were then grouped into relative rankings of low, moderate, high, or very high.

Fire Hazard

Fire hazard is a measure of the potential fire behavior characteristics of an area based on fuel conditions, topography, and weather. The characteristics used in this analysis to represent hazard were flame length (feet), rate of spread (chains/hour), and heat per unit of area (BTU/sq.ft). These values were derived from the FlamMap program developed by Dr. Mark Finney, which uses spatial input data to calculate fire behavior values for each cell in a raster landscape. The forest's digital elevation model (DEM) layer provided topographic data on slope, aspect, and elevation. The fuel conditions were modeled by forest fuels managers based on the latest vegetation data layer and local knowledge of the area. The weather profile used in the FlamMap program represents average worst summer conditions derived from local weather station records. The output values for flame length, rate of spread, and heat per unit area were each grouped into relative rankings of low, moderate, high, and very high, and then combined to derive a composite hazard rating of low, moderate, high, or very high. The composite hazard layer was then "smoothed" by absorbing pixels smaller than three acres in size into the larger polygons surrounding them.

Crown Fire Potential

Crown fire potential is another important factor in the assessment of the fire and fuels situation, however it is more difficult to measure. Researchers have determined methods to relate surface fire behavior and crown fuel characteristics to the development of crown fires. The FlamMap program incorporates these relationships to produce a rating of crown fire potential ranging from little or no crown fire potential, to torching individual or clumps of trees (passive crowning), to fire spreading crown to crown as the surface fire progresses (active crowning). The independent crown fire, which spreads through the crowns of trees without influence from the surface, is not modeled. Crown fire is important to consider in terms of the effects or consequences of fire. The crown fire potential rating from FlamMap was used with other data to generate a map of locations where stand mortality due to fire in the crowns was more likely, relative to other areas. This information was used by various specialists in the fire consequences analysis, and is useful in determining where opportunities exist to modify the stand structure and/or fuel profile to reduce the potential for crown fire development.

Summary

The components of risk, hazard, crown fire potential, and condition class were analyzed to evaluate the relative susceptibility of the CSWA area to wildland fire due to the risk of ignition, the hazard posed by surface fuel and topographic conditions, and the consequences of a fire occurring there. These factors describe the overall existing condition of the analysis area as it relates to fire and fuels management. Comparing the existing condition to the desired condition is useful in determining opportunities and, along with management objectives, helps to set priorities for hazard fuel modification treatments.

An overlay of condition class and fire hazard rating was used as a base to categorize opportunities for hazard fuel reduction in the CSWA area. Crown fire potential was considered within each category to further identify problem areas. Management objectives, such as emphasis on treatment in the wildland-urban intermix, were used to help prioritize opportunities by landscape.

The following pages outline the data used and produced by the analysis.

Fire Analysis Data

Fire Regime

Input:
Order 4 ecological units for CSWA area, integrated terrestrial units derived from Order 4 (Map B-1), references on fire ecology and historic fire regime for Sierra Nevada vegetation types (especially Sierra Nevada Ecosystem Project, Volume II, chapter 38).

Outputs:

1. GIS layer of historic fire regime based on the categories below (Map D-3):

Fire Regime Group	Frequency (Fire Return Interval)	Severity
I	0-35 years	Low severity
II	0-35 years	Stand replacement severity
III	35-100+ year	Mixed severity
IV	35-100+ year	Stand replacement severity
V	>200 years	Stand replacement severity

From "Protecting People and Sustaining Resources in Fire-Adapted Ecosystems – A Cohesive Strategy" The Forest Service Management Response to the General Accounting Office Report GAO/RCED-99-65, October 13, 2000

2. Fire regime by ecological land unit (ELU) for the CSWA area:

ELU	Regime	ELU	Regime	ELU	Regime
101	II	216	I	312	III
201	I	217	I	319	I
202	I	219	I	331	IV
203	I	219u	I	335	III
204	I	227	I	401	III
205	I	303	I	402	III
206	I	304	I, III	403	III
208	I	306	III	405	III
211	I	307	I	407	III
212	I	310	III		

Condition Class

Input:

Fire regime output described above, 1995 Stanislaus National Forest vegetation layer (updated to 1997 for harvest activity and large fires), potential fire behavior characteristics derived from FlamMap (see Fire hazard below), Integrated Terrestrial Units (Map B-1), references on fire in the Sierra Nevada (especially Sierra Nevada Ecosystem Project, Volume II, chapter 37).

Outputs:

1. GIS layer of condition class based on the categories below (Map D-3).

Condition Class[108] Descriptions

Condition Class	Fire Regime	Example Management Options
1	Fire regimes are within an historical range and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within an historical range.	Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.
3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.	Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments, before fire can be used to restore the historical fire regime.

Source: "Protecting People and Sustaining Resources in Fire-Adapted Ecosystems – A Cohesive Strategy" The Forest Service Management Response to the General Accounting Office Report GAO/RCED-99-65, October 13, 2000

[108] Current conditions are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities.

2. Condition class by ecological land unit and integrated terrestrial units:

Integrated Terrestrial Units	ELU	Beardsley -Donnells	Clark Fork	Dodge Ridge	Duckwall	Lyons	Pinecrest	Rose Creek	Sand Bar	Sonora Pass
Canyon types, steep low site	101				2	2		2	2	
	201				2	2		2	2	
	206				2	2			2	
	212	2		2					2	
	216	2		2	2				2	
Low elevation, fire-influenced uplands	202					2		2	2	
	204					2		2		
	211				3			3		
Low mixed conifer	217	3		3	3	3		3	3	
	219	3		3		3	3		2	
	227			3	3	3		3	2	
	307	3		3		3			3	
Open lava cap	203	2	1	2		2		2	2	
	403	1	1				1			1
Ponderosa pine-hardwood upland	205				3	2		2	2	
Ponderosa pine	208			3	3	3		3	3	
Red fir	310	1		1			1			
Red fir, jeffrey pine, lodgepole pine mixed	312	2	2							1
	402	2	1				2			1
Sub alpine, lodgepole pine mixed	401		1							1
	405		1				1			1
Upper mixed conifer	303	2		3						
	306		1							1
	319	2		3		2	2,3			
	219u	2	2							2
Upper montane shrub	331	1	1							1
Alluvial flat - conifer	304	2	2	2			1,2			1,2
Jeffrey pine, rock outcrop	335	2	2							1
Open glaciated granite	407	1					1			1

Fire Risk

Input:

Fire history point data from Stanislaus National Forest PCHA database
Historical period: 1970-1998; 1,892 fires in CSWA area
Spatial analysis: fires/1000 acres/year

Output:

1. GIS layer of relative fire occurrence based on the values below (Map D-6):

Relative Rating	Fires/1000 Acres/Year
Low	0 to .14
Moderate	.15 - .28
High	.29 - .42
Very high	.43 and greater

Fire Hazard

Input:

Stanislaus National Forest grid layers from Sierra Nevada Framework Project with local modifications to fuel model and crown base height.

<table>
<tr><th>FlamMap Input</th><th>Source</th></tr>
<tr><td>Slope</td><td rowspan="3">Digital elevation model layer for Stanislaus National Forest</td></tr>
<tr><td>Aspect</td></tr>
<tr><td>Elevation</td></tr>
<tr><td>Fuel Model</td><td rowspan="5">Estimated from 1995 Stanislaus National Forest vegetation layer, corrected for plantations and recent large fires. Fire Behavior Prediction System (FBPS) fuel models represented in the CSWA area include:
1 – Short grass
2 – Grass with timber overstory
4 – Chaparral
5 – Medium brush
6 – Dormant brush
8 – Closed timber litter, short needle
9 – Hardwood litter, long-needle conifer litter
10 – Timber, litter and understory
11 – Light slash</td></tr>
<tr><td>Crown Closure</td></tr>
<tr><td>Crown Base Height</td></tr>
<tr><td>Crown Bulk Density</td></tr>
<tr><td>Tree Height</td></tr>
<tr><td>Fuel Moisture</td><td rowspan="3">Average worst weather (90th percentile for August 1–September 15) from 1300 hour observations at Mt. Elizabeth weather station, 1970-1998:
1 hr. fuel moisture = 3%
10 hr. fuel moisture = 4%
100 hr. fuel moisture = 6%
Live fuel moisture = 85%
20 ft. wind speed = 11 mph, 250 degrees
Ran FlamMap with fuel moistures conditioned for 8 days, ending at 1500</td></tr>
<tr><td>Wind</td></tr>
<tr><td>Wind Direction</td></tr>
</table>

Outputs:

1. Separate GIS layers for each characteristic-flame length, rate of spread, heat/unit area based on the following values:

Rating score for each characteristic	Fire Behavior Characteristics		
	Flame Length (Feet)	**Rate of Spread (Feet/min)**	**Heat /unit area (BTU/Sq.Ft.)**
Low = 1	0 - 2	0 – 4	0 – 300
Moderate = 2	3 - 5	5 – 8	301 - 600
High = 3	6 – 10	9 – 12	601 - 1200
Very High = 4	11 +	13 +	1201 +

2. GIS layer of relative fire hazard derived from combining the above layers (absorbing polygons less than 3 acres into larger polygons around them) based on the following values, Map D-1.

Fire Hazard Rating	Combined Rating Score Lowest = 3, Highest = 12
Low	3
Moderate	4 - 6
High	7 - 9
Very High	10 - 12

3. Fire Hazard for each landscape within CSWA:

LANDSCAPE	ZONE	FIRE HAZARD Approximate percentage of zone			
		Low	**Moderate**	**High**	**Very high**
Dodge Ridge	Defense	12	17	68	3
	Outside Defense	3	27	68	2
Duckwall	Defense	14	14	42	30
	Outside Defense	9	6	49	36
Sand Bar	Defense	11	25	56	8
	Outside Defense	16	19	43	22
Lyons	Defense	6	10	78	6
	Outside Defense	10	8	60	22
Rose Creek	Defense	8	25	29	36

LANDSCAPE	ZONE	FIRE HAZARD Approximate percentage of zone Low	Moderate	High	Very high
	Outside Defense	10	24	36	30
Beardsley-Donnells	Defense	0	46	51	3
	Outside Defense	25	37	30	8
Pinecrest	Defense	1	18	81	0
	Outside Defense	85	8	5	2
Sonora Pass	Defense	47	24	24	5
	Outside Defense	77	9	4	10
Clark Fork	Defense	0	94	6	0
	Outside Defense	74	10	9	7

Crown Fire Potential

Input:

Same as above, FlamMap layers

Output:

GIS layer of crown fire potential (Map D-7):

Crown Fire Potential Rating	Description
1 - Surface	Surface fire not likely to ignite the crown, or no crown is present
2 - Passive	Passive torching of individual trees as fire spreads through surface fuels
3 - Active	Active spread from crown to crown as fire spreads through surface fuels

Hazard Fuel Treatment Priorities

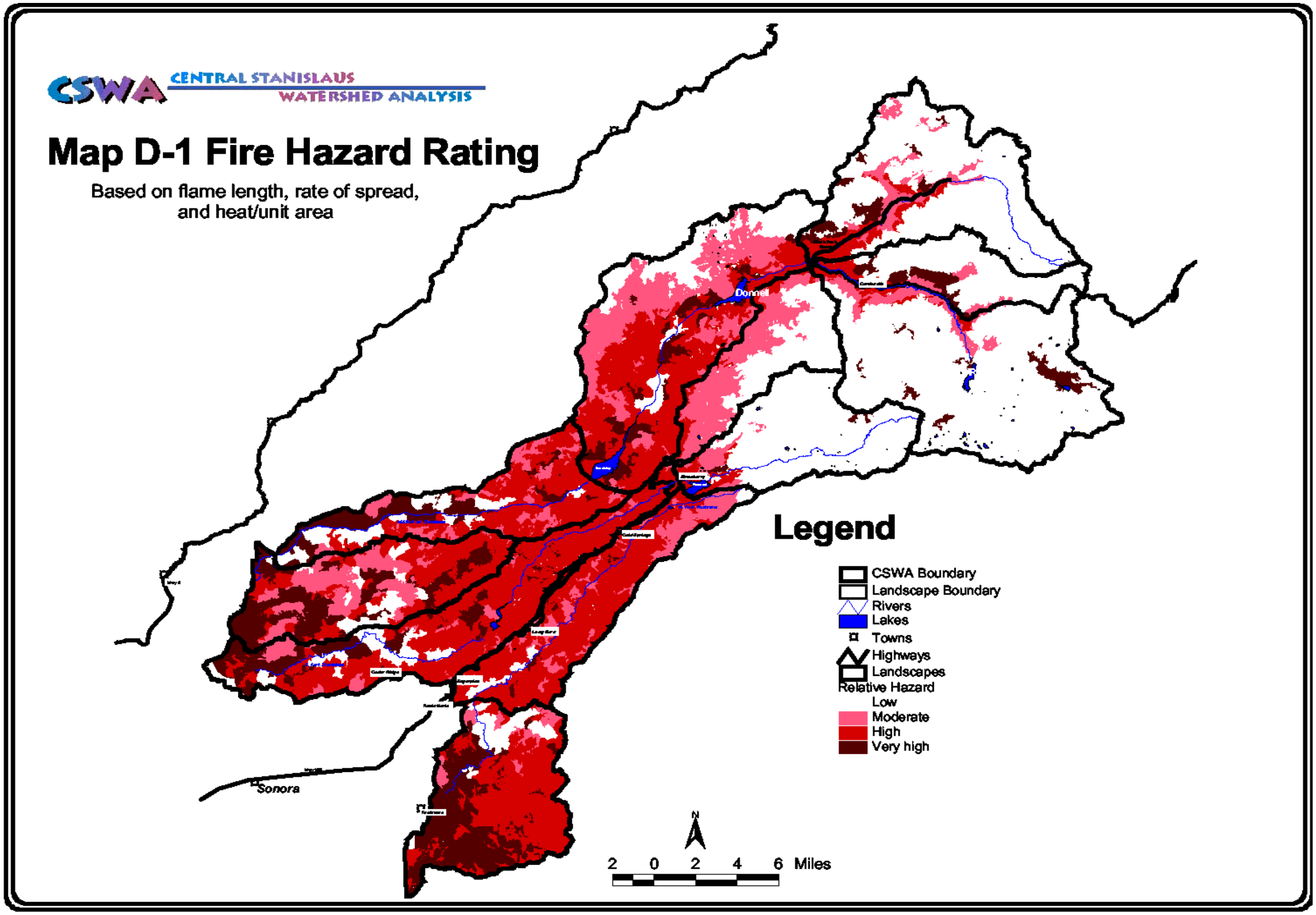
Input:

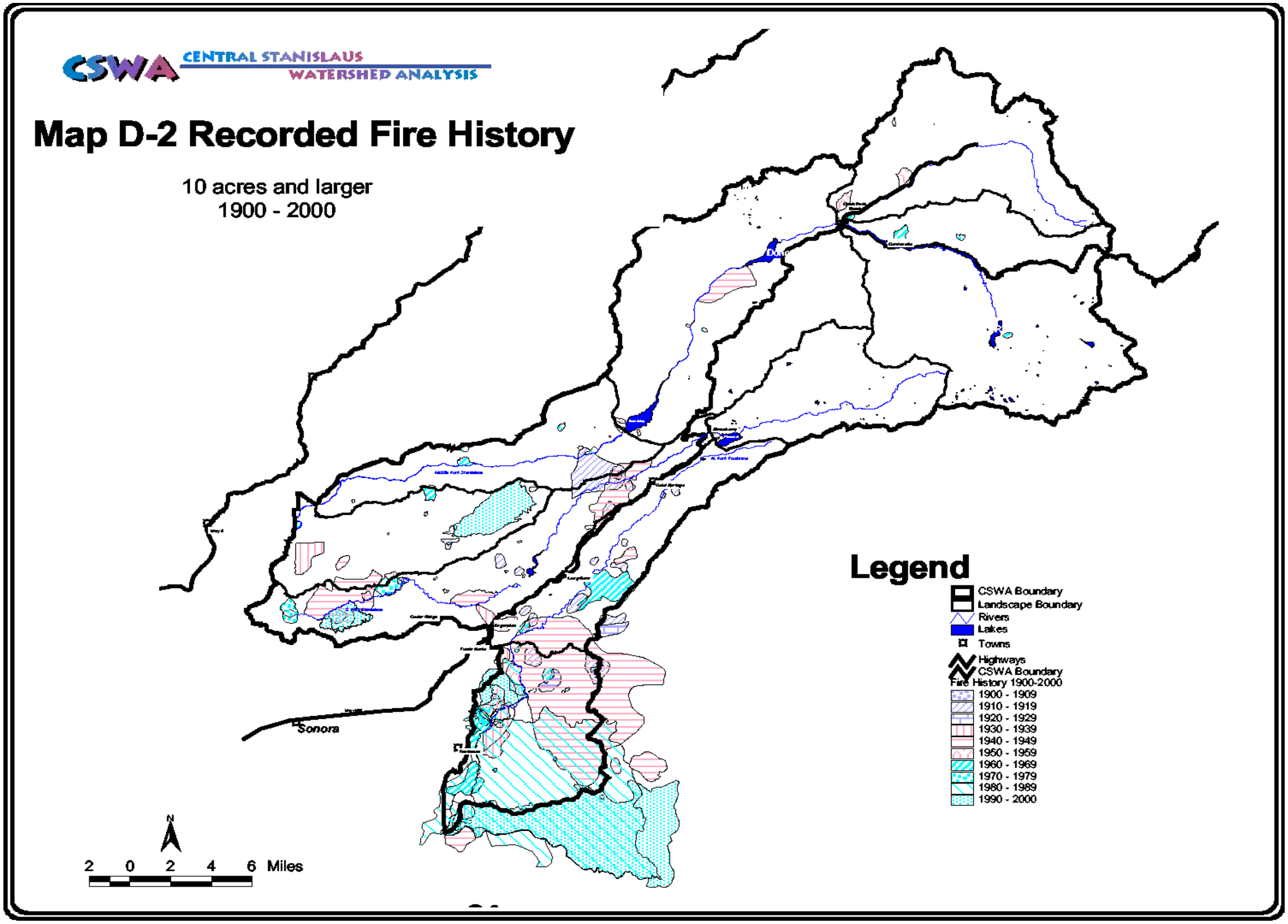
Fire Hazard output (Map D-1), Condition Class output (Map D-3)

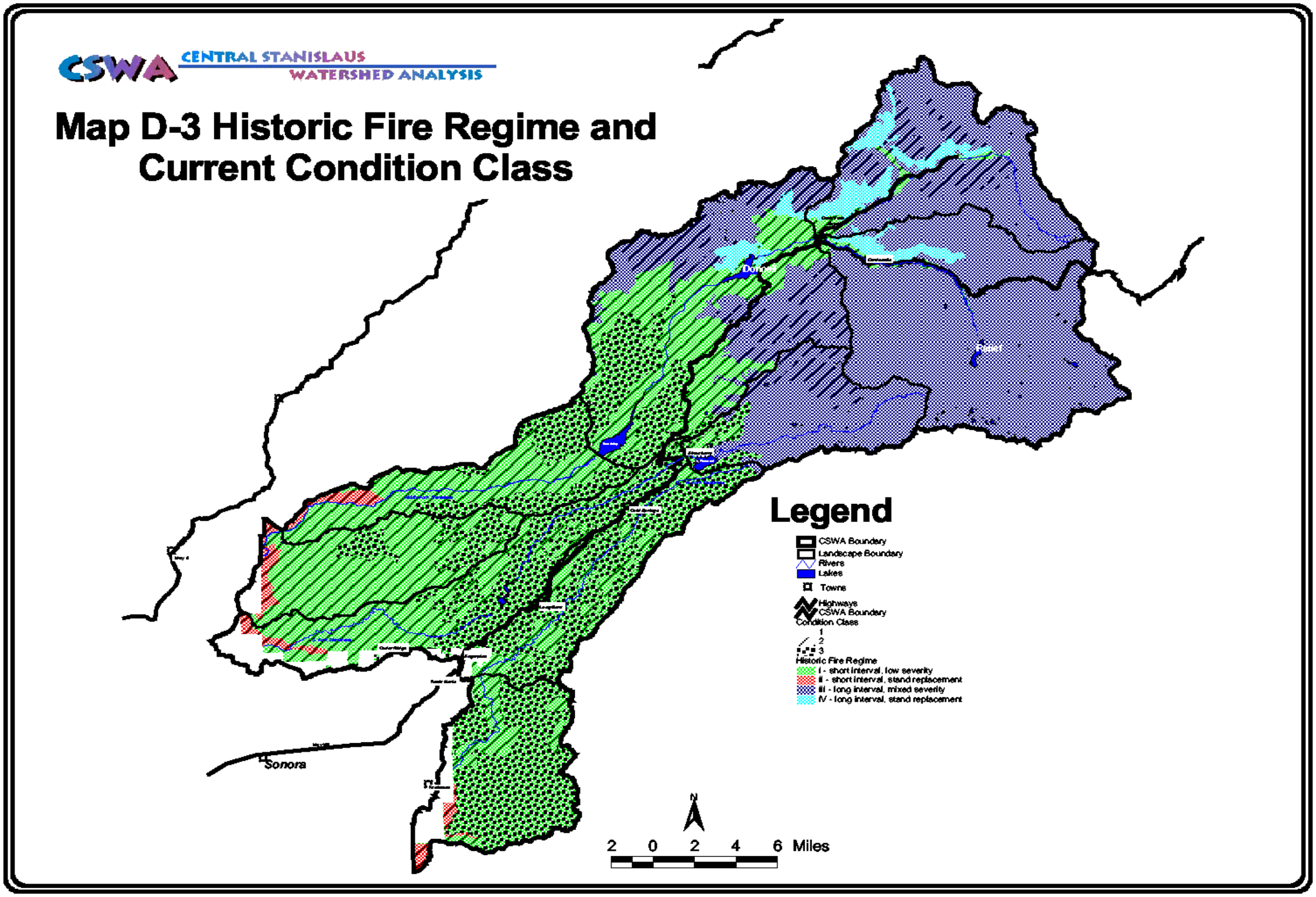
Output:

