Attachment 3.5 – Supporting Documents

Workplan

Project E – Sierra National Forest Fuels Reduction Project

Madera Region – IRWM Implementation Grant Application

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Attachment 3.5, Cedar Valley Environmental Assessment

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ENVIRONMENTAL ASSESSMENT

USDA Forest Service

Cedar Valley Project

Bass Lake Ranger District

Sierra National Forest

Madera County, California

I. INTRODUCTION

The Cedar Valley Project was initiated to address (1) fuel ladders and excessive ground fuels that pose potential for propagation and sustainability of a crown fire, (2) minimizing the effects of wildland fire in high risk (probability of ignition occurring), high hazard (availability of fuels to sustain a fire) wildland urban intermix area, (3) increasing the vigor and health of mixed conifer and pine stands and plantations, and (4) preventing and controlling noxious weeds. This environmental analysis (EA) is tiered to the Sierra National Forest Land and Resource Management Plan (LRMP) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) (USDA, 2004). As directed in the 2004 ROD, the Fresno River watershed was evaluated at a landscape scale and the Fresno River Landscape Analysis (USDA, 2005) was completed. The landscape analysis is incorporated by reference into this EA. The landscape analysis process provides baseline information on strategic placement of fuels treatments in relation to conservation of other natural resources, and is used to generate site-specific projects such as the Cedar Valley project, which then undergo NEPA analysis.

This assessment will reference specialist reports prepared in response to this proposal and listed at the end of this document. They are physically located and filed at the U.S. Forest Service office in North Fork, California.

II. PROPOSED ACTION

The Bass Lake Ranger District is proposing a series of comprehensive vegetation treatments within the area east of State Highway 41, surrounding the community of Cedar Valley, north and east of Sky Ranch Road and south of the Calvin Crest Church Camp and Nelder Grove Historical Area. These treatments will reduce density of trees and shrubs and increase stand health and vigor with pre-commercial thinning, commercial thinning, brush removal, site preparation and reforestation (see Preliminary Treatment Areas Map in Appendix, Maps Section, Map 1).

Stands would be treated with a technique known as thinning from below, where suppressed, intermediate, damaged, diseased, and codominant trees, in order of removal, would be harvested until the desired stocking level has been reached. The poorest quality trees are removed first, leaving silviculturally desirable trees in the stand. Thinning from below will retain the majority of the crown cover, generally the largest trees, and is designed to meet the guidelines in the Sierra National Forest LRMP as amended in 2004 . Many small, poorly crowned trees are removed during the operation. Some of the predicted results will include: acceleration of old forest or pre-European vegetation characteristics, improvement of stand health, and a reduction of the risk to wildfire loss. A complete description of the proposed action begins on page 4.

III. PURPOSE AND NEED

The Cedar Valley Project lies within the Fresno River watershed, where during the period before significant Euro-American influence, natural fires occurred frequently and were low intensity with return intervals ranging from 5 to 10 years (Fresno River LA, page 26). During the past century, fire history maps indicate that wildland fires have played a major role in the Cedar Valley and Nelder Grove area. Between 1909 and 1950 there were numerous large fires in and around the community of Cedar Valley. A 1,155 acre fire occurred in 1917 that encompassed the current subdivision of Cedar Valley. In the 1920's, the largest fire for this area occurred just south of the current Cedar Valley subdivision reaching 10,300 acres in size. Although there are no historical records of wildland fires reaching into the Nelder Grove Historical Area, fires could have easily threatened the grove of giant sequoias based on topographic features of the area and given the proper burning conditions.

The community of Cedar Valley lies in the southern portion of the project area. This project also affects inhabited areas along Sky Ranch Road, where there are numerous homes adjoining national forest lands. Most of these homes do not have sufficient clearance to protect them if a fast moving wildland fire were to move into the subdivision. Compounding this problem is limited access to the subdivision. The subdivision is lined with narrow, winding roads with only one road to access and exit it in the event of a wildfire.

North and east of Cedar Valley and Sky Ranch Road are steep brush covered slopes (>35%) and drainages (Nelder and California Creeks) with three active summer organizational camps situated on the ridges above them. Nelder Grove Historical Area of giant sequoias is also situated above these bordering the northern end of the project area. As with the Cedar Valley subdivision, these areas, with high concentrations of recreation visitors during the height of the summer season, evacuations during wildland fire events would be difficult if a fast moving fire started. Natural and/or human caused fires starting at the base of the slopes within or near Cedar Valley subdivision would have the greatest potential for threat to these areas.

Beginning to appear in the area are pockets of insect and drought induced mortality, within conifer plantations and mixed conifer stands. There are also scattered pockets of heavy dead and downed material accumulated as a result of fire exclusion and past harvesting operations.

The project area has a long history of past logging activities. Over the past 125 years several mills processed logs harvested from within the project boundaries. Railroad and ground-based logging activities over this period as well as stand replacing fires have resulted in little of the area with trees over 130 years of age. The natural stands proposed for thinning generally consist of approximately 90 to 110 year old shade tolerant trees. These stands, once more fire resistant ponderosa and sugar pine, have become dominated by less fire resistant fir and incense cedar.

The last century was unusually wet compared to prior centuries.[1] This wetter than normal period coupled with the exclusion of fire has set the stage for stands to become overcrowded with competing conifers, oaks and other vegetation. Wide swings in climatic conditions over the past thirty years have placed stress on many of these stands. Inter-tree competition, drought, rising temperatures, and insect attacks are beginning to take a toll on both plantation and wild stands. White pine blister rust has also been killing a number of sugar pine over the past ten to fifteen years. Dead and down fuel loadings have been on the rise. These conditions are not unique to the Cedar Valley area. Other examples can be found in the Lake Tahoe Basin, San Bernardino National Forest and in Arizona and New Mexico where entire stands of trees are dieing.

[1] Sierra Nevada Forest Plan Amendment, Record of Decision, 2004.

The Sierra National Forest LRMP (as amended in January 2004 by the SNFPA Record of Decision (ROD) identifies wildland urban intermix areas as places where human habitation is mixed with areas of flammable wildland vegetation. These intermix areas have the highest priority for treatment. The SNFPA ROD directs the application of silvicultural and fuel reduction treatments in plantations to accelerate development of old forest characteristics, increase stand heterogeneity, and reduce the risk of loss from wildland fires. The ROD further directs the national forest to set priorities for fire and fuels management activities to maintain and restore ecological sustainability by providing for a sustainable flow of uses, values products and services from the land. Additionally, the ROD directs the national forest to integrate fire and fuels management objectives with other resource management objectives and address the role of wildland fire in the ecosystem.

The Sierra National Forest LRMP identifies two related broad goals of the old forest and associated species conservation strategy, which are to: a) protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve species associated with these ecosystems while meeting people's need for commodities and outdoor recreation activities; b) increase the frequency of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape. A key element in this strategy includes: a proactive approach for improving stand health and vigor with management objectives to reduce susceptibility of forest stands to insect and drought related tree mortality by managing stand density levels. The forest-wide standard and guidelines state that "vegetation within treatment areas should be modified to meet desired surface and ladder, and crown fuel conditions as well as stand densities necessary for healthy forests during drought conditions".

The Cedar Valley Project objectives are to: (1) reduce fuel ladders and excessive ground fuels that pose a potential for the propagation and sustainability of a crown fire, (2) minimize the effects of wildland fire in high risk (probability of ignition occurring), high hazard (availability of fuels to sustain a fire) wildland urban intermix area, (3) increase the vigor and health of mixed conifer stands and plantations, and (4) prevent and control the spread of noxious weeds.

IV. DECISION TO BE MADE

The decision to be made is whether to implement the proposed action or take no action at this time. The deciding official may modify the proposed action as deemed necessary to better meet the purpose and need of the proposed action. The proposed action is consistent with the Sierra National Forest LRMP as amended.

V. PUBLIC INVOLVEMENT

The Project has been published in the Sierra National Forest Schedule of Proposed Actions every quarter since March 2005. On January 3, 2006, an article appeared in the Sierra Star newspaper describing the proposed action and requesting public input. A total of approximately 370 public scoping letters were sent to adjacent landowners within an approximate two mile radius of the proposed project area, interested parties and twelve Native American tribes/organizations in December 2005. Seventeen phone calls and/or letters were received responding to the proposal. Four issues were raised and are summarized below:

The Sierra Nevada Forest Protection Campaign: Concern regarding the impacts to the Pacific Fisher. The campaign requested that an Alternative be modeled after the 2001 Sierra Nevada Forest Plan Amendment FEIS and ROD to more cautiously protect habitat for Pacific Fisher and Spotted Owl. The 2004 ROD replaced the 2001 ROD in its entirety. Since this document is tiered to the 2004 FEIS and ROD, reanalyzing for the 2001 standards and guidelines for tree removal is outside of the scope of this analysis.

Susan and Robert Lewis: Interested to know if proposed actions would be conducted on private property and if so, could individual property owners prevent the actions on their property. The Federal government has no authority to conduct fuel reduction treatments on private lands, but encourages private property owners living in the wildland urban intermix areas to complete treatments on their property that will reduce the threat of wild land fires within the property. Thus this is outside of the scope of this analysis.

Evelyn Burnett: Interested in proposed actions effects on the walking trails within the project area. As part of the proposed action, these effects will be addressed.

James E. Bending III: Interested in the proposed action maintaining utilization of wood products to be removed by the proposed action in traditional and non-traditional markets. As part of the proposed action and project design, the utilization of wood products will be considered where it is economically feasible and accomplishment of the overall objectives can still be achieved.

The North Fork Rancheria was the only Native American group that responded to the scoping letters and requested consultation on the Cedar Valley Project. Consultation with the Tribal Council was conducted on July 13, 2005.

VI. ALTERNATIVES

PROPOSED ACTION-1: The Bass Lake Ranger District would commercially thin approximately 90 -110 year old mixed conifer and pine stands; remove fuel ladders, brush and slash concentrations, and reestablish the Granddad Fuelbreak near Cedar Valley/Calvin Crest/Nelder Grove in the wildland urban intermix (WUI) Zone (See Map 2 in Appendix). Except for some pitches to 50% in mastication areas, treatments would be undertaken on slopes generally less than 35%. Conifers between 8 and 30 inches DBH exceeding desired stocking levels would be removed during harvest operations.

Concentrations of harvest-generated thinning slash would be treated utilizing Brush Disposal (BD) or Knudsen-Vandenberg (KV) funds generated from harvest operations. Follow-up treatments would thin and/or remove excess smaller trees (less than 8" DBH), fuel ladders, and existing slash concentrations as KV or other funding become available. These concentrations will be treated by various means including, but not limited to, tractor and/or hand piling and burning, mastication, and/or under story burning. Follow-up treatments would be prioritized by strategic location and need to ensure that the most critical work is accomplished first.

Pockets of dead and dying trees (generally less than 2 acres in size) and failed plantations would be prepared for planting to conifer species by mastication or tractor piling and burning. Brush fields would be masticated or in some cases tractor piled and burned to reduce fuel ladders and fuel bed depth. A combination of ponderosa and blister rust resistant sugar pine would be planted and subsequently hand released from brush competition in site prepared areas.

In addition to the fuels treatments, noxious weed control will be conducted concurrently with the above actions. Infestations of klamathweed, bull thistle, yellow starthistle, and medusahead exist in the project area, mostly in sparsely scattered patterns where manual control is reasonable and effective. However the medusahead infestation at Sivels Meadow has expanded to an area of over an acre and will be treated with a combination of methods including prescribed fire. This area is shown as Treatment Unit WA between Units T1 and T2 (See Map 1in Appendix). The timing of burning is generally early summer, when other plants have finished fruiting, but medusahead seeds are still ripening. This generally occurs prior to the season of high fire danger, and burning will be done following all safety considerations.

To summarize, Cedar Valley Project proposes to:

*Apply silvicultural and fuel reduction treatments to accelerate development of old forest characteristics and maintain healthy plantations.
*Commercially thin, from below, approximately 90 -110 year old mixed conifer and pine stands to remove fuel ladders and reduce competition between remaining trees to maintain or improve forest health and vigor and to connect and augment fuel reduction treatments within the WUI.
*Mechanically treat brush and shrub patches and failed plantations to minimize wildland fire effects, tie treatment areas together, and reestablish conifers.
*Apply fuel reduction treatments to provide a buffer between developed areas and wildland.
*Reestablish the Granddad Fuelbreak near Cedar Valley/Calvin Crest/Nelder Grove through fuelbreak maintenance treatments.
* Treat the medusahead infestation at Sivels Meadow, avoiding archaeologically sensitive areas, in order to eventually eradicate the weeds, by prescribed burning.
* Hand-pull other noxious weeds, prior to project implementation, in order to minimize the likelihood of spread into recently treated forests (invasive weeds tend to spread opportunistically into freshly disturbed areas).

Proposed gross treatment acreage totals approximately *2680* acres and would:

- commercially thin mixed conifer and pine stands on approximately *1030* acres including portions of the fuelbreak;
- pre-commercially hand thin, remove fuel ladders, hand pile and burn on approximately *90* acres;
- pre-commercially thin/release plantations on approximately *160* acres;
- perform fuelbreak maintenance on approximately *110* acres;
- masticate brush fields and pre-commercially thin non-commercial size reproduction areas on approximately *730* acres;
- plant and hand release treated openings on approximately *100* acres;
- treat slash concentrations by a combination of tractor or hand piling and burning; mastication and/or under story burning.

(See Proposed and Follow-up Treatment Estimates Table in Appendix B for a further display of follow-up treatments)

The following design features are included in the proposed action:

Project design features for silvicultural treatments:

A limited operating period would be imposed in well stocked stands heavy to fir (over 50% fir) where operations could begin August 1st or later when the sap is not running (fir bark is much more easily dislodged when the sap is running than later in the year). The District Silviculturist will determine which stands require a LOP during the thinning layout phase. (See Appendix A for silvicultural recommendations.)

Project design features for heritage resource:

Procedures and standard protection measures from the *Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region, California State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Identification, Evaluation and Treatment of Historic Properties Managed by the National Forests of the Sierra Nevada, California* (the Sierran PA) will be utilized for the protection of Heritage Resources within the project area. The primary protection measure will be avoidance, but additional measures, such as directional felling and monitoring can be used to minimize potential effects.

Project design features for soil:

Standards and guidelines from both the Sierra National Forest LRMP/SNFPA (2004) for maintaining soil quality management objectives are:

a) Maintain 50% ground cover on slopes less then 35% and evaluation and recommendations by an interdisciplinary team on slopes greater then 50%. (S&G #130)

b) Maintain at least 90% of the soil porosity over 15% of an activity area found under natural conditions. (FSH 2509.18)

c) Maintain an adequate amount of large woody debris of at least 5 well distributed logs per acre. (FSH 2509.18)

d) Avoid mixing or removing soils below the A horizon, with the exception of roads, skid trails, fire lines and log landings. Avoid tractor logging on highly erodible soils, where sustained slopes exceed 35%, except where supported by on-the-ground ID team evaluation. (S&G #130)

e) In areas with high and very high erosion hazards provide for aggregate surfaces on road grades over 5% and considering aggregate surface on road grades below 5% for soil stabilization and drainage. This applies to roads located in the Holland family soils. (S&G #129)

Project design features for engineering:

a) Maintain all National Forest System roads to standards established in the Forest Service Handbook 7709.58. Perform road maintenance, reconstruction and new road construction activities to support project access needs. Insure drainage structures are functional and stable to prevent potential resource damage and degradation of water quality. (S&G #78, #79, #124, #206 and BMPs)

b) Perform a final field review of project roads to determine reconstruction needs prior to project activities. Where economically feasible, place aggregate on existing native surface roads located in areas with High and very High Soil Erosion Hazard ratings. (S&G #129)

c) Close temporary roads required for unit access upon completion of use.

d) Decommission approximately 0.8 miles of unclassified roads upon completion of project activities.

e) Road 6S70, will require a Limited Operating Period for restrictions to road reconstruction and haul activities based on Camp Redwood operations.

f) Road 6S58X, will require a Limited Operating Period for restrictions to road reconstruction and haul activities based on Camp Adahi operations.

Project design features for botanical resources:

a) Mountain lady's slipper orchid populations will be flagged for avoidance, and the locations will be shown as "controlled areas" in the timber sale contract map.

b) Project design features for aquatic species are relevant for protection of veined water lichen and its habitat.

c) As necessary, Rawson's flaming trumpet plants will be flagged for avoidance during water drafting at Gooseberry Flat (Nelder Creek).

d) Any plantings or seeding will conform to the Regional Native Plant Policy in the Forest Service Handbook (FSH 2509) and will be approved by the Forest Botanist.

e) The spur road paralleling Nelder Creek in treatment area T3 will be barricaded after project completion to prevent vehicle access. The barricade will be at the junction of 6S11A. This will protect riparian vegetation in general, and the mountain lady's slipper orchid in particular.

Project design features for prevention of spread of noxious weeds:

a) All heavy equipment used for implementing the project will be washed before arriving on site to remove soil and seeds of noxious weeds so that they are not transported into the project area.

b) A buffer will be flagged around the medusahead infestations in treatment areas T1, T2, and T18 to ensure that seeds and contaminated soil are not transported to new areas on equipment or vehicles.

c) Infestations of yellow starthistle, klamathweed and bull thistle will be handpulled prior to project implementation, and if necessary a small buffer zone will be flagged for avoidance to prevent heavy equipment from transporting seeds in the soil to other areas within the project boundary (see Noxious Weed Risk Assessment in project file).

d) Any plantings or straw used for erosion control will be approved by the Forest Botanist to minimize the likelihood of accidental introduction of noxious weeds.

Project design features for aquatic concern:

Because of the overlap and close proximity of Riparian Conservation Areas (RCA's) within the project area, the entire project area is being considered to be an RCA for the purposes of analysis.

a) Implement all applicable Best Management Practices (BMP's). Also implement the Best Management Practices Evaluation Program within project area to determine the implementation and effectiveness of BMP's. A list of applicable BMP's can be found in the Riparian Conservation Objectives specialist report.

b) Prior to project activities, Stream Condition Inventories will be conducted on Lewis, California and Nelder Creeks.

c) Report any discovery of uncommon herpfauna (reptiles, frogs or salamanders) during sale preparation or implementation to the District Fisheries Biologist.

d) Prior to project activities occurring, protocol surveys will be conducted on Lewis Creek for California red-legged frogs.

e) If federally threatened, endangered or proposed species are encountered, it shall be immediately reported to the US Fish and Wildlife Service and all ground disturbing work on the project will stop pending re-initiation of consultation. Only persons with valid permit authority may handle any listed species that may be found. If threatened, endangered or proposed species are found to occur within the project boundaries, then the Forest Service and/or US Fish and Wildlife Service may impose limited operating periods and/or additional project design measures.

f) If Forest Service sensitive species are found to occur within the project boundaries, then the Forest Service may impose limited operating periods and/or additional project design measures.

g) Implement erosion control measures to minimize sediment movement into any aquatic habitat, including, but not limited to, mulching, seeding, and slash packing of bare soil.

h) Where necessary, stable old temporary access roads and landings that are located within riparian areas may be used rather than constructing new temporary access outside of the riparian areas. Stability and appropriateness of use of these features will be determined by the District Fisheries Biologist and Hydrologist. These temporary access roads will be permanently closed following the project's completion.

i) Bank protection placed on creek channel banks shall be designed for erosion control by means of riparian function enhancement. Designs using native top soil and native riparian local stock are preferred (Bio-technology, logs, willow wattles, potted willows, "soft-tech" or low tech dirt terracing, etc.).

j) Any plantings for revegetation or habitat enhancement associated with the project will conform with the Region 5 Native Plant Policy as found in the Forest Service Handbook.

k) Screen water drafting intake hoses. A screen (no more than 1/8 inch mesh) shall be installed on the intake side that is not less than two feet by two feet (four square feet).

l) Design prescribed fire treatments to minimize disturbance of riparian vegetation

m) Retain at least 50% soil cover, well distributed, for erosion control during slash treatment or piling. If it is acceptable to Fuel Management, consider simply spreading slash over disturbed bare areas rather than piling it.

n) During operations, use directional falling to avoid damaging riparian habitat within RCAs. Fall trees out of, and away from large downed wood, springs, seeps, bogs, and any other wet areas or areas of saturated ground.

o) Limit ground disturbing activities within project area to less than 25%.

p) Mechanical equipment crossing of streams is not permitted unless reviewed and approved by Hydrologist or Fisheries Biologist. Designated crossings must be as perpendicular to the channel as possible. Stream banks must be repaired upon completion of the project.

q) Do not store and/or apply chemicals, including any type of pesticides or petroleum products, within 150 feet of intermittent streams and 300 feet of perennial streams and riparian habitat, including springs, seeps, bogs, and any other wet areas or areas of saturated ground. Storage of hazardous materials (including fuels) and servicing and refueling of equipment will be conducted at pre-designated locations. Additional protections measures, such as containment devices, may be necessary. In addition, a spill prevention containment and countermeasure plan must be prepared prior to implementation of project activities by the contractor.

r) A hydrologist, soil scientist, or fisheries biologist will review existing landings to insure that their location and use is consistent with riparian conservation objectives if located within 150 feet of intermittent streams or 300 feet of perennial streams.

Project design features for terrestrial wildlife:

Should surveys locate activity centers or active nests for California spotted owls or Northern goshawks, Limited Operating Periods (LOP's) will be applied within a ¼ mile radius of the activity center or nest. Should any den sites for the Pacific fisher be discovered, they will be protected by a 700-acre buffer of the best available habitat during established LOP. To mitigate potential disturbance effects to individual fishers and fisher reproduction, the fisher LOP will be implemented within suitable fisher habitat within the Southern Sierra Fisher Conservation Area (SSFCA). Should a great gray owl nest be located, nesting location will be protected by an LOP. LOP's will also apply to nests discovered during project implementation in un-surveyed areas. The district biologist will be notified when a nest or den of any TES or sensitive species is discovered within or adjacent to a treatment area. Consultation with District Wildlife Biologist will be made to determine LOP's for specific species.

For down woody material retention levels wood in the largest size classes and in decay classes 1, 2, and 3 should be used for down wood utilizing species. As well, this level should be maintained after follow-up treatments are completed (SNFPA ROD pg. 51). Typically 10-20 tons of down woody material per acre is acceptable from a fuel loading standpoint (D. Tolmie, personal communication, 5/4/06), and will retain sufficient material to provide for post-treatment habitat for down woody utilizing species, based on extrapolation of pre-European stand conditions.

For snag retention levels use snags larger than 15 inches dbh. Snags should be clumped and distributed irregularly across the treatment units. In the WUI areas, fewer snags can be strategically located in treatment areas and where possible snags and wildlife leave trees will be retained in untreated areas (such as riparian management zones), and clumped in areas not in proximity to structures, access routes, fuel breaks, or private property. Retention of some mid- and large diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure expected to be lost due to hazard removal, the effects of prescribed fire or follow-up treatments (SNFPA ROD pg. 51-52).

Within suitable Pacific fisher denning habitat within the Southern Sierra Fisher Conservation Area, the following design measures will apply:

1) Maintain highest canopy cover possible to still meet the prescription within the stand, stay above 40% but aim for 50-60% immediately post harvest.
2) Retain largest diameter trees (Thinning will not remove any trees larger than 30" dbh). Retain some large, live trees with cavity and platform creating defects (mistletoe, rot, broken limbs and tops) for future den and rest sites.
3) Retain largest snags and logs. Do not remove snags unless it is safety concern (Project does not propose to remove snags). Retain largest logs to maximum allowed by fuel loading standards for the stand in question.
4) Maintain habitat connectivity with riparian corridors wherever possible.
5) Remove unneeded roads in high quality fisher habitat.
6) Retain large oaks in conifer stands, but do not exceed 50% oak canopy cover in proportion to remaining conifers in mixed stands.

Project design features for lands, special uses and recreation:

There are numerous Land-type special-uses authorized under permit in the project area including water systems (spring developments, water lines and storage tanks), buried fiber optic and telephone lines, overhead electrical and cable television lines, roads, apiaries, and a California Department of Transportation maintenance yard.

a) To provide a measure of protection, permit holders will be responsible for identifying the location(s) of their authorized improvements and right-of-ways so they are clearly visible during project implementation. Holders shall identify their improvements by using a combination of flagging and surveyors stakes. Permit holders shall print their name and contact phone numbers on the flagging/stakes with indelible ink capable of lasting several years.

Recreation special-uses authorized under permit in the project area include Camp Adahi, and Camp Redwood. The two camps are principally occupied during summer months, although some use occurs at Camp Redwood in the late spring and early fall months.

b) A Limited Operating Period will be implemented for treatment units around these camps to minimize disturbance to holders and guests. This LOP could be implemented that limits the season, hours, or days of operations (including felling, mastication, hauling, etc) around the camps and will be determined in consultation with the Lands/Special Use Officer.

Recreation trails used by Calvin Crest, identified in the project folder, may have to be crossed with equipment to gain access to units.

c) All project-related equipment will cross at locations perpendicular to identified recreation trails.

d) All slash will be removed out of and away from trails with minimal disturbance to the trail. Activity fuels and slash should not be piled, or treated within 5-feet of trails.

e) Consultation with Special Uses, Recreation and Fuels Management prior to all project related treatments that affect camp trail systems; will be needed to insure interpretive qualities are maintained, where possible.

Project design features for fuels:

Utilization of prescribed fire and designation of areas need to take into consideration the following:

a). In treatment areas designated as mastication (See Map1 in Appendix), prescribed fire should first be considered where it is too steep and/or rocky for the masticator to work effectively, oak dominates the stand and/or as a maintenance treatment in areas where brush re-growth has not been slowed and have not been planted with conifers.

b). In treatment areas designated as commercial thin (See Map 1 in Appendix), prescribed fire should first be considered where there are larger residual trees (of a size less susceptible to fire damage) with light fuel loadings, areas not being thinned due to steepness, follow-up treatments have been completed or are not required, and/or areas where conifer reproduction is not being used for re-generation of openings.

c). Prescribed fire should be used during the late fall to early spring, to minimize negative effects to trees during active growing period and within Pacific fisher denning habitat areas.

NO ACTION-2: No action would be taken at this time to reduce fuels or improve health and vigor of stands in this area. The following is a description of the existing condition.

Conifer stands in the eastern portions of the Cedar Valley project area (using the ridgeline the Granddad Fuelbreak resides as the division line) generally consist of approximately 90 to 110 year old shade tolerant mixed conifer species. Stands in the western portions of the project area (using the same dividing line) are generally dominated by 90 to 110 year old pine species. Pine

Attachment 3.5, Madera Regional Watershed Management Group Meeting Minutes

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Regional Water Management Group
Monday, November 8, 2010 1:30 to 3:30 pm
Location: Chowchilla Library Community Room
Meeting Agenda

In Attendance:
Frank Abley – US Forest Service
Cindy Black – City of Chowchilla
Elissa Brown – Grant Writer
Chris Campbell – Root Creek Water District
Jack Fry – Chowchilla Red Top Resource Conservation District
Jeannie Habben – Central Sierra Watershed Committee
Glenn Eastes – Madera County
Carl Janzen – Madera Irrigation District
Norman Kuhr – Chowchilla Red top RCD
Michael Neveu – YSPUC
Phil Pierre – Root Creek Water District
Don Roberts – Gravelly Ford Water District
Igal Treibatch – S.E.M.C.U.
Dick Tzou – Madera Irrigation District
Dough Welch – Chowchilla Water District

Quorum was met; meeting was called to order by Michael N. at 1:34 PM.

1. **Review Agenda**
   No agenda change

2. **Public Comment (hold to three minutes each speaker)**
   Comment by Central Sierra Watershed, this Saturday 11/13 from 2pm to 5pm, a party in honor of Larry Ballew in Oakhurst.

Old Business/Housekeeping:

3. **Approve minutes from 8-30-10 and 9-21-2010 meeting**

Approve meeting minutes from 8/30/2010 with changes as submitted, unanimous.
Board voted to pass the August meeting minutes; this was passed unanimously, approved 8/30/2010 meeting minutes as submitted.

Review of meeting minutes from 9-21-2010 meeting: discussion. DWR Fresno Rep felt her comments were not to be labeled as a criticism but rather as suggestions. Others agreed. Jeannie H will re-write the section in regards to this discussion and submit as a change. Economic development projects need governance. Group agreed to include September 21 edited document for final approval at December meeting.

