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Executive Summary

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 al. 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.