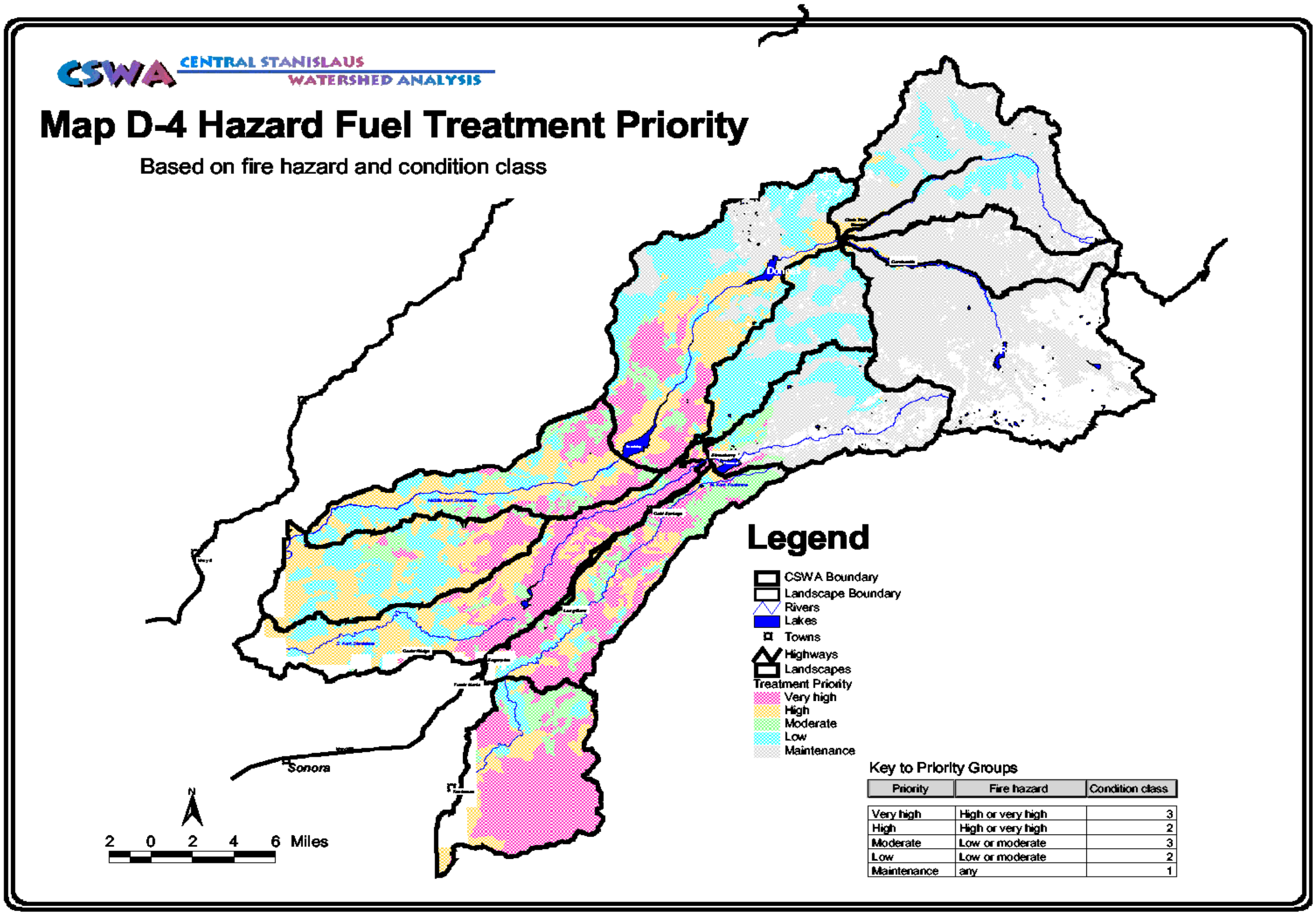
GIS layer of priorities for hazard fuel treatment derived from the following combination of values, Map D-4

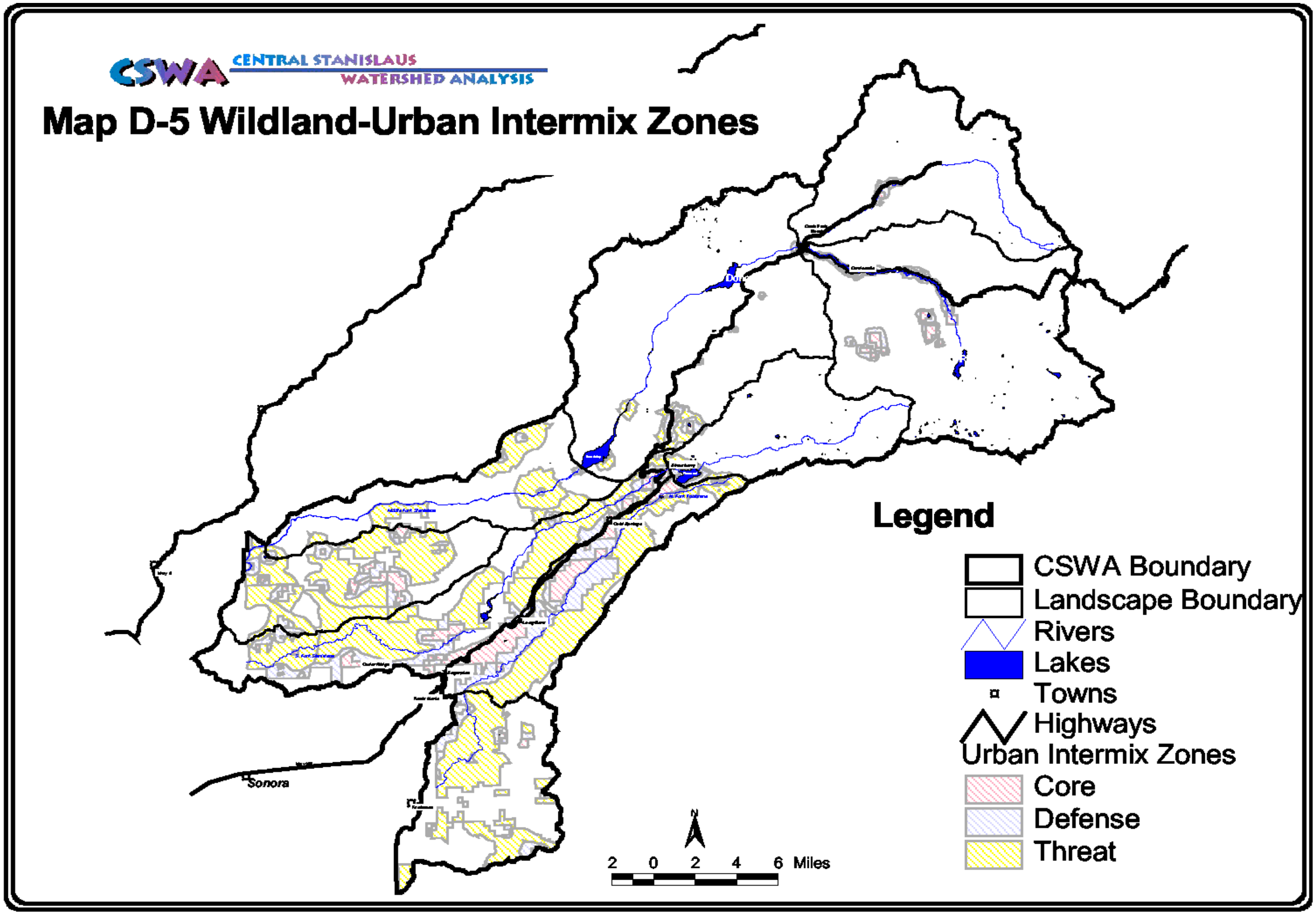
PRIORITY	FIRE HAZARD	CONDITION CLASS
Very high	High or very high	3
High	High or very high	2
Moderate	Low or moderate	3
Low	Low or moderate	2
Maintenance	Any	1


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map D-1 Fire Hazard Rating
Based on flame length, rate of spread,
and heat/unit area
Donnell
Sonora
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Landscapes
Relative Hazard
Low
Moderate
High
Very high
N
2 0 2 4 6 Miles


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map D-2 Recorded Fire History
10 acres and larger
1900 - 2000
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
CSWA Boundary
Fire History 1900-2000
1900 - 1909
1910 - 1919
1920 - 1929
1930 - 1939
1940 - 1949
1950 - 1959
1960 - 1969
1970 - 1979
1980 - 1989
1990 - 2000
Sonora
N
2 0 2 4 6 Miles


CSWA CENTRAL STANISLAUS WATERSHED ANALYSIS
Map D-3 Historic Fire Regime and Current Condition Class
Sonora
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
CSWA Boundary
Condition Class
1
2
3
Historic Fire Regime
I - short interval, low severity
II - short interval, stand replacement
III - long interval, mixed severity
IV - long interval, stand replacement
N
2 0 2 4 6 Miles


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map D-4 Hazard Fuel Treatment Priority
Based on fire hazard and condition class
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Landscapes
Treatment Priority
Very high
High
Moderate
Low
Maintenance
Key to Priority Groups
Priority | Fire hazard | Condition class
Very high | High or very high | 3
High | High or very high | 2
Moderate | Low or moderate | 3
Low | Low or moderate | 2
Maintenance | any | 1
Sonora
N
2 0 2 4 6 Miles


CSWA CENTRAL STANISLAUS WATERSHED ANALYSIS
Map D-5 Wildland-Urban Intermix Zones
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Urban Intermix Zones
Core
Defense
Threat
2 0 2 4 6 Miles
N
Sonora

Appendix E: Sensitive Plants

Introduction

There are eighteen Sensitive plant species that could occur In the CSWA area—One lichen, four mosses, and thirteen vascular plant species. Three of these, *Allium tribracteatum, Erythronium tuolumnense,* and *Lomatium stebbinsii*, will be discussed in the most detail in this section. All three species are endemic to this area and are centered within the CSWA analysis area. *Clarkia australis, Clarkia biloba* ssp. *australis, Cypripedium montanum*, and *Mimulus pulchellus* have also been reported in the CSWA analysis area, but are centered in other areas. *Allium jepsonii, Bruchia bolanderi, Epilobium howellii, Horkelia parryi, Hulsea brevifolia, Hydrothyria venosa, Meesia triquetra, M. uliginosa, Mimulus filicaulis, M. gracilipes,* and *Orthotrichum spjutii* have not yet been found in the CSWA area and have varying degrees of likelihood of occurrence. Surveys for these latter species have only been made since 1998.

Included in this appendix is a (1) brief description of each sensitive plant and its expected occurrence within the watershed analysis area; and (2) a summary table of each sensitive plant showing expected elevation range and habitat.

Plant Descriptions

Allium jepsonii

Allium jepsonii (Jepson's onion) is a perennial herb in the Lily family. S. S. Denison and D. W. McNeal recognized it at the species level in 1989. It has a disjunct distribution with most occurrences on serpentine soils in Butte County and one occurrence on volcanic soils of the Table Mountain formation in Tuolumne County. It usually blooms in May to June, but has been seen as late as August at higher elevations (L. Hanson, pers. comm.). It has not yet been found on the Stanislaus National Forest. The most likely habitat on the Forest (below 4,000’ and on the Table Mountain formation) is to the north of the CSWA Analysis area. It is unlikely within the CSWA area.

Allium tribracteatum

Allium tribracteatum (three-bracted onion) is a perennial herb in the Lily family, Liliaceae. Torrey first described *Allium tribracteatum* in 1857. It is part of a complex of Alliums endemic to California with their distribution centering in the Sierra Nevada. The taxonomy and key characteristics of the *A. tribracteatum* complex were examined and revised by Mortola and McNeal in 1985. Until then two-leaved plants of *Allium obtusum* were often confused with *A. tribracteatum.* This new understanding may not have been widely disseminated until the publication of the Jepson Manual in 1993 (Hickman, 1993).

Allium tribracteatum grows on gravely lahar (volcanic mud flow) soils, often referred to as "lava caps." The sites are usually open with no overstory. In some instances, brush species such as manzanita (*Arctostaphylos* sp.) may be present. While there are not usually commercial conifer species growing on these sites, there are sometimes stands of trees nearby. It grows in very thin soil and is the first onion to bloom on the lava caps. Due to the limited moisture in the soil where it grows, the plants are often well spaced to reduce competition for water. The elevation range for this species is 4,000' to 6,500'. It blooms March to May.

There are approximately 30 known occurrences of *Allium tribracteatum* on the Stanislaus National Forest. The number of occurrences of *A. tribracteatum* is only approximate at this time due to the taxonomic revision and the difficulty in identifying onions. The occurrences are centered on two ridge systems, along Highway 108 and in the Crandall Peak area within the CSWA analysis area. Outlying occurrences are generally small.

The primary threats to *Allium tribracteatum* are from road construction, vehicles leaving roads, and camping. *A. tribracteatum* grows on the thinnest soils, which are often along the crests of ridges where roads are located. Almost every known site has some sort of road through it. The open areas where it grows provide fewer limitations to vehicle movement than forested areas and are used for parking and OHV travel. Sometimes caterpillar tractors are "walked" to the side of a road, to protect the road surface. In addition, there are often dramatic views from the sites and so they are selected by campers for informal campsites.

These areas are also involved in fire prevention and suppression. These low fuel ridge tops are often used as fuel breaks and fire lines. While retardant would not be targeted in these low-fuel areas, they could be on the edge of an application. The phosphorus in one retardant resulted in more weedy growth in one area of thin soils (J. Haas, pers. comm.). Additional plants could compete with *A. tribracteatum.* A fire in the South Fork of the Stanislaus River could involve most of the known populations of *A. tribracteatum.*

Bruchia bolanderi

Bruchia bolanderi is a rare, somewhat ephemeral moss. First described from Yosemite National Park, it has been found in the central Sierra Nevada and in Oregon (Christy, 1980). It is currently known from less than twenty occurrences. At known sites, populations are relatively small (USDA 1998). *Bruchia bolanderi* occupies a specialized habitat within upper montane Sierran meadows (elevations approximately 7,000 to 8,000 feet), preferring vertical soil banks of small streams that meander through the meadows. It can also grow on the exposed sides of a head cut.

One population is known on the Stanislaus National Forest from a watershed just to the south of the CSWA Analysis area. Additional surveys are necessary for more accurate and complete distribution data.

Trampling of stream banks is a threat to *Bruchia bolanderi*. Field observations indicate that grazing may have impacted some populations in other areas (USDA 1998).

Clarkia australis

Clarkia australis (Small's southern clarkia) is an annual herb in the Evening Primrose family, Onagraceae. Ernest Small described *C. australis in 1971* as a result of trials in cross-pollinating several species of *Clarkia* (Small, 1971). Because of this fairly recent discovery of the species, there are no historical records of the species' distribution dating earlier than that year. Leslie Gottlieb and V. S. Ford reconfirmed the taxonomy of this species through more extensive and deliberate cross-pollination tests (Gottlieb and Ford, 1999). They also found that there is no physical characteristic that can differentiate *C. australis* from *C. virgata*, a sister species. Since pollination tests are not feasible on a regular basis, plants that appear to be *C. australis* and are found within a designated range are assumed to be *C. australis.* Very little of *C. australis* range falls within the CSWA analysis area. Currently it is assumed that there are about 250 occurrences of *Clarkia australis* within four fairly distinct, extended populations. Only two of those occurrences fall within the CSWA area.

Clarkia australis is usually found on slopes with a south, southwest or southeast aspect. It grows in openings in ponderosa pine and mixed-conifer stands often in association with bear clover. *C. australis* does not grow well with weedy annuals like grass or in dense stands of manzanita. *C. australis* prefers to grow in open sun or lightly filtered light conditions 2,500 and 6,000 feet in elevation. The appropriate identification period for *C. australis* is about late June through mid-August, depending on elevation and weather conditions.

Clarkia biloba ssp. australis

Clarkia biloba ssp. *australis* (Mariposa clarkia) is also an annual herb in the evening primrose family, Onagraceae. *C. biloba* ssp. *australis* was described in 1955 by Harlan and Margaret Lewis from specimens found in the Merced River Canyon. The more common look-alike, *C. biloba* ssp. *biloba*, is difficult to distinguish from *C. biloba* ssp. *australis*. In addition, the two subspecies can interbreed (pers. comm. with J. Haas,). In addition, the petal characteristics that are used to identify the subspecies appear to vary from year to year. Populations that fit the description of *C. biloba* ssp. *australis* at the time of surveys are treated as the sensitive species.

Clarkia biloba ssp. *australis* is most often found on north, northeast or northwest facing slopes, usually under light shade. It is occasionally found on southwest or southeast-facing slopes or in direct sunlight. *C. biloba* ssp. *australis* tends to prefer sites with little or no competition. In the natural setting, fire can open up areas for it to grow. Currently, road cuts also offer habitat. The appropriate identification period for this species is mid-spring, approximately the month of June.

Clarkia biloba ssp. *australis* has limited occurrences in Mariposa and Tuolumne Counties. There are about thirty-five known occurrences of *C. biloba* ssp. *australis* in existence. Sixteen are known from the Merced River Canyon and its tributary canyons. These are considered the most genetically pure (Harlan Lewis pers. comm. with J. Haas). There are eight occurrences from the CSWA area that have been found in the past two years. There are likely to be more, particularly south of Highway 108 where a high proportion of *C. biloba* found are ssp. *australis.*

One of the biggest threats to *Clarkia biloba* ssp. *australis* is herbicide application, particularly immediately after fires when much of the seed is likely to germinate. Another threat is maintaining a closed canopy for extensive periods of time. Deep tilling has enabled better timber growth in some areas that have historically remained more open. Star thistle often occurs with *C. biloba* ssp. *australis.* It is not clear how much it competes with the Clarkia.

Cypripedium montanum

Cypripedium montanum (mountain ladyslipper orchid) is a perennial herb in the orchid family, Orchidaceae. *C. montanum* inhabits sites, which are relatively undisturbed with a dense overstory, usually of Douglas-fir or white fir. These sites are typically west or north facing with fairly damp, deep loamy granitic soils and a well-developed duff layer. *C. montanum* requires a mycorrhizal fungi relationship for at least five years from germination. The elevation ranges from 3,500 to 6,500'. The appropriate identification period for this species is mid-spring, approximately mid-May to early June.

Cypripedium montanum has a wide range but is rare within its range. It ranges from the central Sierra Nevada and central Coast Ranges in California, north into Alaska. It also occurs in Montana and Wyoming. In California, there are less than 110 occurrences on the National Forests. In the Central Sierra Nevada, there are about 33 occurrences between the Plumas, Stanislaus and Sierra National Forests and Yosemite National Park. There is one sighting of *C. montanum* within the CSWA watersheds. It was reported approximately 20 years ago and was not relocated on a quick visit to the site. *C. montanum* was also collected over 50 years ago on private land near Twain Harte just outside of the CSWA Analysis area. The status of that population is unknown.

Cypripedium montanum was listed as a high vulnerability species in the Sierra Nevada Framework (USFS, 2001, V4. Table R 8). Mechanical disturbance to the rhizomes is usually fatal. *C. montanum* will sometimes survive a low-intensity fire in which most of the duff layer is left intact. However, it usually does not survive a fire of an intensity in which the duff layer is consumed (pers. comm. D. Knecht, with J. Haas). A species management guide is being prepared for it in Region 5.

Epilobium howellii

Epilobium howellii is a small perennial herb in the Evening Primrose family (Onagraceae). It grows in meadows and on Salix (willow) swales. Peter Hoch first described it in 1992. There are only four known populations scattered between Yuba Pass and Huntington Lake and over to Twin Lakes on the east side of the Sierra. The Stanislaus National Forest falls within that range, but no populations are known here. There have been very few surveys for it in meadows.

Epilobium howellii was also listed as a high vulnerability species in the Sierra Nevada Framework (USFS, 2001, V4. Table R 8). Possible threats to it include road maintenance, trampling by recreationists, off-highway vehicle use, livestock grazing and trampling, and lowering of water table by downcutting (USDA Forest Service, 1998).

Erythronium tuolumnense

Erythronium tuolumnense (Tuolumne fawn Lily) is a perennial herb in the lily family, Liliaceae. It reproduces by both seed and offsets. It can take 10 years for a seedling to mature and produce flowers (P. Edwards, pers. comm.). Usually stems grow in clumps due to vegetative reproduction. It sets relatively few seeds. *E. tuolumnense* was first collected by W. C. Blasdale on June 7, 1895.

Erythronium tuolumnense tends to grow on shady, north-facing slopes. Many sites either have water flowing through the drainages with moist saturated soils or saturated soils in the form of springs or vernal seeps. The soils range from granitic clay-loams to rocky pockets of metasedimentary clays to bare granitic outcrops or volcanic lahar formations. In all cases, there is rock on or near the surface of the soil with abundant soil moisture during the growing and blooming period. Most *E. tuolumnense* occurrences are found growing in chaparral, oak woodland, or ponderosa pine plant communities. The elevation range for this species is 1,200' to 5,000'.

Tuolumne fawn lily appears to be able to tolerate fires and has been observed extending out of drainages after fire. The apparent spread may be already established plants that were not visible above ground when there was denser shade. This spread can connect otherwise isolated populations and was observed after the Creek and River fires. Once deer brush (*Ceanothus integerrimus*) and other shrubs grow in, the fawn lily may disappear again. It is generally found in areas with steep slopes, but does occur along one stream with shallower slopes.

There are 28 areas where fawn lily has been found within the CSWA boundary including at least three locations on private land and several more that are on both private and National Forest Service lands. It grows in the Stanislaus, South Fork Stanislaus, and North Fork Tuolumne watersheds. There are only three known locations outside of the CSWA boundary. A botanist has verified none of these three.

In 1990 an interim management guide was written for *Erythronium tuolumnense*. The primary threats to fawn lily include collection by plant enthusiasts and destruction by road construction, maintenance and road failure, camping, off-road vehicles, miners, and hydroelectric development. It grows in areas near active mining operations. The effects of these operations are unknown. It has generally been protected from timber management activities.

Horkelia parryi

Horkelia parryi (Parry's horkelia) is a low, mat-like perennial herb in the rose family, Rosaceae. *H. parryi* grows in dry areas, mostly under brush or low-growing interior live oak branches on the Forest. In the lower elevations in Amador and El Dorado Counties, it grows in openings in chaparral. Slopes are mild to flat. Soils tend to be well drained and slightly to moderately acidic. On the Groveland Ranger District, *H. parryi* has, so far, been found on two similar soil types. The currently known elevation range for *Horkelia parryi* is sea level to 3,500 feet. The appropriate identification period for this species, which coincides with its blooming period, is mid-spring, approximately the month of May. It is possible to be identified most of the year by its vegetation. *H. parry*i has a dormant period during the hottest, driest part of the summer, during which its leaves wither and dry up. It sends up new leaves with the first fall rains.