4. **Review Department Forestry document inclusion to existing IRWMP, Fuel Reduction Recommendation (tabled from October's meeting)**
   See attached documentation for the recommended amendments to the Madera Integrated Regional Water Management Plan

   Doug W made the motion to approve the proposed amendment to the IRWMP Forest Service section and Don R second the motion and the Dept of Forestry document for the amendments of the IRWMP are approved unanimously by the board.

5. **For grant preparation: collect monies from members**
   Monies collection tabled for December meeting.

6. **Review of IRWMP Implementation grant project submissions**
   Elissa B facilitated this issue. Notes from her presentation follow:
   Each region is required to submit multiple projects on one application. This process will include submittal of Project Description for the RWMG to review and vote. The list will be published with a 30 day comment period. Grant Application is due January 7, 2011. The first vote is preliminary; member can vote "against" inclusion at December meeting. However, no additions to the November group of projects will be entertained. There could be as many as 3 rounds of funds and this submittal is for the first round.
   5 projects were submitted at the meeting. Project prioritization will be up to the Grant Applicant. The projects include: (1) Ash Slough Arundo Eradication and Sediment Removal project; (2) Cottonwood Creek/Berenda Creek Arundo Eradication Project; (3) Root Creek In-Lieu Groundwater Recharge Project; (4) Sierra National Forest Fuel Reduction Project; (5) Madera Ranchos Flood Control and Water Recharge Ponding Basin. Please refer to the submitted project documents for details.
   Voting for inclusion of all five projects was unanimous.
   A vote was held in approval of all five projects as presented in review, per project documentation: (1) Ash Slough Arundo Eradication and Sediment Removal project; (2) Cottonwood Creek/Berenda Creek Arundo Eradication Project; (3) Root Creek In-Lieu Groundwater Recharge Project; (4) Sierra National Forest Fuel Reduction Project; (5) Madera Ranchos Flood Control and Water Recharge Ponding Basin.
   Motions were made stating the above, and after the board voted it was unanimous that all five projects be included in the in the Implementation Grant Application.

7. **Selection of Grant Applicant**
   Group members agreed to form subcommittee to recommend the choice of Grant Applicant for the Grant Implementation phase, and come to the December meeting with at least one applicant.

New Business:

8. **Choose next location and time for meeting**
   The next meeting is to be held on December 13 at the Madera Irrigation District office.
   Adjourn Meeting adjourned at 3:45pm.

Recommended amendments to the Madera Integrated Regional Water Management Plan

Add to Section 7.2.2.2 :

High severity wildfire can increase the probability and magnitude of flooding, and potentially result in debris flows. Wildfire can leave areas of a watershed completely devoid of vegetation and ground cover. High temperatures can cause physical and chemical changes to forest soils that reduce infiltration and make them more susceptible to erosion. The combined affect results in rapid concentration of runoff (flash flooding) that carries elevated amounts of sediment and debris, potentially plugging culverts, damaging bridges, and filling reservoirs.

Degraded mountain meadow and riparian areas also contribute to elevated flooding. Mountain meadows and floodplains provide natural storage of stormwater and aquifer recharge. Properly functioning meadows store runoff and maintain dry season flows by the slow release of water. Loss of this storage through channel incision reduces the time of concentration for flood flows, increasing both flood volume and height.

Add :

Section 7.3.7 Watershed Protection and Restoration Projects

The US Forest Service is responsible for managing over 300,000 acres of land in the foothill and mountain regions of Madera County. Both commercial and non-commercial fuel reduction projects are completed annually to reduce the intensity and spread of wildfires and to increase forest resiliency to disturbances such as drought, insect and disease attack, and wildfire; thereby reducing the probability of deforestation and increased flooding.

There are an estimated 1,300 meadow and fen systems (approximately 3,180 acres) in the headwaters of Madera County. Past land management activities have compromised the hydrologic function of many of these through incision and conifer encroachment. The Sierra National Forest has identified 30 meadows in need of restoration within the Upper Chaquito Creek 6th-field Hydrologic Unit Code (HUC). These projects are currently being evaluated as part of the Bass Lake Ranger District Five Year Meadow Restoration Plan. There are potentially an additional 130 meadow restoration projects in other 6th -field HUCs.

Revise 8.2.3 from:

"Madera County has a very active and historical program for fire protection, resource management, and environmental enhancement. Typical practices of fuel management include thinning of conifers; mastication of small trees, brush, and shrubs; prescribed burning and vegetation replacement. Although the main objective of the past and current programs has been fire protection, it has been observed that in areas where vegetation management has been conducted, storm runoff increases and increased groundwater recharge enhances springs, which tend to run for greater durations. A literature review supports the potential to increase water supply through vegetation management."

To: "Madera County has a very active and historical program for fire protection, resource management, and environmental enhancement. Typical practices of fuel management include thinning of conifers; mastication of small trees, brush, and shrubs; prescribed burning and vegetation replacement. The main objective of these programs are fire protection, but they also provide ecological restoration and promote long-term hydrologic function. Properly functioning mountain ecosystems provide long-term resiliency to disturbances, thereby maintaining the quantity and quality of water during a time of changing climate and increased wildfire disturbance. Under certain conditions, vegetation management has resulted in short term increases in water yield. A literature review supports the potential to increase water supply through vegetation management. In evaluating projects for potential increases in water *quantity*, the possibility of decreased water *quality* from erosion and sedimentation should be considered"

Section 8.2.3.1

Change

"There are several other projects within Madera County; however, water yield increases resulting from management were not identified. Some of these projects are as follows:"

TO:

"There are several other projects within Madera County that have not identified increased water yields from management. These projects are designed to reduce the intensity and spread of wildfire, protect lives and property, and increase forest health and resiliency. Some of these projects are as follows:"

ADD TO 9.2.1.4

There are potentially 160 meadow restoration projects on Forest Service land within the headwaters of Madera County. Of these, 30 are currently in the planning phase. It is recommended that the Madera RWMG work with the USFS to identify and restore mountain meadows for the protection of water quality, flood attenuation, and increased dry season flows.

ADD TO 9.2.1.6 (but not under projects designed to increase water supply)

Pursue opportunities with the USFS for vegetation management projects designed for ecological restoration, wildfire protection, and forest resiliency. Future projects would include fuel treatments, thinning, and noxious weed eradication.

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Attachment 3.5, Sierra National Forest Land and Resource Management Plan

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United States
Department of
Agriculture

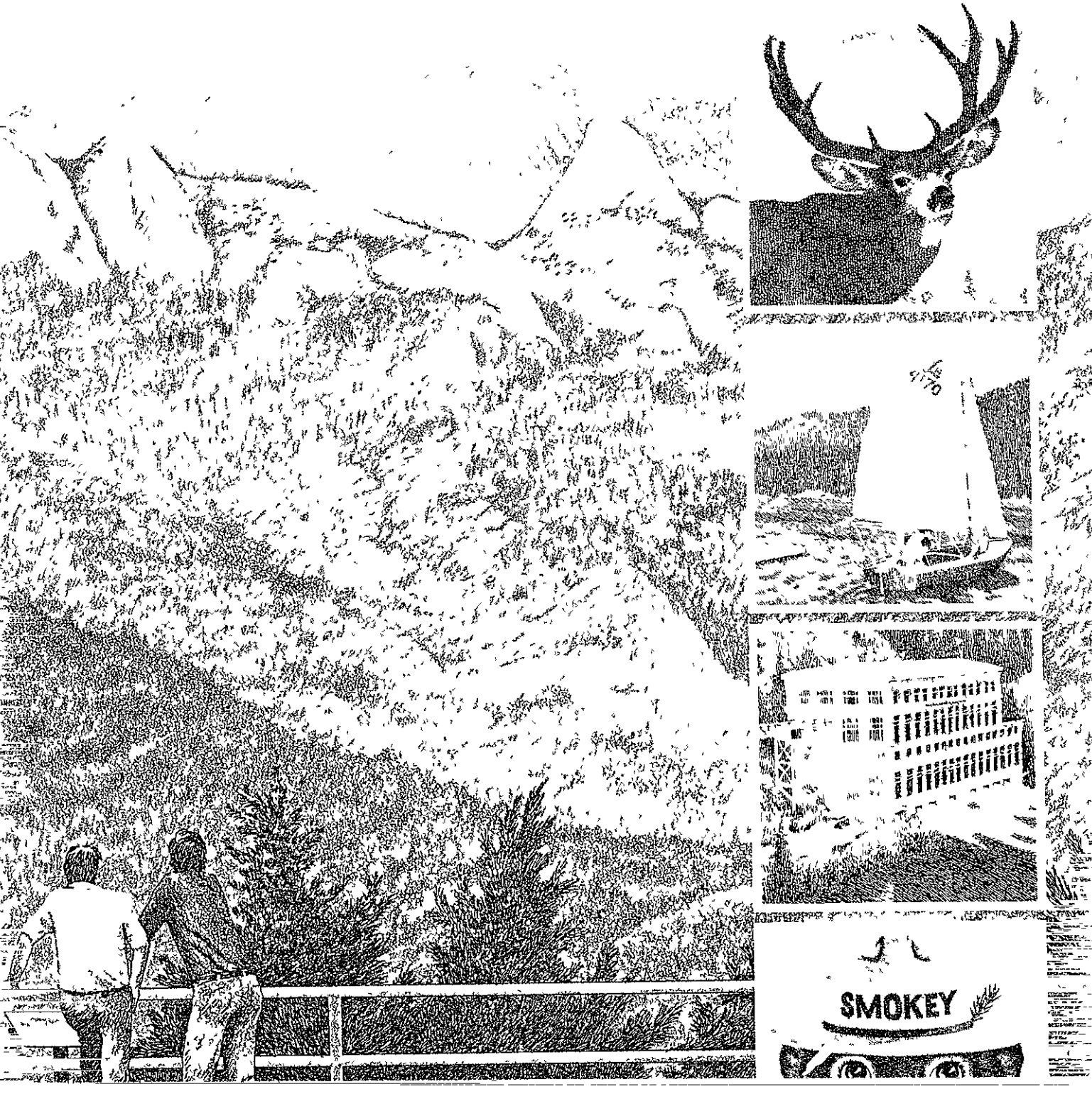
Forest Service

Pacific
Southwest
Region

1991

FOREST LAND AND RESOURCE MANAGEMENT PLAN

Sierra National Forest



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Chapter 1.0 - Introduction

1.0
INTRODUCTION

1 1
PURPOSE OF THE FOREST PLAN

This Forest Land and Resource Management Plan (Forest Plan) was developed to direct the management of Sierra National Forest. The goal of the Forest Plan is to provide a management program reflecting a mix of activities, allow use and protection of Forest resources and fulfill legislative requirements while addressing local, Regional and National issues. To accomplish this, the Forest Plan describes how issues were dealt with, the desired future state of the Forest, forestwide management direction, management prescriptions for individual management areas; schedules of proposed and possible outputs and activities, management standards and guidelines; monitoring and evaluation requirements; and location maps The Forest Plan is applicable to all National Forest land administered by the Sierra National Forest

Preparation of the Forest Plan is required by the Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by the National Forest Management Act (NFMA) Assessment of the Forest Plan's environmental impacts is required by the National Environmental Policy Act (NEPA) and the implementing regulations of NFMA (Title 36 Code of Federal Regulations 219)

The planning horizon is 50 years, but NFMA regulations require Land and Resource Management Plans to be applicable only for 10-15 years with projections for the following 40 years Further, the Plan must be re-evaluated during the first 10 years by analyzing the management situation during the fifth year to assess the need for amendment or revision and then to amend or revise the Plan if it deviates excessively from planned results

1 2
RELATIONSHIP OF THE FOREST PLAN TO OTHER PLANS

All current resource management plans for the Forest will be replaced by the Forest Plan or the land allocation direction in them will be adopted as part of the Plan The Forest Plan will be implemented and kept moving through short-term plans, such as project work plans and annual and five-year operating plans. Most short-term plans and projects will be subject to an environmental analysis, as required by NEPA. An analysis done under the aegis of the Forest Plan EIS identifies the environmental consequences of a proposed action and its alternatives, and specifies mitigating and coordinating measures in addition to those specified by the Forest Plan.

When approved, the Forest Plan will supersede the following individual plans now being used to manage the Sierra National Forest

1. District Multiple Use Plans, and

2 Timber Management Plans.

The Forest Plan will incorporate the land allocation from the following individual plans that are presently in use

1 John Muir Wilderness Plan,

2 Ansel Adams Wilderness Plan,

3 Kaiser Wilderness Plan (interim),

4 Monarch Wilderness Plan,

5 Dinkey Lakes Wilderness Plan,

6 Bass Lake Recreation Area Composite Plan (interim),

7 Huntington Lake Recreation Area Composite Plan (preliminary) (1993),

8 Off Highway Vehicle Travel Plan (1977),

9. Grazing Allotment Plans,

10 5-Year Range Improvement Plans ,

11 North Kings Deer Herd Plan (1981),

12. Yosemite Deer Herd Plan (1981),

13 Oakhurst Deer Herd Plan (1984),

14. San Joaquin Deer Herd Plan (1985),

15 Huntington Deer Herd Plan (1985),

16. Fishery Management Plan for Lahontan Cutthroat Trout (1986),

17 Paiute Cutthroat Trout Recovery Plan (1985),

18. Peregrine Falcon Recovery Plan (1984),

19. Tri-Forest Monitoring Plan (1989),

20. Forest Development Transportation Plan,

21. Facility Master Plan (1989), and

22. Kings River Special Management Area Plan (1990).

It will also incorporate the land allocation direction from the following, when complete

1 Upper Kings River Fishery Habitat Management Plan,

2 South Fork Merced River Fishery Habitat Management Plan,

3. Land Adjustment Plan,

4 Lahontan Cutthroat Trout Recovery Plan,

5 Spotted Owl Habitat Area Plans,

6. Merced Wild & Scenic River Plan (1991),

7 Kings Wild & Scenic River Plan (1991), and

8 Off Highway Vehicle Travel Plan

1.3 FOREST PLAN IMPLEMENTATION PROCESS

Upon approval of this Plan by the Regional Forester, all land and resource management activities and all budget proposals will be based on the Plan As soon as practicable after approval, all permits, contracts, cooperative agreements and other instruments for use and occupancy of the Forest's land will be brought into conformance with the Plan, subject to existing rights Note that previous contracts for timber or other commodities not yet harvested may preclude bringing such activities into full conformance with this Plan

The Forest Plan and the resource implementation plans will be carried out by the District Rangers and their staff The Plan is comprised of a set of goals and objectives for the Forest, and standards and guidelines for both the Forest and each Management Area. These reflect the capability and suitability of the land to support various activities The District Rangers' staffs will plan and conduct resource projects that meet this direction. Projects will continue to be planned and evaluated through the interdisciplinary process. District and Forest staffs will conduct environmental analyses and document them in the appropriate environmental documents (such as Environmental Assessments), which will be tiered to the Forest Plan EIS (40 CFR 1508 28)

If a proposed project on National Forest land is determined to be incompatible with the direction of the Plan, the project will be revised or not permitted Conflicts that recur will result in a review of the relevant management direction in the Plan, according to its monitoring and evaluation process (Chapter 5), and may lead to Plan amendment or revision.

By the time the Forest Plan is implemented in 1991, budget proposals for 1991 through 1992 based on current planning will have been submitted to Congress These budgets may or may not meet budget requirements of the approved Forest Plan Moreover, Congressional appropriations and allocations of the Chief and Regional Forester during any future period may or may not meet budget requirements of the approved Forest Plan. In these situations, the Forest Supervisor will change the proposed Plan implementation schedules to reflect differences between proposed Plan budgets and actual appropriated funds (36 CFR 219.10e)

1 4 FOREST PLAN AMENDMENTS, REVISIONS AND APPEAL RIGHTS

The following excerpt from NFMA 36 CFR 219 10(h) provides a complete discussion of the concept of public appeal of the Plan approval decision.

The provisions of 36 CFR, part 217, Appeal of Decisions Concerning the National Forest System, apply to any administrative appeal of the Regional Forester's decision to approve a forest plan. Decisions to disapprove a plan, and other decisions made during the forest planning process prior to the issuance of a record of decision approving the plan, are not subject to administrative appeal

1 5 ORGANIZATION AND USE OF THE FOREST PLAN

The Forest Plan is new and complex To the uninitiated it may be difficult to understand the various sections and their use and relationships. A brief explanation of the various sections follows to give the reader a mind's eye view of the entire plan and how each section is to be used

Chapter 1 describes the purpose of the Plan and the implementation process.

Chapter 2 describes issues and concerns.

Chapter 3 describes the existing management situation in the Forest.

Chapter 4 is the heart of the plan It contains all management direction. These implementing directions provide the goals, policies and objectives necessary to begin moving toward the desired future condition. Direction begins with a set of Forest goal and objective statements, which generally apply to the entire Forest They may not be appropriate in all situations or areas so some understanding of their appropriateness is neccessary.

The goal and objective statements are followed by a description of the proposed or desired future state of the Forest and the general management prescriptions for the Forest.

Also included in this chapter are management standards and guidelines. These are mitigating and coordinating requirements, as required by NEPA, NFMA and the Multiple-Use Act, which specify where, when, how much or under what conditions, certain activities or conditions may or may not occur. Management standards and guidelines supplement management prescriptions. They often require resource and support element maps, specifying where the standard and guideline is applicable. Many standards and guidelines are applicable to less than the entire Forest. They may cover a very broad area or be specific to a single site. Finally, individual management areas are described. These descriptions include a listing of the applicable prescriptions, standards and guidelines and proposed activities and outputs.

Chapter 5 presents monitoring and evaluation requirements of the Forest Plan. Monitoring and evaluation provides information on the progress and results of the Forest Plan. If progress and results deviate significantly from that planned, they may cause a plan amendment or revision prior to the NFMA requirement for revision within ten years, or reanalysis in five years.

Chapter 6 contains the appendices. It includes needed resource implementation plans, research needs and tentative 10-year timber sale action plan.

Plan and element maps in the accompanying packet serve two purposes. The Forest Plan Map identifies individual management areas and their management emphasis. Resource and support element maps supplement standards and guidelines, supplying location information Element maps are of a very small scale to simplify presentation of their concepts to the reader. Upon approval of the final Forest Plan, the Forest ID team will produce large scale maps for use by field personnel.

In summary, Chapters 4 and 5 provide direction and guidance to the Forest's managers on what is planned, how much should be done and when and where it should occur. Mitigation and coordination requirements are specified and a review and control mechanism is provided.

1.6
VICINITY

Sierra National Forest is located on the west side of the central Sierra Nevada Range in Fresno, Madera and Mariposa Counties in the State of California. The exact center of California is located in the Forest. The forest is bordered on the west by the eastern foothills of San Joaquin Valley, on the north by Yosemite National Park and Stanislaus National Forest, and on the east and south by Inyo National Forest, Kings Canyon National Park and Sequoia National Forest.

The Forest is within a 1-hour drive from Madera or Fresno, a 3-hour drive from Stockton or Bakersfield, and a 6-hour drive from San Francisco or Los Angeles. The communities of Shaver Lake, Big Creek, North Fork and Bass Lake are located within the Forest boundary

1.7
MANAGEMENT PRESCRIPTION PROCESS

A management prescription, as developed by Sierra National Forest, is an overall strategy for managing resources of a specific area of land to address issues and obtain desired goals and objectives. The specific area of land to which prescriptions are tied is the management area. In the case of this Forest, more than one prescription can apply to a management area.

Management prescriptions are the same for all alternatives, however, alternatives differ in the number and distribution of acres to each prescription. The number of prescriptions and the size of the area to which they apply within each management area are described in Chapter 4.

Sixteen general management prescriptions have been identified for use in the Forest. The prescriptions highlight resource emphasis and/or objectives to be accomplished. These prescriptions are described in Chapter 4.

The practices and activities to be carried out under the management prescriptions are also listed in Chapter 4 under each management area description or, if forestwide, in Table 4.03. The practices and activities include those scheduled in FORPLAN and those assigned outside FORPLAN by the ID Team and Forest Management Team.

The general management prescriptions are subject to additional direction and/or constraints as shown on resource element maps or through standards and guidelines. The element maps and applicable standards and guidelines provide more specifics to the general management prescriptions.

Melding of the general prescription with more site-specific direction occurs through a tiering process Since more than one prescription can be applicable to a management area, this tiering process is a key element to generating prescriptions specific to different locations within a management area. The tiering process allows a variable management prescription within each management area, depending on the location.

This process enables management areas to be quite large and continues the general philosophy that some parts of the Forest need to be planned in greater detail and intensity than other parts. The direction tiering process goes from very broad to very specific.

Used in this context, a prescription for a location or project within a management area consists of the general management prescription and activities and practices scheduled for that part of the management area as

determined by a project environmental analysis and the applicable combination of the following: broad forestwide goals and objectives; forestwide standards and guidelines; management area standards and guidelines; and singular or combined analysis area standards and guidelines. This process is graphically depicted in Figure 1 02 to aid the reader's understanding. Element maps have been developed to show where certain standards and guidelines apply.

FIGURE 1.01 - LOCATION OF SIERRA NATIONAL FOREST, CALIFORNIA

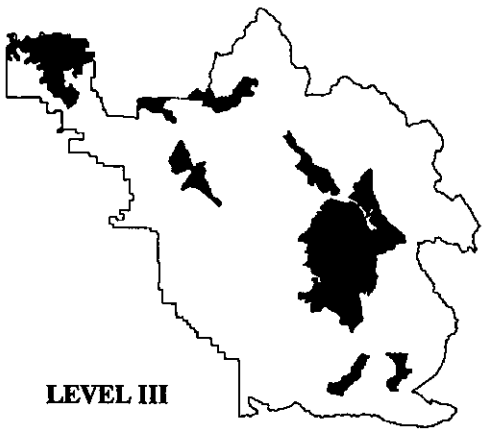
FIGURE 1.02 DIRECTION TIERING PROCESS

LEVEL I Forestwide Management Goals and Objectives

Includes MMRs, MIRs, and FMRs as well as broad goals and objectives applicable to the Forest.

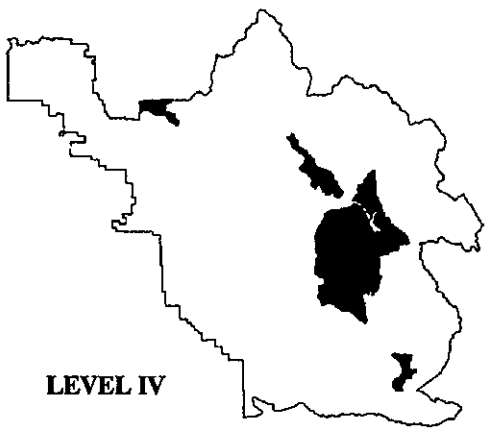
LEVEL II Forestwide Standards and Guidelines

More specific in nature than Forestwide goals and objectives. Element maps are used when Forestwide standards and guidelines are applicable to specific, mapped locations



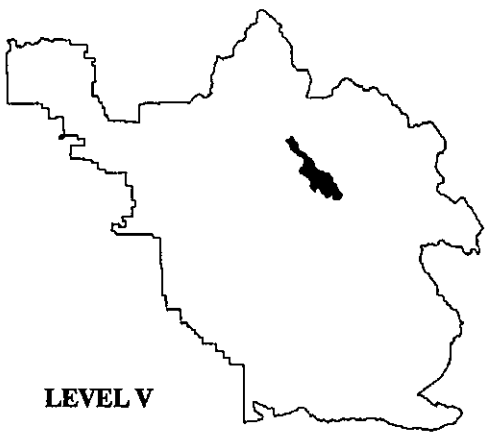
LEVEL III Management Area Directions

Management areas consist of aggregates of analysis areas Management Area direction includes the general prescription which was previously described, the specific standards and guidelines appropriate for the area and the activities and practices scheduled within the area.



LEVEL IV Grouped Analysis Area Direction

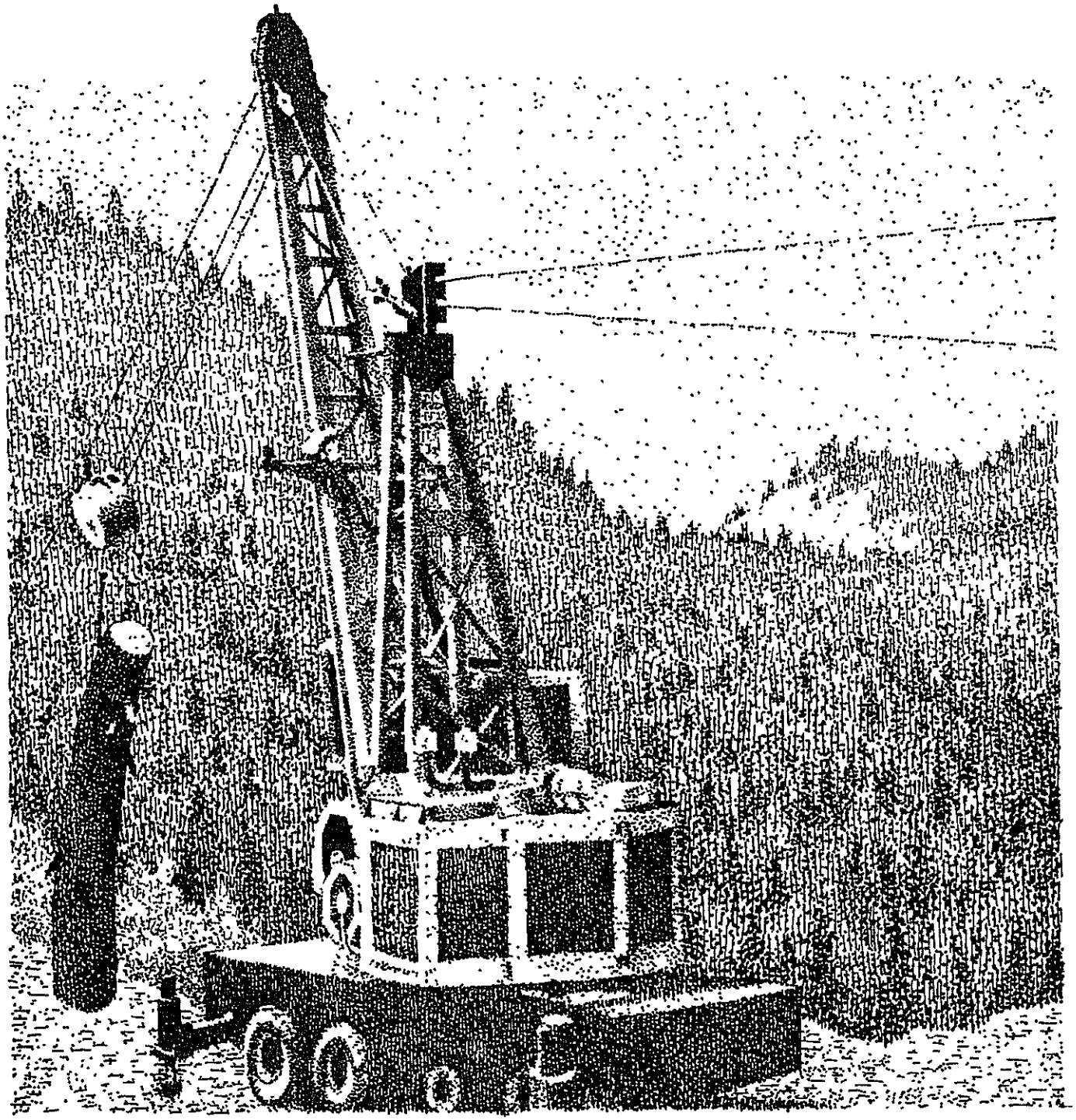
This direction consists of standards and guidelines that apply to more than one analysis area within a Management area, but not to the entire Management area.



LEVEL V Single Analysis Area Direction

These are standards and guidelines that apply to individual analysis areas within a Management Area

Chapter 2.0 – Public Issues and Management Concerns



2.0
PUBLIC ISSUES AND MANAGEMENT CONCERNS

Forestwide public issues and management concerns were developed from comments received over the years and solicited specifically for this planning effort from the public and Forest Service employees.

The initial scoping process in 1979 resulted in identifying eight broad issues and concern areas from which 27 planning questions were derived These planning questions are listed in the FEIS, while the broad issues are summarized below. Specifics of the scoping process and detailed issue statements can be found in the planning records

During the public comment period for the re-release of the DEIS in September of 1986, five additional issues arose from public review concerning allowable sale quantity, clearcutting, economic affect on North Fork, spotted owls and budget. These new issues are identified and displayed in this section with a star next to the issue Section 2 2 discusses the Forest resolution of each issue

2 1
SUMMARY OF ISSUES

Recreation

Issue - What strategy of recreational opportunity development and utilization will be emphasized in terms of kind and amount of recreation and where will they be located?

Visual Resources

Issue - What priority will be given to scenic values in the Forest?

Further Planning

Issue - How will the Forest manage Further Planning Areas?

Wild and Scenic Rivers

Issue - How will the Forest manage rivers that are inventoried for possible inclusion into the Wild and Scenic River system?

Fish and Wildlife

Issue - What kind and amount of fish and wildlife habitat will be provided and what are the effects of management on habitats?

* Issue - How many spotted owl habitat areas (SOHAs) should be established in the Forest?

Timber

Issue - How intensive and how widespread will timber management activities be in the Forest?

* Issue - What should the allowable sale quantity (ASQ) level be?

* Issue - Is clearcutting necessary to meet the Forest's long-term timber resource management goals?

* Issue - What are the socio-economic consequences of the changes in allowable sale quantity (ASQ) on the community of North Fork and surrounding area?

Energy

Issue - How will Forest management contribute to efficiency in the use of energy?

Hydroelectric Development

Issue - How will the Forest respond to the hydroelectric development issue relative to management of other Forest resources?

Economics

* Issue - How will the Forest implement the Forest Plan given the discrepancy between current budget trends and the budget needed?

General Issues

- Use of fire to enhance resource values.

- Desirability of vegetation manipulation

- Adequacy of soil and water quality protection.

- Use by domestic cattle versus other resource use of the Forest's range.

2 2
RESOLUTION OF ISSUES

Because public issues generally represent opposing views, some issues are likely to remain controversial during the life of the Plan. In these cases the goal is to convey the strategy in such a way that those with opposing views understand why a issue was resolved in favor of one of the other viewpoints

Issues and concerns, no matter how controversial, represent the topics that must be addressed if the Plan is to provide appropriate direction for the Forest Alternatives presented in the DEIS explore different ways to resolve the identified issues and concerns. The proposed action represented by this Plan resolves the issues in the following manner:

Recreation Issue

Management Areas 1, 2 and 11 are formulated specifically to deal with the recreation issue. Management Area 1, containing 75,631 acres, emphasizes developed recreation that stress rural and roaded natural recreational opportunities. Management Areas 2 and 11 emphasize dispersed recreation that stress primitive and semiprimitive recreational opportunities. The recreation management direction and standards and guidelines deal with the level and intensity of recreational opportunities within these three management areas, as well as the rest of the management areas in the Forest.

Two element maps, which are an integral part of this Plan, also aid in resolving the recreation issue. The first map shows the recreational opportunity class objectives; the second, visual resource objectives.

Visual Resource Issue

This Plan calls for visual quality objectives of Retention and Partial Retention along most major recreational roads and trails and around all major recreation areas

Further Planning Issue

The California Wilderness Act greatly reduced the areas of issue in the Forest All but one nonroaded area, Kings River B (containing 24,368 acres), were either designated Wilderness or exempted from Wilderness consideration during this planning cycle. The Kings River B further planning area has been Congressionally designated as the Kings River Special Management Area and will be managed primarily for public outdoor recreation and enjoyment of certain areas within the Sierra and Sequoia National Forests. Wildlife and Fish Management of these areas will be maintained. This special designation, however, does not preclude future wilderness consideration

Of the released areas, the proposed plan emphasizes commodity production, such as timber on areas with medium to high productivity. These areas include the Cattle Mountain and Crater/Rattlesnake areas within the San Joaquin B released area and the nonwilderness portion of the Rancheria released area.

The remaining released areas primarily fall into the two dispersed-use management areas. Emphasis is placed on semiprimitive recreational opportunity classes and wildlife management. Where management activities do occur, most roads will be closed upon completion of the activity for the retention of the scarce semiprimitive opportunities

Wild and Scenic River Issue

Sierra National Forest coordinated a joint agency analysis which included the seven inventoried rivers (34 segments, 224 miles, 72,000 acres) in three National Forests, two National Parks, one National Monument and one BLM district. Rivers may be either recommended for designation, not recommended or have a preferred recommendation. After designation by Congress, each agency will manage its segments to the highest potential classification until detailed boundaries are established and classifications are finalized.

In 1987, Congress designated 31 miles of the Merced and South Fork Merced Rivers and 16.5 miles of the Middle Fork Kings River, all administered by Sierra National Forest, as Wild and Scenic Classifications and boundaries have been established in a seperate 1989 EA No further recommendation will be necessary in this Plan for these designated rivers, however, two segments of the Merced, administered by the BLM, from Briceburg to Lake McClure will be considered The BLM, as a cooperating agency, will make final recommendation of these two segments. The Forest is recommending 33 miles for Wild and two miles for a nondesignated classification, totaling 35 miles and 11,200 acres

Fish and Wildlife Issue

The kind and amount of fish and wildlife habitat provided by this Plan are intended to result in diversified communities of plants and animals. Specific management direction and standards and guidelines are provided to emphasize fishery resource and wildlife habitat management in riparian areas and meadows Down logs will be managed at densities that are expected to maintain associated species well above viability thresholds Standards for snag management will maintain primary cavity-nesting species near current levels. The Forest will manage hardwoods in a manner that meets the needs of both wildlife and timber. Late seral stage ponderosa pine will greatly exceed current inventories after the fourth decade, but late seral stage mixed conifer habitat will decline by over half by the fifth decade

An active fish habitat improvement program averaging 100 acres/structures/year will be accomplished by this Plan. Standard and Guidlines intended to protect fish habitat can be found in Section 4.5 under Fish, Wildlife & Sensitive Plants, Range, Facilities, Riparian, Soils and Water.

A regional network of California spotted owl habitat areas (SOHAs) has been established to maintain habitat for this and other species associated with late seral stage forests This plan establishes 29 SOHAs in the Forest. All SOHAs have no scheduled timber harvest.

Standards and guidelines favoring deer habitat management will be applied to 75% of the identified deer holding areas and population centers in commercial forests Deer herd population goals and assigned Forest targets for goshawks, Forest recovery goals for peregrine falcons and bald eagles will be met by this Plan Sensitive furbearers are maintained at current levels by this Plan

Sensitive plants will be managed to ensure that species do not become listed as threatened or endangered because of Forest Service actions

The effects on fish and wildlife when managing other resources are addressed in Chapter 4 of the FEIS. This Forest Plan provides a monitoring program to assess the long-term effects of other resource management on fish and wildlife.

Timber Issue

The six main questions to be resolved under the timber issue are listed below.

1. How extensive will timber harvest be?
2. How intensive will timber management be?
3. How will new timber stands be created?
* 4. What should the allowable sale quantity (ASQ) level be?
* 5. Is clearcutting necessary to meet the Forest's long-term timber resource management goals?
* 6 What are the socio-economic consequences of the changes in allowable sale quantity (ASQ) on the community of North Fork and surrounding area?

How extensive and intensive will timber harvest and management be? Of approximately 1,275,000 acres in the Forest, 393,700 were determined to be tentatively suitable and available timber lands. An additional 18,700 acres of forested land were not capable of growing above 20 cubic feet/acre/year or were not assured of being restocked within five years. This Plan calls for managing timber land according to one of four regulation or management classes. Timber management intensity will be measured by the number of acres assigned to one of the following four classes

a) Full-Timber Yield Management (Class I): 107,100 acres of Forest land will achieve full timber production They are primarily managed using even-aged silvicultural systems Rate of harvest is limited only by economics, long-term sustained yield and dispersion of regeneration harvest units. Timber stands may be regenerated once 95% of CMAI is reached.

b) Modified-Timber Yield Management (Class II): 65,100 acres of Forest land will have modified timber production due to other resource values, deer management areas and partial retention of visual quality areas. They are primarily managed using even-aged silvicultural systems, however, the total amount of regeneration harvest is limited by a need for more physical dispersion of harvest units Rate at which these stands are cut in any one decade is about two-thirds the rate possible in Regulation Class I.

c) Limited-Timber Yield Management (Class III): 156,700 acres of Forest land will have limited timber production due to other resource values These include riparian areas, unstable soils and visual quality (retention) areas. The land is managed primarily using uneven-aged silvicultural systems. Regeneration harvest openings are limited because of other resource values Timber harvest from this land, during the Plan period, will amount to about one half of the net growth.

d) Minimum-Level Management (Class IV): 64,800 acres of Forest land will receive only custodial management, with no scheduled timber harvest. They include some California spotted owl habitat and other areas where long-term scheduled timber harvest is not compatible with other planned uses.

How will new timber stands be created? Four regeneration systems are planned. Clearcutting, Shelterwood, Group Selection and Individual Tree Selection. The regeneration system selected will be based upon a site specific analysis of each harvest area. Clearcutting and shelterwood harvests are predicted to be the dominate methods on Regulation Class I and II lands because they have, to date, proven to be the most reliable regeneration systems. Management emphasis will be to try more group selection regeneration on Regulation Class I and II land This will better identify where group selection can meet objectives In red fir forest type, shelterwood is the primary system with clearcutting being restricted to 2,000 acres/decade until planting survival becomes more predictable. Individual tree selection system will be the dominate method on Regulation Class III land.

What should the allowable sale quantity (ASQ) level be? The annual ASQ under the previous Timber Management Plan was about 152 MMBF. Over the last 30 years, the average annual harvest has been 135 MMBF For the period 1960-1969 the annual average harvest was 129 MMBF; between 1970-1979, 157 MMBF. The period 1978-1982 contained both a historical high and low harvest. This was a consequence of the salvage sale program following the 1976-1978 drought. The 1981 low was the consequence of the general 1981-1982 National economic recession. The average harvest for the 1980-1989 period was 120 MMBF. For the most recent five years (1985-1989), the average annual harvest has been 151 MMBF, with the 1989 harvest reaching 166 MMBF The timber industry considers the 1968-77 period the best reflection of its long-term timber needs.

The Forest Plan establishes an annual ASQ of 88 MMBF That ASQ level will not meet local industry raw material demands during periods of a strong lumber market. As a result, some reassignment of production between the four existing sawmills may occur. That adjustment may mean curtailment or closure of one of the sawmills over the long term. While a higher ASQ will reduce the risk of reallocation of production, it will not guarantee the continued production at each current location.

Factors preventing the Forest from meeting the demand for a higher ASQ are:

1. All SOHAs on CAS land have no scheduled timber harvest during the 160 year planning horizon because of physical constraints on the ability to meet long-term California spotted owl and sensitive furbearer habitat requirements.

2 Until planting survival in red fir clearcuts is consistantly better than 80%, no more than 200 acres per year may be scheduled for clearcutting.

3 No scheduled timber harvest is planned in Analysis areas 3, 7, 18, 45, 55 and 58 because of conflicts with other resource goals including non-roaded dispersed recreation use (Analysis Area 3 and 18), a proposed research natural area (Analysis Area 7) and developed recreation use (Analysis Area 45, 55 and 58)

4. The rate of timber harvest is limited to achieve visual quality objectives for destination developed recreation areas (Analysis Area 14, 17, 28, 45 and 55) and major travel routes to such areas.

5. In the ponderosa and mixed conifer type about 4.5% of the future softwood production potential is forgone in order to grow a desired amount of mast producing oaks for wildlife

6. Three percent of the existing inventory is needed to provide replacement snags in regeneration units.

7. In riparian areas, scheduled timber outputs are limited to skyline corridors, new roads and timber removed to benefit riparian dependent species.

There is not enough land base on the Forest to satisfy all needs The final ASQ of 88 MMBF is a balance between maximizing timber on land capable and suitable for growing timber and protecting other values and resources, such as visual quality, fish, wildlife and riparian areas An increase in the ASQ above 88 MMBF will result in an unacceptable risk and impact to non-timber resources

<u>Is clearcutting necessary to meet the Forest's long-term timber resource management goals?</u> There are three reasons why clearcutting is the Forest's principle stand regeneration system

One is biological, which includes stands heavily infected with mistletoe or stands where too few crop trees remain The only effective treatment to prevent re-introduction of mistletoe is to remove all trees. In stands where too few crop trees remain, starting over is the most effective method to meet acceptable growth rates Under these conditions clearcutting is the optimum method.

The second reason is post-sale treatments can best be accomplished from clearcutting. These treatments include disposal of harvest residue (reduces risk of fire mortality), site preparation for planting, control of competing vegetation (assures survival) and protection of new stands from damage in succeeding harvests.

The last and perhaps most important reason is even-aged management is necessary to sustain the annual ASQ of 88 MMBF. The inventory and growth on existing stands will only maintain the ASQ about sixty years (for Regulation Class I land). While an uneven-aged regeneration system may result in establishing new trees, actual experience indicates that growing new stands to minimum merchantiblity in 60 years can only be done using an even-aged system.

Actual selection of a silvicultural method is only made after a site-specific examination and evaluation. Where conditions indicate objectives can be reasonably accomplished without clearcutting, other methods are used. Thirty-six thousand acres of Regulation Class I and II lands have been assigned to uneven-age management.

Two other alternatives can achieve the planned ASQ while still reducing the amount of clearcutting. The first will increase the land base with existing timber inventory. This will provide additional existing volume and permit a longer time for the development of new uneven-aged timber stands. The other alternative will accept a decline in yield after the existing timber is liquidated until the new uneven-aged stands have developed Wilderness classification and other resource objectives on Regulation Class II, III and IV land will prevent increasing the timber base Forest Service policy is to plan for even-flow of timber products over the planning horizon (160 years). NFMA allows for a departure from the even-flow policy when necessary to meet Forest Plan goals. A departure to further reduce clearcutting will lead directly to a departure harvest schedule. A Forest timber harvest schedule that is a departure from the even-flow schedule will not be consistent with the Forest Plan goals.

<u>What socio-economic impact does the ASQ have on North Fork and surrounding communities?</u> Additional analysis and write-ups have been added to the various social and economic sections of the FEIS describing the effects of each alternative. The result of the analysis shows the Preferred Alternative with an ASQ of 88 MMBF may result in the closing of the North Fork mill during the current planning period. Should this occur, two things will happen, 1) there will be less local employment opportunity and 2) more volume will be available to the other mills dependent on forest timber

Hydroelectric Issue

FERC is the lead agency on most hydroelectric projects and is responsible for development of environmental analysis for the projects. All applications for non-federal hydroelectric projects are filed with FERC. Because many large hydroelectric projects occur on National Forest land, the Forest Service participates as a cooperating agency in the NEPA process The Forest inputs to FERC, through the 4e letter, issues Special Use

Permits and determines what are necessary mitigation measures to protect Forest land.

The FEIS expands considerably the discussion on hydroelectric development and a separate (hydroelectric) element has been established for its direction. The direction requires project environmental analysis, evaluation of secondary effects, mitigation for loss of public resources when feasible and appropriate, stream flows and flushing requirements to maintain fish populations downstream from project sites. The Plan also advocates retention of important rangeland, prime forest land and wetlands, unless other needs clearly override the benefits derived from retention of such lands.

Energy Issue

The energy issue was raised by the Forest Management Team in 1979 during the initial development of the Draft Plan. The oil embargo had caused high petroleum prices, resulting in long lines at the gasoline pumps, and energy was an issue of great concern. However, by the time the final draft was published in 1986, gas was plentiful and less expensive.

Because of the changed condition, the public did not perceive energy as an issue. Only two comments from the public were submitted on this subject; one favoring the construction of the co-generation plant at North Fork, and the other opposing the standard and guideline giving preference to the public for fuelwood.

During the planning process, the energy issue described in the DEIS was examined, and the Forest Management Team found the following: (1) Biomass conversion could not be estimated because of unknown variables, such as the supply of energy, its cost and the declining demand for firewood; (2) Oil and gas sources within the Forest were unknown; (3) Geothermal energy would not be developed, and (4) Demand for bus service to the Forest was minimal.

Energy saving efforts in the Forest have become routine since 1979, rather than part of long range goals and policies. Some of the Forest's practices include widespread use of smaller, more fuel-efficient vehicles, scheduled retrofitting of buildings for energy conservation and designation of public fuelwood gathering areas. While these efforts help reduce energy consumption, they contribute little to the overall energy issue

The Forest Management Team concluded that energy was not an issue of concern to the public, and since energy efficiency cannot be resolved in this planning effort, the issue is unresolvable. No further discussion of this subject will be included in the Plan.

Budget Issue

The purpose of the Forest Plan was to establish overall land allocations and display outputs based on the allocations. While the budget process may influence the outputs to be achieved in a given year, the land allocation and the standards and guidelines will not vary. The Forest Plan also includes a monitoring plan. If the Forest strays too far from accomplishing the objectives set in the Plan, a plan amendment or revision is required. See Appendix P in the accompanying FEIS for a detailed explanation of budgets and their relationship to the Forest Plan.

2.3
GENERAL ISSUES

Prescribed Fire

Prescribed fire will be one of the primary tools used to accomplish program objectives in this Plan. It will be used to reduce fuels, create more nutritious deer browse and herbaceaous forage and maintain natural conditions in wilderness areas.

Vegetative Manipulation

This Plan proposes an active vegetation manipulation program, in accord with the Forestwide Management Direction and Standards and Guidelines, to maintain or enhance timber, range, wildlife and recreational values. For example, vegetative manipulation is needed to increase tree growth, maintain tree species and ecosystem diversity, create fuelbreaks for fire protection and prevent insect and disease occurrence

Soil and Water

Protection of soil and water quality is an integral part of the proposed actions in the Plan. Riparian and water influence zones are established with a minimum of 100 feet from the shores of permanent streams, lakes and reservoirs. Intermittent and ephemeral streams are protected by established streamside management zones. Best Management Practices have been added for use on appropriate projects Special standards have been established for highly erosive and highly sensitive soils. In addition, where soil and water problems exist from natural causes or past activities, this Plan proposes corrective measures.

Range and Wildlife

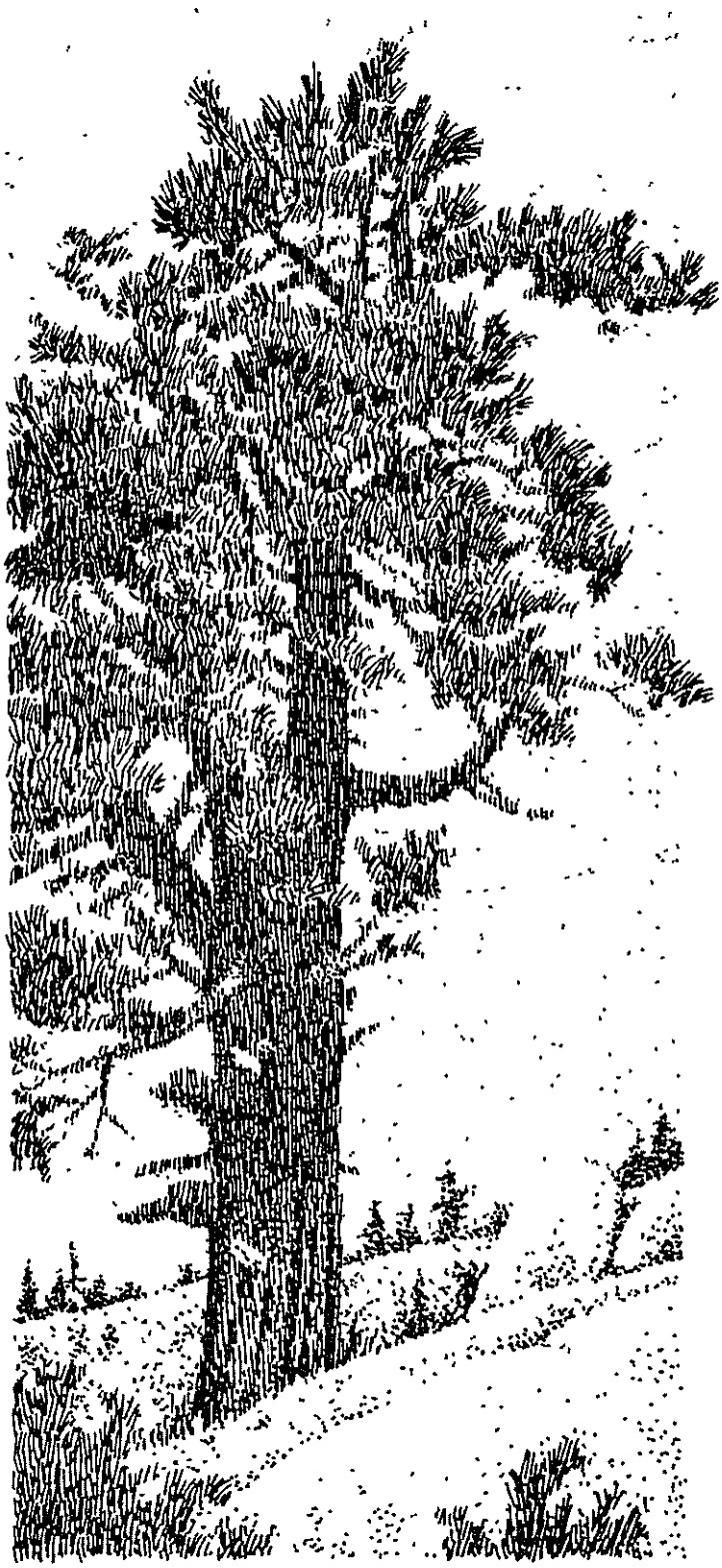
Levels of livestock grazing provided by this Plan are intended to result in balanced use by both livestock and wildlife. Allotment management plans will establish proper stocking levels, seasons and grazing practices which maintain or improve range conditions while considering future wildlife habitat values. Management Standard and Guidelines have been developed for range resources to be in harmony with other resource values,

such as soil protection, water quality, recreation, timber and wildlife. Conflicts between livestock grazing, recreation and wildlife values will be addressed and resolved on a case-by-case basis.

Air Quality

Air quality is not considered to be an issue because: 1) proposed burning is minimal, 2) current air quality is good, 3) elevation/weather factors allow smoke to dispense, and 4) Forest is far from population centers, therefore few concerns exist.

Chapter 3.0 – Summary of the Analysis of the Management Situation



3.0
SUMMARY OF THE ANALYSIS OF THE MANAGEMENT SITUATION

This chapter of the Plan presents summary statements for economic and social issues, resource elements and program areas.

3 1
SOCIAL ENVIRONMENT

The management and activities of Sierra National Forest affect individuals and groups of people living within the Forest's sphere of influence.

The Forest is located in Fresno, Madera and Mariposa Counties, and with the exception of the centralized urban areas, these counties can be characterized as rural, with recent significant population growth and cyclical employment trends.

Population growth in these areas has been rapid, exceeding that of the State in the previous 10-year period The percentage of Native Americans in the local three-county area equals the State average, although the Black and Asian populations are smaller than the State average The percentage of individuals of Hispanic origin (29%) greatly exceeds the State average of 19%.

Native American settlements and/or concentrations of population occur throughout the Forest's sphere of influence, but are located primarily in the Mariposa, North Fork, Auberry, Cold Springs and Table Mountain areas

Within the Forest's sphere of influence, five social groups are identified as most likely to be affected by the management direction expressed by the alternatives They are Long-time residents, new arrivals, regional recreationists, second-home residents and Native Americans.

The impacts of the Plan on social groups are measured and analyzed by the effect on various aspects of the social groups: Lifestyles; attitudes, beliefs and values; group stability and cohesion, population growth, community services, law enforcement, solid waste, sewage, transportation facilities and municipal water supply.

3.2
THE ECONOMIC ENVIRONMENT

The Forest affects the economy by producing outputs that are consumed in local and regional markets, by generating income and employment opportunities by returning to the U S Treasury receipts from the sale of goods and services; and by sharing Treasury receipts with local governments. Although some effects of managing the Forest are dispersed over a broad area, economic effects are most important in Fresno, Madera and Mariposa Counties.

Management programs on the Forest currently generate about 4,000 jobs in the local economy The Forest also affects the local economy by sharing with local governments, revenues from the sale of goods and services - 25% of all receipts to the U S Treasury are returned to the State for distribution to the counties Each county receives a proportionate share of the revenues, based upon National Forest acreage in that county.

Revenues from timber sales account for over 90% of Forest receipts Recreation fees from campgrounds, recreational residences and the Sierra Summit ski area account for most of the remaining revenues. Because timber accounts for such a large share of total returns to the U S Treasury, subsequent county shares fluctuate widely. In 1979, a year with strong timber markets, county revenues were nearly $4 million, while in 1982, a depression year in the timber market, counties received less than $1 million.

Present net value (PNV) is the primary measure of economic efficiency used by the Forest Service. For the Forest, the values of timber, recreation, and water and the budget for managing the Forest are the primary determinants of PNV Over the past decade, timber, recreation, and water values have increased The budget for managing the Forest increased from $6 million in 1975 to nearly $19 million in 1982, but has held relatively constant since then.

3.3
RECREATION

The Forest has a variety of landforms, elevations, climate, vegetation and natural and man-made attractions that draw recreationists It ranks among the top of all National Forests in recreation use. Demands for dispersed use areas and developed sites are expected to increase each decade Conflicts for space among user groups and between recreational activities and resource management uses are now occurring and are expected to intensify

There are a large number of developed and dispersed recreation areas within the Forest. In addition, adjacent to the Forest are two National Parks, three other National Forests and several large reservoirs, all of which have recreation facilities. Demand for recreation was determined by extrapolating 1982 recreation data in conjunction with population projections over the analysis period Demand for developed recreation is expected to increase from 1.6 million visitor days in 1985 to 2.1 million visitor days by 2015. Demand for dispersed recreation is expected to increase from 2.3 million visitor days in 1985 to 3 3 million visitor days by 2015. The FEIS includes a discussion of demand in Section 3.5 1 1 and accompanying figures Included in Appendices F and G

of the FEIS are demand and capacity comparisons for developed sites, dispersed sites and Wilderness by ROS class

3 3 1
Developed Recreation

The major types of developed sites sought by recreationists are campgrounds, resorts, and organization camps, all of which serve as a base for their visits and trips into dispersed areas of the Forest.

Except during August and holiday weekends, most developed campgrounds have space available, yet it is predicted that additional campground units will be needed. A limited increase in developed sites can be accommodated in major recreational areas such as Bass Lake and Huntington Lake. However, some increases are being made in association with new or relicensed power projects at other reservoirs. There is a need to improve low standard campgrounds and picnic facilities. Additional supervision and controls, to reduce conflicts and resource damage, are advisable at some sites

Commercial facilities are sufficient to meet demand. Some facilities need upgrading and services adjusted or changed to maintain needed viable operations. At others, conflicts or lack of general public need will mean eventual phase-out of the facility. Permits for the Huntington Lake Gift Shop, Huntington Lake Lumber Yard and the recreation residence on Lot 1E of the Angel Springs Tract will not be renewed when the present permits expire, based on decisions made outside this Plan. Sierra Summit is the only ski resort in the Forest. The owners are trying to keep pace with the demand for downhill skiing by implementing a long range expansion plan. Barring unexpected changes in demand, major changes by other suppliers in the area or problems in company economics, the demand for downhill skiing will be met.

3.3.2
Dispersed Recreation

There are at least 35 different dispersed uses listed in the Forest activity report These uses include camping in undeveloped sites, hiking, hunting, fishing, cross-country skiing, sailing, horseback riding, OHV use and auto driving, to name a few One intent is to provide a broad range of opportunities for dispersed uses Some of the greatest potential for resource damage and user conflict are associated with dispersed recreation activities Like developed site administration, increased supervision and control has been, and will be, required to reduce conflicts between users and to mitigate resource damage caused by activities As future uses arise, they will be evaluated case-by-case for compatibility with ROS categories. Some may need to be restricted to certain areas and time periods under site-specfic special use permit authorization.

The Forest has had an OHV Plan since 1958. Adjustments have been made in this plan to meet changing conditions and needs The latest plan (1977) established regulations for OHV use while protecting other resources Major changes now proposed as part of this Plan are to restrict OHV travel to designated routes and areas A new Forest OHV Plan will define these changes Until the new Forest OHV Plan is completed in 1991, the interm direction for OHV management will follow current direction as outlined in the 1977 plan.