Horkelia parryi has limited occurrences, in Amador, El Dorado and Mariposa Counties. Because it was found on and near lands administered by the Forest Service only as recently as 1993, surveys were not conducted for the species prior to that year. There are approximately 23 known occurrences of *H. parry*i, making up about five populations on the Stanislaus National Forest. These are all on the Groveland Ranger District. There are several occurrences on lands managed by the Bureau of Land Management and on private property in the vicinity of one of the Forest Service populations. Ten occurrences are in Amador County and two in El Dorado County. There are no known occurrences in the CSWA analysis area. There is un-surveyed possible habitat.

Hulsea brevifolia

Hulsea brevifolia (short-leaved hulsea) is a short-lived perennial in the sunflower family (Asteraceae). It sprouts up from an underground caudex with one to many stems. It generally blooms in July or early August, which is the best period for identification.

Hulsea brevifolia grows on granitic or volcanic soils in relatively open canopy (Wilken, 1975). It has been found from 4,500' to 8,800' and in a range of vegetation types including chaparral, Ponderosa pine, mixed conifer, white fir, red fir, lodgepole, and aspen. It more often found above 6,000' on dry sandy or gravelly sites. It has also been found on road cuts and in harvested timber units.

Asa Gray first described Hulsea brevifolia in 1867 from the Mariposa big-tree grove. Based on information from the Sierra National Forest and the CalFlora Occurrences Database (http://galaxy.cs.berkeley.edu/calflora/occ/), there are at least 35 locations where Hulsea brevifolia has been reported ranging from Tulare to Tuolumne Counties. Approximately two-thirds of these sightings are on the Sierra National Forest. The remaining sightings are in Yosemite and Sequoia-Kings Canyon National Parks and Devil's Postpile National Monument. Many of the Park Service collections are over 30 years old and some of the collections are over 100 years old. The nearest sighting is in the Middle Fork Tuolumne drainage in Yosemite. Surveys have been made for *H. brevifolia* for the past two seasons and to this point it has not been found on the Stanislaus National Forest.

Hydrothyria venosa

Hydrothyria venosa is an aquatic lichen. It is endemic to North America and has been found in the Appalachian Mountains, the northern Rockies, the west slope of the Cascades, and the west slope of the Sierra Nevada (Davis, 1999). It is identifiable year-round, having no dormant or non-living period.

From the occurrences in California documented to date, this species occurs in streams that are fed by cold-water springs. The water is very clear, and peak flows are not of the intensity that would lead to scouring. The streamlets have a rich aquatic bryophyte flora. The streams are rarely more than 8 inches in depth. This lichen is a foliose species with a rather delicate thallus. This species could not tolerate too much physical disruption and is killed by high temperatures and desiccation. It ranges up to about 8,000 feet in elevation.

According to Jim Shevock, (Pers. Comm. to J. Haas), this distinctive species has been in decline throughout its historic range. Sierran populations currently known appear stable at this time, but actual extent of local extirpations in California are not possible to determine. Where populations occur, numbers of individuals are generally low. Six occurrences were found on the Stanislaus National Forest during the past two years. None of these are within the CSWA analysis area. It is likely to occur within the CSWA area since it occurs nearby to the north and south.

Lomatium stebbinsii

Lomatium stebbinsii (Stebbin's lomatium) is a perennial herb in the carrot family, Apiaceae. It has limited occurrences in Amador, Calaveras and Tuolumne Counties. Most occurrences are on lands managed by the US Forest Service, however at least one occurs on private property.

G. Ledyard Stebbins discovered *Lomatium stebbinsii* in 1971. In June of 1971 he examined specimens and described the type locality as, "specimens scattered over the thin-soiled, almost bare ground in volcanics (mud-flow breccia) northwest of Bald Mountain close to Sonora Pass road (Hwy 108), at 5,600ft. (in Schlessman and Constance, 1979). *L. stebbinsii* grows from tubers and propagates by seeds. (Keator, 1990)

Lomatium stebbinsii grows on ridgetops in lahar soils (volcanic mud flow formations). These soils are high in clay content and are generally rocky. Soils are usually shallow. It is often found growing with *Allium tribracteatum* although it extends over a slightly greater range and range of habitats than *A. tribracteatum*. The elevation range for this species is 3,500' to 7,000'. It blooms March to April.

There are approximately 85 known occurrences of *Lomatium stebbinsii* on the Stanislaus National Forest. The known populations of *L. stebbinsii* range in size from 25 individuals to approximately 10,000. Over 70 of the occurrences are within the CSWA analysis area. Due to the shared habitat, the threats to *L. stebbinsii* are the same as those to *Allium tribracteatum*. Since the soil is deeper, landings are also sometime built where *L. stebbinsii* grows.

Meesia triquetra

Meesia triquetra is a moss which grows in wet, somewhat acidic meadows. It is fairly identifiable year-round, but most clearly identifiable when the sporophytes are present in mid-summer. The elevation range is approximately 5,000 feet to 8,000 feet. Neither the California Department of Fish and Game nor the California Native Plant Society tracks this species. The geographic range for this species is primarily northwestern Canada and the northern half of Alaska, with disjunct occurrences in Oregon and California. *M. triquetra* is rare throughout its range. It often grows intermingled with other moss species. It is known from less than ten occurrences in California, all in the Sierra Nevada. It has been found on the Sierra and Tahoe National Forests, but has not yet been found on the Stanislaus National Forest. There have been few surveys in meadows. The biggest threats to it are grazing and lowering of water tables in meadows. *M. triquetra* was listed as a high vulnerability species in the Sierra Nevada Framework (USFS, 2001, V4. Table R 8).

Meesia uliginosa

Meesia uliginosa grows in meadows and seeps with members of the *Carex luzulinia* complex. The geographic range includes Alaska, Canada, and Greenland. There are fewer than ten herbarium records from California stretching from Siskiyou to Tulare Counties with most occurrences in the southern Sierra Nevada (USDA Forest Service, 1998). It has been found on the Sierra and Tahoe National Forests, but has not yet been found on the Stanislaus National Forest. As with *M. triquetra,* there have been few surveys in its habitat. Threats include grazing and trampling. *M. uliginosa* was also listed as a high vulnerability species in the Sierra Nevada Framework (USFS, 2001, V4. Table R 8).

Mimulus filicaulis

Mimulus filicaulis (slender-stemmed or Hetch-Hetchy monkey flower) is an annual herb in the Figwort family, Scrophulariaceae. *M. filicaulis* occurs in moist soils near seeps, springs, meadows and drainages. It also occurs on sites that dry out substantially in the summer but has high soil moisture in the spring. These sites are often within mixed-conifer stands. The appropriate identification period for *M. filicaulis* is mid-spring, from late April through early June, depending on elevation and weather conditions. Any one occurrence might bloom for no more than one week if soils aren't saturated, making it difficult to detect with only one visit to a site. The elevation range for this species is from 2,400 to 5,500 feet

Sereno Watson first described *Mimulus filicaulis* in 1891. *M. filicaulis* has limited occurrences in Tuolumne and Mariposa Counties. It is found in one area of Yosemite National Park, in one area of Mariposa County south of the Merced River, and several areas of the Groveland Ranger District. It has not been found in or near the CSWA area. It is unlikely to occur in the CSWA area since surveys have occurred on Groveland for a number of years and have not found it any further north.

Mimulus gracilipes

Mimulus gracilipes (slender-stalked monkeyflower) is an annual herb in the Figwort family, Scrophulariaceae. The times for germination and identification are the same as for *M. filicaulis. M. gracilipes* prefers open areas with damp to almost dry granitic soils, particularly where there has been fire or other disturbance (Thompson p.1042). It ranges in elevation from 1,500 to at least 4,500 feet.

Mimulus gracilipes is currently known from about 20 sites in Fresno, Mariposa and Tuolumne Counties. *M. gracilipes* has been found in the Sierra National Forest and Yosemite National Park in the Tuolumne, Merced, Fresno, Kings and San Joaquin watersheds. It has not been found on the Stanislaus National Forest in two years of surveys. It’s known distribution is all to the south of the CSWA area.

Mimulus pulchellus

Mimulus pulchellus (pansy monkeyflower) is an annual herb in the Figwort family, Scrophulariaceae. The times for germination and identification are also the same as for *M. filicaulis*. *M. pulchellus* grows in vernally wet to moist sites which are usually flat or with a slight slope. The elevational range for this species is 3,000 to 5,000 feet.

Mimulus pulchellus occurs in Calaveras, Mariposa and Tuolumne Counties. It occurs in the Chowchilla River watershed (near Mariposa), and the Merced, Stanislaus and Tuolumne River watersheds. In the Stanislaus National Forest, there are sixteen known occurrences. Seven of these are in the CSWA analysis area. In that area, it occurs primarily in seeps on lava caps and in meadows. The biggest threat has been OHVs and four-wheel drive vehicles that leave roads and drive through the seeps and meadows. Another threat is medusahead grass, a noxious weed. Few management activities take place where it grows.

Orthotrichum spjutii

Orthotrichum spjutii, a moss, is known from a single site near Leavitt Lake east of Sonora Pass. It grows on granitic rocks in diffuse light and moist conditions. It is not known to occur within the boundaries of the Stanislaus National Forest, but there have been few surveys. There have been few proposed activities in areas where it is most likely to occur.

Table E-1. Summary Table of the Sensitive Plants expected to occur within the Central Stanislaus Watershed Analysis Area

Species	Elevation	Habitat Type and Geographic Range
Allium tribracteatum	3,500-6,500'	Volcanic ridges between Stanislaus & Tuolumne Rivers.
Bruchia bolanderi	5,000-7,000'	Meadows, generally on soil bank of streamlets. Southern Sierran Forests.
Clarkia australis	3,000-6,000'	Ponderosa pine/bear clover, oak/manzanita, east of Clavey River, and between Tuolumne & Merced Rivers.
Clarkia biloba ssp. *australis*	1,500-5,000'	Mostly open sites in chaparral, ponderosa pine, oak habitats from Table Mtn. south to city of Mariposa, esp. Merced River Canyon.
Cypripedium montanum	3,500-6,500'	Deep, loamy soils with heavy duff layer, under dense canopy, douglas fir, fir/pine. Little or no recent disturbance.
Epilobium howellii	6,000-8,100'	Wet meadows and mossy seeps in subalpine coniferous forest.
Erythronium tuolumnense	1,200-5,000'	North-facing canyons, riparian areas, rocky areas with subsurface water flow, Stanislaus River, N.Fork Tuolumne River, & tributaries.
Horkelia parryi	0-3,500'	Soils with low pH: including Josephine-Dystric Lithic assoc. and Josephine-Sites families complex.
Hulsea brevifolia	4,500-8,500	Red fir forest, gravelly soils.
Hydrothyria venosa	3,000-9,000'	Shallow streams fed by cold water springs.
Lomatium stebbinsii	3,500-7,500'	Volcanic ridges between Mokelumne & Tuolumne Rivers.
Meesia triquetra	5,000-8,000'?	Meadows, usually with *Sphagnum* and cold springs or seeps. Sometimes associated with *Vaccinium* spp.
Meesia uliginosa	7,000-9,500'	Meadows, usually in the subalpine zone.
Mimulus filicaulis	3,000-5,500'	Meadows and seeps or damp to wet places that dry out in summer.
Mimulus gracilipes	1,500-4,500'	Burned areas in chaparral, foothill woodland and lower montane coniferous forest. Mariposa, Tuolumne & Fresno Counties.
Mimulus pulchellus	3,000-5,500'	Meadows, seeps, vernally wet sites. Yellow pine forest.
Orthotrichum spjutii	5,000-8,000'	On down-wind sides of granitic rocks where it would receive indirect moisture from storms. (Sonora Pass, Walker Pass)

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Appendix F: Potential Natural Vegetation

An Ecological Unit Inventory of this area was completed in 1997 and is described in Appendix B. Potential Natural Vegetation (PNV) types within the Central Stanislaus Watershed Analysis (CSWA) area were mapped at this time (see Map F-1 at the end of this appendix). This mapping process identified plant communities that would be established if all succession sequences were completed without human-caused disturbance, under present environmental conditions. It is used in this document to paint a picture of the desired condition for vegetation within the CSWA area.

Table F-1 lists PNV map units named for their component plant communities. Table F-2 lists percentages for each PNV mapping unit for each landscape. Consociations are named for the single component PNV that defines them. Associations of multiple PNV types are named for the component plant communities in the order of importance, as determined by percent cover. If multiple components are of equal importance, than the order of the sequence is arbitrary.

Table F-1. Potential Natural Vegetation Map Units—Percent Area of CSWA.

Potential Natural Vegetation Mapping Unit	%
Blue Oak/Wedgeleaf Ceanothus	<1
Chamise/Mariposa Manzanita	<1
Dry Volcanic Meadow (Upper Montane)/Mountain Mule Ear	6
Dry Volcanic Meadow (Upper Montane)/Mountain Mule Ear /Jeffrey Pine/Red Fir	3
Dry Volcanic Meadow (Upper Montane)/Red Fir	2
Interior Live Oak	2
Interior Live Oak Series/Wedgeleaf Ceanothus/Mariposa Manzanita	1
Jeffrey Pine/Rock Outcrop	2
Jeffrey Pine/Rock Outcrop/Red Fir	2
Jeffrey Pine/Rock Outcrop/White Fir/Lodgepole Pine	3
Jeffrey Pine/Rock Outcrop/White Fir/Lodgepole Pine	1
Jeffrey Pine/White Fir/Mixed Conifer	<1
Lodgepole Pine	2
Lodgepole Pine/White Fir/Upper Montane Meadow	1
Lodgepole Pine/Whitebark Pine/Rock Outcrop	6
Mariposa Manzanita/Chamise/Foothill Pine/Wedgeleaf Ceanothus	1
Mixed Conifer	18
Mixed Conifer/Douglas Fir-Ponderosa Pine/	1
Mixed Conifer/Ponderosa Pine	1
Mixed Conifer/Ponderosa Pine/California Black Oak	2
Mixed Conifer/White Fir	<1
Montane Meadow	<1
Ponderosa Pine	2
Ponderosa Pine/California Black Oak	1

Potential Natural Vegetation Mapping Unit	%
Ponderosa Pine/California Black Oak/Interior Live Oak	13
Ponderosa Pine/Douglas Fir-Ponderosa Pine	1
Ponderosa Pine/Interior Live Oak	<1
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	3
Red Fir	1
Red Fir/Jeffrey Pine	2
Red Fir/Jeffrey Pine/Lodgepole Pine/Rock Outcrop	8
Red Fir/Lodgepole Pine	2
Red Fir/White Fir	1
Red Fir/White Fir/Jeffrey Pine	<1
Rock Outcrop/Lodgepole Pine	4
Undifferentiated Montane Shrubland/Jeffrey Pine/Mixed Conifer	3
Wedgeleaf Ceanothus/Interior Live Oak/Ponderosa Pine	2
White Fir	4

Table F-2. Potential Natural Vegetation Types (Percent) for each Landscape.

Vegetation Type	Beardsley-Donnell	Clark Fork	Dodge Ridge	Duckwall	Lyons	Pinecrest	Rose Creek	Sand Bar	Sonora Pass
Blue Oak /Wedgeleaf Ceanothus and Chamise /Mariposa Manzanita					<%1		2%	7%	
Dry Volcanic Meadow/ Red Fir	7%								1%
Dry Volcanic Meadow/Mountain Mule Ear		7%							24%
Dry Volcanic Meadow/Mountain Mule Ear/Jeffrey Pine/ Red Fir	1%					10%			7%
Interior Live Oak				9%	4%		10%	2%	
Interior Live Oak/Wedgeleaf Ceanothus/Mariposa Manzanita					4%		4%		
Jeffrey Pine/Rock Outcrop									9%
Jeffrey Pine/Rock Outcrop /White Fir/Lodgepole Pine	6%								
Jeffrey Pine/Rock Outcrop/Red Fir	1%	1%				16%			
Lodgepole Pine		15%							1%
Lodgepole Pine/White Fir/Upper Montane Meadow			2%			5%			1%
Lodgepole Pine/Whitebark Pine/Rock Outcrop		20%							14%
Mixed Conifer	41%	2%	48%	1%	20%	11%	<1%	30%	2%
Mixed Conifer / Ponderosa Pine			14%	1%	1%		2%	<1%	
Mixed Conifer / Ponderosa Pine /California Black Oak	3%		<1%	<1%	9%		<1%	4%	

Vegetation Type	Beardsley-Donnell	Clark Fork	Dodge Ridge	Duckwall	Lyons	Pinecrest	Rose Creek	Sand Bar	Sonora Pass
Mixed Conifer /Douglas Fir-Ponderosa Pine	1%			2%	1%		1%	3%	
Mixed Conifer-White Fir		3%							1%
Montane Meadow			<1 %						
Ponderosa Pine			7%	14%	4%		9%	1%	
Ponderosa Pine / California Black Oak			8%		5%				
Ponderosa Pine / California Black Oak/Interior Live Oak	7%		11%	54%	25%		37%	49%	
Ponderosa Pine/Douglas Fir-Ponderosa Pine			3%	10%	5%		<1%	<1%	
Ponderosa Pine/Interior Live Oak				9%					
Ponderosa Pine/Mariposa Manzanita/Annual Grassland	<1%	<1%	6%	<1%	18%		13%	3%	<%1
Red Fir									3%
Red Fir/Jeffrey Pine	4%					11%			<1%1
Red Fir/Jeffrey Pine/Lodgepole Pine	7%	23%				16%			9%
Red Fir/Lodgepole Pine	1%	3%				8%			1%
Red Fir/White Fir	4%	<1%	1%			3%			
Rock Outcrop/ Lodgepole Pine						19%			10%
Undifferentiated Montane Shrubland/Jeffrey Pine/Mixed Conifer	3%	14%							4%
Wedgeleaf Ceanothus/Interior Live Oak/Ponderosa Pine					4%		20%		
White Fir	2%	11%				<1%			8%

Potential Natural Vegetation (PNV) types in this document are described below. Each PNV type includes one or more sub-type (series). The approximate percentage share within the PNV mapping unit is listed. Also listed are inclusions of other series that occur within the mapping unit.

Blue Oak/Interior Live Oak/ Wedgeleaf Ceanothus:
30-50% Blue Oak Series
20-40% Interior Live Oak Series
20-40% Wedgeleaf Ceanothus Series
With inclusions: Foothill Pine Series, California Buckeye Series, Shrub Interior Live Oak Series

Chamise/Mariposa Manzanita:
30-50% Chamise Series
30-50% Mariposa Manzanita Series
With inclusions: Wedgeleaf Ceanothus Series (SCW), Interior Live Oak Series, Foothill Pine Series

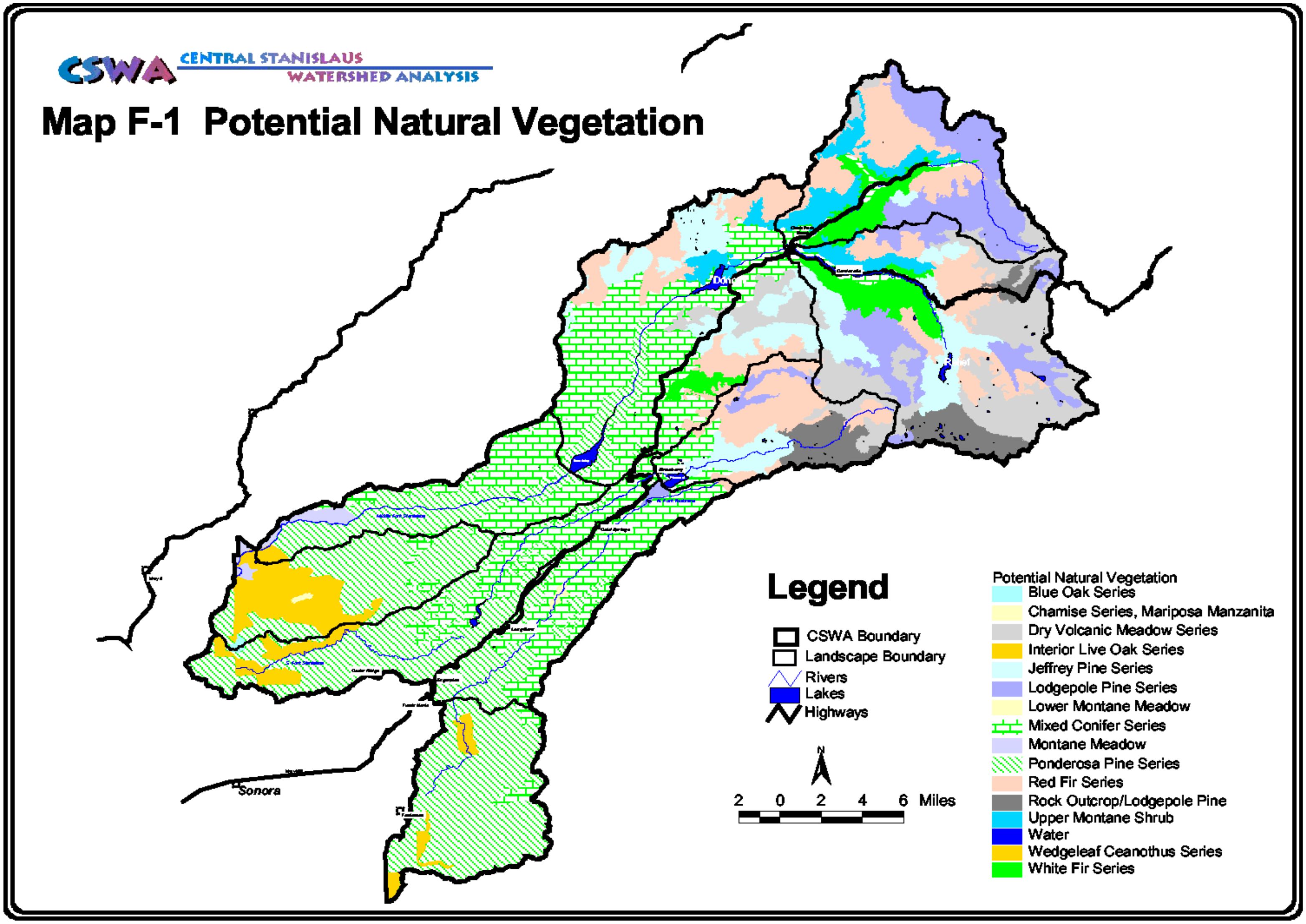
Dry Volcanic Meadow (Upper Montane)/ Red Fir:	40-60% Dry Volcanic Meadow Series 20-40% Red Fir Series With inclusions: Rock Outcrop, Jeffrey Pine Series
Dry Volcanic Meadow (Upper Montane)/Mountain Mule Ear:	40-60% Dry Volcanic Meadow Series 40-60% Mountain Mule Ear Series With inclusions: Rock Outcrop, Jeffrey Pine Series, Red Fir Subseries, Western Juniper Series, Lodgepole Pine Series, Whitebark Pine Series
Dry Volcanic Meadow (Upper Montane)/Mountain Mule Ear/ Jeffrey Pine/Red Fir:	20-30% Dry Volcanic Meadow Series 20-30% Mountain Mule Ear Series 20-30% Jeffrey Pine Series 20-30% Red Fir Series With inclusions: Rock Outcrop, White Fir Series, Western Juniper Series, Lodgepole Pine Series, Whitebark Pine Series
Interior Live Oak/Wedgeleaf Ceanothus/ Mariposa Manzanita:	30-50% Interior Live Oak Series 30-50% Wedgeleaf Ceanothus Series 10-20% Mariposa Manzanita Series With inclusions: Foothill Pine Series, Ponderosa Pine Series, California Buckeye series, Blue Oak Series
Interior Live Oak:	60-80% Interior Live Oak Series With inclusions: Mariposa Manzanita Series, Brewer Oak Series, Ponderosa Pine Series, Wedgeleaf Ceanothus Series
Jeffrey Pine/Rock Outcrop/Red Fir:	20-40% Jeffrey Pine Series 20-40% Rock Outcrop 20-40% Red Fir Series With inclusions: Lodgepole Pine Series, Western Juniper Series, White Fir Series
Jeffrey Pine/Rock Outcrop/White Fir:	30-40% Jeffrey Pine Series 10-30% Rock Outcrop 20-30% White Fir Series 20-30% Lodgepole Pine Series With inclusions: Western Juniper Series, Red Fir Series, Mixed Conifer Series