During the interim period the following direction applies· 1) Zone A - closed to motorized use; 2) Zone B - OHV use except over-the-snow will be restricted to designated routes with three exceptions; 3) Zone C - over-the-snow use is restricted to designated routes; 4) Zone D - snow and land travel open with five exceptions; 5) Zone E - snow and land travel restricted to designated routes; 6) Maintenance Level 1 roads are open to summer motorized use unless designated closed; 7) Maintenance Level 2 roads open unless signed or gated closed; and 8) Maintenance Level 3, 4 and 5 roads are closed to unlicensed OHV travel. (See 1977 OHV plan for details)

Approximately 1,100 miles of forest trails are available for hiking, horseback riding and other uses. Many of them are in need of heavy maintenance or reconstruction. They vary in quality from trails that were developed for intensive use to barely defined routes (French Trail)

There are approximately 120,000 acres of non-roaded land outside of wilderness that are in relatively large blocks These areas currently provide a wide variety of recreation in a primitive or semiprimitive environment

3.3.3
Other Recreational Areas

Several areas of unusual significance have been set aside to preserve their unique character and scientific features. Aside from these uses, visitors find these areas attractive for their primary or subsidiary recreational and educational goals. These areas are discussed in Section 3.20, Special Areas.

These natural resources, where special recognition or management may be justified, include groves of giant Sequoia, sensitive plants and areas of geologic or scenic interest. Sequoia/Kings Canyon National Park has identified more than 50,000 acres as having potential for recognition of natural history features. Designation of natural history features in the Forest should compliment, rather than duplicate, similar recognition or designation in National Parks and other National Forests

3.4
VISUAL RESOURCES

Few National Forests offer the range of scenic attractions found in the Forest. The Forest landscape is quite diverse, ranging from steeply rolling chaparral and

grass-woodland foothills to barren windswept crags on the Sierra Crest. The mid-elevations are characterized by steep-walled river canyons interspersed with gentler highly productive heavily forested areas. At the high elevations the knife-edged ridges, sharp peaks and steep-walled basins, frequently containing lakes, owe their form to the abrading action of glaciers. The steep-walled canyons and rolling topography of the lower elevations developed through water and wind erosion. Landscapes with the greatest variety of landforms, water features and vegetation are considered to be the most attractive. All Forest areas have been evaluated and placed into one of three landscape variety classes: distinctive, common or minimal The distinctive class accounts for 38% of the Forest, the common, 48%; and the minimal the remaining 14%.

The most important areas within each variety class are those frequently seen by persons appreciative of scenic beauty It is considered important that these areas have a more or less natural appearance The degree of natural appearance, together with the variety class, describe the quality of the visual resource An inventory of Visual Quality completed in 1979 found most of the scenic resource in good condition, Classes I, II and III Only 5% (about 70,000 acres) was found to be in fair to poor visual condition Nearly all of this area occurred on landscapes in the common or minimal variety class

3.5
WILDERNESS

The Forest has 527,938 acres in five designated wildernesses, including all or parts of the John Muir, Ansel Adams, Kaiser, Dinkey Lakes and Monarch Among these are some of the most and least popular wilderness areas in California, as evidenced by user data analyses.

Though recreation is but one of several objectives for which wilderness is established and managed, it receives the greatest use Alpine and subalpine areas are particularly attractive to wilderness visitors The high lakes, tarns, meadows and streams, bordered by rugged peaks overlooking expansive vistas, provide a setting that attracts a very high proportion of recreation use. Conversely, there are large portions of wilderness which lack these attractive qualities and receive little or no recreational use. Problems commonly associated with heavy use include lack of solitude, waste disposal, soil compaction, damage to vegetation and excessive numbers of old campfire rings

Heavy levels of wilderness visitor use required some controls Limits on group size and length of stay were implemented in 1970 User quotas have recently been established for entry points and certain travel corridors or zones. In the most congested areas, further user supervision and controls may be needed to mitigate or eliminate site damage and unsanitary conditions. On the other hand, there are many areas that are rarely visited, indicating a need for education about wilderness opportunities to encourage better dispersal of visitors.

3.6
WILD AND SCENIC RIVERS

The Kings and Middle Fork Kings Rivers, from their sources to Pine Flat Reservoir; San Joaquin, North and Middle Forks San Joaquin Rivers, from their sources to Mammoth Pool; South Fork San Joaquin River above Florence Lake; and Merced, North and South Forks Merced Rivers were inventoried in 1982 by the Department of Interior as free-flowing rivers that had potential for inclusion into the National Wild and Scenic River System. In November 1987, Congress designated portions of Merced, South Fork Merced, Kings, South and Middle Forks Kings as Wild and Scenic Rivers.

The majority of these river segments are located in steep-walled canyons where little or no management activity takes place. Several of the areas are in Wilderness. Designation of the San Joaquin Rivers into the system will have little effect on Forest management. Some issues concerning hydroelectric and mining development exist. These management activities may adversely affect wild and scenic river designation. Until Congress acts on these designated river recommendations, no management activities will take place that preclude designation.

This Forest Service analysis is a recommendation that may receive further review and possible modification by the Chief of the Forest Service, Secretary of Agriculture, and the President of the United States. Final decisions have been reserved by Congress to designate rivers to the National Wild and Scenic Rivers System. Classification and boundary decisions have already been finalized concerning the Merced and Kings Wild and Scenic Rivers

3 7
FISHERY RESOURCES

The Forest fish habitat includes 1,800 miles of streams and rivers, and 480 inventoried lakes. There is a diverse range of aquatic habitat types, from low elevation ponds in chaparral woodland to glacial tarns near granitic alpine ridgelines. Of the 1,800 miles of perennial streams in the Forest, 85% or 1,580 miles are estimated to contain fish, with rainbow trout as the dominant harvested species Of the total length of streams supporting fish, habitat conditions are estimated as 28.4% high quality, 53.9% medium quality, 13.3% low quality and 4 4% unknown Approximately 70% of the high and medium quality waters are located in wilderness areas.

Generally, habitat for trout are rated medium to high quality throughout the Forest The small portions (13.3%) identified as low quality habitat are either localized areas where livestock are breaking down streambanks, loggers are harvesting timber, utilities have hydroelectric power developments, recreationists are

highly concentrated or certain low quality channel conditions naturally occur This Plan provides measures that reduce conflicts between fish habitat and management of other resources.

The Forest's aquatic resources provide habitat for 31 species of fish. Only eight of the fish species occurring in the Forest are native These native fish, except rainbow trout and salmon are nongame and warmwater species Most Forest waters were barren of fish prior to man's transplanting activities starting in the late 19th Century. Currently Upper Kings River and a portion of South Fork Merced River are designated by California Fish and Game Commission as Wild Trout Streams. These river segments are managed without the introduction of catchable sized hatchery trout. Extensive interdrainage transplanting has resulted in the wide distribution of rainbow trout and other trout species.

Relative to streams and lakes in other parts of California, Sierra Nevadan streams are low in productivity, have a short growing season and exhibit wide ranges in seasonal flows Typically, Sierra Nevadan streams flow through varied and changeable habitats such as meadows, granitic outcrops, bedrock cascades and falls, open floodplains, dense coniferous stands, expanses of barren bedrock and riparian communities

Native fish of California, but not endemic to the Forest, are golden trout, Paiute cutthroat trout and Lahontan cutthroat trout. The two species of cutthroat trout are federally-listed threatened species that will be managed according to their respective Federal Recovery and/or State management plans, to avoid endangered status, and to assist in the complete recovery and delisting of the species. There are two populations of Paiute cutthroat trout and both are located in wilderness areas. Each population persists at a low but stable level which is a consequence of the naturally-occurring poor habitat of the occupied streams Opportunities to conduct major habitat improvement projects are very limited because of the difficulty of transporting equipment and materials, an operational restriction within wilderness areas There are no habitat improvement projects planned at this time. The two streams containing Lahontan cutthroat trout are in areas that have been intensively managed for timber. The Forest is conducting habitat improvement projects to help restore habitat in both drainages. Improvement measures such as reforestation, willow planting, fences to restrict livestock, check dams, gully plugs, road closures, road stabilization, and pool enhancement work has been done to improve conditions in the two drainages. Additional habitat improvement for these trout will continue as opportunities are identified.

Rainbow trout and brown trout are the most common and important fish used for recreation in the Forest. Catchable rainbow, brook and brown trout are planted by CDFG on a regular schedule during the recreational season in some Forest waters, usually next to developed campgrounds and arterial roads. The remaining Forest streams support self-sustaining populations of trout. Many wilderness area lakes are aerially planted with fingerling size trout. Natural reproduction is usually limited to lakes with accessible inflowing and/or outflowing streams for spawning.

Coldwater angling, expressed as visitor days, is used as an index of intensity and demand. During 1983, an estimated 215,300 visitor days were spent on coldwater fishing. The majority of angling occurs throughout the Forest in the mixed conifer zone. The large streams appear to be the most attractive to anglers, although an increasing number of anglers are discovering that small perennial streams also support abundant numbers of trout. Demand for coldwater angling is expected to increase 1-2% annually during the next five decades

There is limited opportunity to improve some of the streams with low quality aquatic habitat. Many of these sites are located in remote areas; habitats are small; summer flows are very low; and waters are nonproductive. About half of the streams with low quality habitat are in areas not subject to land and vegetation-disturbing activities, such as classified wilderness areas and steep rugged canyon streams. Low to moderate quality habitat, with the potential to improve from structural or non-structural management, is identified and prioritized annually for project completion. Approximately 100 acres or structures of fish habitat improvement is accomplished annually using this Plan.

Forest fish and wildlife management involves the following. (1) multiple use coordination with other functions, and (2) direct habitat improvement projects financed by (a) Protection and Maintainance (P&M) dollars, (b) Knudsen- Vandenburg (K-V) funds collected from timber sale receipts and/or, (c) other government or private sources, such as county fish and game fine collections, or short-term State proposition funds Habitat improvement projects are identified on a continuous basis and are prioritized for completion based on the potential risk or benefit to the resource

Extensive coordination with management of other resources, coupled with mitigation and enhancement measures, can achieve a moderate increase in fish habitat quality This Plan offers direction that is intended to enhance the Forest fishery resource

3.8
WILDLIFE RESOURCES

Variety in the Forest's flora and fauna reflects the variation in climate and terrain Typical Sierra Nevada species are present, including two endangered wildlife species, six sensitive wildlife species, and nineteen sensitive plant species. The distribution of these species across the Forest is dependent upon habitat which changes through plant growth and succession, natural processes and management activities through time.

NFMA and the Secretary of Agriculture's implementing regulations (36 CFR 219.19) require the selection of Management Indicator Species (MIS) and the evaluation of the effects of alternatives on the viability and diversity of plant and animal communities MIS is used to evaluate the effects of management on fish and wildlife resources Species selected shall include where appropriate:

1. Threatened and endangered plant and animal species identified on State and Federal lists.

2. Forest Service sensitive species.

3 Species with special habitat needs that may be influenced significantly by planned management programs.

4 Species that are commonly hunted, fished or trapped

5. Nongame species of special interest.

Population trends of MIS are monitored and relationships to habitat changes determined. Monitoring, where practical, is done in cooperation with State fish and wildlife agencies.

This plan provides for a viable population of all native and desired non-native vertebrate species and habitat contributing toward recovery of threatened and endangered species. Annually, approximately 2,000 acres or structures of wildlife habitat improvement is accomplished Federally-listed threatened and endangered habitat is improved at a rate of 20 acres per year. Direct habitat improvement projects are financed by (a) Knudsen-Vandenberg (K-V) funds collected from timber receipts, (b) Protection and Maintenance (P&M) dollars, (c) private sources such as sportmens clubs, garden clubs, Sierra Club and (d) other government sources such as county, fish and game collections, schools and state proposition funds.

3.8.1
Wildlife Species

The Forest provides suitable seasonal or year-round habitat for about 346 vertebrate species including 31 species of fish, 13 species of amphibians, 22 reptiles, 198 birds and 82 mammals.

At least seven species of game birds inhabit the Forest. These are band-tailed pigeon, mountain quail, California valley quail, blue grouse, mourning dove, wild turkey and waterfowl

Of the 82 species of mammals that occur in the Forest, 72 species are relatively common inhabitants. The remaining 10 species are uncommon or rare in occurrence. Nearly all common species are year-long residents. Mule deer, black bear, two species of cottontail rabbits and the two species of squirrels are game animals in the Forest. Mule deer represent the most important game species in the Forest. The Forest provides summer and winter range habitat for North Kings, San Joaquin, Huntington, Oakhurst and a portion of the Yosemite deer herds. Local herd populations have declined steadily since the 1950s and hunter efforts have decreased accordingly.

Sierra National Forest species which are classified endangered, threatened or sensitive according to the Endangered Species Act and the Regional Forester's Sensitive Species List include·

Endangered	Bald eagle, peregrine falcon.
Threatened·	Lahontan cutthroat trout, Paiute cutthroat trout
Sensitive:	California spotted owl, goshawk, willow flycatcher, marten, fisher, Sierra Nevada red fox and nineteen Sensitive plants.

The Forest provides habitat for nine furbearers which are harvestable species under State Fish and Game regulation. These are bobcat, coyote, mink, weasel, opossum, skunk, gray fox, raccoon and beaver. Seven sensitive furbearers are exempt from "take" under State Fish and Game regulations. These are wolverine and Sierra Nevada red fox which are listed by the State of California as threatened, and five fully protected species of concern· river otter, marten, fisher, ring-tailed cat and badger Four nongame species of mammals generate special management concerns because of their influence on timber management The species are the beaver, porcupine, mountain pocket gopher and Botta's pocket gopher.

Demand

Big game hunting and trout fishing are important activities in the Forest. Users are primarily from the local area, Los Angeles and the San Francisco Bay area Many recreationists seek wildlife to enhance their wildland experience in the Forest Many just want to observe and photograph wildlife. Consumptive and non-consumptive demands for fish and wildlife will increase with human population expansion, but it is anticipated that non-consumptive demand will expand or grow faster.

Endangered Species

Bald Eagle

The bald eagle is a federally-listed endangered species that inhabits the Forest during winter Wintering populations appear to be static at 5 to 10 individuals and are most commonly observed at Pine Flat Reservoir, Mammoth Pool, and Bass Lake. Less frequent sightings occur at Wishon, Shaver, Huntington and Redinger Lakes.

Bald eagles currently receive little special management attention because they inhabit the Forest during periods when conflicts with other management activities are limited The construction of large, low elevation reservoirs for hydroelectric power generation and flood storage has altered the "riverine" habitat with their once thriving anadromous fish runs, to a 'flat-water' reservoir habitat. The introduction of warm water fish populations provides a year-round food supply that at least partially compensates for the loss of winter salmon and steelhead as a food source. All major reservoir areas in the Forest provide roost structures for these birds. Little improvement of habitat for wintering bald eagles is planned because suitable roost trees are abundant near preferred lakes and reservoirs, and food supplies are currently adequate. Current management includes monitoring bird numbers during winter and coordinating protection of bald eagle roost sites with other resource management Formal consultation with the U. S. Fish and Wildlife Service is undertaken when eagles or their habitat may be affected by other resource management activities

Peregrine Falcon

The peregrine falcon is a federally-listed endangered species Endangered species status directs National Forests to protect critical habitat and participate in recovery efforts for listed species Sightings of peregrine falcons in the Forest are occasionally reported but successful breeding has not been documented for many years. Peregrine falcons nest on cliff ledges and protection of active nests should not conflict with other management activities. The Pacific Coast Recovery Plan for the American Peregrine Falcon (1982), indicates a population of 120 breeding pairs in California are necessary to remove the species from federal listing The National Forests of California are responsible for establishing and maintaining 60 breeding pairs to delist A goal of 3 nesting pairs, to contribute towards the recovery effort, has been established for the Forest . A reintroduction program which emphasized "hacking" was initiated in 1986 in cooperation with the Santa Cruz Predatory Bird Research Group. Peregine falcon chicks were successfully reintroduced into Kings River drainage in 1986, 1987 and 1988. Additional reintroduction efforts will be implemented in San Joaquin and Merced River drainages. The recovery efforts provide genetic interchange for birds being fledged from known eyries in Yosemite National Park and from successful recovery efforts conducted in Sequoia and Inyo National Forests.

Threatened Species

Lahontan and Paiute Cutthroat Trout

Two streams in the Forest support Lahontan cutthroat trout, and two additional streams are inhabited by Paiute cutthroat trout. Both species are federally-listed threatened species These species are discussed in the previous fishery resource section.

Sensitive Species

California Spotted Owl

California Spotted owls nest and forage within 1/4 mile of Forest streams in dense multi-storied mixed conifer, ponderosa pine, black-oak woodland and low-elevation red fir habitats. Nesting success is dependent upon the presence of nesting groves (dense canopy closure and high densities of multi-storied trees), and adequate forage or prey base, freedom from disturbance during the nesting season, adequate nest sites and favorable weather. The current estimated capacity for spotted owls in the Forest is determined to be 120 to 130 pairs They appear to prefer habitat at elevations from 4,000 to 8,000 feet during summer. There is some evidence that birds migrate downslope for the winter. A network of 29 SOHAs has been established in the Forest to maintain the existing spotted owl range through clusters of nest sites, spaced 6 to 12 miles apart and linked to networks of other Forests.

Current management includes maintaining an inventory to determine occupancy of network SOHAs, identifying potential alternate SOHAs, coordinating owl habitat requirements with other resource management and documenting nest site characteristics. Management plans for each SOHA are currently being prepared

Three strategies are available to manage the Forest SOHA network. They are: 1) no scheduled timber harvest, which includes 1,000 acres of currently suitable habitat plus 650 acres of replacement habitat, 2) even-aged timber management, which includes 1,000 acres of currently suitable habitat plus 1,650 acres of replacement habitat; 3) uneven-aged timber harvest, which includes 1,000 acres of currently suitable habitat plus 1,000 acres of replacement habitat. "No scheduled harvest" is adopted to assure the Forest meets the intent of the Regional requirements.

Goshawk

Goshawks nest widely in coniferous forest throughout the west They typically nest in older dense stands of mixed coniferous forest with slopes less than 60%, and within 1/4 mile of water sources. Nests are also found in the true fir and lodgepole pine conifer forest. The Forest has potential to supply suitable nesting and foraging habitat for 60 pairs, but historical populations are unknown. Nesting success is dependent on maintaining nest groves which are characterized by substantial canopy closure and high density mature trees, an adequate forage base, minimum disturbance during nesting season and suitable climatic factors. Populations are probably limited by amount and distribution of suitable nesting habitat.

Current Region 5 planning direction for goshawks suggests managing at least one nest territory for goshawks per 18 square miles of suitable habitat within the goshawk's existing range. Distance between nests are not

to exceed 12 miles and must provide at least 50 acres of suitable habitat for nesting. The 50 acres can be provided as one block around a known nest stand or two parcels of 25 acres each composed of the nest stand and alternate nest stand Because of current land allocations, the Forest predicts many goshawk territories will be larger than 50 acres Active nest sites are to take priority over areas of non-use, thinning should not occur in nest territories and timber harvest activity is to be excluded from areas during nesting.

Current management includes completion of goshawk inventory, inventorying suitable habitat for nest sites, monitoring selected nest sites for occupancy and reproductive success and coordinating nesting habitat requirements with other resource management.

Willow Flycatcher

The willow flycatcher is listed as a sensitive species in Region 5 This species is highly dependent on willow assemblages within mountain meadows or streamside areas Although a complete Forest inventory for willow flycatchers is lacking, a partial survey of the Forest in 1982 located 12 males (Serina 1982) Several additional individuals have been located on the Forest since 1982

Removal of critical willow assemblages by hydroelectric projects is reducing habitat for this species. In addition, preliminary field work by others suggest that livestock grazing near willow assemblages may be severely affecting willow flycatcher's breeding success.

Current management is to protect identified active nest sites through fencing or other means The Forest supports many montane meadows with willow assemblages, however, not all are suitable Completion of an inventory for the flycatcher will provide data for successful maintenance and enhancement of suitable habitat

Opportunities to expand local populations of willow flycatcher could include: 1) complete a forestwide inventory of montane meadows which support willow assemblages and determine suitability for nesting, 2) establish willow assemblages in select meadows which currently do not support willows, and 3) exclude cattle from specific meadows with active nests

Marten

The marten listed as a sensitive species in Region 5 is common in the higher elevation of the Sierra Nevada Habitat preference is mature and late seral stage forest, although they occasionally extend their foraging activities into meadows and talus slopes of the subalpine area during summer. Mature stands of timber are essential habitat, especially during winter. Because of this close dependency on forested habitat, marten distribution and abundance can be adversely affected by timber harvesting. Martens are nocturnal, seldom active during the day. They are solitary as adults and pair briefly during breeding season. A diversity of forest communities is not only beneficial to martens, but to other mammals, birds and other vertebrates. Martens favor high elevation basins dominated by fir, montane brush and Jeffrey pine - mixed conifer associations are generally avoided.

Habitat needs are met by providing 7 suitable sensitive furbearer habitat areas (62,140 acres) and habitat linkage (4,180 acres) between habitat areas, adjacent Forests and Yosemite and Kings Canyon National Parks.

Fisher

The fisher is listed as a sensitive species in the Forest Service's Pacific Southwest Region. It is an uncommon animal throughout its range and in the Forest prefers mid-elevation range from 4,000 to 8,000 feet. Habitat preference is similar to the marten which prefers multi-storied multi-species mature forest, late seral stage or large tree stages in dense mixed conifer, red fir and lodgepole pine habitat associations. They are active all year during day and night. The fisher is a solitary animal, roaming over a large home territory. It is as much at home in trees as on the ground It is a tireless hunter, searching for and pursuing prey on the ground, in burrows and in trees. They nest in tree holes, rock slides, hollow logs and snags.

Habitat needs are met by providing 7 suitable sensitive furbearer habitat areas (62,140 acres) and habitat linkage (4,180 acres) between habitat areas, adjacent Forests and Kings Canyon and Yosemite National Parks.

Sierra Nevada Red Fox

The Sierra Nevada red fox occurs in vegetation types similar to the marten and wolverine. They are found in red fir, lodgepole and sub-alpine and alpine dwarf shrub habitats, which occur in the Forest above 7000 feet. The Sierra Nevada red fox prefers open areas for hunting, such as meadows and open forest stands. (See Marten for additional information)

Other Species of Concern

Osprey

Ospreys are year-round residents in the Forest. Information regarding local osprey population levels is limited. One pair has traditionally nested at Bass Lake for many years. Observations of osprey have been recorded at other areas in the Forest, however, no other breeding pairs have been documented It is assumed that increased human disturbance, impacts to riparian forest in the San Joaquin Valley, reduction of anadromous fish runs and introduction of pesticides into the food chain have all contributed to the relatively low numbers regionally and locally. Construction of large, low-elevation reservoirs for hydroelectric power

generation altered "riverine" habitat, with their once thriving salmon and steelhead runs, to a "flat-water" reservoir habitat. Introduction of warm water fish populations provides a year-round food supply that at least partially compensates for loss of winter salmon as a food source for both ospreys and bald eagles. All major reservoirs in the Forest provide suitable trees for construction of nests

Opportunities exist to enhance and increase nesting habitat which include installation of artificial nest platforms, and/or topping off select, suitable mature trees to provide a more natural looking nest platform.

Wolverine

The wolverine is listed as threatened by the State of California Literature indicates the wolverine is uncommon in the Sierra Neveda and historically was never present in large numbers in the State. The wolverine inhabits "high country", mostly near or above timberline and wanders over a very large home range on both sides of the Sierra crest. The optimum habitat preferred by the wolverine is large tree stages with moderate to dense canopy in red fir and lodgepole pine forest and alpine meadows. The wolverine does not hibernate even during the coldest weather and spends most of its time in search of food. They are solitary hunters as adults and pair briefly during the mating season. They excavate a "den" or burrow under shelving rock or in logs, caves or snags.

Presently, Wilderness, RNAs and SOHAs contain the largest areas of suitable wolverine habitat consisting of mature and late seral stage forest with abundant snags, down logs and prey species

Harvest Species

Mule Deer

Mule deer are the most important big game species in the Forest Yosemite, Huntington, Oakhurst, San Joaquin and North Kings are the principal deer herds. Although a few animals occupy winter ranges throughout the year, each herd is predominately migratory. The Forest provides the majority of summer and winter range for the San Joaquin, Huntington and North Kings herds. The Forest also provides most of the summer range for the Oakhurst herd and a portion of winter range for the Yosemite herd.

CDFG data suggests deer population in the Forest, like many west-slope herds, has declined from a peak of approximately 35,000 to 40,000 in the mid-1950's to a current estimated low of 6,000 to 7,000 deer. Although the reasons for decline are not completely understood, predation, habitat degradation and loss, poaching, antlerless harvests and drought are thought to have influenced herd size The Forest and CDFG have cooperatively prepared deer management plans that set deer population goals. These plans are dynamic and flexible, and can be changed over time in response to changing conditions and trends. The Forest is expected to provide its proportional share of habitat to meet these deer herd goals. Deer herd management plans for the Forest herds establish target population levels that are less than the peak populations of the 1950's, but are higher than current levels Target levels for the Oakhurst (3,200), San Joaquin (5,500), Huntington (1,200), Yosemite (9,000) and North Kings (7,800) herds are roughly the same as populations during the early 1960's

Opportunities to help meet herd population goals include modifying, in the commercial forest zone, harvest unit sizes and reforestation practices in identified deer population centers and holding areas In addition, an ongoing habitat improvement program includes meadow enhancement, forage seeding and prescribed fire. Modification of road use in critical areas is also underway. Additional habitat enhancement schemes include broadening the low elevation front country prescribed fire program, regulating road use, providing more thermal and hiding cover, changing amount and distribution of seral stages, providing more roadside vegetation screening, and prescribing timber management activities to accommodate deer habitat objectives in summer range.

Resident Trout

Rainbow trout and brown trout are the most common and important fish used for recreation in the Forest. Catchable rainbow, brook and brown trout are planted in some Forest waters, usually next to developed campgrounds and arterial roads, by CDFG on a regular schedule during the recreational season. The remaining Forest streams support self-sustaining populations of trout. Many wilderness area lakes are aerially planted with fingerling size trout Natural reproduction is usually limited to lakes with accessible inflowing and/or outflowing streams for spawning

The majority of angling occurs throughout the Forest in the mixed conifer zone. The large streams appear to be the most attractive to anglers, although an increasing number of anglers are discovering that small perennial streams also support abundant numbers of trout.

Two streams in the Forest have been designated by the California State Fish and Game Commission as wild trout streams. These streams are the Kings River above Pine Flat Reservoir and the South Fork Merced River in Mariposa County.

3.8.2
Forest Diversity

Managing for diversity is important for provision and maintenance of. 1) ecosystem stability, 2) biological variety, 3) fish and wildlife habitats, and 4) aesthetic values. Diversity generally refers to the relative degree of

abundance of wildlife species, plant species, plant and animal communities, habitats, or habitat features per unit of area

Diversity is evaluated according to three components: richness, evenness, and pattern

Richness - includes the number of different kinds of elements found within the planning area. Examples are individual species, plant communities, vegetative seral stages, and special habitat components such as snags, cliffs, hardwoods, and dead and down material.

The three broad ecosystems in the Forest are conifer forests, hardwoods and chaparral. Included within these ecosystems are riparian and grass vegetation types. All of the vegetation types, their successional stages, and their localized, special components, such as caves, talus slopes, rock outcrops, snags and down logs, provide habitat for a diverse array of fish and wildlife species.

The diversity of habitats in the Forest helps provide for the needs of about 346 species either seasonally or on a year-round basis The wildlife includes 198 species of birds, 82 species of mammals, 22 species of reptiles, 31 species of fish, and 13 species of amphibians

Three major coniferous forest types grow in the Forest including mixed conifer, ponderosa pine/Jeffrey pine, and red fir/white fir. Other conifer forest types include lodgepole pine, digger pine and subalpine forest. The total forested acreage in the Forest (productive forest with potential to provide at least 10% crown closure) is 562 9 M acres, which is 44 percent of the total land base.