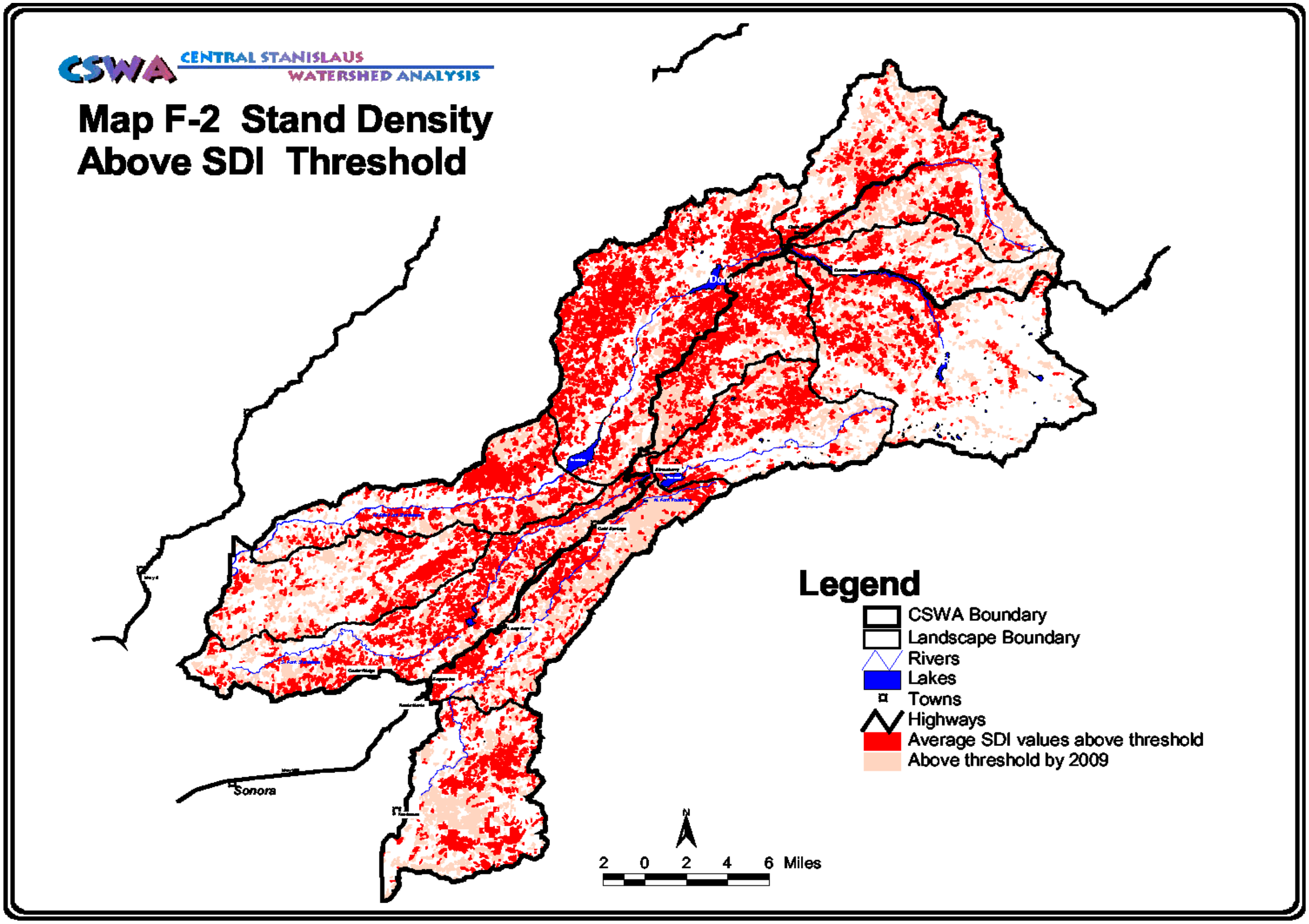
Jeffrey Pine/Rock Outcrop:	50-70% Jeffrey Pine Series 20-40% Rock Outcrop With inclusions: Lodgepole Pine Series, Red Fir Series, Western Juniper Series
Jeffrey Pine/White Fir/Mixed Conifer:	20-40% Jeffrey Pine Series 20-40% White Fir Series 20-40% Mixed Conifer Series With inclusions: Lodgepole Pine Series, Red Fir Series, Ponderosa Pine Series, Rock Outcrop
Lodgepole Pine/White Fir/ Upper Montane Meadow:	30-50% Lodgepole Pine Series 20-40% White Fir Series 20-40% Upper Montane Meadow Series With inclusions: Red Fir Series, Jeffrey Pine Series, Mixed Conifer Series, Rock Outcrop
Lodgepole Pine/Whitebark Pine/Rock Outcrop:	20-40% Lodgepole Pine Series 20-40% Whitebark Pine Series 20-40% Rock Outcrop With inclusions: Alpine Forb Series, Foxtail Pine Series, Dry Volcanic Meadow, Red Fir Series
Lodgepole Pine:	60-80% Lodgepole Pine Series With inclusions: Red Fir Series, Rock Outcrop, White Fir Series, Jeffrey Pine Series
Mixed Conifer/ Ponderosa Pine/California Black Oak:	30-50% Mixed Conifer Series 30-50% Ponderosa Pine Series 20-40% California Black Oak Series With inclusions: White Fir Series, Interior Live Oak Series, Mariposa Manzanita Series
Mixed Conifer/Douglas Fir-Ponderosa Pine:	30-60% Mixed Conifer Series 30-60% Douglas Fir-Ponderosa Pine Series With inclusions: White Fir Series, Ponderosa Pine Series
Mixed Conifer/Ponderosa Pine:	30-60% Mixed Conifer Series 30-60% Ponderosa Pine Series With inclusions: White Fir Series, Interior Live Oak Series, California Black Oak Series

Mixed Conifer:	60-80% Mixed Conifer Series With inclusions: Ponderosa Pine Series, White Fir Series
Mixed Conifer-White Fir:	30-50% Mixed Conifer Series 30-50% White Fir Series With inclusions: Ponderosa Pine Series, Jeffrey Pine Series, Red Fir Series, Lodgepole Pine Series, Rock Outcrop
Montane Meadow:	60-80% Montane Meadow Series
Ponderosa Pine/California Black Oak/Interior Live Oak:	20-40% Ponderosa Pine Series 20-40% California Black Oak Series 20-40% Interior Live Oak Series With inclusions: Mariposa Manzanita Series, Mixed Conifer Series
Ponderosa Pine/California Black Oak:	40-60% Ponderosa Pine Series 30-50% California Black Oak Series With inclusions: Interior Live Oak Series, Mariposa Manzanita Series, Wedgeleaf Ceanothus Series, Mixed Conifer Series
Ponderosa Pine/Douglas Fir-Ponderosa Pine:	30-60% Ponderosa Pine Series 30-60% Douglas Fir-Ponderosa Pine Series With inclusions: Mixed Conifer Series, California Black Oak Series
Ponderosa Pine/Interior Live Oak:	40-60% Ponderosa Pine Series 40-60% Interior Live Oak Series With inclusions: Mixed Conifer Series, California Black Oak Series, Mariposa Manzanita Series
Ponderosa Pine/Mariposa Manzanita/Annual Grassland:	30-50% Ponderosa Pine Series 30-50% Mariposa Manzanita Series 20-40% Annual Grassland Series With inclusions: Wedgeleaf Ceanothus Series, Mixed Conifer Series, Interior Live Oak Series, Foothill Pine Series
Ponderosa Pine:	70-90% Ponderosa Pine Series With inclusions: Interior live Oak Series, Mixed Conifer Series, California Black Oak Series

Red Fir/Jeffrey Pine/Lodgepole Pine/ Rock Outcrop:	20-40% Red Fir Series 20-40% Jeffrey Pine Series 20-40% Lodgepole Pine Series 10-30% Rock Outcrop With inclusions: White Fir Series, Mountain Hemlock Series, Western Juniper Series
Red Fir/Jeffrey Pine:	30-50% Red Fir Series 20-40% Jeffrey Pine Series 10-20% Rock Outcrop With inclusions: White Fir Series, Lodgepole Pine Series, Mountain Hemlock Series, Western Juniper Series
Red Fir/Lodgepole Pine:	40-60% Red Fir Series 30-50% Lodgepole Pine Series With inclusions: White Fir Series, Jeffrey Pine Series, Mountain Hemlock Series, Western Juniper Series, Rock Outcrop
Red Fir/White Fir/ Jeffrey Pine:	20-40% Red Fir Series 20-40% White Fir Series 20-40% Jeffrey Pine Series With inclusions: Lodgepole Pine Series, Mixed Conifer Series, Rock Outcrop
Red Fir/White Fir:	30-60% Red Fir Series 30-60% White Fir Series With inclusions: Lodgepole Pine Series, Jeffrey Pine Series, Mixed Conifer Series, Mountain Hemlock Series, Western Juniper Series, Rock Outcrop
Red Fir:	60-80% Red Fir Series (CFR) With inclusions: White Fir Series, Jeffrey Pine Series, Lodgepole Pine Series, Mountain Hemlock Series, Western Juniper Series
Rock Outcrop/Lodgepole Pine:	40-60% Rock Outcrop 40-60% Lodgepole Pine Series With inclusions: Red Fir Series, Jeffrey Pine Series, Whitebark Pine Series

Undifferentiated Montane Shrubland/Jeffrey Pine/Mixed Conifer:	40-60% Undifferentiated Montane Shrubland series 20-40% Jeffrey Pine Series (CPJ) 10-20% Mixed Conifer Series (CX0)
Wedgeleaf Ceanothus/Interior Live Oak/Ponderosa Pine:	20-40% Wedgeleaf Ceanothus Series 20-40% Interior Live Oak Series 20-40% Ponderosa Pine Series With inclusions: Shrub Interior Live Oak Series, Mariposa Manzanita Series, California Buckeye Series
White Fir:	60-80% White Fir Series (CFW) With inclusions: Mixed Conifer Series, Jeffrey Pine Series, Red Fir Series, Lodgepole Pine Series, Rock Outcrop


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map F-1 Potential Natural Vegetation
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Highways
N
2 0 2 4 6 Miles
Potential Natural Vegetation
Blue Oak Series
Chamise Series, Mariposa Manzanita
Dry Volcanic Meadow Series
Interior Live Oak Series
Jeffrey Pine Series
Lodgepole Pine Series
Lower Montane Meadow
Mixed Conifer Series
Montane Meadow
Ponderosa Pine Series
Red Fir Series
Rock Outcrop/Lodgepole Pine
Upper Montane Shrub
Water
Wedgeleaf Ceanothus Series
White Fir Series
Sonora


CENTRAL STANISLAUS
WATERSHED ANALYSIS
CSWA
Map F-2 Stand Density
Above SDI Threshold
Sonora
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Average SDI values above threshold
Above threshold by 2009
N
2 0 2 4 6 Miles

Appendix G: Traditional Native American Plants

This appendix provides a list of plants that (1) are important to local Native American people, and (2) they would like Forest Service managers to be aware of. Some of the plants are quite common within National Forest boundaries, while others are less common. Some plants not very common within the Stanislaus National Forest, such as redbud, may be common outside Forest boundaries. However, being on private land they may not be accessible, whereas on public land they are accessible. Some of these plants are non-native species, which came to North America with European explorers and settlers, and were assimilated into the Native American culture and lifestyles.

Species	Elevation	Habitat Type
Hazel *Corylus cornuta var. californica*	Below 6,900'	Moist shady places
White Alder *Alnus rhombifolia*	300-8,000'	Along perennial streams
Bracken Fern *Clarkia australis*	0-10,500'	Pasture woods, meadows, hillsides, and partial to full sun.
Buckeye *Aesculus californica*	<5,500'	Dry slopes, canyons, borders of streams
Buckbrush *Ceanothus cuneatus*	<5,900'	Dry mountain slopes and ridges
Deer Brush *Ceanothus integerrimus*	1,000-6,900'	Dry slopes and ridges
Mountain Whitethorn, Snow Bush *Ceanothus cordulatus*	3,000-9,500'	Rocky ridges, forest openings
Flannel Bush *Fremontodendron californicum*	1,300-6,500'	Chaparral, oak/pine woodlands, rocky ridges
Sedge *Carex* species	All elevations	Seasonally moist soil, grasslands to open forest
Angelica *Angelica breweri*	3,000-10,000'	Coniferous forests

Species	Elevation	Habitat Type
Bolander's Yampah *Perideridia bolanderi*	2,000-76,500'	Meadows, scrub, pine forest, blue oak woodlands; Summer-dry clay soil
Gairdner's Yampah *Perideridia gairdneri*	0-9,800'	Moist soil of flats, meadows, streamsides, grasslands, pine groves
Tuberous sanicle *Sanicula tuberosa*	500-9,000'	Open gravelly meadows, chaparral, woodland or pine forest
Western Juniper *Juniperus occidentalis*	2,300-7,500'	Dry slopes, flats, juniper woodlands
Indian Hemp *Apocynum androsaemifolium*	4,000-9,000'	Open slopes, rocky places, with conifers, chaparral
Brown Dogwood *Cornus glabrata*	<5,100'	Moist communities
Mountain Dogwood *Cornus nuttallii*	<5,100'	Forests
Woolley Mullien *Verbascum thapsus* (alien)	<7,200"	Disturbed areas
Sierra Currant *Ribes nevadense*	2,950-4,300'	Forest margins
Sierra Gooseberry *Ribes roezlii*	<9,200'	Forests, chaparral woodlands
Wild Grape *Vitus californica*	<3,300'	Streamsides, springs and canyons
Deergrass *Muhlenbergia rigens*	<7,000'	Sandy to gravelly places, stream bottoms, canyons
Mariposa Manzanita *Arctostaphylos viscida spp. mariposa*	1,900-6,000'	Rocky slopes, woodland, chaparral, coniferous forests
Parry Manzanita *Arctostaphylos manzanita*	<5,000'	Slopes, rocky soils woodlands, and forest

Species	Elevation	Habitat Type
Pacific Madrone *Arbutus menziesii*	300-4,900’	Coniferous oak forests
Elderberry *Sambucus mexicana*	<9,000’	Streambanks, open places in forest
Honeysuckle *Lonicera hispidula var. vacillans*	<3,600’	Canyons, streamsides, woodlands
Mountain Honeysuckle *Lonicera interrupta*	1,600-4,600’	Streambanks, open places in forest
Scouring Rush *Equisetum arvense*	<9,800’	Moist disturbed areas
Hartweg’s Iris *Iris hartwegii*	1,900-7,540’	Open or partly shaded slopes
Western Blue Flag *Iris missouriensis*	2,900-11,155’	Moist, grassy places
California Bay *Umbellularia californica*	<5,200’	Canyons, valley, chaparral
Brewer’s Clover *Trifolium breweri*	650-5,900’	Dry forests, open areas, roadsides
Carpet Clover *Trifolium monanthum*	5,000-12,500’	Mountain forests near streams, wet meadows with aspen or willow
Redbud *Cercis occidentalis*	300-4,500’	Dry shrubby slopes incanyons or ravines, along streambanks, in chaparral, woodlands
Sulphur Pea *Lathyrus sulphureus*	1,960-8,200’	Foothill woodlands to fir forests
Blue Camas *Camassia quamash*	<10,800’	Damp forests
Blue Dicks *Dichelostemma capitatum*	<7,500’	Open woodlands, scrub, desert, grassland

Species	Elevation	Habitat Type
Harvest Brodiaea *Brodiaea elegans*	<5,000’	Grasslands, meadows, open woodlands
Mariposa Lily *Calochortus venustus*	950-8,900’	Shady soil in grassland, woodland
Soaproot *Chlorogalum pomeridianum*	<5,000’	Bluffs, grasslands, chaparral and dry open woodlands
Swamp Onion *Allium validum*	3,900-11,000’	Wet meadows
Wild Onion *Allium membranaceum*	490-4,600’	Wooded slopes
Big Leaf Maple *Acer macrophyllum*	<5,000’	Streambanks and canyons
Narrow-leaved Milkweed *Asclepias fascicularis*	165-7,218’	Dry ground, valleys, foothills
Purple Milkweed *Asclepias cordifolia*	150-6,230’	Rocky slopes, talus, woods, chaparral
Showy Milkweed *Asclepias speciosa*	<6,230’	Many habitats including fields, roadsides
Chia *Salvia columbariae*	<3,900’	Dry disturbed sites, chaparral, coastal-sage scrub
Field Mint *Mentha arvensis*	<7,900’	Moist areas, streambanks, lake shores
Mountain Monardella *Monardella odoratissima*	2,000-10,000’	Sagebrush, scrub, montane forest
Mustang Mint *Monardella lanceolata*	<8,500’	Open, rocky often disturbed sites, chaparral, woodlands
Wild Mock Orange *Philadelphus lewisii*	<4,900’	Slopes, canyons, forest openings
Morel *Morchella* species	<8,000’	Streams, springs, marshes, lake margins

Species	Elevation	Habitat Type
Watercress *Rorippa nasturtium-aquaticum*	<9,000’	Streams, springs, marshes, lake margins
Black Oak *Quercus kellogii*	650-7,800’	Slopes, valleys, woodlands and conifer forests
Canyon-live Oak *Quercus chrysolepis*	650-8,500”	Canyons, shaded slopes, chaparral, mixed evergreen forest and woodlands
California Ash, Foothill Ash *Fraxinus dipetala*	3,000-4,300’	Cayons, slopes, chaparral, oak/pine woodland
Oregon Ash *Fraxinus latifolia*	<5,500’	Canyons, streambanks, woodlands
Gray or Foothill Pine *Pinus sabiniana*	500-5,000’	Foothill woodlands, oak woodlands, chaparral, infertile soils
Ponderosa Pine *Pinus ponderosa*	500-7,500’	Mixed conifer, lower mixed-evergreen forest
Sugar Pine *Pinus lambertiana*	<10,500’	Mixed conifer, mixed evergreen forest
Miner’s Lettuce *Claytonia perfoliata*	<6,500’	Vernally moist, often shady or disturbed areas
Mountain Strawberry *Fragaria virginiana*	3,900-10,800’	Meadows, forest openings
Wood Strawberry *Fragaria vesca*	100-6,500’	Partial shade in forests
California Wild Rose *Rosa californica*	<5,200’	Generally moist areas, streambanks
Mountain Rose *Rosa woodsii var. ultramontana*	2,600-11,100’	Generally moist areas
Western Raspberry *Rubus leucodermis*	100-8,000’	Generally rocky, moist areas

Species	Elevation	Habitat Type
Thimbleberry *Rubus parviflorus*	<8,200’	Moist shade
Skunkbrush *Rhus trilobata*	<7,200’	Slopes, washes, shrubland
Golden Fleece *Ericameria arborescence*	<9,500’	Woodlands, chaparral and open forests
Thistle *Cirsium californicum*	<7,500’	Often disturbed plaes, woodlands and open forest
Gray Mules Ear *Wyethis heloides*	<6,500’	Open grasslands, shrubland
Mountain Mules Ear *Wyethia mollis*	3,900-11,100’	Open forest, dry rocky slopes
Narrow-leaved Mules Ear *Wyethia angustifolia*	<6,500’	Grasslands
Wormwood or Mugwort *Artemisia douglasiana*	<7,000’	Open to shady places, often in drainages
Yarrow *Achillea millefolium*	<11,000’	Varied
Arroyo Willow *Salix lasiolepis*	<9,200’	Shores, marshes, meadows, springs, bluffs
Dusky Willow *Salix melanopsis*	2,600-8,800’	Streambanks, opten among rocks
Red Willow *Salix laevigata*	<5,600’	Riverbanks, seepage areas, lake shores, and ditches
Western Chokecherry *Prunus virginiana var. demissa*	300-9.500’	Rocky slopes, canyons, shrubland, oak/pine woodlands and conifer forest
Sierra Plum *Prunus subcordata*	300-6,200’	Mixed evergreen, coniferous forest
Bitter Cherry *Prunus emarginata*	<7,200’	Slopes, canyons, washes, shrubland, woodland

Appendix H: Wildlife and Aquatic Species

Introduction

This appendix contains background information for the wildlife and aquatic portions of the Central Stanislaus Watershed Analysis. Included here are:

- Aquatic species habitat descriptions (page 1);
- Desired conditions for animal species habitat (page 13);
- North District Ecosystem Management Area Assessment of the Stanislaus Deer Herd and Habitat Improvement Opporutnities (page 15); and
- Map of the wildlife land allocations derived from the Sierra Nevada Forest Plan Amendment (last page).