While there are only three major coniferous forest types, these types are comprised of many different species with one species usually dominating. There are 15 different coniferous species occurring in stands throughout the Forest

Broad-leafed trees comprise the hardwood ecosystem of the Forest Hardwoods can be broken into several types: blue oak, black oak, live oak, and riparian woodlands Hardwoods can be found among the mixed conifers and ponderosa pine types. Common species include blue oak, black oak, canyon live oak, and big leaf maple.

Black oak is found in pure stands or in association with conifers, usually appearing as a successional stage of a conifer type Black oak is an extremely important hardwood type for wildlife. Canyon live oak is the most common species found in live oak woodlands. Interior live oak is another species found in the Forest Both canyon and interior live oak occur on steep, rocky slopes Over the years, cone-bearing trees, primarily white fir, incense-cedar, ponderosa pine, and sugar pine have effectively competed with black oak. There are areas throughout the Forest where the conifer species have grown over the crowns of the black oaks. This trend can be reversed by selectively harvesting softwoods or by starting the successional process over with regeneration harvests Wildfire has the same effect.

The riparian woodland grows where water runs intermittently or year-round. The most common species are alders, cottonwoods, and willow. An estimated 155,000 acres of riparian habitat is scattered throughout the Forest.

Chaparral also occurs throughout the Forest. A detailed description of the chaparral ecosystem is found in the Chaparral Section of this Chapter.

Approximately 80,200 acres of chaparral habitat occur between 2,000 and 4,000 feet in elevation in the Forest. This habitat is composed of dense stands of shrubs with little or no herbaceous understory. About 160 wildlife species either live full time in chaparral or use the habitat while migrating to and from higher elevation habitats. The Forest prescribes burning programs to rejuvenate brushfields for both game and nongame species that average about 2,000 acres per year. Recent wildfires have burned about 10,000 acres of this habitat increasing diversity of grasses and forbs for wildlife use.

Approximately 21,500 acres of annual grassland habitat comprised of a variety of annual grasses and forbs occupy lower elevations of the Forest About 200 species are potential inhabitants of this habitat but few remain in it during their entire life cycle. This habitat can be improved for range and wildlife by periodic prescribed or natural fire. There are also about 5,100 acres of wet meadows.

In addition to the vegetated land, there are about 258.1 M acres of barren land comprised of rock or water.

Evenness - is the relative abundance of animals, habitat types, successional stages, and cover classes within the planning area Evenness describes the relative extent to which the proportional abundance of these elements is uniform.

Evenness of both plant and animal communities can generally be approximated by the proportions of the Forest within each vegetation type. Table 3 01 shows the proportions of each major combined Forest vegetation type and provides a good estimate of evenness from a broad perspective. This Figure shows that 64 percent of the Forest is in the conifer vegetation type, 8 percent is occupied by hardwoods, 6 percent chaparral, 2 percent grass, and 20 percent is either barren rock outcrops or water.

TABLE 3.01 - MAJOR VEGETATION TYPES BY PERCENT

Vegetation Types	Percent
Conifer Forest Type	64
Non-vegetated Land	20
Hardwood	8
Grass	2
Chaparral	6
Total	100

Individual vegetation formation may be further categorized, based on plant size and density to evaluate the evenness component of plant diversity This is referred to as "seral stage diversity".

Six wildlife habitat relationship (WHR) seral stages are identified. The current distribution of acres by seral stage and vegetation type found in the Forest is displayed in Table 3 13 of FEIS.

Conifer forests are the most dominant Forest vegetative formation. They mostly include mature trees over 50 feet tall with canopy closures that vary from 10 to 100 percent. Numerous species make up the conifer forests' ecosystem, and each has environmental parameters that effect its range and location

Presently, an estimated 9 percent of the Forest vegetation is in grass/forbs/shrubs seral stage, 4 percent in pole/medium seral stage and about 87 percent large tree seral stage Approximately 8 percent of the vegetation is in hardwood stands including blue oak and annual grass, digger pine and live oak, and black oak woodland.

Pattern - is the structural (vertical pattern) and spatial characteristics (horizontal pattern) of the different elements, e g., vegetation layers, patch size and shape, and the spatial distribution of plants and animals adjacent to each other within the planning area.

The existing pattern of vegetation types, seral stages and special components vary widely across the Forest. The predominant areas of hardwoods occur in three locations: (1) at the lower elevations where there is scattered blue oak with an annual grassland understory, (2) between 500 and 2,000 feet in elevation where there is digger pine and live oaks with a shrub, annual grass and forbs understory, and (3) on the Mariposa Ranger District where there are dense to open stands of black oak in small scattered tracts within ponderosa pine/mixed conifer habitats. Concentrations of shrubs referred to as chaparral occur between 2,000 and 4,000 feet in elevation in a relatively narrow band separating the front country from forested areas. Of the productive forested land, approximately 142 M acres have been withdrawn from timber production because of wilderness designation. These timbered areas include lodgepole pine, ponderosa pine, red fir, and mixed conifer habitats. Approximately 70 percent of the productive forested timber land is classified as tentatively suitable for timber production and 30 percent as unsuitable for timber production. In addition, the Limited-Timber Yield Prescription includes long rotations that provide for mostly late seral stage habitats. The combination of unsuitable timber land and Limited-Timber Yield Prescription allows for interspersion of intensively and extensively managed lands

The size and location of the Forests' broad ecosystems will not change over time. Even the size and location of vegetation types will not change significantly Within these types, wildfire and man, primarily through timber management activities and prescribed burning, alter the amount and pattern of structural diversity This alteration of habitat is important to wildlife in providing a continuous rejuvenation of forest vegetation Man has limited control over wildfire but can manage for a variety of successional stages using prescribed burning activities

3.9
RIPARIAN AREAS

Riparian areas, deciduous zones within the Forest, are one of the most important wildlife habitats. Unique vegetation associated with riparian zones results in wildlife activity that is disproportionately higher than other habitats Timber management, recreational *development, hydroelectric projects, and livestock* grazing can reduce riparian values. This Plan includes numerous standards and guidelines to protect riparian areas. Timber in RMAs will only be harvested to improve the riparian ecosystem or remove incidental timber for skyline corridors and roads.

Mountain meadows are similar in wildlife importance to riparian deciduous habitat. The principal management activities that occur in and around mountain meadows are also the same as those listed for riparian habitats The Plan offers direction for protecting meadows.

3.10
SENSITIVE PLANTS

The Endangered Species Act of 1973 mandates the Forest Service to conserve threatened and endangered plant species. As a Federal agency, the Forest Service must ensure that all actions authorized, funded, or carried out by the Service do not jeopardize continued existence of threatened and endangered species or result in destruction or modification of their critical habitat

The Forest contains about 2,000 species of plants occupying habitats ranging from low-elevation foothills to high, sub-alpine Sierra Nevada crests. Of this total, 19 species are considered sensitive and are listed by the Regional Forester as requiring special management attention. Since 1978, the Forest has conducted sensitive plant inventories. As a result, 29 sensitive plant species have been removed from the Forest's original 1978 list These delisted species were proven to be more abundant or widespread than previously believed, are not

threatened by management activity, or were found not to occur in the Forest. The Regional Forester's list includes only those species known or reported, or highly suspected of occurring on National Forest land in California It is subject to change, (both additions or deletions) as new data are obtained, taxonomic problems are clarified or as revisions to the source documents are made.

Distribution of each sensitive plant species is unique, both geographically and ecologically. Management of our sensitive plants must be done on a case-by-case basis due to specific locations, potential threats and ecology of each species Current Forest Service policy and direction as previously stated is in accordance with the Endangered Species act of 1973. The harshness, remoteness and innaccessibility of sites on which some species occur does provide some measure of protection from land disturbing activities.

The nature of the knowledge base for sensitive plants *requires the list to be updated as new information* becomes available. Past inventories on the Forest indicate a net reduction of sensitive plant species As the Forest inventory (and inventories of adjacent public lands) reaches completion, we can expect further deletion from or addition to the sensitive plant list. Currently, the Forest inventory is of a resolution that enables prediction of potential habitat and occurence on any given project.

Sensitive plants are generally not a significant constraint on outputs in the Forest because they typically occur in locations that do not conflict with commodity resource management In most cases, ecological requirements for most of these taxa are not associated with the best timber producing areas, they occur in scattered locations, and generally are few in number. Some sensitive plants occur in very rocky habitats, while others occur in chaparral ecosystems. Conflicts with other resources are predicted to be few. Collomia rawsoniana (Greene), a Forest endemic with a limited range, occurs in riparian habitats, and has potential to constrain timber outputs within its range Proposed hydroelectric development projects within its range will also be affected.

Below is a complete list of sensitive plants occurring in the Forest. The Forest will pursue status determination and long-term protection of all sensitive plants. Currently, sensitive plant surveys and field investigations are conducted prior to any ground disturbing activity in areas where they are known or suspected to occur. Avoidance or mitigation measures are included in project plans and Environmental Assessments.

Generally, sensitive plants in the Forest fall into three broad categories. They are

(1) Plants rare, but found in sufficient numbers and distributed widely enough that potential for extinction is low at this time.

Golden annual lupine *	Lupinus citrinus
Bolander's clover	Trifolium bolanderi
Unexpected larkspur	Delphinium inopinum

(2) Occurrence of plants confined to several populations or one extended population.

High Sierra evening primrose *	Camissonia sierrae ssp. alticola
Rawson's flaming trumpet *	Collomia rawsoniana
Congdon's sunflower **	Eriophyllum congdonii
Many-flowered fawn lily *	Erythronium pluriflorum
Yosemite ivesia	Ivesia unguiculata
Tree anemone * **	Carpenteria californica

(3) Occurence limited to one or a few highly restricted *populations Very little information is known, or present* in such small numbers that it is seldom reported.

Yosemite onion **	Allium yosemitense
Two-lobed clarkia *	Clarkia biloba ssp. australis
Merced River clarkia * **	Clarkia lingulata
Tompkin's sedge **	Carex tompkinsii
Mariposa annual pussypaws	Calyptridium pulchellum
Congdon's bitterroot **	Lewisia congdonii
Muir's raillardella	Raillardella muirii
Tehipite jewelflower	Streptanthus fenestratus
Tehipite buckwheat	Eriogonum pratteniarum var. avium
Kings River buckwheat *	Eriogonum nudum var regirivum

At this time, there are no plants in the Forest which are federally-listed as threatened or endangered. Merced River clarkia, Yosemite onion, Congdon's eriophyllum, Congdon's bitterroot and Tompkin's sedge are listed as "rare" by the State of California pursuant to Section 1904, Fish and Game code (Native Plant Protection Act). Tree anemone was recently listed as threatened by the same State agency. A species management guide has been prepared and approved and an Interagency Agreement has been established between the Forest Service and USDI Fish and Wildlife Service for Rawson's flaming trumpet (a Forest endemic species). This management plan and agreement affect Forest management within the range of the species, especially within designated essential habitat. A species management guide has been approved for Merced River clarkia. Additional Species Management Guides will be prepared in the future for all Forest sensitive plants as ecological and management information becomes available or is developed.

* These eight sensitive plants are endemic to the Sierra National Forest.
** These sensitive plant species are officially listed by the State of California.

3 11
RANGE

Annually about 37,000 AUMs of grazing are realized in the Forest The largest amount of forage is grazed by cattle with a significant portion used by recreation pack and saddle stock, commercial outfitter operations and Forest Service administrative stock. Presently, sheep are not grazed in the Forest. About one-third of the primary range area is located below 4,000 feet in the annual grass forage zone The balance is composed mainly of widely scattered, wet and dry meadows at higher elevations and transitory range in the commercial forest zone. Grazing capacity of meadow areas is generally fully obligated, with little or no opportunity for increased use. However, significant increases in grazing is possible in the lower elevation annual forage zone, by taking advantage of surplus forage generated through the chaparral management program, and by implementing improved systems of grazing

Condition and trend measurements from past years indicate most primary range lands are in fair or better condition, with an improving trend. In past years poor conditions resulted from overuse. Trifolium bolanderi is a sensitive plant which occurs in meadow habitats. It has been grazed by both sheep and cattle for over 100 years Pacific Southwest Experiment Station has initiated a five year study to determine the effects of defoliation, including the effects of livestock grazing. Of the limited rangeland in poor condition, monitoring has indicated that some soils are incapable of supporting increased forage production, even with special treatment.

Allotment Management Plans will be used as the vehicle for ensuring protection of riparian areas from livestock impacts Continued utilization of positive measures such as salting, herding, water developments, fencing, and riding when the opportunities exist, will be used to improve livestock distribution and minimize impact to riparian areas. If mitigation is unsuccessful in preventing unacceptable resource damage to riparian habitat, as a last resort, measures will be taken to reduce or eliminate livestock use in affected areas

3.12
TIMBER

The forested land base, prior to analysis for capability, availability and suitability is about 563,000 acres. Timber land occurs in four major forest types ponderosa pine, mixed conifer, red fir and subalpine.

Ponderosa pine, ranging from 2,500 to 3,500 feet in elevation, occurs in pure stands or with varying mixtures of incense cedar and hardwoods. The average timber site is Dunning Class II, productivity ranging from 85-119 CF/acre/year

Mixed conifer, composed of mixtures of ponderosa pine, Jeffrey pine, sugar pine, white fir and incense cedar, dominates the mid-elevation zone up to 6,000 feet. The average timber site is Dunning Class II, productivity ranging from 85-119 CF/acre/year.

Red fir, dominant at the 6,000-8,500 foot level, is found in pure stands or in mixtures with white fir. Sugar pine, Jeffrey pine and lodgepole pine also occur in this forest type. The average timber site is Dunning class III, productivity ranging from 85-120 CF/acre/year.

Subalpine forest, present above 8,500 feet, is characterized by stands of lodgepole pine interspersed with occasional stands of western white pine, mountain hemlock or white bark pine. Average timber site is Dunning Class V, the least productive category in the forest.

Located in the foothills below 2,500 feet is a fifth forest type, hardwood-grassland, which yields an occasional fuelwood harvest

The tentative available and suitable timber land is 393,700 acres This is all forest land outside of Wilderness areas, except for 18,600 acres of forest land not deemed capable of producing above 20 CF/acre/year or not assured of being restocked within five years. The Forest Plan advocates that timber management should be practiced on 328,900 acres These acres are further subdivided into three regulation classes. Regulation Class I land, containing 107,100 acres, are managed for full-timber production. Regulation Class II land, with 65,100 acres, are managed for modified-timber production. They include key deer areas and partial retention visual quality areas Regulation Class III land, applying to 156,700 acres, are managed for limited-timber yields They include unstable soils and retention visual quality areas. Also, there are Regulation Class IV land, containing 64,800 acres, managed to provide custodial protection with no planned timber harvest.

The average annual number of acres to be regenerated within this planning period is 2,970 Intermediate and selection harvest will occur on an additional 4,400 acres. Total annual yield is estimated to be 88.0 MMBF.

Two management methods are used to regulate harvesting of timber resources, uneven-aged and even-aged management. Uneven-aged management results in trees of different ages intermingled throughout a stand. Even-aged management results in trees in a stand being essentially the same age. The current Timber Management Plan prescribes even-aged management, but both methods are used. Considering silvicultural characteristics of the trees, composition and condition of the various kinds of timber stands and uncertainties of uneven-aged management, even-aged management appears most capable of sustaining optimum yields into the future.

Timber from this Forest and adjacent National Forests is the only long-term supply for the local wood products industry. This Forest provides 20 to 25% of the lumber manufactured in the San Joaquin Valley. Interest in biomass as an energy source is increasing. Annual demand for woody material for home heating purposes has decreased slightly over the past 2 years, with an estimated 23M cords of wood being removed from the Forest.

3.13
INTEGRATED PEST MANAGEMENT

Insects, diseases, plants (weeds) and animals can cause damage that interfere with attaining management goals When they do, they are considered pests and are managed under an integrated pest management approach This approach can include regulatory, biological, chemical, mechanical and silvicultural treatments. Vegetation management along with salvage and hazard tree removal offers the best opportunities to reduce pest impacts, which are currently at relatively low levels in the Forest

3 14
SOILS

Current management is directed toward implementing practices designed to retain soil stability and maintain site productivity Direction is also to maintain a watershed monitoring effort which evaluates effects of ground disturbing projects. Monitoring determines if soil management objectives are achieved, and if productivity of the soil resource is not substantially or permanently impaired

Approximately half of the Forest soils have developed in place from granitic rock while the remaining half is divided between metamorphosed, sedimentary rocks, glacial deposits or volcanic flows

According to the soil survey of the Forest, soils can be divided into four productivity groups: high, medium, low and unproductive There are 200,500, 350,000 and 272,000 acres, respectively. Remaining Forest acres fall into the unproductive category.

Productivity of forest soils can be lost through erosion, displacement or compaction

3.15
WATER

Nearly all of the 2 6 million acre/feet of water yielded from 28 National Forest System Watersheds in the Forest are used off-Forest for irrigation in the San Joaquin Valley. Currently, the total use of water in the Forest is about 5,985 acre/feet. An additional annual need of 867 acre/feet is projected.

The most important uses of water in the Forest are nonconsumptive and include lakes, streams and reservoirs that provide fishing, swimming, boating and other water-related activities. Presently, 19 hydroelectric projects are operating. Two projects are in the process of FERC relicensing, and five projects are proposed and in the planning process Although hydroelectric power production is considered a nonconsumptive use, annually about 41,000 acre feet is lost to evaporation from reservoir surfaces.

Currently, 98% of the water from the Forest meets State and Federal water quality objectives Increases in land disturbing activities, such as timber harvesting and road building, increase the potential for lowering water quality Water quality is still preserved by the application of Best Management Practices.

About 452 acres at 58 specific locations are identified as needing watershed rehabilitation.

Present management direction specifies a minimum riparian protection zone of 100 feet on each side of all perennial streams, standing bodies of water and wetlands. Approximately 155,000 acres of Riparian Management Area are located within the Forest. Intermittent and ephemeral streams are managed under Streamside Management Zone procedures

The Streamside Management Zone (SMZ) concept prescribes the BMP needed to meet water quality objectives. SMZs are discrete areas adjacent to streams or lakes that are managed primarily to meet water quality objectives. Riparian areas along streams are included within the Streamside Management Zone SMZs help protect water quality and riparian areas and are delineated based on stream class and associated sideslope gradient. The SMZ determination process is described in FSH 2509.22 Sierra Supplement #1. (See Appendix V in FEIS)

TABLE 3.02 - SMZ WIDTH (FEET) BY STREAM CLASS, GROUND COVER AND SLOPE GRADIENT

Stream Class	Percent Cover	(Percent sideslope)				
		30	40	50	60	70
		(Total width in feet)				
I	50	100	130	160	190	220
II	50	75	105	135	165	195
III	50	50	80	110	140	170
IV	50	25	45	65	85	105
V	50	Variable				

Opportunities to significantly increase water yields to meet off-Forest demand are limited. Increases can be realized from vegetative modification projects, such as converting brush and trees to grass The best opportunities for increasing water yield occurs in highly productive timber areas. The maximum yield that can occur, assuming vast areas are clearcut, is 2.7 MM

acre/feet annually, or approximately 5% over base year yield As trees return to the site, water yield will decline to its original amount over a 50-year period.

3.16
MINERALS

About 180 reported deposits and/or prospects containing minerals of potential economic value occur within the Forest Nearly all of these prospects have been explored and some have been past producers. Strawberry tungsten mine and a few gold mining operations in the Merced River area are currently being explored or are in production. Seven minerals are on the National Critical Minerals list. Laws and regulations pertaining to mining are summarized in Appendix M of the FEIS.

A number of mineral withdrawals occur within the Forest Withdrawals protect administration, recreation, natural history sites, experimental areas and scenic corridors from impacts which might be generated by mineral entry and development. In 1984, mineral entry rights for 527,938 acres were withdrawn in wildernesses formally classified under the 1964 Wilderness Act Currently 550,628 acres are not open to mineral entry. PL 94-579, passed November 21, 1976, requires a Congressional Review and Rejustification of all withdrawals, except those previously approved by Congress.

3.17
LANDS

The Forest's administrative boundary encloses 1,395,553 acres, of which 109,493 acres are non-federal. The private holdings were patented under various laws, such as Timber and Stone Act, Homestead Act or 1872 Mining Act. The pattern of private holding is generally irregular and scattered along the Forest's western boundary at the lower and mid-elevations

Approximately 1,000 miles of property lines require marking and posting to acceptable standards and about 3,500 property corners need to be monumented. Opportunities to consolidate holdings are diminishing due to accelerating fragmentation of private land for recreational homes, urban-type developments or speculation.

There are about 475 land use permits. Since 1977 an average of 45 new permits each year have been issued. This rate is expected to continue over the next several years Most permits have been generated by power projects or private residential developments for roads, water transmission and power and telephone line rights-of-way In addition, about 25 short-term permits are issued each year for apiaries, movies, television shows and other purposes

The objective of the Forest's land adjustment program is to acquire or exchange land which helps to consolidate scattered parcels for more efficient management. This will reduce management costs, facilitate protection, development, and management of Federal and adjacent non-Federal lands, and increase production of resource commodities

3.18
HYDROELECTRIC DEVELOPMENT

The Forest contains ideal terrain and climatic conditions for development of hydroelectric resources and therefore, ranks high in planning considerations of future developments by power companies.

There are 19 major projects providing an installed capacity of 2,300 mw. An additional generator of 35 mw capacity is being installed in Powerhouse No. 3 in the Big Creek complex. The Kerckhoff Project, with the powerhouse located outside Forest boundary, has an installed capacity of 34 mw.

There are 9 potential major hydroelectric projects for which preliminary permits are on file with FERC. Their final project boundaries will include an estimated 16,000 acres if all nine projects are constructed. Numerous minor projects are proposed throughout the Forest that may yield additional 5 mw.

For the 9 proposed projects, no transportation or utility corridors are identified or designated. If concentrations of existing and/or planned facilities dominate the use and management of an area, the need to formally designate corridors will be re-examined

The processes currently being followed in hydroelectric developments are given in Appendix O of the FEIS. Over 150,000 acres of the Forest's land are encumbered with power withdrawals. Typically, large tracts of land are withdrawn to protect power values for potential projects. However, the area needed to operate and maintain a project, once constructed, is considerably less than the original withdrawal. The excessive amount of withdrawn land hinders Forest management by requiring that easements, ingress-egress grants or land exchanges, be executed only after FERC finds that power values are not impaired. It appears that over 120,000 acres of withdrawals are excess to the amount of land needed to accommodate existing and potential hydroelectric projects.

3.19
CULTURAL RESOURCES

Cultural resources include archaeological, historical and architectural sites and data of value to ethnic groups. Because of Federal legal protection, cultural resources are considered a nonrenewable resource and receive special attention in planning and conducting Forest activities.

The Forest contains much evidence of the original habitation of this area by Native Americans, and later use by early timber, grazing, hunting, trapping, homesteading and exploration activities. Over 3,000 sites have been identified, but probably not more than 10% of the Forest has been reliably inventoried

In the past, remoteness of National Forest land provided protection to cultural resources. With improved access and increasing use, damage to areas and items of historic and scientific interest has increased significantly. As a result, the Forest Service has begun an active program of cultural resource management. This program integrates cultural resource management with other multiple use management. Three objectives have been identified to assist the Forest in integrating cultural resource management with other multiple use management. These are 1) meet legal requirements for inventory, evaluation and interpretation of cultural resources, 2) assist local Native American communities in continuation and enhancement of their cultural traditions, and 3) interpret culture history of the Forest for the public. To accomplish this, the Forest needs to manage and protect cultural resources from damage. Activities and natural occurrences that can damage properties need to be monitored, and, if necessary, preventive and mitigative measures taken.

A cultural Resource Overview has been prepared This report discusses archaeology, ethnography, and history of the Forest. Major deficiencies in the cultural resource data base are also identified. Current and future work are directed toward answering questions important for removing these data deficiemes.

Most of the inventory and evaluation of cultural resources has taken place within the timber management zone. Little inventory has taken place in management areas such as Wilderness, although such areas will require increased cultural resource management emphasis in the future.

Avoidance of cultural resources is preferred, however, a system of mitigation is available for situations where impact cannot be avoided

3.20
SPECIAL AREAS

Existing and potential special areas in the Forest are described in this section. In most cases, special areas are administratively designated (in contrast to legislative designations, such as Wilderness or Wild and Scenic Rivers) to be set aside or protected for a specific purpose.

3.20.1
Special Interest Areas (SIA)

An SIA is designated because of its unusual or outstanding scenic, cultural, scientific, natural or other unique characteristics meriting special attention and management. They are managed to protect resources and, where appropriate, foster public uses and enjoyment of their significant values. Presently, there are three designated SIAs in the Forest - Courtright Intrusive Contact Zone Geological Area, Kings Cavern Geological Area, and Carpenteria Botanical Area. These three areas and some additional areas which are considered for designation as special interest areas are briefly described here

Existing:

a. Courtright Intrusive Contact Zone Geological Area - This 11 acre area, located along the crest of a barren ridge, contains a variety of bedrock features characteristic of intrusive granite contacts in the Sierra Nevada Range. It is located at the south end of Courtright Reservoir on Helms Creek Tributary to North Fork Kings River.

b Kings Cavern Geological Area - This is a network of caverns and related features within a marble unit covering 388 acres of the Lower Kings River Roof Pendant. It is accessible by a trail and is located south of Wishon Reservoir along North Fork Kings River.

c Carpenteria Botanical Area - This 500 acre area was established for protection and study of the sensitive plant, Carpenteria californica. The area is located along Highway 168 near Big Sandy Bluff.

Established:

a Nelder Grove Historical Area - This 1,434 acre area was set aside in 1972 for preservation of giant Sequoia. The area is located 2 miles east of Sugar Pine on Highway 41. It is also rich in early logging history and prehistoric habitation.

b. McKinley Grove Botanical Area - This 520 acre area was set aside in 1963 for preservation of giant Sequoias. The area is located 12 miles southeast of Shaver Lake in the vicinity of McKinley Grove Campground and picnic area.

c Dinkey Creek Roof Pendant Geological Area - This 640 acre area is located east of the town of Shaver Lake It represents a metamorphosed remnant of sedimentary rocks predating intrusion of Sierra Nevadan granitic bodies Five different rock types are exposed, revealing details of folds and faults resulting from mountain-building episodes.

d. Devils Peak Botanical Area - This 1,600 acre area is located just north of Signal Peak Lookout. It will be established for the protection and conservation of three sensitive plants; Yosemite onion, Congdon's wooly sunflower and Congdon's bitterroot.

3 20.2
Research Natural Areas (RNA)

Establishment of RNAs recognizes the need to promote and protect natural diversity in all forms RNAs typify important forest, shrubland, grassland, alpine, aquatic, and geologic types and other natural conditions that have special or unique characteristics of scientific interest and importance RNAs are for non-manipulative research and education. There are two designated RNAs in the Forest; Backbone Creek and San Joaquin Experimental Range Two additional areas are recommended for classification; Bishop Creek Pacific Ponderosa Pine and Home Camp Creek Red Fir/White Fir.

RNAs serve many purposes including: 1) opportunities for the study of plant succession and other biological and physical phenomenon over long periods of time, 2) a baseline data source for monitoring changes in natural processes and systems brought about by man's activities, and 3) "benchmark" values to aid managers in their resource management activities

Existing

a. Backbone Creek RNA - This 430 acre area is located near the Carpenteria Botanical SIA and was designed for protection and study of Carpenteria californica

b San Joaquin Expermental Range RNA - This 80 acre parcel lies within San Joaquin Experimental Range, approximately 20 miles north of Fresno along Highway 41. It is dedicated to research of the blue oak-digger pine ecosystem

Recommended:

a. Bishop Creek Pacific Ponderosa Pine RNA - Containing 1,400 acres, this RNA will be dedicated for research of the Pacific Ponderosa Pine ecosystem. It is located between South Fork Merced River and Yosemite National Park.

b Home Camp Creek White Fir - Red Fir RNA - This 1,200 acre area will be dedicated for research and study of the red fir/white fir ecosystem. It is located within Kaiser Wilderness.

3.20.3
Experimental Forest

Experimental forests occur throughout the National Forest System for field studies and demonstrating forest management practices The 3,200-acre Teakettle Creek Experimental Forest, located 4 miles southwest of Wishon Reservoir, was designated in 1955 for watershed research. Vegetation consists primarily of virgin red and white fir. It is administered by the Pacific Southwest Forest and Range Experiment Station.

3 20.4
Experimental Range

Experimental ranges occur throughout the National Forest System for field studies and demonstrating range management practices. The San Joaquin Experimental Range, located in the Sierra Nevada foothills north of Fresno, was designated in 1934 for range research purposes and is under the direction of the Pacific Southwest Forest and Range Experiment Station The area contains 4,580 acres.

3.20.5
Kings River Special Management Area

In 1987, Kings River Special Management Area was designated by Congress to provide for public outdoor recreation use, and to protect the area's natural, archaeological, fish, wildlife and scenic resources. The area will be referred to as a "Special Management Area." This area of approximately 49,000 acres is within the Sierra and Sequoia National Forests, and shall be administered by the Sierra National Forest.

3.20.6
National Natural Landmarks

This program provides a mechanism for identifying, protecting and maintaining sites, which have unique scenic, geological or botanical features, with National significance in a particular geographical region. If designated, they will be managed to ensure that such features will not be altered. No site has been designated or nominated for Registered National Natural Landmark status in the Forest

3.21
TRANSPORTATION AND FACILITIES

The Forest's transportation system consists of nearly 2,550 miles of Forest development roads Functionally, they are divided into three classes: arterial, collector and local roads.

Arterial roads (265 miles) are primarily two-lane all-weather roads. They service large land areas and usually connect with public highways or other Forest arterial roads to form a network of primary travel routes Location and standard are often determined by a demand for maximum mobility and travel efficiency, rather than specific resource management service. They are usually developed and operated for long-term land and resource management purposes and constant service.

Collector roads (500 miles) are two-lane or single-lane with intervisible turnouts. They service smaller land areas and are usually connected to an arterial road or public highway. They collect traffic from local roads or terminal facilities. The location and standard are influenced by both long-term, multi-resource service needs, as well as travel efficiency. They may be operated for either

constant or intermittent service, depending on land use and resource management objectives for the area served by the facility.

Local roads (1,785 miles) usually access a single resource terminal facility, such as a log landing, a campground or a trailhead. The typical local road is single-lane, with native soil surface that follows the terrain and requires low driving speed. Local roads usually connect with a collector road, but may tie directly with arterial roads or public highways The location and standards are usually controlled by a specific resource activity rather than travel efficiency Local roads may be developed and operated for either long or short-term service.

The planned system is 80% in place, with completion anticipated within 50 years Some of the older sections are substandard and are improved as opportunities arise, mainly drainage and surface improvements, to prevent erosion and siltation or improve economic efficiency. Improvements of standards will continue following completion of the system Some roads are temporarily closed to prevent damage to the surface under certain weather conditions, during periods of high fire danger, or for wildlife considerations

Forest Highways are another integral part of the transportation system. They are segments of the State and County road system, generally serving areas of heavy public ownership. To ensure adequate access and mobility between the major road system and forest development roads, Congress established funding separate from ordinary tax sources for these roads The Forest Highways are a cooperative venture between the Federal Highway Administration, CALTRANS, affected counties and the Forest Service. The Forest currently has 60 miles of road designated as Forest highways. Additionally, 185 miles of county roads lie within the Forest and supplement the Forest system.

Another aspect of the Forest Road System which is emerging is Scenic Byways. Scenic Byway routes showcase scenic and historical values of the National Forest. They are to be properly identified by road signs and on maps, and are to be safe for passenger car travel. The Sierra Vista Scenic Byway has been designated in the Forest

In the Forest, there are 6 leased and 26 government - owned sites with 193 permanent administrative structures with an appraised value of $12 million. About 75% of these buildings are 36 years old or older.

3.22
AIR

The Forest is experiencing increasing impacts from air pollution Symptoms of smog diseases are widespread in the southern Sierra Nevada Range In addition, visibility and scenic quality in the foothills and mountains is often impaired. The goal of the Clean Air Act is to remedy industrial-based impairment and to prevent any future impairment in Class I (Wilderness) areas The Forest's prevailing downwind location from major pollution sources makes attainment of the CAA goal difficult. The primary source of air pollutants is the San Joaquin Valley and, possibly the San Francisco Bay area. Oxidants generated in urban areas are carried by prevailing air currents into mountain areas, where pollution levels higher than urban areas have been recorded.

The potential for acidic deposition (pH 5.6) resulting from nitrous and sulfurous pollutants is a major concern. In the state of California, research has shown that acid rain may be a relatively rare phenomenon, while dry acid deposition is a constant process. The Forest intermittently monitors the pH of various waters in conjunction with standard water quality monitoring programs.

Forest Service activities, such as fuels reduction and vegetative manipulation, use fire to dispose of woody materials Such activities may cause short periods of reduced air quality from particulates and aerosols Timing of prescribed fire is planned to limit or exclude smoke from sensitive areas Burning is accomplished under conditions specified by the Air Resources Board.

3.23
PROTECTION

Fire suppression policies initiated early in this century have allowed vegetation to become dense and hazardous Activity-caused fuels left on the ground until recent years constitutes additional fire hazard. Even though burned acreage has been reduced over the years, fire intensities and suppression costs have increased from fuel buildups. This, plus increasing public use, raises potential risk of resource losses to high levels.

Changes in resource management objectives and ever increasing costs of fire suppression resulted in modification of the fire exclusion policy in 1978 The current Forest Service objective in fire suppression is to confine or control wildfire in the most cost-effective manner, while still meeting land management objectives.

Fuel reduction and completion of the front country fuelbreak system are high priorities in chaparral areas. Fuel reduction will also be highly beneficial to other resources.

An average of 171 fires/year has caused an average annual fire loss of 2,200 acres. These burned acres have had an adverse effect on resource outputs, especially timber yields. The cost of suppressing the fires, plus the value of resources lost, annually exceed $1.8 MM. The historic level of funding for both fuel reduction and the fire suppression organization is inadequate to protect the resources at stake.

Chapter 4.0 – Management Direction

4.0
MANAGEMENT DIRECTION

4.1
INTRODUCTION

This chapter describes management direction that will guide administration and use of Sierra National Forest until the Forest Plan is amended or revised. Direction is used by Forest personnel to achieve desired results. Direction also informs the public and other agencies of future programs.

The Forest is guided by direction from numerous sources. Laws passed by Congress, such as the National Environmental Policy Act, Threatened and Endangered Species Act, and others provide direction for certain aspects of management.

Additionally, the Forest Service has developed regulations and policies for management of resources in response to legislation or management needs. This direction is contained in the Code of Federal Regulation and Forest Service Manuals and Handbooks. They cover a wide range of direction for managing Forest resources.

At the National level, the Resources Planning Act gives broad direction. At the Regional level, the Regional Guide gives direction for management as well as target levels of output for various resources in each National Forest.

The Forest continues to be guided by laws, regulations, policies, and guidelines mentioned. This Forest Plan supplements, but does not replace direction from these sources The Plan generally does not restate this direction, except where it was felt necessary to clarify treatment of an issue or concern.

The first level of direction in the Plan are Forest Goals and Objectives (Section 4 2). Goals and objectives provide broad, overall direction for type and amount of goods and services the Forest will provide in the future This is followed by a discussion of Future Condition of the Forest (Section 4.3). Next are general Management Prescriptions (Section 4 4) and Management Standards and Guidelines. (Section 4 5)

Management Standards and Guidelines more specifically describe how Forest Goals and Objectives will be achieved and set minimum conditions that must be maintained while achieving the Goals and Objectives and adhering to policies.

Finally, Management Area prescriptions, practices, outputs and activities are described in Section 4.8. These descriptions are preceded by tables summarizing forestwide outputs and activities and prescription acres by Management Areas.

Resource outputs, activities and environmental changes described in the Plan represent anticipated results of Plan implementation. Differences can be expected to occur between what is planned and the results. The most important differences that may occur are included as monitoring items in Chapter 5. That chapter explains the way monitoring is used to make adjustments in the Plan to achieve desired results.

Through annual budgeting and work planning processes, management direction will be turned into visible results. These processes allow for annual adjustments to be made within the overall Plan direction to reflect current priorities. The degree to which the Plan can be implemented will depend to a large extent on appropriation of funds by Congress and distribution to the Forest through budget procedures.

Project environmental analyses will be tiered to the Plan Environmental Statement (40 CFR 1508.21)

4.2
FORESTWIDE GOALS AND OBJECTIVES

1. Provide a broad spectrum of dispersed and developed recreational opportunities in accord with identified needs and demands and meet ROS class objectives shown on ROS element maps.

2. Manage wilderness to meet recreational, scenic, educational, conservational and historic uses, as well as preserving wilderness character.

3. Manage the most visually sensitive areas in the Forest by placing major roads, trails, streams and areas of concentrated visitor use in scenic corridors and managed viewsheds.

4. Identify and enhance low to moderate quality fish habitat that has potential to improve from structural or nonstructural improvement.

5. Coordinate habitat management with other resource activities and programs to maintain or improve fish and wildlife habitats.

6. Manage fish, wildlife and plant habitats to maintain viable populations of all resident or indigenous fish, wildlife and plant species

7. Manage habitat for State and Federally listed threatened and endangered fish, wildlife and plant species to meet objectives of species recovery plans

8. Emphasize habitat improvements for sensitive, threatened, endangered and harvest species

9. Manage habitat for Forest Service sensitive fish, wildlife and plant species in a manner that prevents any species from becoming a candidate for

threatened or endangered status. Manage botanical resources to maintain present diversity of species

10. Identify a goshawk network with at least one nest territory per 18 square miles of suitable habitat.

11. Manage livestock to utilize available forage, while minimizing adverse impacts on soil, vegetation, water quality, wildlife habitat, fisheries and riparian zones.

12. Manage chaparral vegetation to provide increased forage, water, wildlife habitat and vegetation diversity, when practical.

13 Produce high yields of timber and forage, while minimizing adverse environmental impacts and providing for other resource values.

14. Annually market the allowable sale quantity as needed to meet local, regional and national demand for wood products.

15. Harvest timber from future timber stands in a manner that will permit continued non-declining harvest.

16. Conduct timber harvest program in a manner that will maximize net public benefit

17 Manage plant communities so as to maximize diversity for plants and animals.

18 Provide an integrated pest management program to minimize adverse effects of insects, diseases, weeds and other pests.

19. Maintain or improve soil productivity.

20. Produce water of sufficiently high quality to meet or exceed user requirements.

21. Encourage mineral exploration and development, while minimizing adverse environmental impacts of such activities.

22 Identify Federal land suitable for land exchange to improve management of Forest land.

23. Inventory and manage cultural resources to prevent loss or damage.

24 Develop an efficient and environmentally sound transportation system, which provides access to Forest land and permits appropriate access to private land.

25. Manage existing transportation facilities to facilitate resource management, protect wildlife, meet water quality objectives and provide recreational access.

26. Manage Forest activities so air quality is compatible with federal, state and local laws, including a program that achieves the Clean Air Act responsibilities.

27. Provide a cost-effective fire management program to protect forest resources, life and property, utilizing prescribed fire and suppression strategies of confinement, containment or control.

28 Coordinate land and resource planning efforts with other federal, state, county, and local governments and adjacent private landowners.

29. Encourage use of the Forest by disadvantaged, handicapped and minority persons.

30. Follow and pursue intent of the Civil Rights Act to provide equal employment opportunities for all employees on the Sierra National Forest while increasing average grade of women employees and percentage of minority group representation, and ensure that no person is denied participation or benefits of any program or activity of the Forest Service. Strengthen rural economies by implementing 1990 RPA rural development policies.

31. Maintain, on a continuous basis, Watershed Improvement Needs (Conditions) Inventory (WIN).

32. Inventory and map riparian areas. This effort will allow for identification of areas to be protected and will identify watershed restoration needs.

4 3
FUTURE CONDITION

4.3.1
Forest Theme

The Forest Plan represents a balanced management program with a slight decrease in some market resources over present levels Dispersed recreation and wilderness use are stressed, with opportunities for quality wilderness experiences enhanced Timber benefits will be commensurate with costs, while recognizing essential balance with other uses and resource capabilities. Fish habitat will be maintained at about current levels while considerable amounts of late seral stage wildlife habitat will be replaced by regenerated stands.

4.3.2
Social Condition

The ASQ may not be sufficient to ensure continued operation of all existing local sawmills. If one of the existing sawmills closes, there will be a loss of opportunity for local employment

Current trends in population growth will probably continue at present rate. This will increase Forest related recreational activities. Additional service jobs will be generated within local communities Since a good portion of recreationists come from outside areas, local communities will benefit from increased revenue.

Signs and brochures will be translated into other languages, where necessary. International symbols will be used to reduce multilingual signing Field employees with bilingual skills will continue to be a necessary component for good management.

4 3.3
Economics

The total annual budget needed to implement the Forest Plan is $23 1 million This will result in reduced returns to the U.S. Treasury and lower 25% receipt shares to the three-county area There will be fewer jobs and income in the local community. Present net value and benefit/cost ratio will be lower than current level.

4 3.4
Recreation

There will be a moderate increase in the number of developed sites to accommodate increased use. Some new development will be done by existing commercial permittees and/or licensees and through appropriated dollars as a requirement for new or relicensed water projects. Development emphasis will be in high use areas and in the Rural and Roaded Natural Recreational Opportunity Class zones. Full service management will be provided in most developed sites Existing sites will be rehabilitated. Some additional OHV routes and areas will be designated where cross-country travel was previously allowed. Forest Plan implementation will also include development of a new Forest OHV Plan which will designate an OHV route system and contain management direction from the Forest Plan. The OHV Plan will be completed eighteen months after the Regional Forester signs the LMP Record of Decision. This new plan replaces the 1977 OHV Plan. Developments such as parking lots, sanitation facilities, marked trails and on-site supervision will be added to facilitate snow activities

Outdoor recreation emphasis will provide a wide spectrum of recreational opportunities The ROS class objectives element map provides a picture of the mix of opportunity classes the Forest will strive to maintain or reach under this Plan.

The Forest trail system will expand moderately, using new construction and reconstruction, with more intensive maintenance and management practices of the system provided to contribute toward meeting outdoor recreation demand. The historic French Trail from near Millerton Lake to the Pacific Crest Trail is in the process of being reconstructed. Also, small undeveloped sites used for camping will receive more intensive management and maintenance to assure a quality dispersed recreation experience.

Visitor information and interpretative facilities will expand. A full range of services will be provided at major recreational use centers, with emphasis on dispersed recreation opportunities.

4.3.5
Visual Resources

The visual resources will be managed for the highest quality in areas significant to recreation. In high resource production areas, visual quality will be reduced. The landscapes will appear altered as the effect of management activities accumulate. In many areas other management activities will provide opportunities to enhance visual variety

4.3.6
Wilderness

There are 527,938 acres dedicated to wilderness. Trail rehabilitation will continue, being completed before 2010, with emphasis on high-use trails and those that disperse use. Two types of trails are planned: trails and paths.

Some Wilderness River segments of the San Joaquin River have been recommended for inclusion in the National Wild and Scenic River System. Monarch Wilderness River segments of Middle Fork Kings River have already been designated WSR. Vegetation will be returned to a more natural condition, through use of prescribed or natural fire, reducing fuel levels accumulated during the period of fire exclusion.

4.3.7
Wild & Scenic Rivers

River segments totaling 82 5 miles will be managed as part of the National Wild and Scenic River System. This includes 70 0 miles classified as Wild, 2.0 miles as Scenic, and 10 5 miles as Recreational. Nearly 26,400 acres will be included in these river corridor management classifications

Studying metasedimentary rocks, photographing the local flora in riparian zones within the corridor, whitewater rafting, picnicking, swimming, fishing, walking/hiking, viewing natural scenery, camping and studying several historic sites is expected to increase.

Some current and potential uses like mining, hydroelectric development and major facility development will be foreclosed or curtailed for some river segments. The segments affected will depend on location and extent of a future activity. Operations on valid, existing mining claims will continue. Mining on Recreational or Scenic segments may be restricted from designated segments. Major hydroelectric development

will be forgone on rivers designated as Wild/Scenic where no previous developments exist Facility construction will be implemented within Scenic/Recreational river segment designations commensurate with existing uses and conditions

4.3 8
Fish, Wildlife, and Sensitive Plants

The Forest program of direct habitat improvement will annually treat 2,000 acres of wildlife habitat and 100 acres or structures of fish habitat Habitat improvements for threatened and endangered species will continue near present annual rate of 20 acres. A forestwide program will be implemented to identify target fish and wildlife species and long-term habitat objectives for each Class 1 watershed and individual planning compartment.

Activities designed to enhance habitat for stream dwelling resident trout will involve structural and nonstructural treatments Structural improvements may include watershed stabilization through streamside fencing, instream cover improvements, fishways and fish screens, construction of migration barriers, removal or relocation of roads, stream bank stabilization, control of water level fluctuation, and construction of water bars and culverts to retard or direct water runoff.

Nonstructural improvements may include improving quality of spawning gravels, removal of stream barriers, control of fish or aquatic plant populations, control of human access and fishing pressure and enhancement of riparian vegetation.

Activities designed to enhance warm and cold water lake fisheries will also involve structural and nonstructural treatments. Structural improvements may include fish cover developments, shoreline stabilization, migration barriers and structures to control water levels in lakes Nonstructural improvements may include fish population control, aquatic plant control, enhancement of riparian vegetation and lake fertilization

The Forest will strive to establish and maintain three breeding pairs of peregrine falcons Habitat will be maintained for the current population of 5-10 wintering bald eagles Twenty-nine California spotted owl habitat areas with no scheduled timber harvest will be maintained in the Forest. A goshawk survey will identify a network with an average of one nest territory per 18 square miles of suitable habitat Timber harvest strategies will be modified to improve deer habitat in 75% of identified population centers and holding areas within the commercial forest All federally-listed threatened and endangered species will be managed in accordance with their recovery plans. The Forest will develop and implement management practices to ensure sensitive species do not become threatened or endangered because of Forest Service actions.

More field surveys will be conducted to improve our knowledge of sensitive plants. A monitoring program, consisting of baseline data collection and regular surveys, will evaluate effects of Forest management on species and habitats of concern

Management of all perennial and many intermittent streams will emphasize maintainance of water quality as well as preservation of riparian habitat values for fish, wildlife and other dependant resources. The goal of managing riparian areas will be to maintain and improve existing forestwide conditions over time. When new hydroelectric developments are proposed or relicensing occurs on existing developments, the Forest will coordinate with project proponents and CDFG to insure associated fish and wildlife habitats and sensitive plant resources are maintained near current levels on new proposals and improved where needed on relicense proposals.

4.3.9
Riparian Areas

Riparian zones will extend 100 feet on both sides of rivers and perennial streams and from shorelines of lakes and ponds. Of an estimated 155,000 acres of riparian land, about 33,000 will be managed for multiple use. Harvesting timber in riparian areas will be limited to road rights-of-way, skyline corridors, public safety and fish and wildlife enhancement projects. Most of the Forest's riparian land is located in Wilderness, thereby giving a high level of protection, preservation, and enhancement of fish and wildlife, soil and water, and riparian plant communities now and in the future.

Since riparian zones receive proportionately more use from wildlife, road and foot traffic, and grazing cattle, various projects to protect and enhance affected riparian areas are part of this Plan Travelways are not considered riparian dependent, though they will be permitted to occur when compatible with riparian dependent resources. Potential impacts will be moderate to low and future overall conditions expected to be very similar to present conditions because of protective measures proposed for various management activities Protection under Federal laws will be accomplished through Best Management Practices (BMP) (including SMZs that control commodity production and associated constructed facilities, such as roads) and Standard and Guidelines.

4 3 10
Range

Permitted livestock use will increase to about 40,600 AUMs annually Most of the increase will be accomplished by taking advantage of intensified grazing on annual grassland, treatment of chaparral, transitory range, construction of water developments and additional drift fences Limited areas of primary range, presently in poor condition, will be managed to improve range

condition. Increased production will be partially offset by reducing or discontinuing use of poor condition range at higher elevations and by grazing adjustments on some ranges to maintain amenity values, such as dispersed recreation and wildlife resources.

Site specific management decisions will be made in individual Allotment Management Plans (AMPs) through an interdisciplinary planning process. Continued utilization of positive measures, such as salting, herding, water developments, fencing and riding will be used whenever the opportunities exist, to improve livestock distribution and minimize impacts to riparian areas. If mitigation is unsuccessful in preventing unacceptable resource damage to riparian habitat, measures will be taken to reduce or eliminate livestock use in affected areas.

4.3 11
Timber

Timber production targets are less under this Plan than in the preceding timber management plan. This reduction reflects changes in management direction that provide greater emphasis on other resources and a shift of productive timberland into Wilderness designation Uneven-aged management (Group Selection harvest) will be tested on some high volume per acre tractor loggable Regulation Class I land. Additional uneven-aged management (Group Selection harvest) will occur on tractor loggable Regulation Class II land. Uneven-aged management (Individual Tree Selection) will be used on all Regulation Class III land. In addition, harvest on low site land will only be conducted to maintain health and vigor of existing stands. Timber management will be conducted on 328,900 acres of the Forest's 393,700 acres identified as the tentative CAS land base.

Silvicultural treatments will be selected to meet site-specific objectives of a particular, emphasized resource. Management options will include prescribed burning for wildlife, replanting to replace fallen trees on recreational sites, and selective harvesting in SMZs and visual retention areas. Although these activities will not result in appreciable change to the existing Forest condition in the first decade, the amount of late seral stage vegetation will decline over the planning horizon.

The goal on the full- and modified-yield CAS land will be timber production. Forest stands will be managed to fully utilize site productivity. New timber stands in areas of sufficient size and location to facilitate stand tending, protection, and future harvest will be created. Treatments to concentrate growth on the most vigorous and healthy trees will be made during the first 30-40 years of stand life. Final harvest of regenerated even-aged stands is scheduled to begin as stands reach culmination of mean annual increment (CMAI) measured in cubic feet. Intermediate harvest in these stands may extend culmination period. Assumptions used for rotation age are given in Region 5 Land Management Planning Direction.

Given the projected harvest schedule of the Plan, saplings, poles, and small sawtimber will replace existing late seral stage tree stands. The majority of these stands will be even-aged of relative uniform density. Increased tree growth and site adaptability is expected from continuation of the Regional Genetic Improvement Program.

Size, spacing and sequence of regeneration harvest will be designed to provide diversity of age classes between timber stands, maintain or improve wildlife habitat, and provide an acceptable level of visual quality.

Measures to protect soil, water and cultural resources will be an integral part of all harvest activities In stands where hardwoods occur naturally, they will be managed to maintain and enhance biological, wildlife, cultural and commodity values.

Cull logs and slash will be available to the public for firewood and, after providing for wildlife habitat needs, use of large amounts of woody biomass materials for energy production will be encouraged.

The overall effect of management activity on full-, modified- and limited-timber yield CAS land is to increase age class diversity in these areas. These stands, of varying ages and sizes, intermingled with upwards of 250,000 acres of noncommercial land, are part of timber emphasis areas.

4.3.12
Integrated Pest Management

Pest management activities will be moderate to high, particularly in developed recreational areas and on land managed for timber production.

4.3.13
Diversity

This Plan will provide for a wide variety of plants and animals by retaining at least five percent of each seral stage in each major vegetation type by the end of the fifth decade. This Plan also will provide for a pattern of early and late seral stage habitats produced by the interspersion of less intensively managed timber stands with more intensively managed stands. This mosaic will reduce the possibility of intensive timber management in large contiguous homogenous timber stands and will help provide wildlife travel corridors and islands of habitat within and between larger stands of vegetation. Riparian areas and sensitive furbearer corridors will also create mosaic patterns and provide movement corridors.

Timber management intensity will have a major effect on diversity. This Plan will include a distribution of management intensity prescriptions that slightly favors

late successional stage habitat on capable and suitable (CAS) timber land (56 percent extensive management and 44 percent intensive management). If intensively managed areas are compared to total forested land base instead of CAS, 69 percent will be extensively managed and 31 percent intensively managed By the end of the fifth decade, this distribution of timber management intensities will result in 10 percent of the forested areas being in early successional stage, 14 percent mid-successional stage and 76 percent late successional stage. Typical late seral stage stands with multi-layered large trees, with obvious signs of decadence and a tree canopy cover of over 70 percent, will total about 119,000 acres (21 percent of the forested land base) by the end of the fifth decade.

This Plan will include treatment of 2,000 acres of chaparral habitat per year by crushing and prescribed burning. This treatment, in conjunction with wildfires will produce a mosaic of brush including 30,000 acres of early successional stage, and 50,000 acres of late successional stage

None of the 5,000 acres of black oak stands on CAS land will be harvested for conversion to conifers. However, mature hardwood trees within conifer stands, above the required crown closure standard, will be removed reducing hardwoods in some harvested stands.

Snags and down logs will be managed at densities intended to preserve primary cavity nesting birds near current densities. In areas where Full-Timber Yield prescription is to be used, snags will be created by the second decade because snags left in regeneration cuts in the first decade are only expected to last for ten years. Down logs will be managed at levels that are believed to be between the existing and naturally occurring condition. Other special habitat elements such as cliffs, talus, rock outcrops, caves, ponds, marshes, etc will remain unchanged within the Forest.

4.3 14
Soil and Water

There will be a moderate potential of reducing water quality and soil productivity. However, mitigation measures described in BMP and coordinated specialist input will be used in project planning to maintain present levels of water quality and soil productivity. Water quality will remain at its existing high level and meet or exceed State and Federal objectives

Water yield increases will result from timber harvesting activities, but especially from clearcut and shelterwood techniques Other resource projects, such as fuelbreaks and wildlife burns will also increase yield but be limited to on-site uses. Instream yields in any one drainage will be small due to the dispersed nature of timber harvesting Based on historical averages, annual water yield at end of first decade will be increased by 60,000 acre/feet.

Implementation of a soil and water enhancement program, to be initiated during the first five years of the Plan, will include provisions to correct identified water quality problems on 452 acres. Approximately 226 acres will be treated in the first decade. Soil productivity will be improved on sites that have been degraded by past management practices.

4.3.15
Minerals

Opportunities for mineral exploration and development will improve as some nonroaded land is entered for resource management purposes. With emphasis being placed by the current administration on decreasing U.S. dependence upon foreign sources for strategic and critical minerals, it is likely that exploration, development and extraction of minerals will increase. As a result of this increased minerals activity, cost of administering the minerals management program is expected to increase.

Stricter compliance with operating plans for surface protection and reclamation will occur. Assistance in planning for mineral extraction will take place to facilitate reclamation. Efforts to return disturbed areas to planned production will increase.

Rejustification, by 1991, of mineral withdrawals will result in some withdrawals being retained to protect key resource areas, such as administrative sites and recreational developments.

4.3 16
Lands

The Real Estate Management Program will be accelerated moderately. General priorities are:

Priority 1.

(a) Acquire, through land adjustment, key tracts of non-Federal land (1,000 acres) to enchance management efficiency;

(b) Acquire "inholding land" to reduce costs related to right-of-way acquisition and landline survey;

(c) Perform special use permit administration, to extent necessary to protect public health and safety;

(d) Property lines will be surveyed, marked and posted to standard with emphasis on those areas of potential occupying trespass and production of resource commodities; and

(e) Resolve unauthorized occupancies through sale or interchange of Federal land in conformance with Small Tracts Act, when appropriate.

Priority 2.

Acquire remaining land classified as desirable for National Forest status

Priority 3.

(a) Acquire tracts, which because of location or character, will become key tracts in the foreseeable future, but for which immediate action is not urgent, and

(b) Acquire land intermingled with or adjacent to National Forest land primarily valuable for watershed purposes, timber production, or public recreation and needed to adequately block in or consolidate National Forest land.

Increased efforts will be expended to respond to requests from private interests for use of National Forest land. Most of these externally imposed needs will be associated with accelerated hydroelectric generation developments and community expansion. As more private land within the Forest is developed, more demand will be placed on public land for community uses Recent requests for community water systems and sewer plant effluent spray fields on Forest land are examples of this trend Permits related to urban uses will not normally be provided in areas where county zoning calls for limited urban development.

4.3.17
Hydroelectric Development

There will be continued high interest in maintaining or improving existing projects that store water from spring runoff and free flowing streams behind dams to create hydroelectric power and/or to make water available for delayed release to downstream users Other projects will be proposed that divert water from streams into penstock, then return to streams

Major potential hydroelectric projects which are located all or in part in the Forest are shown in Figure 3.06 of FEIS. Additionally, numerous minor projects will continue to be proposed Some of these projects will prove economically feasible and environmentally sound, resulting in eventual development Others, due to high costs, low outputs or adverse environmental impacts, will be dropped from further consideration.