Aquatic Species Habitat Descriptions

Foothill yellow-legged frog
Rana boylii

Management Status: US Fish and Wildlife Service Species of Concern, California Species of Concern, Region 5 Forest Service Sensitive Species, and National heritage ranking is unknown. Added to R5 Sensitive Species List: June 10, 1998

Distribution and Abundance

Historically, foothill yellow-legged frogs occurred between sea level and 6,000 feet in most Pacific drainages west of the Sierra-Cascade Crest from the Santiam River, Marion County, Oregon to the San Gabriel Drainage, Los Angeles County, California (Jennings and Hayes 1986). Its known elevational range in California extends from near sea level to 6300 feet (Snow Mountain, Trinity County: Hemphill 1952). Currently, the potential suitable habitat for this species on National Forest system lands in Region 5 occurs on the Angeles, Eldorado, Klamath, Lassen, Los Padres, Mendocino, Six Rivers, Plumas, San Bernardino, Sequoia, Shasta-Trinity, Sierra, Stanislaus, and Tahoe National Forests.

Species Life History

Breeding occurs in shallow, slow flowing water with at least some pebble and cobble substrate (Lind 1996, personal communication) between March and June after high flows have receded. Eggs are laid in compact clusters of 100 to 1100 eggs attached to stones in cool water streams at the edges of riffles. Egg masses have also been found attached to aquatic vegetation, woody debris, and gravel (Lind 1996, personal communication). Eggs hatch in five to 30 days (Zweifel 1955). Metamorphosis for this species generally occurs in three to four months. Foothill yellow-legged frogs usually reach sexual maturity between one to two years although some individuals may reproduce as early as six months after metamorphosis (Jennings 1988). The life span of foothill yellow-legged frog is essentially unknown, but it may be a dozen years or more, based on studies of other ranids (Duellman and Trueb 1996).

Little is known about the movement and dispersal of this species (Jennings and Hayes 1994). During breeding and summer, foothill yellow-legged frogs are rarely encountered far from permanent water. During the winter, frogs have been observed in abandoned rodent burrows and under logs as far as 100 meters from a stream (Zeiner et al. 1988). Recently metamorphosed frogs show a strong tendency to migrate upstream (Twitty 1967). Overwintering of larvae probably does not take place (Zweifel 1955).

Specific Habitat Requirements

Foothill yellow-legged tadpoles feed on algae scraped from rocks or plants. Adults eat both aquatic and terrestrial insects. Foothill yellow-legged frogs are susceptible to a wide range of predators, including aquatic insects, garter snakes, bullfrogs, birds, and raccoons. A wide variety of fish species prey on all life stages of foothill yellow-legged frog (Jennings 1988).

This species is mainly a frog of rocky or gravelly permanent streams, including those that may be reduced to water holes connected by trickles during the dry season (Nussbaum et al. 1983). Foothill yellow-legged frogs have also been found in ponds and stock ponds (Tierney 1997, personal communication and personal observation). Partly shaded, shallow streams and riffles are the key components for habitat. Breeding takes place in the pools or streams they usually inhabit and egg masses are deposited in rounded clusters attached to cobble often on the downstream side. Foothill yellow-legged frogs are sun baskers and seldom seen far from the water.

Threat(s)

The distribution and abundance of this species has been significantly reduced from historic conditions. The primary threat to foothill yellow-legged frogs appears to be altered flow regimes that impact both eggs and adults. Other activities that modify stream flows or affect stream substrates are mining, grazing, and the timing of flows from dams. The introduction of exotic species may also impact these frogs.

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Mountain yellow-legged frog
Rana muscosa

Management Status: US Fish and Wildlife Service Species of Concern, California Species of Special Concern, Region 5 Forest Service Sensitive Species, and National heritage ranking of G3N3. Added to R5 Sensitive Species List: June 10, 1998

Distribution and Abundance

Mountain yellow-legged frogs are native to California and occur primarily in the Sierra Nevada from 4,500 feet to over 12,000 feet elevation. This species also occurs in Nevada around Lake Tahoe. In southern California, isolated populations exist in the San Gabriel, San Bernardino, and San Jacinto Mountains. The Angeles, Cleveland, Eldorado, Inyo, Lassen, Plumas, San Bernardino, Sequoia, Sierra, Stanislaus, Tahoe, and the Lake Tahoe Basin Management Unit are within the range of the mountain yellow-legged frog and may have suitable habitat for the species.

Species Life History

Tadpoles and adults of this species overwinter in deep pools with undercut banks that provide cover (Martin 1992). Since the adults and tadpoles overwinter underwater, in high elevations they are restricted to relatively deep lakes (over five feet deep) which do not freeze solid in winter (Knapp 1994).

In high elevations, breeding occurs between May and August as soon as the meadows and lakes are free of snow and ice. In lower elevations breeding occurs between March and June once high water in streams subsides. Mountain yellow-legged frogs usually lay their eggs in clusters of up to 500 eggs submerged along stream banks or on vegetation. Tadpoles require at least one year before metamorphosis to the adult stage. Tadpoles in some high elevation populations may require up to three years before metamorphosis (Knapp 1994).

Little data exists on dispersal for mountain yellow-legged frogs (Bradford 1991). Occasional movements up to 50 m may be associated with habitat degradation, especially drying (Zeiner et al. 1988).

Specific Habitat Requirements

Adults feed primarily on aquatic and terrestrial invertebrates such as beetles, flies, ants, bees, and true bugs (Jennings and Hayes 1994). Tadpoles graze on algae and diatoms along rocky bottoms in streams, lakes, and ponds.

Suitable breeding habitat for mountain yellow-legged frogs is considered to be low gradient (up to 4%) perennial streams and lakes. Streams in this category generally have the potential for deep pools and undercut banks which provide the habitat requirements of this frog.

Mountain yellow-legged frogs are seldom far from water and prefer well illuminated, sloping banks of meadow streams, riverbanks, isolated pools, and lake borders with vegetation that is continuous to the water's edge (Martin 1992, Zeiner et al. 1988).

Threat(s)

The decline of mountain yellow-legged frogs in the Sierra Nevada has been attributed to the introduction of salmonid fishes during the last century (Bradford et al. 1993). As populations are lost, remaining populations become more isolated, which can indirectly result in extinctions of additional populations and reduce opportunities for recolonization of these sites (Bradford et al. 1993). Garter snakes and introduced trout prey upon mountain yellow-legged frog tadpoles (Zeiner et al. 1988). Due to the adults' overwintering underwater and the tadpoles' long metamorphosis, this species is very vulnerable to introduced fish (Knapp 1994). Additional reasons for the frog's disappearance that have been offered include: loss of habitat, altered habitat, grazing, and other environmental problems such as increased ultraviolet radiation, pesticides, viruses, and acid rain.

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Yosemite Toad
Bufo canorus

Management Status: California Species of Special Concern, Region 5 Forest Service Sensitive Species, National heritage rating is unknown. Added to R5 Sensitive Species List: June 10, 1998

Distribution and Abundance

The Yosemite toad is native to the Sierra Nevada mountains. This species ranges from the vicinity of Grass Lake, Eldorado County to south of Kaiser Pass and Evolution Lake, Fresno County (Stebbins 1985). It occurs 4800 to 12,000 feet with most sitings occurring between 8,500 and 10,000 feet (Karlstrom 1962). Potential habitat for this species on National Forest System lands in Region 5 occurs on the Eldorado, Inyo, Sierra and Stanislaus National Forests.

Species Life History

The Yosemite toad is primarily a diurnal frog, but during warmer seasons, these toads are more active nocturnally. Rodent burrows, crevices under rocks, or the base of willows are used for overwintering sites. Emergence from hibernacula depends on elevation and season, but known dates of emergence range from early May to mid-June (Kagarise-Sherman 1980).

Yosemite toads breed along short emergent aquatic vegetation in shallow, still water environments during the months of mid-April to mid-July depending on local conditions (Zeiner et al. 1988). Single female clutch sizes are estimated to be made up of 1,000 to 2,000 eggs. Larvae hatch in three to twelve days, and tadpoles metamorphose seven to nine weeks after the eggs are laid (Kagarise-Sherman 1980, Kagarise-Sherman and Morton 1984). First breeding occurs for females at four to six years and three to five years for males. Females probably do not breed each year once they are sexually mature (Morton 1981).

After breeding occurs, both sexes will move into meadow areas to feed for two to three months before hibernating (Kagarise-Sherman 1980 and Kagarise-Sherman and Morton 1984). Kagarise-Sherman found toads which traveled 150-230 meters between hibernaculum and breeding ponds at Tioga Pass Meadow (Kagarise-Sherman 1980). Populations of Yosemite toads may be isolated due to the patchy distribution of the montane meadow habitats used.

Specific Habitat Requirements

The Yosemite toad is typically found in high mountain meadows and forest borders near permanent water, although they spend little time actually in the water (Karlstrom 1962). Yosemite toads feed on a variety of prey including tenbronid and ladybird beetles, weevils, large ants, spiders, dragonfly nymphs, mosquitoes and lepidoptera larvae (Grinnel and Storer 1924, Mullally 1953).

Suitable breeding habitat includes shallow pools and streams, slow moving water, usually in meadows. Short emergent vegetation is usually dominating at these breeding sites. Overwintering sites are often in rodent burrows.

Threat(s)

Sharp declines in Yosemite toad populations were reported in the Eastern Sierra Nevada from 1971 to 1991 (Kagarise-Sherman and Morton 1993). Kagarise-Sherman and Morton (1993) attributed drought, predation, and disease to the decline of this species. During years of drought, desiccation of pools before metamorphosis is a major cause of mortality and decline in reproductive success. Another factor that may have detrimental impacts on the Yosemite toad is habitat alteration due to livestock grazing (Davidson 1994).

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Hardhead
Mylopharodon conocephalus

Management Status: No federal listing, Natural heritage ranking of G3
Added to R5 Sensitive Species List: June 10, 1998

Distribution, Abundance and Taxonomic Relationships

Historically, hardhead have been regarded as a widespread and locally abundant species (Ayres 1854b, Jordan and Evermann 1896, Evermann 1905, Rutter 1908, Murphy 1947, Soule 1951, Reeves 1964). Hardhead are still widespread in the foothill streams, but their specialized habitat requirements, combined with widespread alteration of downstream habitats, has resulted in the isolation and localization of populations. These conditions increase the chance for localized extinctions. Hence, hardhead are less abundant than they once were, especially in the southern half of their range.

Hardhead are widely distributed in low to mid-elevation streams in the main Sacramento-San Joaquin drainage as well as the Russian River drainage. Their range extends from the Kern River, Kern County, in the south to the Pitt River, Modoc County, in the north.

Populations are scattered in the tributary streams of the San Joaquin drainage, but have not been found in the valley reaches of the San Joaquin River (Moyle and Nichols 1973, Saiki 1984, Brown and Moyle 1987). In the Sacramento River drainage, Hardhead are present in most of the larger tributary streams as well as the Sacramento River. They are widely distributed in the Pitt River drainage (Cooper 1983, Moyle and Daniels 1982), including the main Pitt River and its series of Hydroelectric reservoirs.

Hardhead were first described by Baird and Girard (Girard 1854) as *Gila conocephala.* Ayres (1854) redescribed it as *Mylopharodon robustus*. *G. conocephala* was later classified as *M. conocephalus* and considered to be closely related to *M. robustus*. Electrophoretic studies by Avise and Ayala (1976) indicate the hardhead to be closely related to the Sacramento squawfish, but different enough to be considered a separate species.

Specific Habitat Requirements

Hardhead are typically found in undisturbed areas of larger middle- and low- elevation streams (Moyle and Nichols 1973, Moyle and Daniels 1982). Elevational range is 10-1450m (up to 4,700 feet)(Reeves 1964). Most streams occupied by hardhead have summer temperatures in excess of 20°C, selecting an optimal range between 24-28°C (Knight 1985). Hardhead are relatively intolerant of low oxygen levels, especially at higher temperatures, a factor which may limit their distribution to well oxygenated streams and the surface water of reservoirs (Cech et al 1990). They prefer clear, deep (> 1m) pools with sand-gravel-boulder substrates and slow water velocities (<25cm sec^1) (Moyle and Nichols 1973, Knight 1985, Moyle and Blatz 1985). In streams, adult hardhead tend to remain in the lower half of the water column, rarely moving into the upper levels (Knight 1985), while juveniles concentrate in shallow water close to the stream edges (Moyle and Baltz 1985). Hardhead are always found in association with Sacramento squawfish and usually with Sacramento suckers. They tend to be absent from streams introduced with exotics, especially centrarchids (Moyle and Nichols 1973, Moyle and Daniels 1982), or streams that have been severely altered by human activity (Baltz and Moyle 1993).

Life History

Primarily bottom feeders, hardheads forage for benthic invertebrates and aquatic plant material in quiet water. They will occasionally feed on plankton and surface insects. Smaller fish (<20 cm SL) feed primarily on mayfly larve, caddisfly larve, and small snails, whereas larger fish feed mainly on aquatic plants (especially filamentous algae), as well as crayfish and other large invertebrates (Reeves 1964). The ontogenetic changes in teeth structure seems to fit the dietary switch. Reeves (1964) found no remains of fish in the stomachs of large hardhead.

Hardhead mature after their second year and most likely spawn in the spring (Reeves 1964), judging by the by the upstream migrations of adults into smaller tributary streams during this time of year (Wales 1946, Murphy 1947, Bell and Kimsey 1955, Rowley

1955). Estimates based on juvenile recruitment suggest that hardhead spawn by May-June in Central Valley streams and that the spawning season may extend into August in the foothill streams of the Sacramento-San Joaquin drainage (Wang 1986).

Hardhead reach 7-8 cm by their first year , but growth slows in subsequent years. In the American River, hardhead reach 30 cm SL in 4 years, whereas in Pitt and Feather Rivers, it takes six years to reach that length (Moyle et al 1983, PG&E 1985).

Threat(s)

Current threats included but are not limited to population isolation which increases possibility of local extinction, habitat loss from hydroelectic power developments, and predation by exotic species.

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Desired Conditions for Animal Species Habitat

California Spotted Owl PACs

Stands in each 300 acre PAC have: (1) at least two tree canopy layers, (2) trees in the dominant and co-dominant crown classes averaging at least 24 inches diameter at breast height (dbh), (3) at least 70 percent tree canopy as measured by a 10 degree moosehorn or aerial photo interpretation (including hardwoods), (4) a number of very large (greater than 45 inches dbh) old trees, and (5) higher than average levels of snags and downed woody material.

Northern Goshawk PACs

Stands in each 200-acre Northern goshawk PAC have: (1) one to two tree canopy layers, (2) trees in the dominant and co-dominant crown classes averaging at least 24 inches dbh, (3) at least 70 percent tree canopy cover as measured by a 10 degree moosehorn or aerial photo interpretation (including hardwoods), (4) a number of very large (greater than 45 inches dbh) old trees, and (5) higher than average levels of snags and downed woody material.

Great Gray Owl PACs

Meadow vegetation supports a sufficiently large meadow vole populaton to provide a food source for great gray owls through the reproductive period.

Fisher Den Sites

Habitat surrounding the den includes at least two large (greater than 40 inches dbh) conifers per acre and one or more oaks (greater than 20 inches dbh) per acre with suitable denning cavities. Canopy closure exceeds 80 percent.

Marten Den Sites

Habitat surrounding the den has: (1) at least two conifers per acre greater than 24 inches dbh with suitable denning cavities; (2) canopy closures exceeding 60 percent; (3) more than 10 tons per acre of coarse woody debris in decay classes 1 and 2; and (4) an average of 6 snags per acre on the westside and 3 per acre on the eastside.

Sierra Nevada Red Fox Den Sites

Denning areas have: (1) large hollow logs (greater than 20inches diameter at the largest end), distributed individually or in piles; (2) access to underground burrows, such as via uplifted root masses where large trees have fallen; and (3) where possible, areas of talus, scree, or boulder slopes.

Willow Flycatcher Nesting Habitat

Running water, standing water (ppols), or saturated soils are present in the vicinity of willow clumps at least through late June.

Meadows have large clumps of riparian shrubs (usually willows) interspersed with open spaces. Average foliar density in the lower 6.5 feet of willow clumps is 50 to 75 percent.

At least 50 percent of the foliar density of shrubs is in the lower portions of the shrubs. Duff from the previous season's growth is available for nest material. Grasses, rushes and sedges dominate the ground cover.

Lower Westside Hardwood Ecosystems

A diversity of structural and seral conditions is present in landscapes in proportions that are ecologically sustainable at the watershed scale. Regeneration and recruitment of young hardwood trees is sufficient over time to replace mortality of older trees. Hardwood ecosystems are present in sufficient quality and quantity to provide important habitat elements for wildlife and native plant species.

Source: Sierra Nevada Forest Plan Amendment (USDA 2001)

North District Ecosystem Management Area Assessment of the Stanislaus Deer Herd and Habitat Improvement Opportunities—Mi- Wok Ranger District

Prepared by Tom Rickman, District Wildlife Biologist, September 1995

I. Introduction

The migratory Stanislaus mule deer herd occupies a range of approximately 650 square miles within Calaveras, Alpine and Tuolumne counties (Maddox 1984). Of these 650 square miles, approximately 485 square miles are located on public lands; most of the range of this herd is within the boundaries of the Stanislaus National Forest. Winter Range for this herd lies primarily between the North and South forks of the Stanislaus River, and includes portions of both the Calaveras and Mi-Wok Ranger Districts. Two areas identified in the Stanislaus National Forest's Land and Resource Management Plan (USDA 1991) as being critical winter habitat for the Stanislaus herd are located on the Mi-Wok Ranger District in an area identified as the "North District Ecosystem Management" area. This North District area is approximately 51,500 acres in size, and is located between the Middle and South forks of the Stanislaus River, stretching east from the confluence of these two forks to the joint boundary of the Mi-Wok and Summit Ranger Districts. Within the North District area the Mi-Wok Ranger District has proposed a landscape level, ecosystem based management scheme to include prescribed fires, habitat and riparian improvements and other projects designed to restore or improve forest and ecosystem health. As part of this process, several public meetings were held, during which the health and management of the Stanislaus deer herd was raised as a primary public interest issue. This assessment is a result of those meetings, and is intended to assess the current condition of the herd and to identify management opportunities available to improve the overall health of the herd.

II. Description of the Stanislaus Deer Herd

The Stanislaus herd is comprised of deer classified as a California mule deer (*Odocoileus hemionus californicus*) (Maddox 1984). The deer are migratory, wintering at lower elevations, generally below 4,500 feet, and summering at higher elevations, generally above 6,500 feet. Deer east of the Sierra crest are classified as Rock Mountain mule deer (*Odocoileus hemionus hemionus*). During the summer some of the deer form either side of the crest will mix, as was evidenced in 1982 when 3 of 10 deer captured and radio-collared in the Dardanelles area migrated east over the crest. However little interbreeding occurs because the deer usually separate and begin migration before the breeding season occurs. Additional mixing of individuals from different herds located west of the crest occurs during the summer, when portions of summer range are shared by the Stanislaus herd and individuals from the Railroad flat herd to the north and the Tuolumne herd to the south. Also, non-migratory, resident deer will form mixed herds in the lower elevation wintering areas used by migratory deer.

A current telemetry study on the migratory patterns of the Stanislaus herd has shown that summer range for individuals which winter within the North District Ecosystem Management area extends north to the northern portion of the Carson-Iceberg wilderness and south to the Cherry Lake area, a straight line distance of approximately 40 miles. The longest migration yet tracked by this study occurred in the summer of 1994, when one of 20 telemtried does ventured over the Sierra crest and onto the Toiyabe National Forest, a straight-line distance of over 35 miles from her winter range. Migratory routes are generally the shortest and easiest routes of travel between winter and summer ranges, and appears to be learned (Bertram and Rempel 1977). Individual deer use the same migration corridors, holding areas and seasonal ranges year after year. Fidelity to these areas and corridors is very strong, as evidenced in Northern California, where migratory deer following historic routes continued to swim up to a mile in crossing Trinity Reservoir, even though doing so in severe winters may have lead to substantial mortality (Loft et al 1984). This fidelity to learned migratory routes is emphasized by Bertram (1976), who suggests that if a migratory corridor or holding area deteriorates or is lost, the portion of a deer herd using those sites will gradually decline or disappear rather than shift to a new area.

Movements from winter to summer ranges generally begin in late April or early May, however weather influences can advance migration into early April, or delay migration until late May or even the first of June (Bertram and Rempel 1977). In the 1985 telemetry study, 11 of 17 collared deer on the Stanislaus had begun to move upslope form their winter range on April 30; all had been located on the winter range during the previous check on April 16, 1985. On May 14, 1985, three deer remained within the winter range; all had moved upslope by May 21. The first deer to arrive on their summer ranges in the Dardanelles area arrived between May 6 and May 14; the last deer to reach the summer range arrived on June 10. In 1994, one of 21 telemetried deer began to move upslope from winter range on March 28, and all of the 21 deer had moved off their winter range by May 9th. These deer arrived on their summer ranges by mid-June. The above dates indicate that Stanislaus deer spend 3-6 weeks in migration from winter to summer ranges. Duration of spring migration in the North Kings herd lasted up to 7 weeks (Bertram and Rempel 1977).

Holding areas, which are sites in which deer delay during migrations, are used during both spring and fall migrations. Spring holding areas are generally located on south or west facing slopes at the base of a steeper ridge or mountain slope, above which slopes are often abrupt and plants are at earlier growing stages. There may be two or three holding areas along the spring migratory route. Deer may spend from one to three weeks, and up to 40 days, within the lower elevation spring holding areas, and up to 10 days in the higher areas (Bertram and Rempel 1977), before reaching their fawning areas. Fawning takes place on the summer range, beginning in June and continuing into August. The peak two weeks of fawn drop for the North Kings herd (Salwasser and Holl 1979) occurred between June 14 and June 30, with 60% of the fawns being born in this period.

Migration from summer to winter ranges is triggered by fall and early winter storms. Deer will begin to move into the higher fall holding areas with the first storms of October, and may be pushed through these areas during severe weather (Bertram and Rempel 1977). Deer may spend up to a month in these upper holding areas if there is a lack of severe storms. Deer will use two or possibly more fall holding areas during fall migrations. Fall holding areas are generally located where deer can descend rapidly if severe weather occurs, and are characterized by dense cover and the presence of preferred shrubs and oaks. Duration of fall migration is influenced by severity of weather, but can last up to six weeks (Bertram and Rempel 1977). Arrival dates onto winter range are advanced or delayed depending on weather, but most deer are on winter ranges by the end of November.