Conflicts between a proposed hydroelectric development and the need for free-flowing streams will continue to occur. Increasing number of streams being proposed for hydroelectric development will result in need for cumulative impact studies that address combined effects of several projects on entire watersheds Also, wild and scenic river studies have been made to determine if certain streams should be recommended for designation within the National Wild and Scenic River System. If designation by Congress occurs, hydroelectric development will be foreclosed or curtailed on some river segments. As water developments increase up and down the State, some white water rafting areas will be eliminated. This will result in increased pressure on remaining white water rafting areas, such as Merced River and Kings River. Continued efforts will take place to reduce acreage withdrawn for power purposes that appear to be in excess of power needs

4 3 18
Cultural Resources

Cultural resource management will emphasize site identification, evaluation and management A data recovery program will be initiated on significant areas affected by land-disturbing activities. Significant sites, including areas of extreme importance to local Native American groups, for which adequate mitigation of impacts is unlikely, will be protected in place. The procedures of 36 CFR 800 will be followed.

4.3.19
Special Areas

Existing and potential special areas in the Forest are described in this section. In most cases special areas are administratively designated (in contrast to legislative designations such as Wilderness or Wild and Scenic Rivers) to be set aside or protected for a specific reason.

Special Interest Areas - A SIA is designated because of unusual or outstanding scenic, cultural, scientific, natural, or other unique characteristics, which merit special attention and management. They are managed to protect the resources and, where appropriate, foster public use and enjoyment of their significant values.

Research Natural Areas - The establishment of RNA recognizes need to promote and protect natural diversity. They typify important forest, shrubland, grassland, alpine, aquatic, and geologic types and other natural conditions that have special or unique characteristics of scientific interest and importance. These areas are for non-manipulative research and education.

Experimental Forests - Experimental forests exist throughout the NFS for field studies and to demonstrate forest management practices.

Experimental Ranges - Experimental ranges exist throughout the NFS for field studies and demonstrating range management practices

Special Management Areas - This program provides protection for areas containing outstanding examples of plant and animal communities, geological features, scenic grandeur, or other special attributes that merit special management. Areas so designated are managed to emphasize recreational and other specified related values The law or order designating each area provides

specific objectives and guidelines for management of the area.

National Natural Landmarks - This program provides a mechanism for identifying, protecting, and maintaining sites which have unique scenic, geological or botanical features.

The following are established or recommended special areas:

	Established Acres	Recommended Acres
Special Interest Areas		
Kings Cavern Geological Area	388	
Courtright Intrusive Contact Zone Geological Area	11	
Dinkey Creek Roof Pendant Geological Area		640
Carpenteria Botanical Area	500	
Devils Peak Botanical Area		1,600
McKinley Grove Botanical Area		520
Nelder Grove Historical Area		1,434
Research Natural Areas		
Backbone Creek	430	
San Joaquin Experimental Range (Blue Oak-Digger Pine)	80	
Bishop Creek Pacific Ponderosa Pine	1,140	
Home Camp Creek (Red Fir - White Fir)		1,200
Experimental Forest		
Teakettle	3,200	
Experimental Range		
San Joaquin	4,580	
Special Management Areas		
Kings River	48,668	

4.3 20
Transportation and Facilities

The present arterial system is adequate in terms of current location. However, some upgrading of road standards, such as paving or safety improvements, are required.

The collector road system will increase into areas which do not currently have adequate access This increase will include relatively few miles, but these miles are more expensive than those of the local road system.

Total miles of roads maintained annually will vary according to assigned maintenance levels and frequency of activities scheduled in various areas. Maintenance activities result from volume of timber harvest, recreation traffic, fire management, administrative traffic, protection of adjacent resources and capitol investment.

Because 75% of existing buildings are presently over 36 years old, many will be eliminated or replaced by 2020.

Construction of three major work centers/fire stations will be needed. This includes two new work centers, Kokanee at Huntington Lake and Batterson near Bass Lake, as well as a combined Ranger Station serving Kings River and Pineridge Ranger Districts. In addition to these facilities, the Forest Service may choose to accept facilities that will be constructed at hydroelectric projects. Acquisition of the Tule Meadow facilities and consolidation of the other existing facilities may be essential

4.3.21
Protection

Protection priority will increase moderately, with emphasis on areas of high value urban interface, critical watersheds and commercial forest land The major functional activities for the Fire Management Program is 68% for initial attack, 20% for prevention, 1% for detection, and 11% for fuel management. The accelerated fuel reduction program, which includes fuelbreak construction and maintenance and periodic burning of natural fuel, will substantially increase costs before 2015, until backlog fuel treatment is completed.

Before 2015, potential for losses from wildfire on commercial forest land will have increased as total plantation area under 40 years old reaches approximately

129,000 acres. There will be a gradual budgeting shift from fuel reduction programs to increased protection on commercial forest land Where 50% of the budget increase is initally targeted for fuel reduction programs, before 2015 this activity will account for less than 20%. After 2015, suppression costs in front country will decline below 1982 levels. Prescribed burning will continue to be used to maintain reduced fuel levels.

Upon approval of this Plan, a fire management action plan will be prepared. This Plan will describe the appropriate wildfire suppression responses.

4.4
MANAGEMENT PRESCRIPTIONS

Management prescriptions are sets of overall direction for managing individual land units. Collectively, they represent the range of management options available to the Forest. Each prescription describes a management theme, including emphasized resources and general direction for its management.

For planning purposes, the Forest was divided into geographical subdivisions called management areas To develop planning alternatives, the interdisciplinary team assigned management prescriptions to individual management areas in a manner that best met the theme of each alternative The range of alternatives was set to display a broad spectrum of management intensities and resource emphasis.

All management prescriptions are subject to additional more site-specific direction and/or constraints shown on Resource Element Maps. These element maps and applicable direction are considered part of the prescription for each management area. The management prescriptions for Sierra National Forest are summarized below. Additional information regarding these prescriptions can be found in the accompanying EIS and the planning files.

4.4.1
Wilderness

This prescription maintains and protects wilderness values. All National Forest land within designated wilderness is managed in accordance with the Wilderness Act of 1964 (16 USC 1131-1136) and/or terms established in the legislative act. The areas are free of roads. Motorized trail use is prohibited. Pest management activities are used to protect adjacent land from unacceptable pest-caused damages and prevent unnatural loss of the wilderness resource from exotic pests. Opportunities are abundant for primitive and semiprimitive dispersed recreation, such as hiking, horseback riding, camping, fishing, hunting, sightseeing and photography. No regulated or unregulated timber yields are planned Fire protection activities are conducted to minimize suppression impacts and permit reintroduction of prescribed and natural occurring fire Livestock grazing continues with approved Allotment Management Plans. In most wildlife populations, species composition and habitat are allowed to change as part of natural processes. Wildlife objectives focus on stands favoring late successional stage vegetation and species that prefer these habitats

4.4.2
Wild, Scenic, and Recreational Rivers

This prescription emphasizes preservation of the free flowing condition of selected rivers having various outstandingly remarkable features and notable values for eventual inclusion in the National Wild and Scenic River System. This prescription calls for management of recommended segments in accordance with the Wild and Scenic Rivers Act of 1968.

Wild segments are managed to protect natural values, while providing river-related outdoor recreational opportunities in a primitive setting that is generally inaccessible, except by trail. Construction of dams or diversions are prohibited Wildlife objectives focus on stands favoring late successional stage vegetation and species that prefer these habitats.

Scenic segments allow motorized access in special locations. Nonintensive timber management to correct safety problems and control insect and disease outbreaks, inconspicuous fish and wildlife habitat improvement, and water management practices to correct resource problems are allowed, as well as recreational pursuits along the river.

Recreational segments allow recreational development along the river to provide opportunity to engage in activities enhanced by the river, as well as all activities listed for scenic segments. Recreational designations do not preclude consideration of dams and/or diversions in certain situations. Fish and wildlife projects are permitted. Designated rivers within designated wilderness or special management areas are governed by the more restrictive act.

4.4.3
Minimum-Level Management (Class IV)

This prescription provides custodial protection to existing Forest resources. Management activities are limited to monitoring for conditions that might adversely affect resources on such sites. Appropriate actions are initiated when and where necessary to reduce threat to adjacent resources. Wildlife objectives focus on stands favoring late successional stage vegetation and species that prefer these habitats. Timber harvest can occur incidental to other permitted activities. Dead and dying timber may also be harvested after analyzing and providing for other wildlife habitat needs. All timber harvest is unregulated. This prescription applies to Mt. Raymond, Ferguson Ridge, Devils Gulch, Dinkey Lakes, Kings River Special Management Area, SOHAs, (unless another prescription

is authorized in the SOHA management plan), portions of the Developed Recreation Area visible from Courtright and Wishon Reservoirs, the area between the Ansel Adams and Dinkey Lakes Wilderness leading to Edison and Florence Lakes, and riparian areas

4 4 4
Limited-Timber Yield (Class III)

This prescription protects sensitive soils and maintains visual quality in a nearly natural state. The prescription permits limited-timber harvest commensurate with other resource protection goals. Other commodity resources are managed for a limited range of multiple use objectives. Mineral exploration and development, OHV use, livestock grazing, fire suppression and recreational development are permitted when emphasized resource values such as visual, soils and wildlife can be protected. This prescription applies to areas which have retention as the visual quality objective, such as the viewshed along major roads and highways and within and adjacent to major recreation areas. It also applies to otherwise unencumbered (No other restrictions) sensitive furbearer habitat outside of SOHAs.

4.4.5
Modified-Timber Yield (Class II)

This prescription provides moderate levels of timber outputs, while allowing significant considerations for wildlife habitat and visual quality. Where viewshed protection is planned, vegetation management can be evident, but is subordinate. Wildlife objectives focus on balanced stands favoring early and mature successional stage vegetation and species that prefer these habitats.

Forest resources are managed to provide a moderate range of multiple use objectives and outputs. Timber harvesting is modified to improve or maintain wildlife habitat and visual quality. Forage is managed for grazing of domestic livestock and wildlife use. Recreation opportunities are primarily for dispersed activities in a roaded natural setting, OHV use is permitted on designated routes or areas. Mineral exploration and/or development is permitted where emphasized resource values can be protected This prescription applies to Shuteye, the areas adjacent to Mammoth Pool, areas which have partial retention as the visual quality objective and deer population centers and holding areas.

4 4 6
Full-Timber Yield (Class I)

This prescription provides intensive management of selected forest resources, including timber, range, water and wildlife habitat. The greatest production of goods comes from these areas. A full range of intensive pest management practices is available to minimize pest damages An efficient and economical transportation system is developed for resource management. Dispersed recreational opportunities exist in a roaded natural setting. OHV use is permitted on designated routes or areas.

Forest resources are managed to achieve a broad range of multiple use objectives and outputs. Timber is managed intensively using a full range of silvicultural methods. Forage is managed for domestic livestock grazing. Vegetation modifications can visually dominate the landscape and mineral exploration and/or development is permitted. Fire protection is carried out at a level necessary to protect the Forest's ability to produce scheduled resource outputs. Wildlife objectives focus on stands favoring early successional stage vegetation and species that prefer these habitats. This prescription applies to all areas not described in Minimum-Level Management, Limited- and Modified-Timber Yield Prescriptions.

4 4 7
Developed Recreation

This prescription emphasizes developed recreational opportunities at levels of development and intensities expressed by management direction and standards and guidelines. These opportunities include public campgrounds, picnic areas, visitor information centers, vistas, resorts, organization camps and recreation residences Rural and roaded natural recreational opportunities are stressed.

Regulated timber harvest is prohibited within the actual developed site, but is permissible outside the site when it is compatible with primary goals for the area. Diseased and hazardous trees are removed from the developed site. OHV use is prohibited, except for ingress and egress. Threatened / endangered and sensitive wildlife habitat and species are protected.

Other important considerations include water quality and intensive fire protection measures to protect the public, improvements and Forest resources

4.4 8
Administrative Sites

This prescription provides sites necessary for administration of the Forest. These areas are generally small (1/4 to 40 acres) and include facilities such as lookouts, work centers and ranger stations. These areas presently exist or are needed to provide planned management.

Forest resources are managed to meet administrative objectives. OHVs are restricted to roads. Vegetation and soil are modified to accommodate facilities, but disturbance minimized. Timber is harvested to salvage dead, diseased or hazardous trees. No regulated timber yield is planned. Grazing is prohibited at most administrative sites. Mineral exploration and/or development is not permitted. Fire protection measures are planned to protect improvements.

4 4.9
Special Interest Areas

This prescription protects and manages unique geological, historical, archaeological, botanical, and memorial features, and makes educational opportunities available. A wide range of resource activities is permitted on areas where features can be protected. Mineral exploration and /or development are not permitted. Regulated timber yields are not planned. Specific fire protection objectives are established to protect special values. Wildlife objectives for species favoring late successional stage vegetation are met.

4.4.10
Special Management Area (Kings River)

This prescription emphasizes dispersed recreation; protection of the area's natural archaeological and scenic resources, and management for fish and wildlife Existing grazing and off-road vehicle use are permitted to the same extent as was before the enactment OHV use is restricted to designated roads and trails.

Timber harvesting is permitted only as required to control insect and disease attacks, salvage fire damaged timber, and conserve scenery or historical values Hunting and fishing is permitted where applicable State and Federal laws, fish and wildlife values, and public safety are not jeopardized. Land within the area continues to be withdrawn from mineral entry. Outdoor recreation use and hiking trails are permitted.

4.4.11
Experimental Forest

This prescription provides research and development of silvicultural, wildlife, watershed and other applied forest management practices. Management activities permitted in experimental forests do not conflict with objectives of ongoing research. A limited transportation system is developed. Recreation opportunities are limited and occur in nonroaded natural settings while OHV use is prohibited. Mineral exploration and/or development are not permitted Livestock grazing is permitted Timber is managed with appropriate silvicultural methods to achieve research goals, but no regulated timber yields are planned. Fire protection is carried out to protect research values and minimize acreage burned.

4 4 12
Experimental Range

This prescription provides for range and wildlife research in nonforested areas. Management activities on experimental ranges do not conflict with research objectives. The range of permitted management activities are the same as those described for experimental forests. Recreational opportunities are limited.

4.4.13
Research Natural Areas

This prescription protects and manages natural areas as potential components of the Forest Service RNA System. Dispersed nonmotorized recreation is limited. Livestock grazing is restricted or prohibited. Mineral exploration and/or development is prohibited. No timber yields are planned. Specific fire protection objectives are set for each area to protect natural values. Pest management activities are directed toward non-native pests. Most wildlife objectives for species favoring late successional stage vegetation are met.

4.4.14
Land Exchange

This prescription improves National Forest land ownership patterns through land exchange. Emphasis is directed toward cost-effective cases, which will reduce management costs, facilitate protection and increase production of resource commodities.

Those isolated/scattered parcels of Federal land identified for disposal through exchange are managed for a range of multiple use objectives and outputs, but investments are limited. The objective is to exchange these parcels for non-Federal land within National Forest boundaries, which enhance public benefits and reduce administrative costs, such as boundary line establishment and maintenance, right-of-way acquisition, fire protection, and trespass. Land that provides critical habitat for threatened and endangered species is not identified for disposal

Encumbrances, such as special use permits, and investments, such as roads, fences, cattle guards, fuelbreaks, wildlife habitat improvement projects and developed recreational sites, are limited. Dispersed recreation in a roaded natural setting is permitted, but not encouraged. Mineral exploration and/or development is permitted. Mineralized land is exchanged only if the government can reserve the minerals. Limited fish and wildlife habitat improvements are provided during other resource activities, but are not emphasized. A full range of pest management practices are used. Vegetation and soil stability is most likely modified due to the predominance of privately owned land surrounding Forest parcels Fire protection seeks to minimize acreage burned and are usually implemented by cooperating agencies.

4.4 15
Dispersed Recreation

This prescription emphasizes dispersed recreational opportunities, primarily in semiprimitive, roaded natural and rural recreational opportunity-class settings. Emphasis is also placed on wildlife management. Visual condition is normally Type III or better. Levels of

development and management are expressed by management direction and standards and guidelines.

Although most areas given this prescription have limited suitability for timber, range, wildlife, and developed recreation due to topography, soils and/or climate, these projects and/or activities are allowed on suitable land. Road construction is held to a minimum with most roads closed, to retain dispersed recreational opportunities in a semiprimitive nonmotorized or motorized setting, after completion of management activities. OHV use of access routes into most of these areas is generally allowed to continue. Semiprimitive non-motorized areas are closed to OHV use.

4 4.16
Front Country

This prescription emphasizes wildlife and range management activities, with adequate protection of watershed values. Forage and range improvements are provided as needed. Vegetative manipulation, such as prescribed burns and fuelbreaks, are used to promote early successional stage browse species and grasses for wildlife habitat improvement, increased livestock forage, natural fuels reduction and watershed protection. Fire protection and natural fuels reduction are very important. Multi-resource benefitting projects (wildlife, range, fuel management) are the management objective.

4.5
MANAGEMENT STANDARDS AND GUIDELINES

4 5.1
Orientation

These management standards and guidelines supplement National and Regional standards, guidelines, and direction and also complete the management prescriptions for the management areas Standards and guidelines apply to all management areas and analysis areas or aggregates of analysis areas. The numbered areas are shown on the Forest Plan Map. Their use depends on the prescribed prescription. They start with large groupings of analysis areas and progress downward through subgroups to individual analysis areas. Thus, to ascertain the sum total of standards and guidelines applicable to a specific area, the reader must work progressively through them

For example, the first grouping of standards and guidelines is forestwide, affecting all applicable management areas. The second grouping is based on individual management areas with standards and guidelines applicable to all analysis areas within the management area. The third group has standards and guidelines that apply within a single analysis area or grouping of analysis areas within the management area. The concept is initially of a very broad focus, progressively narrowing through subgroupings to specific locations as necessary to deal with issues and concerns, opportunities, and needs identified in the planning process. Site specific areas are also located through use of the Element Maps accompanying this document.

4.5.2
Forestwide Standard and Guidelines

4 5.2.1
<u>Recreation</u>

1. Provide moderate increases in intensively used recreational developments.

2. Rehabilitate trails for user convenience and resource protection by 2010.

3. Encourage use of Forest by disadvantaged, disabled, and minority persons. Provide for their needs when designing facilities.

4. Continue emphasizing opportunities for equestrian uses.

5. Provide substantial increases in interpretive services about Forest environments and Forest management programs

6. Increase capacity of developed sites about 7% by 2000. Use the FERC hydroelectric licensing/relicensing process to develop recreational facilities necessary to accommodate project-induced recreational needs.

7. Provide for upgrading commercial recreational services and facilities such as stores, outfitters guide services, resorts, etc. Existing permittees will be allowed to expand in response to public demands within existing recreation development and experience level. The following are examples of recreation development level:

   Level 1 Ansel Adams - Primitive
   Level 2 Florence/Edison - Semiprimitive motorized
   Level 3 Redinger - Motorized
   Level 4 Huntington/Dinkey - Rural
   Level 5 Bass Lake - Urban

8. Provide for expansion of Sierra Summit ski area to capacity before authorizing additional ski area development.

9. Develop a group day use and trailhead facility on Trails End site.

10. Prohibit expansion of Camp Fresno and regain portions of the camp's facilities which conflict with unrestricted public access and use of Dinkey Creek.

11. Prohibit expansion of Camp El-O-Win onto the Forest's land.

12. Allow no new recreation lots or tracts to be established.

13. Establish visitor information stations at locations accessible to and frequented by large numbers of people. Encourage joint agency information centers.
14. Provide increases in road and trail construction to facilitate opportunities for dispersed use.

15. Provide opportunities for increasing dispersed recreation about 15% by 2000

16. Rehabilitate facilities in dispersed recreational areas to provide for visitor comfort and site protection by 2005

17 Except for over-snow vehicles, allow no cross-country OHV travel. Designate additional OHV routes in areas where cross-country travel was previously allowed. Open all Maintenance Level 1 and 2 roads for OHV use unless designated closed Maintenance Level 3, 4 and 5 roads are closed to unlicensed OHV use unless designated as a confirmed use road. Designate those trails where motor bike use will be allowed Restrict snowmobile use to designated routes in snowplay areas, along major highways, within major developed recreation areas, and in popular cross-country ski areas.

18. Provide protection and retainment of trails and OHV routes when land-disturbing activities are planned

19. Provide parking and sanitation facilities for snowplay, snowmobiling and cross-country ski areas.

20 Limit recreational events involving motorized vehicles to established or approved routes. Approve other types of events on a case-by-case basis, all to be authorized by special use permit

21. Follow Sierra National Forest Manual direction, providing Forest policy on recreational residence tract administration

22. Maintain acreages in each ROS class to meet objectives shown on ROS Element map.

23. A plan will be developed, as needed, to manage bicycle use in mountainous areas outside of wilderness.

24. Cooperate with State, other agencies, and user groups to identify and, where compatible with Forest plan management objectives, develop segments of trail that support the concept of a statewide trail system connecting use areas and providing opportunity for long distance trail touring.

4.5.2.2
Visual Resources

25. Meet visual quality objectives for all Forest land, managing for Visual Condition Types II and III along designated recreational travel routes and around destination recreational areas. (See Visual Quality Element Map.)

26. Where visual quality objectives are Type II Visual Conditions:

    a. Manage activities affecting vegetative cover type or structure to be visually buffered after completion.

    b. Manage CAS timber stands for diverse size classes
    and distribute according to the following guide:

Size Class	% crown closure
30+ inches	28-38
21 - 30	23-31
11 - 21	14-18
5 - 11	12-16
< 5	8-12

    c. Timber removals will generally be limited to sanitation and salvage, with complete slash treatment

    d. Design and install structures to be compatible with
    and subordinate to the landscape's natural characteristics.

    e. Roads are to be designed and constructed to be subordinate to the landscape's natural characteristics, after completion, as viewed from off-site.

27. Where visual quality objectives are Type III Visual Conditions·

    a. Activities affecting vegetative cover type or structure may be visually evident, but will appear subordinate to the landscape's natural characteristics after completion.

    b. Manage CAS timber stands to maintain size class distribution as follows:

Size Class	% crown closure
30+ inches	0
21 - 30	25-32
11 - 21	25-32
5 - 11	22-28
< 5	15-21

c. Timber removals in the foreground will be limited to group selection and shelterwood, with total slash treatment. Clearcutting may be used if site condition precludes assurance of a healthy stand using shelterwood.

d. Emphasize shelterwood over clearcutting in the middleground, limiting harvest units generally to 20 acres or less.

e. Design and install structures to be compatible with and subordinate to the landscape's natural characteristics.

f. Roads are to be designed and constructed to be subordinate, after completion, to the landscape's natural characteristics, as viewed from off-site.

g. The visual quality objective is Type III Visual Conditions in the immediate foreground at all developed recreational sites of 25 PAOT capacity, or greater, unless another objective is specified on Visual Quality Element Map. Similar consideration will be given to smaller sites, based on their significance in project planning

h. Seldomly-seen areas within Type III Visual Condition zones, where regulated timber harvest is practiced, may be managed for Type IV Visual Conditions.

28. Where visual quality objectives are Type IV Visual Conditions:

a. Plan management activities in the foreground that may appear dominant, suggesting the features of the natural landscape

b. Plan activities in the middleground that may appear dominant, but have features similar to those occurring naturally.

c. Plan activities in the background that may be evident, but subordinate to the natural landscape

29 Where visual quality objectives are Type V Visual Conditions

a Plan management activities in the foreground or middleground that may be dominant and unnatural, only suggesting features natural to the landscape.

b. Plan activities in the background that may appear dominant, with features similar to those occurring naturally.

4.5.2 3
Wilderness

30. Provide opportunities for public use, enjoyment and understanding of wilderness.

4.5 2.4
Wild and Scenic Rivers

31. Manage designated river corridors according to classification and direction established in the Wild and Scenic River management plans.

32. Study and inventory rivers for possible inclusion into the Wild and Scenic River System and protect until future status is determined.

4 5.2.5
Fish, Wildlife, and Sensitive Plants

33 Generally, riparian management areas will extend 100 feet horizontally from the edge of perennial streams, lakes and reservoirs, except along those streams designated as essential habitat in the Interagency Agreement for Collomia rawsoniana, where the zone will be 150 feet.

34 Maintain or increase current forestwide program of direct habitat improvement.

35. Annually submit requests for habitat improvement funds to. (1) appropriate county commissions that disperse fish and game fine money, and (2) State agencies that disperse Senate bill/State proposition money.

36. Annually update 3-year habitat improvement plans for each Ranger District in cooperation with California Department of Fish and Game.

37. For fish and wildlife habitat projects funded through timber sales, give highest priority to meadows and riparian areas in sales areas.

38 For habitat improvement projects funded from sources other than timber sales, focus on habitats outside the timber planning compartment.

39. Establish a 200-foot zone on each side of all reaches of the tributaries to Portuguese Creek and Cow Creek where Lahontan cutthroat trout currently occur on all Class I, II, and III tributaries above those reaches. Apply the following standards within this zone:

a. Recommendations of a fisheries biologist must be considered prior to removal of any vegetation;

b. Trees must be felled and yarded away from the stream course;

c. No motorized vehicles will be allowed off permanent roads except as authorized by permit or contract;

d. Slash and other debris will be kept out of stream courses except for the purpose of fish habitat improvement. Woody debris removed from stream courses will be disposed of by methods other than machine piling or broadcast burning.

e. Dust abatement within 200 feet of stream courses will be made with materials other than petroleum products and will be recommended by a fisheries biologist;

f. Ephemeral channels may only be crossed with equipment after consultation with a fisheries biologist, and

g. Permit no water drafting from stream reaches described in #6 that could jeopardize the current status of pure Lahontan cutthroat trout populations.

40 For each Class 1 watershed, timber sale planning compartment and other appropriate land management areas, select fish and wildlife species or guilds that will become the area's target animals for management Establish habitat objectives for all target species during the next planning cycle.

41. Seek flows and habitat conditions below new hydroelectric projects that maintain fishery and wildlife resources near naturally occurring (pre-project) conditions.

42 During relicensing of hydroelectric projects, seek flows and habitat more favorable to fish and wildlife on projects where they have obviously been degraded by the project. Adequate flow and habitat conditions will be defined in our 4e letter to the FERC, or during our effort to set Fish and Wildlife objectives for Class I watersheds, (whichever happens first).

43 When watering roads for dust abatement, protect fishery streams by:

a. Allowing no drafting unless immediate downstream discharge from drafting site is maintained at 1.5 cfs or greater

b. Permitting water drafting to remove no more than 50% of any stream's ambient discharge that is over 1.5 cfs.

c Allowing no drafting in or above stream reaches supporting pure populations of Lahontan cutthroat trout (See Section 4.5.16 and EIS Section 3.5.5.3).

44. Minimize, during July, management activity, such as logging and vehicular traffic, in deer population centers 2, 3, 4, 5, 7, 10, 12, 14, 15, 16, 22, 24 and 29. (See Wildlife Element Map)

45 Minimize management activity in deer holding areas 2, 3, 4, 6 and 10-18 during the following periods (See Wildlife Element Map):

a. Holding areas above 5,000 feet elevation - May 15 to June 15 and October 1 to November 30.

b. Holding areas below 5,000 feet elevation - May 1 to June 1 and October 15 to November 30.

46. Keep vehicle travel at low levels in deer winter ranges 2, 5, 6 and 7 from December 1 through April (See Wildlife Element Map)

47. In key wildlife areas, regulate road use through seasonal or permanent closures. Do not close roads needed for permanent public use. (See Wildlife Element Map)

48. In key deer areas, reduce disturbance from normal traffic by leaving a screen of vegetation immediately adjacent to maintenance Level III, IV and V roads, where feasible and practical Where screening does not exist or when existing screening cannot be protected during routine management activities, carryout subsequent management in a manner that will not impede the development of adequate screening

49. Within deer holding areas 2, 3, 4, 6, 10-18 and deer population centers 2, 3, 4, 5, 7, 10, 12, 14, 15, 16, 22, 24 and 29. (See Wildlife Element Map):

a. The average regeneration unit will be no greater than 10 acres, unless sizes and shapes are organized to optimize the usable area for deer.

b. Plant conifers on a 6' x 12' spacing, with widest distance along contour.

c Release from grass, forb and shrub competition will be allowed until plantations are certified as acceptably stocked (typically 3 years).

d. Grasses, forbs and shrubs may be planted after plantations are certified as acceptably stocked.