The breeding season or rut for the Jawbone herd (Bischoff 1957) begins in November, appears to peak in mid or late December, and tapers off in January. In the North Kings herd (Salwasser and Holl 1979), the average breeding date over a 5-year period was December 1; 75% of all breeding took place within 8 days of that date. For the Railroad Flat deer herd, located in the north part of the Stanislaus National Forest, the average breeding date was the second and third week of December, when over 50% of the breeding took place (Browning et al 1973). Gestation period for does is about 204 days.

III. Status of the Stanislaus Herd

As described by Maddox (1984), the Stanislaus deer herd likely experienced low population levels during the mid and late 1800s and the early 1900s due to the effects of the gold rush and associated market hunting. Market hunting, severe winters and other factors kept numbers low until the early 1890s. Beginning in the 1890s several factors occurred which lead to improved habitat conditions and higher populations. The Stanislaus National Forest was established in 1897, after which previously uncontrolled grazing and logging began to be regulated. Also, enforceable game laws were adopted in the early 1900s. These actions resulted in improved deer habitat and a rebound in numbers; this increase in herd size lasted through the 1940s. Since the 1950s, the population of the Stanislaus herd has gradually declined, due largely to habitat related factors (Maddox 1984).

Composition counts have been conducted on the Stanislaus herd since 1963 and have been conducted annually since 1982. These counts, conducted during the fall and spring of each year, assess the ratio of bucks, do and fawn within the herd, and assess over winter fawn survival. These ratios are used to indicate fawn production and recruitment into a herd. A summary of the counts conducted on the Stanislaus herd is given below in Table 1.

The Stanislaus Deer Herd Management Plan (Maddox 1984), sets a goal of maintaining a post-hunting season buck population of 20-30 bucks per 100 does. As indicated by data obtained from composition counts, this goal is being met (Table 1). However, the Plan also sets a spring fawn: doe ratio of 50 fawns per 100 does. The figures in Table 1 show fawn recruitment into the Stanislaus herd to be well below this desired level. A spring fawn: doe ratio of 50 has been met in only one year, 1963-1964.

The low ratio of fawns per doe indicates high levels of fawn mortality. The degree of mortality experienced by fawns between fawn drop and arrival on winter range can be estimated. The average rate of fawn production per 100 does has been estimated to be 150 for the North Kings herd (Salwasser et al 1978), and this and this same figure has been used as a statewide average (Longhurst et al 1976). During the 1990s, the average proportion of Stanislaus herd fawns per 100 does that survived to reach winter range, as indicated by fall composition counts, has been 38, and the average number of fawns to survive into the spring has been 24 per 100 does. Assuming the rate of production of 150 fawns per 100 does is valid for the Stanislaus herd, the above figures would indicate that from 1990-1994, 75% of the annual production of fawns died during the winters. Therefore, recruitment of fawns into the herd during the 1990s has averaged only 16% of the fawns produced. Longhurst et al (1976) estimated that spring fawn counts of healthy herds should be over 60% of production, to give a ratio of 90-100 fawns per 100 does. A study plan for a fawn survival study within the Granite Fire (Anonymous 1974) estimated that approximately 30% of fawns produced must survive throughout the winter to replace natural losses. A survival of over 30% (or more than 45 fawns per 100 does) would be necessary to result in an increase. The last time the Stanislaus herd approached a spring ratio of 45 fawns per 100 does was in 1980 (Table H-1). This information is graphically displayed in Figure 1. Low fawn recruitment was identified in the Management Plan (Maddox 1984) as probably the single most significant factor limiting the population of the Stanislaus herd, a conclusion supported by the above figures.

Table H-1. Results of herd composition counts of the Stanislaus deer herd, 1963 to 1994.

Year	Fall Count of Bucks and Fawns/100 Does		Spring Count of Fawns/100 Does	% Fawn Survival	# Deer Samples Fall/Spring
	Bucks	Fawns			
63/64	32	82	70	85	107/156
69/70	31	63	35	56	169/120
79/80	30	56	43	77	119/149
82/83	31	27	31	115	162/184
83/84	30	38	36	95	136/230
84/85	21	46	31	67	170/145
85/86	27	37	29	78	337/226
86/87	20	44	24	54	209/196
87/88	24	33	30	91	156/205
88/89	38	36	22	62	179/170
89/90	19	37	27	73	176/208
90/91	23	45	25	56	287/264
91/92	28	39	30	77	154/207
92/93	25	42	28	67	60*/297
93/94	30	25	13	52	145/208

* Count incomplete due to early snows

Figure H-1. Number of fawns per 100 does counted during spring composition counts for the Stanislaus Deer Herd.

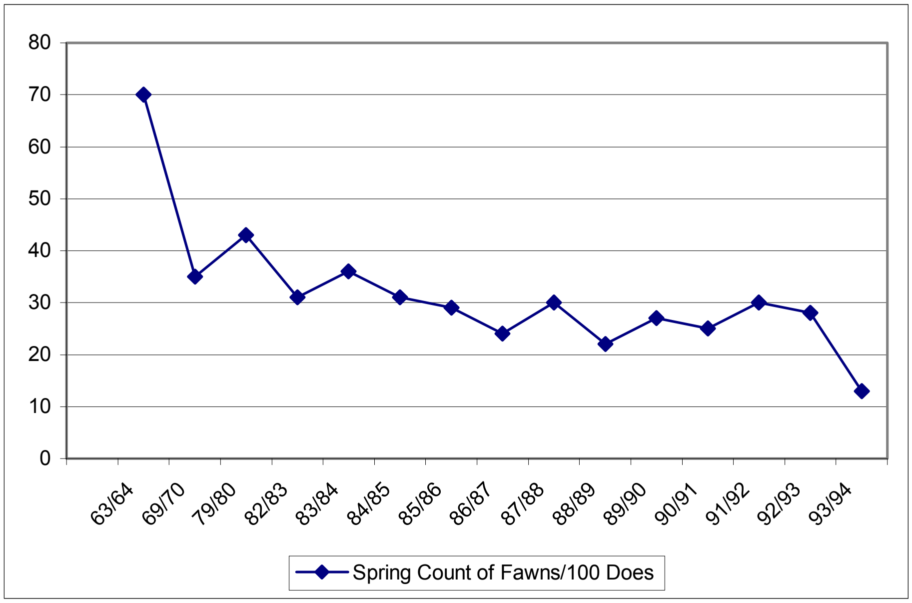

Table H-2 below shows how information from the Stanislaus herd compares with information from the two other migratory herds on the Stanislaus National Forest, the Yosemite and Tuolumne herds. A general downward trend is apparent within each of these three herds.

Table H-2. Summary of spring fawn counts per decade for the Stanislaus (STA), Tuolumne (TUO) and Yosemite (YOS) herds. Figures in parentheses within columns are combined averages for all three herds for the decade.

Years	Herd	Counts Taken Years/Decade	Fall Fawns: 100 Does (Average)	Spring Fawns: 100 Does (Average)	% Winter Survival (Average)
1950-1960	TUO	7	74	61	84
	YOS	0	-	-	-
	STA	0	-	-	-
1961-1970	TUO	10	48	40	80
	YOS	4	53 (58)	34 (42)	63 (71)
	STA	2	72	52	70
1971-1980	TUO	10	46	39	87
	YOS	10	43 (48)	42 (41)	99 (88)
	STA	1	56	43	77
1981-1990	TUO	10	37	28	74
	YOS	10	40 (38)	32 (30)	77 (77)
	STA	8	37	29	79
1991-1994	TUO	4	39	29	73
	YOS	4	41 (39)	33 (29)	80 (72)
	STA	4	38	24	63

The apparent declines in each of these three herds matches a declining trend which has been observed in many of the migratory deer herds on the west slope of the Sierras (Bertram and Rempel 1977; Salwasser et al 1978; Holl et al 1979), and which was predicted in 1952 (Longhurst et al). Mule deer herds have also declined in the other western states (Longhurst et al 1976). The primary reasons given for the declines in deer herds of the Sierra is a general maturing trend of the vegetation within the range of these herds, drought, and permanent loss of habitat due to human development.

Direct mortality factors likely have greater affects on adult deer on winter ranges than on summer ranges, because many deer are concentrated into smaller areas during winter, are at higher densities, and environmental stresses are greatest during the winter periods. This is evidenced by deer, which have died during a current telemetry study on the Stanislaus herd. Of 17 radio-collared adult does, which were found dead during the course of this study, 12 (71%) occurred on winter range habitats. Also, only 1 of 6 radio-collared deer found dead during a telemetry study from 1982-1985 occurred on summer range. Ultimate causes of death in each study included predation, poaching, disease, and highway mortality during migration and unknown causes. Factors influencing mortality of deer within the Stanislaus herd are discussed below.

Nutrition

As vegetation has matured due to lack of fires or other disturbances, the quality and quantity of forage available to the deer has been reduced. As indicated by numerous studies, the resulting inadequacy of nutrition is especially significant to does during gestation and the early fawning period. The timing and amount of precipitation during the year is also a factor in influencing forage and cover availability and fawn survival.

Timing and the amount of precipitation, and the resultant effects on vegetation, influence deer throughout the year. Quality of forage lies on late summer and fall ranges may influence the number of ova and fetuses produced by does entering the breeding season. Severe winters restrict deer to critical wintering areas, which limits available forage and causes a reduction in the nutritional condition of the deer. Severe winters may cause does to reabsorb ova and fetuses, and predation pressures also increase in severe winters since deer are concentrated in small areas and are less able to avoid and escape predators. Mild winters allow deer to range wildly on winter range, which reduces pressure on important browse plants within critical ranges, and allows greater accessibility of forage and reduces predation pressure. Mild winters also allow higher over-winter fawn survival and allow deer to enter spring migrations in good condition. Winters with a lot of precipitation will lead to an abundance of vegetation during the summer, improving fawning cover and leading to improved deer health going into the next winter. In such winters availability of forbs and grasses along spring migration routes may also be enhanced, better sustaining the condition of does during this critical period. Fall rains promote early green-up of winter ranges, allowing deer to supplement their diet with nutritious grasses and forbs. Winters of low precipitation may result in a reduction of spring and summer plant growth, reducing ability of does to maintain condition during late gestation, reducing quality of forage during lactation, and reducing fawning cover which may lead to increased vulnerability of fawns to predators. Leader growth on winter range shrubs may also be limited, reducing available forage during the fall and winter. Correlation's between weather, vegetation and deer condition, predation and mortality has been indicated in many studies (Browning et al 1973, Longhurst et al 1976, Salwasser et al 1978, Holl et al 1979, and others).

In Arizona (Smith and LeCount 1976), fawn survival was correlated with winter precipitation and forb production. During years of low precipitation and poor forage, does enter the fawning period in poor condition. While birth rates remain high, does and fawns in poor condition were more vulnerable to predation, and with low precipitation the amount of hiding and escape cover available for fawns would be decreased. Fawn survival increased with increasing precipitation and forb production.

Inadequate nutrition during gestation may lead to the production of stillborn fawns or weak fawns, which are highly vulnerable to predation (Salwasser 1974). During winter periods, the physical condition of deer drops as they deplete energy reserves acquired over the previous summer and fall. This deconditioning period on winter ranges may be especially harmful by forcing does to begin spring migration in a poor nutritional state. Herds on depleted winter ranges have been known to suffer severe fawn mortality at or shortly after birth (Julander et al 1961). Several studies have shown that nutritional deficiencies during late gestation can reduce milk production and fawn birth weights and can lead to an increase in neonatal mortality (Holl et al 1979). Since spring migration occurs at the beginning or the last trimester of pregnancy, it would seem reasonable to expect that those does leaving winter ranges in good condition would be more likely to successfully rear young than those which leave winter ranges in poor condition. Studies by Holl et al (1979) and Salwasser et al (1978) on the North Kings herd indicate a significant decline in doe condition in the last trimester of gestation, a period which coincides with spring migration. The studies strongly indicate that low fawn survival is a result of degradation of habitat within migratory corridors, holding areas and mid-elevation summer ranges. Loss of herbaceous forage and young browse plants, as well as losses of hiding and escape cover, has resulted in poor fawn survival. Studies (Holl 1975, Loft et al 1984) have indicated the importance of riparian areas and meadows for fawning cover. Poor forage conditions in fawning habitats was indicated within the Railroad Flat herd during 1970, when average fawn weights did not increase during a four month period from April to July (Browning et al 1973). Improving or reversing this trend towards decreasing nutrition and condition of Sierran deer herds, especially in those critical areas that deer inhabit during late gestation periods, is a crucial step in improving deer populations.

Predation

The major predatory species on deer are the mountain lion, black bear, coyote and bobcat. Of these, only lions, coyotes and bears are thought to have potential to constitute a limiting force on a herd (Salwasser et al 1978). Although they state that mountain lions individually take more deer than do coyotes, Longhurst et al (1976) ranked coyotes as the primary deer predator in California due to coyotes being more numerous than lions. Coyotes were determined to be the primary agent of death for fawns on Steens Mountain in Oregon (Trainer 1975). Use of deer by coyote peaks during the fawning period (Salwasser 1974, Browning et al 1973).

Levels of predation on deer are apparently to some degree related to precipitation. Smith and LeCount (1976) suggest that precipitation can influence predator-deer relations in Arizona. In years of poor forage resulting from low precipitation, alternative food items for coyotes and other predators are reduced, forcing them to prey more heavily on fawns. Knowlton (1976) indicates that a similar relationship, with fawn survival increasing with increased precipitation. He found that during winters of abundant precipitation, fawning (with a higher incidence of fawns due to good forage) can be advanced by 10 or more days, and in years of poor precipitation, fawning (with fewer instance of twins) can be delayed for the same number of days. An advancement of fawning dates and an increase in twinning during years of high precipitation results in a high proportion of fawning occurring while coyotes have plentiful berries and other foods to eat, and the high numbers of twins provides for an over-saturation of fawns at a time when coyotes can not take full advantage of them. A delay in fawn drop would mean that other food items available to coyotes would be reduced, and that coyotes would turn more to the fawns, which are fewer in number to begin with.

Mountain lions are principal predators of deer, especially of adults. Of 90 fawns radio-collared in a migratory deer herd in eastern Fresno County (Neal et al 1987), 43% were killed by predators, and of those killed and identified to predator, 47% were taken by lions. Also, of 23 does telemetried during Neal's study, lions killed 5. The area studied by Neal exhibited a high mountain lion: deer ratio, which was thought to be a result of high mountain lion densities (attributed to 14 years of legal protection) and a declining deer herd (attributed to habitat deficiencies). Neal concluded that although predation was not likely the cause of the observed decline in population that the deer herd suffered between the 1950s and 1970s, predation might represent a factor preventing recovery of the herd. That predators can dampen or prolong fluctuations in prey populations was also discussed by Hornocker (1970), who concluded that mountain lions were not limiting deer and elk populations in Idaho. Another indication that the declines in deer numbers were not caused by predation is that deer declines within the Western States began before restrictions were initiated on the taking of either coyotes or mountain lions (Longhurst et al 1976, Hornocker 1976).

Of the 17 adult deer, which have died during the current telemetry study on the Stanislaus, 16 were identified as to cause of death. Ten (62%) of the 16 were attributed to mountain lions, and 6 of these 10 occurred on winter habitat. Of the 3 deer which died during the 1982-1985 study were identified to cause of death, all three were attributed to lions. Although Maddox (1984) indicates that mountain lions were thought to be increasing within the range of the Stanislaus herd, he also mentions that higher than normal losses to predation may be a reflection of poor habitat conditions, and not necessarily an increase in predator numbers.

Similarly, Salwasser et al (1978) studied fawn production and survival in the North Kings deer herd and concluded that although predators [coyotes] may be the principal agent of death for most fawns, "…the impact of predation on the herd has been enhanced ultimately by the more basic ecological factors related to habitat quality." They further concluded that a maturing trend in plant communities, especially on spring an early summer habitats, and the resulting decline in the deer's nutritional status was the ultimate cause of the herd's decline. The relationship between habitat quality and predation was discussed by Hornocker (1976), who stated "When a prey population is lowered drastically by whatever factor, then any depressing factor gains more importance. In this situation, predator control may help, but usually doesn't solve the problem."

Development, Disturbance, Poaching

A factor that may exacerbate the impacts of poor nutrition of wintering deer is disturbance. Roads serve to decrease the effectiveness of deer habitat and can reduce the amount of land used by the deer (Thomas et al 1979). Vehicular and other forms of disturbance of deer, and resulting stress and displacement of deer from their normal range, would likely increase the deer's energy requirements (Livezey 1991). Since deer on winter habitats may be going through a deconditioning phase due to weather and forage-related stresses, additional stress caused by disturbance may serve to further the deconditioning. Also, limitations of forage availability on winter ranges could reduce a deer's ability to compensate for energy expenditures caused by disturbance (Freddy et al, 1986), and may decrease spring fawning success. Deer additionally stressed by disturbance could become more vulnerable to predation due to a worsening condition or by being forced to alter daily activity patterns. Another mortality factor for the Stanislaus herd are road kills. Major migratory routes cross Highway 108, and although actual deer mortality in these areas is unknown, observations indicate mortality to be high. Road mortality may also reach significant levels on some of the more heavily traveled roads within the winter range.

Poaching was second only to predation as a cause of death to telemetried deer within the Stanislaus herd, being attributed to 3 of the 16 deer (19%) which died and could be identified to cause of death. All of the deaths attributed to poaching occurred on winter habitat, and represent 25% of those deaths recorded during the winter periods. Although records have not been maintained on the relative frequency of poaching in winter area of the Stanislaus herd compared to other areas, it is known to be an ongoing problem in the area, and poaching was one of the main concerns expressed by landowners and others during the North District Ecosystem Management planning process and public meetings. The high road and trail densities within the winter range for this herd likely contribute to high poaching pressure by providing many sources of access, and by limiting the amount of non-roaded habitat into which deer can take refuge. Maddox (1984) stated that losses from poaching and subsistence hunting are likely high on the winter range due to the accessibility of the area and the increase in the number of homes within or adjacent to the range.

Another factor influencing the decline of herds has been the loss of habitat to human developments. Maddox (1984) estimated that within the winter range of the Stanislaus deer herd, 3,006 acres were lost to development from 1968-1983. This is about 3% of the estimated 165 square mile winter range for this herd. The influence of these developments ripples outside of the developments due to increases in road mortalities, impediments to habitual travel routes, mortality and confinement caused by deer-proof fencing, harassment and mortalities caused by dogs, poaching, etc. The effects of development have also been discussed for the Railroad Flat herd (Browning et al, 1973), and have been implicated by Salwasser and Rempel (1977) as a factor in the decline of the North Kings herd.

Disease

A recent factor having an affect the Stanislaus herd is a virus that has caused mortality to both adult and young deer. In 1993 and 1994, over 200 deer that had died form this virus were reported to the local Fish and Game biologist. There is some indication that the mortality began at a lower level in 1992. The mortality has largely been confined to summer ranges, with peak die-off in August and September, which is the time fawns are being weaned. Mortalities attributed to the virus have been detected in the Stanislaus, Tuolumne and resident herds. This virus has likely existed in the herd at low background levels previous to this outbreak, but may have become a significant mortality factor now due to other stress factors that caused the deer to be more vulnerable to its effects, such as the prolonged drought or deficiencies of habitat. To what extent a possible decrease in nutritional state among the deer, and especially fawns, may contribute to the lethalness of this disease is unknown.

IV. Habitat Assessment and Management Opportunities

The 1984 Stanislaus Deer Herd Management Plan (Maddox 1984) set a goal to improve habitat conditions so as to maintain a population of 7,000 deer within the Stanislaus herd. The plan also assessed the habitat limitations that exist within the range of the herd. A limiting factor identified on the summer range is “lack of suitable soils on which to create additional usable range.” Much of the summer range is typified by bare granite or shallow soils that limit management options designed to improve or create foraging habitat. In intermediate and winter ranges, the Plan identified fire suppression as the cause of a decline in overall habitat quality. Other factors within the winter range that were identified as having a negative effect on the deer include competition with livestock for available forage, and the effects of urban developments including the permanent loss of habitat, disturbance and poaching.

Corrective measures the Management Plan suggests in order to improve deer habitat include: support of prescribed fires on National Forest lands; management of oak stands so as to maintain adequate mast production; implementation of timber, fire and grazing practices so as to optimize deer habitat improvement opportunities; maximization of habitat suitability through the use of roadside screening and road closures, and the consideration of deer and deer habitat when planning management activities.

Since the 1984 herd management plan indicated low fawn recruitment to be the primary factor limiting recovery of the herd, an indication supported by data obtained form composition counts, management activities should be directed at fawn recruitment. Reasons for the low fawn recruitment are likely numerous and interrelated, however, the primary factor is likely the general decline in forage quality on summer, winter and transitional ranges and the resulting drop in nutrition and condition of the deer, especially among does during gestation. Other contributory factors include higher than desired road and trail densities, road mortality, predation and drought.

Because the North District Ecosystem Management planning process generated this assessment, the main focus here will be on management opportunities within the winter range of the Stanislaus herd, contained within the North District area. Opportunities exist within this winter range for habitat improvements that could improve forage conditions and lessen disturbance and poaching. Although predation may be a significant mortality factor within the herd, opportunities to reduce or control predator populations are limited, especially given the current protection of mountain lions. Also, although the fact that predators kill deer is well known, the effect of that predation within the Stanislaus herd is unknown, therefore attempts at predator control as means of increasing deer numbers would be premature at this time. Improving those habitats that are relied upon by the deer during key periods of the year could likely reduce losses to predators. Overall improvements of the habitat would not only improve the ability of the deer to avoid predators, but would also serve to increase deer production and recruitment.

A. Opportunities to Improve Forage Condition

The primary reason give for the observed declines in deer herds on the west slope of the Sierras has been a gradual maturing trend in the vegetation, which in turn has reduced the quantity and quality of forage for deer (Bertram and Rempel 1977; Salwasser et al 1978; Holl et al 1979). Acres by decade that have burned by wildfires within the 51,500-acre North District Ecosystem Management area are given below in Table 3. As shown relatively little (29%) of the area ahs experienced fire this century, and indication that availability and quality of forage has decreased throughout the winter range.

Table H-3. Acres burned by wildfires within the 51,500-acre North District Management area. Does not include acres burned by prescribed fire.

Decade	Acres Burned
1910	3,580
1920	666
1930	2,698
1940	3,349
1950	723
1960	324
1970	887
1980	74
1990	3,876
Total	16,177

Opportunities exist to rejuvenate decadent shrub fields and other areas so as to provide younger, more nutritious and available forage. Prescribed burning may be the best, most efficient and cost effective method for doing so in many areas. Within the North District region, 10 areas within the herd's winter range have been tentatively identified for potential prescribed fires, and an additional area was selected for prescribed fire immediately east of the North District boundaries, in an area which may have potential to improve as a spring holding area. In addition, controlled burns within the winter range of the Stanislaus herd have been conducted in 1986 (200 acres), 1992 (850 acres), 1993 (2,500 acres) and 1994 (2,500 acres). The ten areas tentatively identified as future prescribed fire sites range in size from 700-4000 acres, and average about 2000 acres; all are designed to improve habitat for deer and other species which prefer early seral stages.

These burns would be implemented in the fall of the year so as to burn and open up old, decadent shrub fields and encourage the sprouting of preferred shrub and forb species, as well as to remove encroaching shrubs and trees from annual grasslands and meadows. Preferred browse species native to the lower elevations of the Western Sierras respond to fires by either basal sprouting or germination from seed that often requires heat scarification for improved germination. Some shrubs respond by both methods. Of six common shrub species in the North District area, one (buckbrush) responds to a fire by germination from seeds. Two other species (birchleaf mountain mahogany and bear clover) respond almost wholly by sprouting, while three species (manzanitas, chamise and deerbrush) respond both by sprouting and germination from seeds. The burns will result in a greater interspersion of small openings grown to grasses and forbs, which provide highly nutritious forage during early winter and spring green-up periods.

These areas selected for prescribed fires were identified based on which areas were known to be important to wintering deer or where observed numbers of wintering deer have declined. Implementation dates of the burns would be set to allow several years of recovery within one burn area before another is conducted nearby. Burns also will be spaced as to build upon and extend improved habitat conditions that result from wildfires, such as the 1992 Ruby Fire, which burned 3,876 acres in the upper elevations of the herd's winter range. This fire resulted in a proliferation of buckbrush and deerbrush sprouts, as well as new bear clover growth, all of which have been heavily utilized by deer during the winters since the burn.

Other opportunities to improve habitat include thinning of overstocked stands and plantations to allow an increase in understory herbaceous and shrub cover, as well as the interplanting of species such as black oak and buckbrush within such stands or in other areas.

Recommendations

1) Continue to identify opportunities and funding sources to support an effective program of prescribed fire within the winter range of the Stanislaus herd. Pursue the implementation of controlled burns on the 10 sites that have been identified as the prime locations for such burns.
2) Conduct site preparation and other management activities within the winter range so as to maintain or improve existing forage conditions. This is especially important within the borders of those natural fires that result in an increase in desired forage species.
3) Identify stands that could be silviculturally altered to improve their value for deer and other species. This would include opportunities to thin conifers away from oaks in those stands in which oaks are being shaded out, to interplant oaks and/or preferred shrubs in stands or areas in which they have been removed or are deficient, and to thin plantations. Due to the loss of mature oaks within the North District and other areas of the forest as a result of wildfires, oaks within the North District should be managed at levels above the minimums established by the Forest LMP.
4) Initiate a native seed program so fire control lines and other activities can be reseeded to native grasses, forbs and shrubs.
5) Investigate existing distribution of available water sources within the winter range. Where appropriate, create small impoundments or other water sources distribution of water.

B. Opportunities to Reduce Human Disturbance and Poaching

As mentioned in a previous section of this report, poachers were responsible for 3 of 12 (25%) deaths of telemetried does within the winter range of the Stanislaus herd. Poaching was the second most significant source of direct mortality to telemetried deer. That poaching is a significant mortality factor on the winter range is also evidenced by the concern expressed by landowners in the area who attended the public meeting dealing with the North District Ecosystem Management area. Many of those present spoke of routinely observing or hearing evidence of poaching in the area, which can be accessed by an extensive network of roads and trails. The winter range for the Stanislaus herd is accessible year round from the Italian Bar/South Fork road, which is county maintained and open year-round for use and access by private landowners. From this year-round road, extensive networks of secondary roads are available to four-wheel drives and other Off-Highway Vehicles (OHVs). There are approximately 220 miles of system and non-system roads within the 80 square mile North District area, an average of 1.5 miles of road per square mile. This road density is much greater than this average in some key areas. For instance, within the LMP-designated critical deer winter area at Deer Creek, approximately 27miles of system and non-system roads exist, an average of about 5 miles of roads and trails per square mile of habitat. These figures do not fully include the miles of OHV trails that also exist in the area. Within the second LMP-designated critical deer winter area, located south of the Middle Fork Stanislaus, there is also about 27 miles of system and non-system roads, for an average of about 3.5 miles per square mile. The upper level for desired densities for roads and trails combined is generally about 2 miles per square mile of habitat.

Due to problems with road maintenance resulting from wet-weather travel, and also in response to concerns over the amount of poaching and disturbance to wintering deer, some roads within the winter range have had traffic-control gates installed which are closed during the winter. However, even in the areas in which traffic-control gates have been installed, OHV trails, other roads or both exist which compromise the effectiveness of these closures by allowing access behind the gates. Such access continues the disturbance which the gates were intended to reduce, and also allows some access by poachers. Therefore, to fully reduce the disturbance and to control poaching pressures, these trails would need to be closed or reduced in density during the period the deer are concentrated on their winter ranges.

Recommendations

1) Support road maintenance proposals to gate roads that in turn provide benefits to the herd. Such roads would be those that enter key deer areas and/or those that may be commonly used by poachers. Some roads that have been tentatively identified for gate installation include 3NO1Y, 3N12, 3N58, 3N11, 4N01Y and 4N75. Seasonal closure of these roads would also reduce road maintenance cost resulting from wet weather travel.
2) As a method to improve deer condition, especially now when forage availability and condition may be limited due to decades of fire suppression, continue the wet season closure of trails within the North District, especially within the two critical deer winter areas, the Deer Creek area and the Schaeffer Meadow/Forebay area. Doing so would serve to decrease poaching pressures and. By decreasing overall disturbance to the deer, may improve or help maintain condition of does in the latter stages of gestation, which would in turn improve fawning success. Also, such a seasonal restriction would increase the effectiveness of existing road closures by preventing use of the OHV trail network to gain access behind the closure.
3) Continue the current management program practice of maintaining roadside screening on existing roads, so as to decrease visibility and vulnerability of deer adjacent to the roads.
4) During the planning of new road construction or road reconstruction, assess and mitigate the potential impact the resulting roads would have on wintering deer.

If implemented, improvements the above recommendations might have on deer production and fawn recruitment could be monitored through the annual composition counts conducted by state personnel. Certain recommendations may be amended when desired fawn recruitment and herd population levels are met; the need to continue or amend such recommendations could be reassessed at that time.

V. Summary

During the planning process for the North District Ecosystem Management area, landowners and others expressed concern over the condition and health of the Stanislaus deer herd. This herd, like others on the west slope of the Sierra Nevada, has experienced a decline in population since the 1960s. The ultimate reason for this decline is likely a reduction in forage quantity and quality, due to a general maturing trend in the vegetation within the range of the herd. Other interrelated factors that may be limiting recovery of the herd or exacerbating the effects of poor habitat are predation, prolonged drought, poaching and disturbance. Fawn recruitment from 1990-1994 has averaged approximately 16% of fawn production. Opportunities to improve deer habitat within the winter range of this herd include habitat manipulation to improve forage quality and road vehicle controls to reduce access and poaching.

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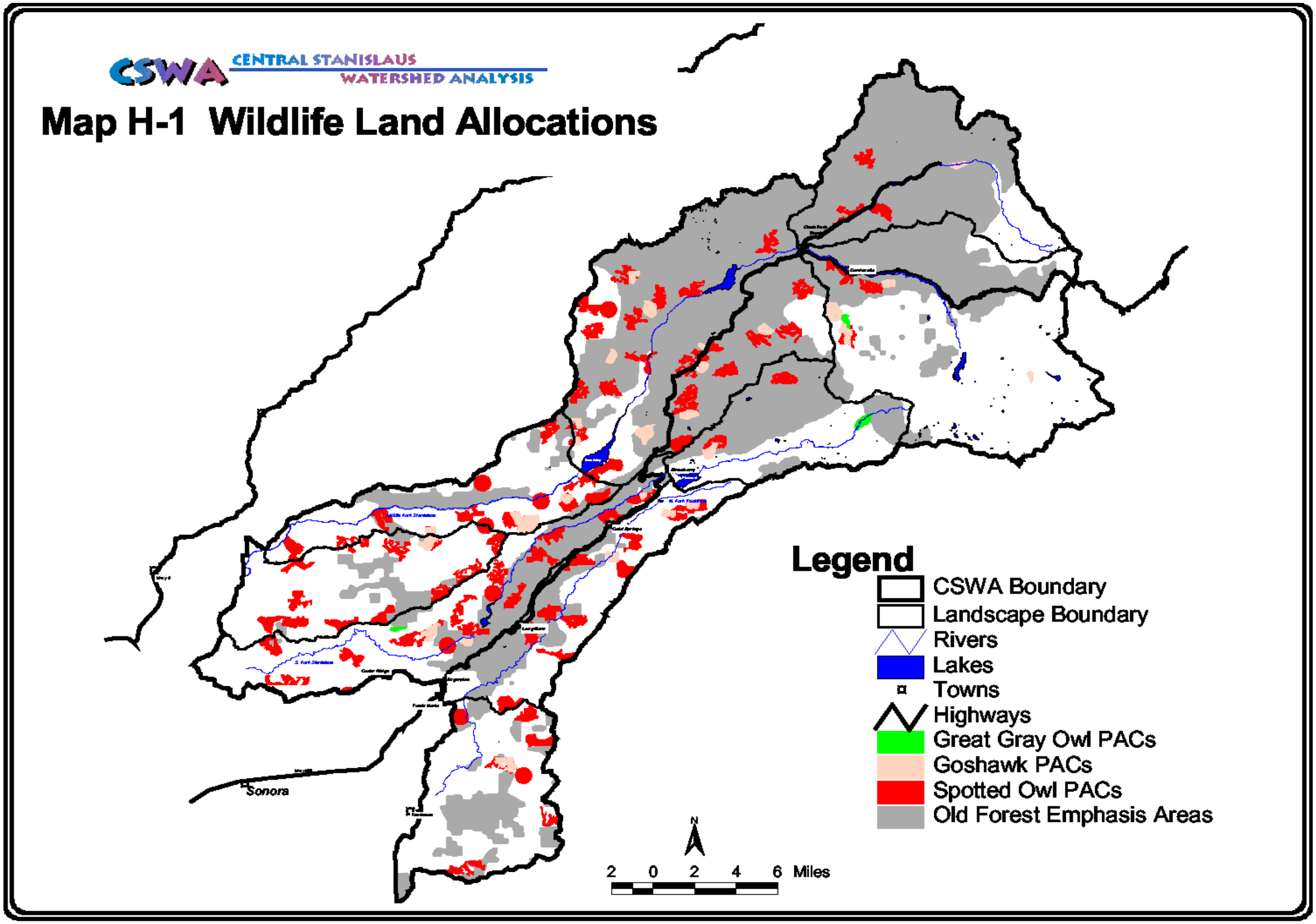

CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map H-1 Wildlife Land Allocations
Sonora
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Great Gray Owl PACs
Goshawk PACs
Spotted Owl PACs
Old Forest Emphasis Areas
N
2 0 2 4 6 Miles

Appendix I: Watershed Data

Table I-1: Road Densities for Landscape Areas and Sub-watersheds

Landscape Name	Sub-watershed Name	Landscape Area		Sub-watershed		Road Length (Miles)	Road Density (Mi/Sq.Mi.)
		Acres	Sq.Mi.	Acres	Sq.Mi.		
Beardsley-Donnells	Brushy Hollow			2.74	1,754	11.41	4.2
Beardsley-Donnells	Campoodle Creek			8.13	5,204	31.98	3.9
Beardsley-Donnells	Cascade Creek			7.12	4,554	24.48	3.4
Beardsley-Donnells	Cow Creek			9.13	5,843	54.5	6.0
Beardsley-Donnells	Dardanelle Creek			5.55	3,553	0.50	0.1
Beardsley-Donnells	Drew Creek			2.32	1,484	1.08	0.5
Beardsley-Donnells	Lily Creek			1.45	926	5.93	4.1
Beardsley-Donnells	Lion Creek			3.13	2,006	6.26	2.0
Beardsley-Donnells	McCormick Creek			5.07	3,244	1.22	0.2
Beardsley-Donnells	Mid Mid Fk Stanislaus			35.26	22,566	92.13	2.6
Beardsley-Donnells	Mill Creek			11.98	7,666	31.49	2.6
Beardsley-Donnells	Niagara Creek			12.87	8,240	50.04	3.9
Beardsley-Donnells	Shoofly Creek			10.22	6,538	37.71	3.7
Beardsley-Donnells	Wheats Meadow Creek			6.43	4,112	0	0.0
Beardsley-Donnells		121.39	77,691			348.73	2.9
Clark Fork	Arnot Creek			14.61	9,349	0.07	0.0
Clark Fork	Disaster Creek			7.94	5,084	0.04	0.0
Clark Fork	Low Clark Fork			20.45	13,091	18.02	0.9
Clark Fork	Up Clark Fork			25.34	16,219	0.10	0.0
Clark Fork		68.35	43,743			18.23	0.3
Dodge Ridge	Up No Fk.Tuolumne			40.52	25,935	125.10	3.1
Dodge Ridge	Wrights Creek			5.95	3,807	41.44	7.0
Dodge Ridge		46.47	29,742			166.54	3.6
Duckwall	Basin Creek			13.96	8,934	56.39	4.0
Duckwall	Duckwall Creek			6.81	4,357	24.74	3.6
Duckwall	Hunter Creek			14.93	9,558	59.62	4.0
Duckwall	Low No Fk Tuolumne			17.14	10,968	39.84	2.3
Duckwall		52.84	33,816			180.59	3.4
Lyons	Deer Creek			8.68	5,557	35.37	4.1
Lyons	Five Mile Creek			5.64	3,607	18.61	3.3
Lyons	Low So Fk Stanislaus			25.61	16,393	82.66	3.2
Lyons	Mid. So Fk Stanislaus			22.84	14,617	111.60	4.9
Lyons		62.77	40,174			248.24	4.0
Pinecrest	Herring Creek			17.25	11,039	45.76	2.7
Pinecrest	Up So Fk Stanislaus			27.04	17,307	18.22	0.7
Pinecrest		44.29018	28,346			63.98	1.4
Rose Creek	Eagle Creek			8.74	5,594	48.20	5.5
Rose Creek	Knight Creek			11.35	7,266	30.34	2.7
Rose Creek	Rose Creek			22.26	14,249	74.15	3.3
Rose Creek	Stanislaus River			6.30	4,034	16.41	2.6
Rose Creek		48.65975	31,142			169.1	3.5
Sand Bar	Chinaman Creek			3.15	2,014	12.3	3.9
Sand Bar	Dry Meadow Creek			4.82	3,084	21.35	4.4
Sand Bar	Low Mid Fk Stanislaus			36.53	23,376	86.12	2.4
Sand Bar	Sourgrass Creek			1.62	1,038	6.07	3.7
Sand Bar		46.11378	29,513			125.84	2.7
Sonora Pass	Deadman Creek			16.40	10,498	9.41	0.6
Sonora Pass	Eagle Creek			19.29	12,344	22.06	1.1
Sonora Pass	Kennedy Creek			20.94	13,404	0.09	0.0
Sonora Pass	Summit Creek			24.96	15,972	5.31	0.2
Sonora Pass	Up Mid Fk Stanislaus			35.70	22,848	41.59	1.2

Landscape Name	Sub-watershed Name	Landscape Area		Sub-watershed		Road Length (Miles)	Road Density (Mi/Sq.Mi.)
		Acres	Sq.Mi.	Acres	Sq.Mi.		
Sonora Pass		117.2918	75,067			78.46	0.7

Table I-2: Road-Stream Crossings for Landscape Areas and Sub-watersheds

Landscape Name	Sub-watershed Name	Stream Miles	Road/Stream Crossings	Crossings/Mile
Beardsley-Donnells	Brushy Hollow	15.13	41	2.71
Beardsley-Donnells	Campoodle Creek	51.13	131	2.56
Beardsley-Donnells	Cascade Creek	55.90	97	1.74
Beardsley-Donnells	Cow Creek	53.37	199	3.73
Beardsley-Donnells	Dardanelle Creek	52.75	0	0.00
Beardsley-Donnells	Drew Creek	20.38	3	0.15
Beardsley-Donnells	Lily Creek	10.87	28	2.58
Beardsley-Donnells	Lion Creek	18.64	19	1.02
Beardsley-Donnells	McCormick Creek	46.73	6	0.13
Beardsley-Donnells	Mid Mid Fk. Stanislaus	270.54	430	1.59
Beardsley-Donnells	Mill Creek	115.20	166	1.44
Beardsley-Donnells	Niagara Creek	102.38	169	1.65
Beardsley-Donnells	Shoofly Creek	57.84	138	2.39
Beardsley-Donnells	Wheats Meadow Creek	49.45	0	0.00
Beardsley-Donnells		920.31	1,427	1.55
Clark Fork	Arnot Creek	195.05	1	0.01
Clark Fork	Disaster Creek	91.65	1	0.01
Clark Fork	Low Clark Fork	183.57	65	0.35
Clark Fork	Up Clark Fork	250.03	0	0.00
Clark Fork		720.3	67	0.09
Dodge Ridge	Up No Fk Tuolumne	295.59	801	2.71
Dodge Ridge	Wrights Creek	43.69	219	5.01
Dodge Ridge		339.28	1,020	3.01
Duckwall	Basin Creek	136.79	431	3.15
Duckwall	Duckwall Creek	54.27	117	2.16
Duckwall	Hunter Creek	133.29	245	1.84
Duckwall	Low No Fk Tuolumne	175.04	180	1.03
Duckwall		499.39	973	1.95
Lyons	Deer Creek	103.10	245	2.38
Lyons	Five Mile Creek	79.08	122	1.54
Lyons	Low So Fk Stanislaus	327.70	559	1.71
Lyons	Mid So Fk Stanislaus	173.36	509	2.94
Lyons		683.24	1,435	2.10
Pinecrest	Herring Creek	164.13	270	1.65
Pinecrest	Up So Fk Stanislaus	357.87	55	0.15
Pinecrest		522.00	325	0.62
Rose Creek	Eagle Creek	110.87	195	1.76
Rose Creek	Knight Creek	152.55	220	1.44
Rose Creek	Rose Creek	255.00	498	1.95
Rose Creek	Stanislaus River	89.08	134	1.50
Rose Creek		607.5	1,047	1.72
Sand Bar	Chinaman Creek	19.15	57	2.98
Sand Bar	Dry Meadow Creek	24.79	75	3.03
Sand Bar	Low Mid Fk Stanislaus	276.84	319	1.15
Sand Bar	Sourgrass Creek	9.60	26	2.71
Sand Bar		330.38	477	1.44
Sonora Pass	Deadman Creek	92.18	40	0.43
Sonora Pass	Eagle Creek	122.15	57	0.47

Landscape Name	Sub-watershed Name	Stream Miles	Road/Stream Crossings	Crossings/Mile
Sonora Pass	Kennedy Creek	123.33	0	0.00
Sonora Pass	Summit Creek	176.97	7	0.04
Sonora Pass	Up Mid Fk Stanislaus	233.55	129	0.55
Sonora Pass		748.18	233	0.31

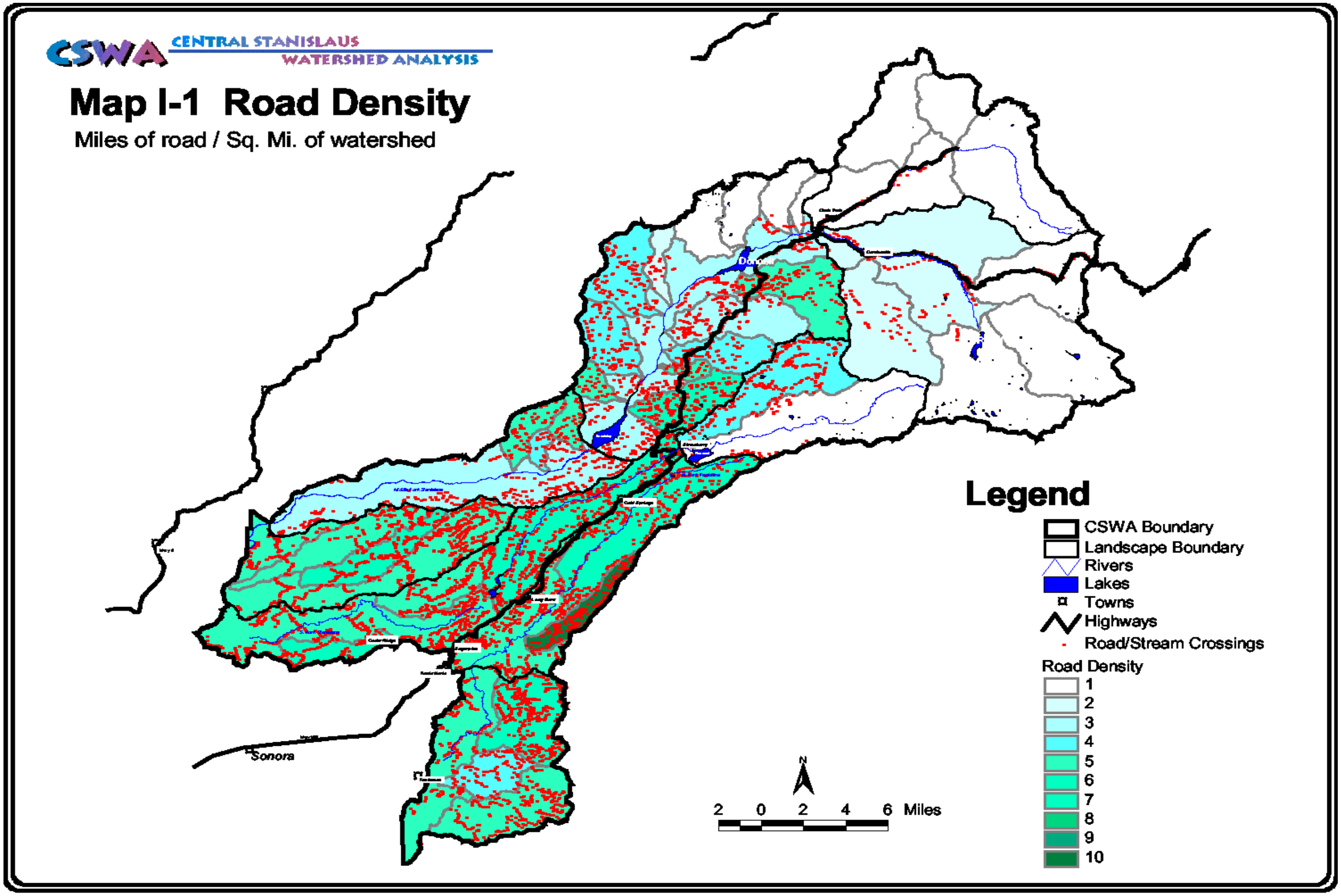
Table I-3: Principal Candidate Stream Channel Restoration Locations

Landscape	Stream	Stream Reach
Beardsley-Donnell	Cow Creek	Bull Run
Beardsley-Donnell	McCormick Creek	McCormick Meadow
Beardsley-Donnell	Mid Fk Stanislaus	Montgomery Meadow
Beardsley-Donnell	Niagara	Barn Meadow
Beardsley-Donnell	Niagara	Below 5N04 crossing
Beardsley-Donnell	Shoofly	Shoofly @ 6N05
Beardsley-Donnell	Wheats Meadow Creek	Wheats Meadow-Clover
Clark Fork	Arnot Creek	Lower Arnot Creek
Clark Fork	Boulder Creek	Coyote Meadow
Clark Fork	Clark Fork	Clark Fork @ Clark Fork bridge-Sand Flat
Clark Fork	Clark Fork	Clark Fork Meadow
Clark Fork	Clark Fork	Cottonwood Picnic
Clark Fork	Clark Fork	Eltringham
Clark Fork	Clark Fork	Porcipine
Clark Fork	Disaster Creek	Adams-Lower
Clark Fork	Disaster Creek	Adams-Upper
Clark Fork	Disaster Creek	Paradise-North
Clark Fork	Disaster Creek	Paradise-South
Dodge Ridge	No Fk Tuolumne	"Pinecrest" Meadows
Dodge Ridge	No Fk Tuolumne	Brownes Meadow (PVT)
Dodge Ridge	Sugarpine Creek	Saints Rest
Dodge Ridge	Unnamed	Faust Cabin Meadow
Dodge Ridge	Wrights Creek	Wrights Creek Meadow
Duckwall	Duckwall	Murphies Ranch (PVT)
Lyons	So Fk Stanislaus	Above Rushing Meadow (PVT)
Lyons	So Fk Stanislaus	Fraser Flat
Pinecrest	So Fk Stanislaus	Horse and Cow Meadow
Pinecrest	Herring Creek	Hammill Canyon Meadow
Pinecrest	Herring Creek	Herring Creek Reservoir
Pinecrest	So Fk Stanislaus	Big Basin
Pinecrest	So Fk Stanislaus	Cooper Meadow Lower
Pinecrest	So Fk Stanislaus	Cooper Meadow Upper
Pinecrest	So Fk Stanislaus	Cooper Pocket
Pinecrest	So Fk Stanislaus	Hay Meadow
Pinecrest	So Fk Stanislaus	Old Lake Eleanor
Pinecrest	So Fk Stanislaus	Whitesides Meadow
Pinecrest	Deer Creek	Deer Creek Flat
Pinecrest	Unnamed	Fiddlers Green
Pinecrest	Willow Creek	Bluf Meadow
Pinecrest	Willow Creek	Castle Meadow
Pinecrest	Willow Creek	Herring Creek Reservoir
Pinecrest	Willow Creek	Three Meadows
Pinecrest	Willow Creek	Willow Meadow
Rose Creek	Deer Creek	Valley above County Rd

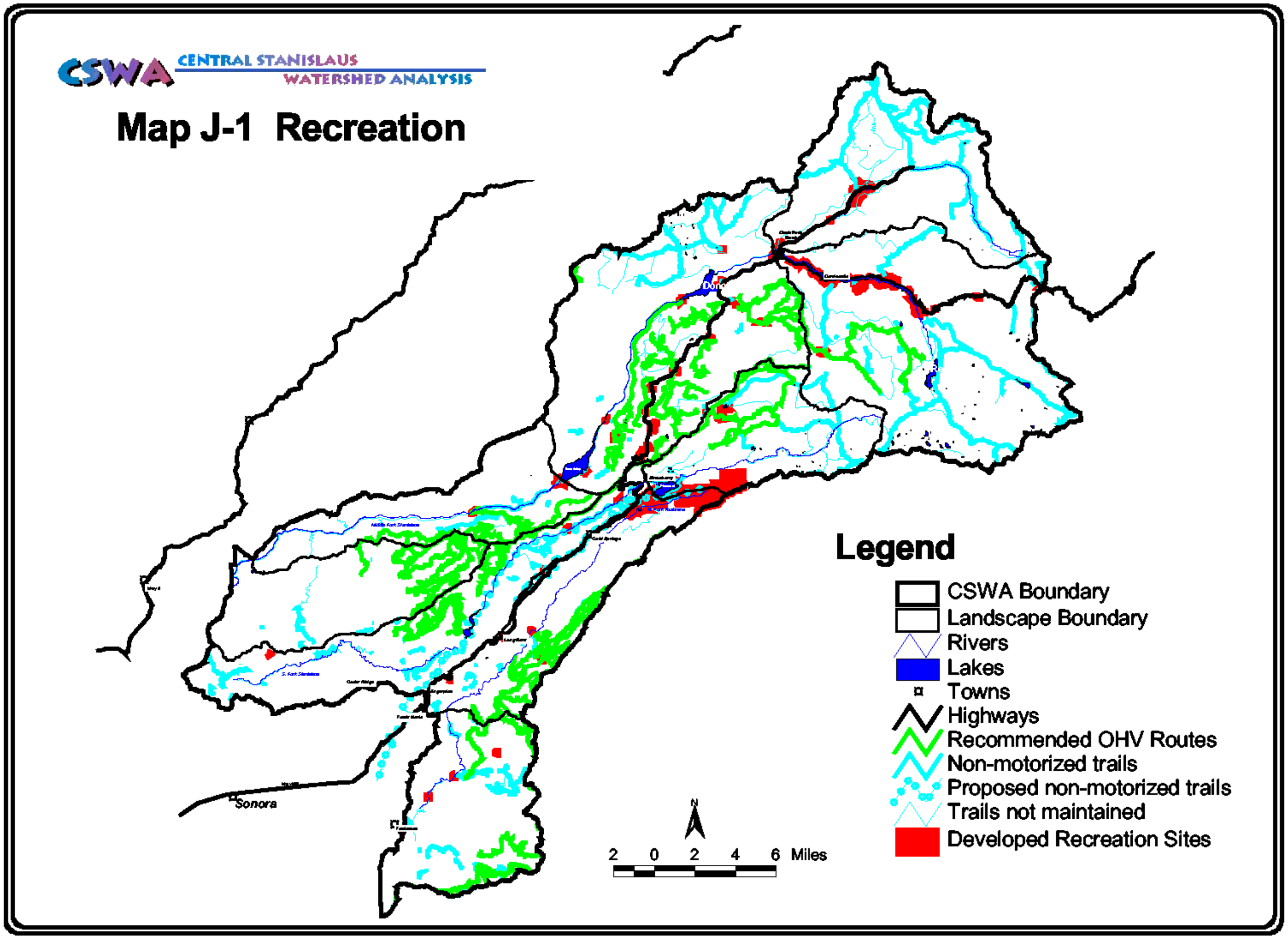
Landscape	Stream	Stream Reach
Rose Creek	Rose Creek	"Rose Bowl"
Sand Bar	Unnamed	Spring Gap Penstock Bypass
Sonora Pass	Deadman Creek	Sonora Pass Meadows
Sonora Pass	Eagle Creek	Eagle Meadow
Sonora Pass	Eagle Creek	Lower Eagle Meadow
Sonora Pass	Eagle Creek	Red Rock
Sonora Pass	Eagle Creek	Sardine
Sonora Pass	Kennedy Creek	Kennedy Creek
Sonora Pass	Mid Fk Stanislaus	Kennedy Meadow (PVT)
Sonora Pass	Mid Fk Stanislaus	Deadman CG to Brightman Flat
Sonora Pass	Summit Creek	Lower Relief
Sonora Pass	Summit Creek	Upper Relief

Table I-4: Water Quality Monitoring Candidate Locations

Landscape	Location	Concerns	Affector
Beardsley-Donnell	MFK Stanislaus River	Temperature regulating amphibian breeding/rearing	Hydropower
Dodge Ridge	NFK Tuolumne River – Dodge Ridge to 3N01	Wastewater effluent and other pollutants from concentrated development.	Recreation
Duckwall	Hunter Creek	Hexazinone persistence	Reforestation
Lyons	SFK Stanislaus River – below Lyons Reservoir	Increased temperature due to very low flow releases.	Hydropower
Lyons	SFK Stanislaus River – below Lyons Reservoir	Turbidity	Dredging
Pinecrest	Herring Creek Reservoir	Nutrients, turbidity	Recreation/Grazing
Pinecrest	Powell Lake	Acid Neutralizing Capacity	Ambient Air Quality
Rose Creek	Rose Creek	Hexazinone Persistence	Reforestation
Rose Creek	Rose Creek	Turbidity	Dredging
Sandbar	MFK Stanislaus River	Temperature regulating amphibian breeding/rearing	Hydropower
Sonora Pass	Kennedy Creek	Nutrients, bacteria	Grazing


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map I-1 Road Density
Miles of road / Sq. Mi. of watershed
Sonora
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Road/Stream Crossings
Road Density
1
2
3
4
5
6
7
8
9
10
N
2 0 2 4 6 Miles

Appendix J: Recreation Map


CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map J-1 Recreation
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Recommended OHV Routes
Non-motorized trails
Proposed non-motorized trails
Trails not maintained
Developed Recreation Sites
N
2 0 2 4 6 Miles
Sonora

Appendix K: GIS Data Dictionary

Introduction

All GIS data for the Central Stanislaus Watershed Analysis (CSWA) is in UTM projection, Zone 10, Units Meters, Datum NAD27, and is clipped to the CSWA area. Most data sets were either clipped from the Stanislaus National Forest GIS database, or collected and digitized from the 1:24,000 scale USGS topographic quad base.

The data listed below is found in the GIS library at: /fsfiles/ref/library/gis/Stanislaus/projectdatasets/cswat.

NOTE: GIS data for CSWA analysis was created in during FY 2000 and FY2001. All GIS data in the library are dynamic and subject to change over time. When using GIS data for further analysis, please note that the data in this directory is a snapshot in time, and you may be better off using the latest data sets available in the library at: /fsfiles/ref/library/gis/...

Questions, call Joyce Mousseau, Stanislaus National Forest, 532-3671 x444.

Data Sets

eui.shp	Ecosystem Unit Inventory (EUI) map authored by Alex Janicki, Soil Scientist, Allen Gallegos, Geologist, Katie Phillips, Ecologist and Jan Rea, Fire/Fuels Specialist, January through September, 2000.
devrec.shp	Developed recreation sites clipped from forest database April 2001.
euilanownveg	Overlay of EUI map, with landscapes, ownership and 1997 vegetation layer used for analysis. Also used to delineate **Potential Natural Vegetation** categories for map in the document.
goshawkpac_0101clip	Goshawk PACs delineated by Adam Rich, Summit RD wildlife biologist, January 2001.
greatgraypac_0101clip	Great gray owl PACs delineated by Adam Rich, Summit RD wildlife biologist, January 2001.

landscapes.shp	Landscape analysis boundaries agreed on by CSWA team, combining logical management watersheds into analysis units.
ofe_framework.shp	Old Forest land allocations delinated by the Sierra Nevada Framework EIS, January 2001.
ohv_0301.shp	Recommended OHV routes coordinated with Steve Bailey, Summit RD, and March 2001.
pnv	See euilanownveg.
roadx	Built node table from roads_all, added column to id road intersections.
roastrbufwat	Union of roads, 200 ft buffered streams, and watersheds, to report miles of road per square mile of 200 ft. stream buffer, by watershed.
roastrx	In ArcEdit, selected arcs from strx and put into roax this combined node attribute tables that were quierried to determine points where roads crossed the streams.
roawat	Updated the road layer with watershed information to determine miles of road / watershed.
soil_deep.shp	Selected set of order 3 soil survey map units including, 116, 117, 120, 121, 197, 191, and 192, 200. Soils in these units are deep, coarse textured, non-cohesive granitic soils. Deep gullies can result from inside ditch erosion or Gerle & Wintoner soils, particularly within the rain-on-snow zone of 4500–6500 feet elevation. Alex Janicki, Soil Scientist.
soil_highclay.shp	Selected set of order 3 soil survey map units including, 155, 156, 136, 137, 130, 126, 127, 132, 156, 161, 182, 188, 189, 190. Soils in these mapping units are native surface roads with low “R” values. Soils are easily rutted and once rutted they concentrate water & form gulleys. Alex Janicki, Soil Scientist.

soil_granitic.shp	Selected set of order 3 soil survey map units including, 109, 120, 121, 126, 127, 128, 129, 130, 131, 132, 134, 135, 139, 140, 145, 146, 171, 172, 182, 197, 198, 199. Woils in these mapping units are granitic with high erosion potential (k-factor .28 or greater). Alex Janicki, Soil Scientist.
spopacveg.shp	Spotted Owl PACs delineated by Andy Aldrich, MiWok Ranger District Forester, in cooperation with Laura Conway, Fisheries Biologist & Adam Rich, Wildlife Biologist, using Sierra Nevada Framework EIS (January, 2001) criteria and aerial photographs. PAC updated this data using 1997 vegetation data polygons in order to determine strata data.
strbufwat.shp	Updated stream 200' buffer with watersheds.
strmain.shp	Selected mainstream channels for each watershed from streams_all layer and exported to shapefile. Converted to grid, used to determine ave. mainstream elevations by watershed.
strx	Built node table from streams_ephem, added column to id stream intersections.
trails_all.shp	All non-motorized trails, column in database *type*, indicates trail type, i.e. primary, secondary, no data (no data indicates trail is no longer being maintained), coordinated with Reggie Bowdler, Trails Coordinater, April, 2001.
trails_proposed.shp	Proposed trail development coordinated with Reggie Bowdler, Trails Coordinator, Summit RD.
urban_new_clipped	**DRAFT** urban intermix zones identified by Jan Rea & Gary Cones April 2001.
watersheds	Management watersheds inside CSWA boundary.
watstr	Updated streams_ephem theme with watersheds to determine miles of streams/watershed.
weedpolyclip.shp & weedpointclip.shp	Noxious weed locations delineated by Denise VanKeuren, Range Coordinator, April 2001.

Appendix L: Reference Variability for Soil Productivity

Desired Condition #15: There are five environmental indicators for soil desired condition #15. There is a natural range or reference condition for each indicator.

Soil Porosity—The reference condition for soil porosity is highly similar to the native, undisturbed soil. Forest topsoils typically have a soil density of less than 1 gram per cubic centimeter (62 lbs per cubic foot). The desired condition however, allows for a limited degree of soil compaction over a limited area.

Large Downed Woody Material—Large Downed Woody Material (LWM) is defined as downed logs greater than 20 inches in diameter. The reference condition for LWM in natural stands (includes size class 3 and 4) ranges from 0 to over 40 tons per acre. The amount of downed wood varies by Ecological type: Ponderosa pine ranges from 0-2 tons/acre; Mixed conifer-pine is about 3-11 tons/acre; Mixed conifer-fir is about 7-18 tons/acre; Upper mixed conifer (White Fir-Sugar Pine-Red Fir and Red Fir-White Fir plant associations) ranges from 20 to 30 tons per acre; and the Red Fir plant association averages 40 tons per acre (Potter, 1998; Harmon et al. 1987; Blonski and Schramel 1981).

The following, using the best existing information, recommends desired ranges of LWM within vegetation zones, as influenced by aspect and pre-fire suppression fire return interval. Values are based on work done by Bill Rose, Fire and Fuels, Ashland Ranger District, Rogue River National Forest (Rose 1994). Rose's work is cited here because the environmental factors he was working with are similar to those found in the Sierras. Values are in tons per acre:

Ponderosa pine	0.1 to 0.9 on south aspects; 0.6 to 1.5 on north aspects
Mixed conifer-pine	0.9 to 2.1 on south aspects; 1.5 to 3 on north aspects
Mixed conifer-fir	2.1 to 3.6 on south aspects; 3 to 4.8 on north aspects
Red fir	3 to 6 tons per acre

Surface Fine Organic Matter—Surface fine organic matter consists of (1) forest duff, litter, and (2) small woody material up to 3 inches diameter. The reference condition for forest duff and litter (needles and decomposed organic matter) is typically 10-30 tons per acre for natural stands represented in the photo series; the reference condition for small woody material (0 to 3 inch diameter) is typically 2-7 tons per acre (Blonski and Schramel 1981).

Topsoil Organic Matter—The amount of topsoil organic matter varies by soil type. The organic matter content for soil types found in the CSWA landscape ranges from 2 to 8 percent organic matter content (USDA 1995). The reference condition for a given soil type is always the undisturbed condition.

Evidence of Soil Organisms—The reference condition for this indicator is an undisturbed soil with natural soil structure (presence of granular or sub-angular blocky; absence of platy, massive, or clod structure), and presence of biopores, casts, and mychorrizae.

Desired Condition #16: The allowable rate of soil erosion is typically referenced to the rate of soil formation. The reference condition for the rate of soil formation in the Sierras is 2Mg per hectare per year, about 1 ton per acre per year (Powers et al. 1998). Natural erosion rates vary by Ecological Unit and disturbance regime. Natural erosion rates have not been determined by Ecological Unit, but can be estimated. Soil erosion after fires can vary from under 0.4 to 2.6 tons per acre in prescribed burns and 9 to over 49 ton per ac per year in wildfires (Robichaud et al. 2000). Areas within CSWA with high erosion potential are identified on Map L-1.

Surface Cover—Surface cover is an indirect indicator of soil erosion potential. Surface soil cover is typically very high for undisturbed forest soils. The photo series for quantifying natural forest residues gives a range of 70 to 100 percent surface cover of duff and litter in natural stands, size class 3 and 4 (Blonski and Schramel 1981).

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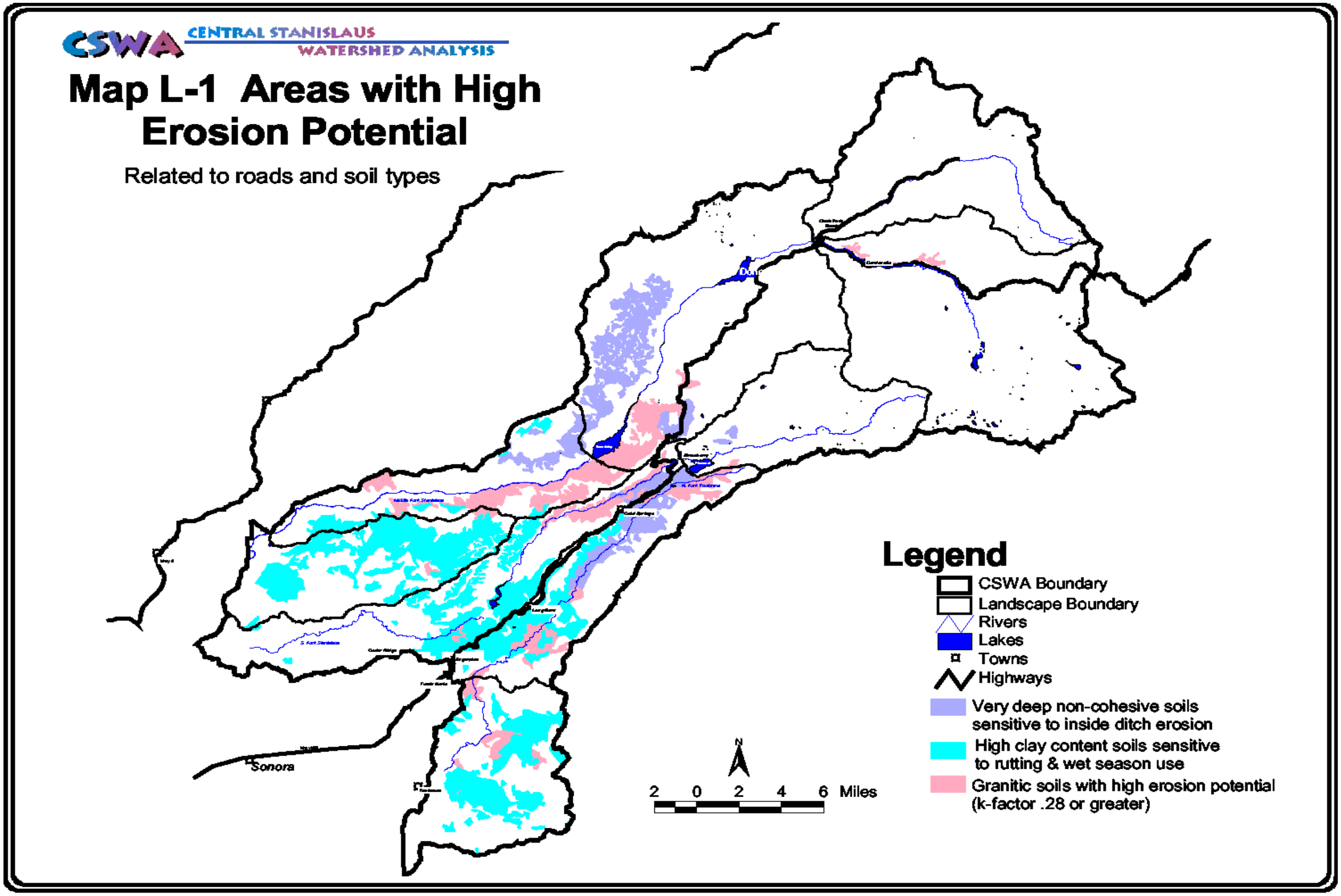
CSWA
CENTRAL STANISLAUS
WATERSHED ANALYSIS
Map L-1 Areas with High Erosion Potential
Related to roads and soil types
Sonora
Legend
CSWA Boundary
Landscape Boundary
Rivers
Lakes
Towns
Highways
Very deep non-cohesive soils sensitive to inside ditch erosion
High clay content soils sensitive to rutting & wet season use
Granitic soils with high erosion potential (k-factor .28 or greater)
N
2 0 2 4 6 Miles