50 Seed skid trails, landings and temporary roads, where desirable and feasible, with species favored by wildlife.

51. Use the management plans for the North Kings, San Joaquin, Huntington, Oakhurst and Yosemite deer herds as deer habitat management guides.

52. Cooperate with private landowners to encourage resource protection on private lands.

53. Protect nests and dens of all sensitive wildlife species until young are gone. Arrange harvest units and other management activities to preserve nests and dens

54 Protect Forest's 6 identified superior nest sites for peregrine falcons.

55 Protect important roost trees and feeding areas for wintering bald eagles at Shaver, Redinger, and Bass Lakes, and Pine Flat Reservoir.

56. No new management activities will be approved within goshawk nest site areas until a Forest Goshawk Network is approved. Nest site areas may encompass up to 50 acres of suitable goshawk habitat Occupied nest sites found within areas where management activities have already been authorized shall be protected as described in S&G #53

57. Provide 24 California spotted owl habitat areas (SOHAs) outside wilderness areas, each with at least 1,000 acres of suitable core habitat and 650 acres of replacement. Prior to approving new management activities within the 4,500 acre circle, as depicted on the spotted owl/sensitive furbearer element map, an analysis will be prepared and a SOHA plan written to identify the 1,000 acres of base habitat and 650 acres of replacement habitat.

58. Manage marten and fisher habitat management areas with the goal of maintaining sufficient amounts of habitat and habitat characteristics that contribute to the viability of these species. Validate assumptions of the Regional literature review as modified to meet Sierra National Forest conditions. Use information from research, administrative studies and monitoring to improve management for the maintenance of marten and fisher in coordination with California Department of Fish and Game.

59 Continue existing Forest uses in marten and fisher management areas when such activity will not directly or indirectly preclude use of the areas by marten and fisher.

60. Permit limited-timber yield harvests and other new activities in marten and fisher habitat management areas when supported by a biological evaluation and habitat management plan.

61. Prepare biological evaluations for proposed new activities in management areas with the objectives of maintaining sufficient amounts and distribution of marten and fisher habitat and habitat characteristics to contribute to a viable population and sustain the health and vigor of timber stands. Based on the biological evaluation and environmental analysis, utilize timber harvest practices such as salvage, sanitation, individual tree and group selection harvests that meet these stated objectives.

62. For connectivity, manage a minimum of 600 foot wide travelways, identified and mapped as part of the planning record, to provide linkage between marten and fisher habitat management areas. Continue existing Forest uses in and adjacent to travelways. Allow new management activities in travelways when they will not directly or indirectly preclude use by marten and fisher as determined by a biological evaluation.

63 Manage all marten and fisher reproductive sites, located outside designated habitat management areas, to retain suitable habitat attributes. Include 120 acres of suitable habitat if adjacent to mature timber stands or 500 acres if adjacent to open canopy areas. Identify recommended acreage and habitat conditions utilizing the biological evaluation process. The biological evaluation should analyze. a) whether to move habitat management area boundaries to incorporate known marten and fisher reproduction sites, or b) modify the boundaries of the seven identified habitat management areas to accommodate the use of suitable habitat, keeping acres managed for furbearers constant. Permit no new management activities in any reproductive site that will preclude use of the area by marten and fisher for reproduction, as evaluated in a biological evaluation.

64. Manage snag and down logs within each timber planning compartment as follows:

    a. Maintain an average of 1 5 hard snags/acre in sizes 15-24" DBH x 20' or larger in height in all time periods

    b. Maintain an average of 0 5 hard snags/acre in sizes 25" or greater DBH x 20' or larger in height in all time periods

    c. Maintain a sufficient number of live trees (replacement snags) in the compartment to sustain average densities in a and b.

    d. Retain approximately 3 down logs/acre measuring at least 20" diameter x 20' in various stages of decomposition

    e. Snags used to meet the average should be comprised of hardwood and softwood trees.

    f. Snags should be managed in small clumps of 5 or 6 that are well distributed through the compartment, and down logs should be uniformly distributed, where feasible.

g. Cedar snags should not be used to meet prescribed snag densities.

h. Snags used to meet the average should be concentrated more in the vicinity of streams, meadows, and the edges of openings

i Leave all snags and downed logs in riparian areas, where consistent with public safety and fisheries habitat objectives.

j. If the conditions in items a., b. and c. are not met in a compartment, the compartment should meet these conditions when project activity is completed

65 On CAS timber land, forestwide, maintain and grow mast-producing oaks in numbers proportional to current inventory. However, where hardwoods and conifers coexist, the goal is to increase conifers, subject to limits imposed to protect oaks. Opportunity to increase conifers in regeneration units will be evaluated on a stand-by-stand basis, while targets for oak management will be evaluated by timber compartment or planning area

66. Manage oaks where they occur naturally as follows·

a. In harvest units and other treatment areas within key deer winter ranges, migration corridors, holding areas, and population centers, the abundance of oaks on CAS land (as measured by their contribution to regulated stand crown closure) should not be less than half the existing average oak crown closure of mast producing oaks on all CAS land within the deer areas, or 20% crown closure, whichever is greater The existing, average oak crown closure in timber compartment deer areas and other planning areas should be determined from the best available data for 1985. Where regenerated stands average less than 20% crown closure of mast producing oaks prior to regeneration, retain all oaks to the extent practical.

b. For other harvest units and treatment areas, the abundance of oaks (as measured by their contribution to crown closure) should not be less than one-quarter of existing average crown closure of mast producing oaks for all CAS land within the compartment or 10% crown closure, whichever is greater. Where regenerated stands average less than 10% before regeneration, retain all oaks to the extent practical.

c. In noncommercial areas, retain all oaks for wildlife needs, except in existing and proposed shaded fuelbreak areas Where desirable and feasible, undertake direct habitat improvement measures to increase the number of oaks

67. Develop sensitive plant species management guides to identify population goals and compatible management activities that will maintain viability.

68. Manage sensitive plant species to avoid future listing as threatened and endangered Ensure maintenance of genetic and geographic diversity and viable populations.

4.5.2.6
Riparian

69. Give primary management emphasis in riparian areas to protect and enhance the riparian ecosystem, riparian vegetation, water quality, soils, fish and wildlife resources.

70 Riparian area protection and Streamside Management Zone determination will be based on methods described in FSH 2509 22, Sierra Supplement 1 which gives specific direction for width determinations.

71. In the absence of on-site riparian area protective width determinations, riparian areas will extend 100 feet horizontally from the edge of perennial streams, lakes and reservoirs. Deviations resulting from on-site evaluations will be documented in project environmental assessments.

72. When on-site project evaluations identify the need to afford protection to intermittent and/or ephemeral drainages, the protection zone widths will be defined in accordance with the Forest Streamside Management Zone determination process as described in the FSH 2509.22, Sierra Supplement 1.

73. Riparian areas in the Forest will be mapped, inventoried, and monitored during the current planning cycle.

74. Manage vegetation in designated riparian areas so existing forestwide diversity is maintained in all periods.

75. Maintain or enhance productivity of Forest meadows to accommodate wildlife and range resources.

76. In stream reaches occupied by fish, any activity that results in trampling and chiseling of stream banks should not exceed 20% of any given stream reach. Controls such as re-routing trails, relocating dispersed campsites, and/or fencing of areas will be used to manage activities and improve riparian conditions in identified areas not meeting this standard

77. Protect streamside zones by locating new roads outside of riparian areas, except at stream crossings.

78. Avoid constructing new roads within the perimeter of meadows and other riparian areas where opportunities exist to relocate or obliterate existing roads

79. When existing routes through riparian areas and meadows are not compatible with riparian dependent resources, consider re-routing.

80 Allow picketing or tethering of stock in meadows and overnight tie-ups no closer than 100 feet of lakes and streams.

81 Seek flows below new hydroelectric projects that maintain riparian resources at adequate levels (near current, pre-project conditions) so as to protect water quality

82. During relicensing of hydroelectric projects, seek flows favorable to riparian resources on projects obviously degraded by the project; when it doesn't conflict with instream flows recommended for the fishery resource.

4 5.2 7
Range

83. Provide structural and nonstructural range improvements to increase forage production and utilization to 40,600 AUMs/year by decade 5. Follow the direction in FSM 2211, during Forest Plan implementation, when updating and developing allotment management plans.

84 Emphasize multi-purpose brush manipulation treatments such as fuel reduction and/or prescribed burn projects, which will benefit wildlife, watershed, range, recreation and fire management.

85 Maintain current level of permit administration.

86 Use transitory forage produced by wildfire and other resource activities.

87. Extend grazing seasons into winter and early spring on low elevation annual grass ranges and utilize treated brushfields and transitory range.

88. Salt grounds will be located more than 1/4 mile from streams, meadows and trails.

89 Manage domestic livestock to meet wildlife needs in identified important wildlife habitat areas.

90. Manage available forage resources in wilderness areas for continued grazing in accord with existing allotment management plans, recreation stock and wildlife needs.

91. Maintain stock driveways and travelways in usable condition.

92. Perennial forage meadows presently in poor ecological condition, but having capability for improvement, will be managed to establish a fair or better ecological condition.

4.5.2.8
Timber

93. On lands where resource goals other than timber are emphasized, limited timber yield will be incidental to management of those resources. Silvicultural systems will be selected to meet site specific needs of those resources.

94. On lands where full and modified timber yield is the emphasized or co-emphasized resource, sustained timber production at the highest possible level is the management goal.

95. Establishment and growth of new timber stands is the priority goal for management activities on lands suitable for full and modified timber yield, where timber is the emphasized or co-emphasized resource during this planning period.

96. The silvicultural system best suited to meet the priority goal will be selected by a certified silviculturist, after an on-site analysis of the operational environment

97. When necessary because of catastrophic damage or national emergency, harvest timber by appropriate silvicultural system and reforest all capable lands classed as unsuitable

98. Conduct mortality salvage harvests on all CAS lands, where compatible with other resource values and uses.

99. Cooperate, when commensurate with benefits, with research organizations in trial applications of new practices designed to increase yields.

100. Provide maximum opportunities for firewood gathering by the public prior to closing roads and where compatible with other resources and uses.

101. Consider harvest areas as regenerated when any of the following conditions are met:

    a. Reproduction, in the minimum amounts specified below, has survived 3 growing seasons and the trees are distributed over 90% of the harvest area.

Minimum Number Of Trees / Acre

Forest Type	R-5 Site Class I	II	III	IV
Ponderosa pine	150	125	100	75
Mixed conifer	150	150	150	150
Red fir	200	200	200	200
Subalpine	125	100	75	75

b Following removal of all merchantable overstory trees and completion of slash treatment, the basal area weighted mean age of residual growing stock is 50 years or less. The stand is stocked at 70% of desired basal area with growing stock trees more than 5" DBH and with a basal area weighted average height of at least 50% of expected dominant height for the site class concerned.

c. The stand is stocked with seedlings and trees < 5" DHB and their projected growth would bring them to 70% of desired basal area and 50% of expected dominant height when the basal area weighted mean age reaches 50 years.

d. The combined stocking of trees > 5" DBH and those < 5" DBH will have the same result as the projected in the preceding definition.

e. Meets future management objectives.

102. In any year following initial regeneration and prior to a stand meeting a regeneration standard, if the number of surviving trees falls below that needed to meet a regeneration standard, the area will either be planted or receive necessary site preparation maintenance until regeneration standard is met. Such treatments may be discontinued if, through Plan amendment or revision, the land is removed from the "suitable" land classification or minimum stocking standards are reduced

103. Areas being regenerated using an even-aged system shall be dispersed over each management area by employing the following standards, unless more restrictive standards are specified elsewhere in this Plan because of other resource considerations

a. Maximum size of an individual area to be regenerated by an even-aged system is 40 acres, unless a larger area is approved, as provided for in the regulations.

b Distance between regeneration units will average 660 feet or greater If ground and stand conditions dictate, the Forest Supervisor may approve sales averaging less than 660 feet between regeneration units.

c Regeneration areas cannot be located adjacent to previous regeneration units until the previous unit meets minimum stocking standards of trees 4.5 feet in height. (See S&G 101)

104. Regeneration of stands made necessary by natural acts need not comply with dispersion standards and guidelines.

105. When natural seed fall is the planned reforestation technique, provide a mineral soil seedbed on at least 70% of the harvest area, assuming BMP are implemented and soil productivity can be protected.

106. Improve genetic selection opportunities during precommercial thinning, and assure plantation stocking is generally at optimum levels, plus provide for planting at least 400 trees per acre, evenly distributed, where artificial regeneration is the reforestation technique.

107 Treat regenerated stands as necessary to assure the average unit has a sufficient number of merchantable trees to reach 90% of normal stocking within 6 decades of stand establishment.

108. Select tree species to plant or seed regeneration areas from those found in natural forests that have occupied the site.

109 Collect all seed from selected, phenotypically superior trees. Plant stock grown from seed collected within appropriate seed zones, except where a certified silviculturist certifies another location is acceptable.

110. The uneven-aged silvicultural system may be applied on suitable timber land in lieu of even-aged management when the following criteria are met:

a. After treatment, stand will contain at least three distinct and identifiable 20-year age classes. For this purpose planned regeneration following a selection method harvest may be counted as one age class.

b. Even-aged group generally will not exceed 2 acres in size.

c Each age class in stand will occupy approximately equal areas after the second cutting cycle.

d. The cumulative cubic foot growth, up to the third cutting, will be favorably comparable to the CMAI for that of a new even-aged stand on the site

111 Where timber management practices create residual forest fuels (dead biomass), secondary utilization (personal firewood use, commercial fuelwood and other commercial product utilization) will be preferred to on-site disposal whenever such utilization meets management objectives in a cost effective manner. Public demand for firewood will be given preference over other forms of secondary utilization

112. In areas not meeting standards for wildlife snags, an ID team will determine which merchantable trees must be left to meet wildlife snag standards.

4 5.2 9
Diversity

113 Provide vegetation diversity to maintain viable wildlife populations, scenic qualities and to minimize losses from wildfire.

114 Provide and maintain at least five percent of each naturally occurring vegetative seral stage including annual grass, blue oak/savannah, diggers pine/oak, chaparral, black oak woodland, ponderosa pine, mixed conifer, Jeffrey pine, red fir and subalpine forest, where practical or where management direction states differently

115. In the ponderosa pine, mixed conifer, hardwoods and red fir forest vegetation types, maintain at least 5% of the type throughout the Forest (outside wilderness) in each of the following seral stages·

Stage 1	Grass/Forbs
Stage 2	Shrub/Seedling/Sapling
Stage 3B/C	Pole/Medium tree with >40% crown closure
Stage 4B/C	Large trees with >40% crown closure
Stage 4C+	Multi-storied dominated by large trees and canopy closure greater than 70%.

Changes in seral stage distributions will be monitored every 10 years by management area, and compared to the FORPLAN database.

116 Manage chaparral primarily by prescribed burning.

4.5.2 10
Integrated Pest Management

117. Use an integrated pest management approach in the planning and implementation of all activities. Consider a full range of alternatives and base the selected alternative(s) on biological effectiveness, cost efficiency, and health and environmental safety.

118. Treat all freshly cut stumps in developed recreation areas with borax (sodium tetraborate decahydrate, EPA Reg No. 1624-94; see FSM 2303.14 R-5 Supp 164, 9/86)

119. Plant only sugar pine seedlings which are proven resistant to white pine blister rust, when available If resistant stock is not available, plant no more than 10% untested seedlings.

4.5.2.11
Soil and Water

120. Preclude the impacts of cumulative watershed effects by applying appropriate BMP and mitigation measures during project implementation Utilize regional CWE methodology when refined for application within the Forest to assess each project for potential to incur cumulative effects

121 Determine recharge/contributing area for groundwater resources serving Forest Service wells used for recreation or administrative sites. Limit any Forest activities from taking place on defined recharge areas that would:

a. Introduce contaminants likely to enter groundwater,

b. Prevent or significantly reduce infiltration of recharging water, or

c. Intercept groundwater from reaching wells

122. Improve water quality and protect soil productivity by restoring deteriorated watersheds on the basis of economic efficiency and severity of problem and its impact on downstream beneficial uses.

123. Avoid development in floodplains, wetlands, and riparian areas, except where alternatives will not meet essential management objectives or purposes. This includes bridges, approaches, water diversion structures and boat ramps.

124. BMP will be implemented to meet water quality objectives and maintain and improve the quality of surface water in the Forest. Methods and techniques for applying BMP will be identified during project level environmental analysis and incorporated into the associated project plan and implementation documents. (See Plan Appendix F)

125. Avoid tractor logging on highly erodible soils, where sustained slopes exceed 35%, except where supported by on-the-ground ID team evaluation.

126 Allow no regeneration harvest on highly erodible soils where sustained slopes exceed 65%.

127. Apply appropriate erosion prevention measures on all ground-disturbing activities (FSH 2409.23) prior to fall storms (October 1) and immediately upon completion of activity begun after November 1.

128. Apply appropriate erosion prevention measures (FSH 2409.23) on high erosion hazard soils under the following conditions:

a When exposed soils from an average of several 500-foot linear transects

1. Exceed 150 feet on slopes of 15-35%,

2. Exceed 75 feet on slopes of 35-65%, or,

3. Exceed 25 feet on slopes over 65%,

b On linear disturbances, such as skid trails and firelines, cross-drain area at the following intervals:

Interval Between Cross-Drain (feet)

% Slope	HEHR	VHEHR
0 -15	150	125
15 - 35	75	45
35 - 65	35	20
65 +	15	15

Installation must utilize proper engineering techniques and recommendations for high (VHEHR) and very high (VEHR) erosion hazard ratings, as defined in the Forest Soil Resource Inventory.

129 Road construction on areas with High and Very High Erosion Hazard will follow standards in FSH 2509.22, Sierra Supp. No. 1 which gives direction concerning soil stabilization and road surface drainage. See Soils Element Map for primary locations of highly erodible soils and soils sensitive to loss of productivity. (Also see Appendix V of the FEIS)

130. Plan and execute activities such as timber harvesting, site preparation and fuels reduction on soils sensitive to loss of productivity by using the following standards (see FSH 2509.18).

a. Avoid mixing or removing soils below the A horizon. Roads, skid trails, firelines and log landings are exceptions.

b. On completion of a ground disturbing project on less than 35% slope, maintain an average accumulation of 50% protective ground cover density in the 1 to 100-hour fuels with some 1,000-hour fuels up to 10" in diameter.

c. On slopes over 35% with Very High and/or High Erosion Hazard soil, an ID team will evaluate ground cover needs and develop prescriptions

131. Secure water rights and obtain water availability assurances for existing and foreseeable future Forest Service nonconsumptive and consumptive uses.

4.5.2.12
Minerals

132. Actively support orderly exploration and development of mineral and energy resources under NEPA, Federal Land Planning Management Act (FLPMA), and mining laws and regulations. Require disturbed area reclamation as soon as planned uses cease Assist in planning for extraction of minerals to facilitate reclamation. Reclamation will include treatment of any unneeded mine shafts, tunnels, tailing ponds or any other on-site developments.

133. In conformance with P.L 54-579 (Section 104), review and recommend to the Secretary of Interior by October 1991, whether, and for what duration, the various mineral withdrawals, exclusive of Congressional withdrawals, in the Forest will continue. Other agency withdrawals will be reviewed by the respective agency.

134. Initiate Forest Service withdrawals for new sites only when other available surface use and occupancy controls cannot protect surface resources.

135. Request public and quasi-public agencies, contemplating applications resulting in withdrawals, to review their applications with the Forest Service. Seek to minimize impact of withdrawal on mineral development, while protecting area included in the project proposal.

136. Require compliance with operating plans for surface protection and reclamation.

137. Require operating plans to include measures that control surface runoff and minimize soil erosion.

138. Require operating plans that provide for revegetation of disturbed areas to be in prescription within 2 years of conclusion of operating plan period

139. Within withdrawn areas, all claimed valid existing rights will be verified by a Forest Service mineral examiner prior to authorizing any surface disturbing mineral activities or authorizing surface access development.

140. Access and development in specially designated areas and areas withdrawn from mineral entry, where valid existing rights may be exercised, are

restricted to the extent the integrity for which the area is designated must be maintained.

141 For locatable minerals, act on Notice of Intent and Plans of Operation in a timely manner.

142 Investigate patent applications in a timely manner.

143 As a minimum, determine validity of all claims located in Wilderness areas after Plans of Operation are submitted

144 Require mine operators to furnish a performance bond to cover reclamation in amount equal to an estimate of the cost of reclamation.

145 Require all mining projects (including extraction of road materials) to provide for resource protection and rehabilitation

146 All authorized surface use of a mining claim will be described in the Plan of Operation.

147 Off-claim uses and needs that can be tied to a specific claim will be authorized by special use permit or other conventional document

148 Mineral activities which cannot be tied to a specific claim will be authorized only in the Plan of Operations approved for such activities (such as active exploration or prospecting not within the limits of a claim).

149. Actively pursue and resolve all unauthorized mineral-related land uses.

150. Establish and maintain a listing of all parcels of Forest land that have "acquired land" status.

151 Require lease conditions to be consistent with requirements for mining operations on locatable claims.

152 No leasable minerals in the oil or gas category are known to exist within the Forest The one geothermal area is economically infeasible at this time. If any oil/gas is found, Forest Service manual direction will be followed.

153. Encourage utilization of the most energy efficient sources to obtain marketable, common variety mineral materials.

154 Establish and maintain an inventory of common variety materials within the Forest.

155 Identify common variety material sites needed for Forest purposes and rank each for development.

156. Quarry material, in excess of Forest needs, will be available for public use by permit

157. Identify common variety material sites available for public use and rank each for development.

158. For each common variety materials site, prepare a development and rehabilitation plan prior to development and use

4.5.2.13
Lands

159. Parcels of Forest land will be identified as suitable for exchange (in conformance with the Forest's Land Adjustment Plan to be developed after approval of the Forest Plan) and will be managed as a potential land exchange base. These parcels will be economically managed for a range of multiple use objectives and outputs with moderate timber, water and forage yields. Investments will be limited and long-term encumbrances will be reduced as follows:

a. Authorize only temporary uses through special use permits

b Existing permits which encumber the land will be terminated as opportunities arise.

c. These lands will be managed for a range of multiple use objectives and outputs, but investments will be limited.

160. Participate with BLM in considering possible boundary adjustments along the Forest's western boundary.

161. In areas where the Forest is the predominate landowner, use the following actions:

a. Emphasize acquisition of "inholding lands" to improve administration, reduce conflicts in use, and reduce costs related to right-of-way acquisition and landline survey.

b. Emphasize landline surveys that support all resource programs and resolve trespass.

c. Emphasize acquisition of rights-of-way for public access and to support resource programs.

d. Limit Forest land use to benefit National Forest programs, or when in the National interest.

e. Emphasize acquisition of land in key areas to protect fish and wildlife habitat.

162. In areas where the Forest is the minority landowner:

a Exchange to meet private land and other ownership goals to resolve conflicts in use.

b Emphasize cooperative landline survey programs with adjacent owners to reduce costs and resolve suspected trespass.

c. Emphasize acquisition of rights-of-way to support resource programs, but coordinate access with other landowners

d. Make the Forest's land use priority that which serves private, local and State government goals and resolves conflicts.

e. Cooperate with other landowners to encourage protection of fish and wildlife habitat on lands of other ownerships.

163 Discourage unwarranted expansion of peripheral boundaries of existing townsites.

164. Whenever conversion of important farmland, range, forest or wetland to other uses is proposed by actions or programs of other agencies or by licensing, permitting or approval of a Federal agency, advocate retention of these lands, unless other needs clearly override the benefits.

165. Within a reasonable time period, take appropriate criminal and civil action and resolve all cases of unauthorized occupancy and use.

166 Proposed sites for standard FM or television broadcast stations and radar stations will be separated from service-type radio installation sites by at least one air distance mile

167. Require developers, who propose major projects with short turnaround time, to pay for desired services Projects planned with adequate advance notice will be accomplished through normal planning/budgeting process as priorities and funds permit

168. Encourage licensee acquisition of private lands within areas withdrawn by FERC.

169. Before considering land exchange, use purchase authority to acquire lands or interest in lands important for wilderness, wildlife or recreation.

170. Discourage conversion of prime farmland, forest range and wetlands to other uses.

171 Improve administration and management efficiency through land ownership consolidation and acquisition of identified key parcels. Emphasis will be directed toward cost-effective cases which will reduce management costs, facilitate protection and increase production of resource commodities.

172. Utilize land exchange authority to acquire lands, or interest in lands, important for wilderness, wildlife, or recreation.

173. Acquire permanent easements for all system roads. Recommend condemnation, if necessary.

174. Grants of right-of-way for roads and utilities will utilize common corridors, where feasible.

4.5.2.14
Hydroelectric Development

175. Encourage licensee acquisition of private lands within areas withdrawn by FERC, where beneficial for resource protection.

176. During power project licensing procedures, licensees will be responsible for development, operation, maintenance, and replacement of recreational facilities, the need for which is, or was, project related

177. Require environmentally essential studies on all projects be completed and signed prior to issuance of 4e letter

178 On all projects, require essential studies, plans and agreements be completed and approved prior to a Forest Service Special Use Authorization (SUA).

179. Mitigation for loss of public resources resulting from hydroelectric project development, will be borne by the licensee Included, as applicable, will be compensation to the Forest for lost wildlife habitat, timber, commercial forest land, cultural resources, fishery values, visual resources and recreational opportunities

180. All new powerline installations of 35 KV and less shall be underground, where technically feasible and desirable for resource protection, as determined by an environmental analysis. The Forest will actively pursue undergrounding of existing powerlines, where economically feasible and desirable for resource protection, as determined by an environmental analysis.

181. Bury new penstocks where feasible and desirable for resource mitigation, as determined by an environmental analysis.

182 Insure that EISs and/or EAs for hydroelectric projects evaluate and propose mitigation measures for secondary, and/or side effects of projects, such as crew housing, recreational needs and law enforcement problems.

183. Request cooperative assistance in revising the Forest's Land Management Plan direction for management area impacted by hydroelectric project

development. This should occur with development of the Recreation Plan. This revision should also show indirect resource losses.

184 During the project planning phase, consider the need for construction of trails, roads and/or recreational facilities prior to starting project development The intent is to maintain or enhance current use and mitigate adverse impacts on recreation during construction.

185 Licensee will adopt the Forest's design motif and standard details to coordinate recreational visual standards throughout the Forest.

186. Facility signs will be made by the licensee in coordination with Forest standards and design motif.

187 Transmission lines, switchyards and access roads are considered direct impacts of the project and are evaluated with the other project facilities and documented in the environmental assessment or EIS.

188. For an Environmental Assessment, cumulative effects (hydroelectric-related) for more than one project are to be addressed in the drainage in which they occur, starting from the last point on the stream where any impacts may cease or are not evident and include all the area upsteam to the point of diversion.

189 All new water development project areas will be considered for reclassification into "Developed Recreation" analysis areas. Reclassified analysis areas will be studied for required levels of development, new permitted uses, special conditions and other special management requirements or stipulations.

190 Where withdrawals are no longer needed, request applicants to relinquish them.

191. Tunnel muck in excess of Forest Service and developer's needs will be available for public use by permit.

192. The signing of a Decision Notice and issuance of a Special Use Authorization may occur simultaneously.

4.5 2 15
Cultural Resources

193 Inventory and evaluate cultural resources, giving priority to areas where land-disturbing activities are planned or likely.

194. Pending completion of forestwide inventory and evaluation, conduct a cultural resource survey adequate to make a determination of effect in all areas where land disturbing activities are planned, pursuant to 36 CFR 800.

195. Evaluate identified properties. Provide for nomination of sites to the National Register as appropriate.

196. Contribute to a system of natural history examples throughout the eastside foothills and southern Sierra Nevada Range

197. Coordinate site identification, evaluation and management with concerned local Native Americans.

198. Coordinate Forest management practices to assure local Native Americans have access to and use of traditional food, medicinal and basketry resources

199. Take measures to protect cultural resources by issuing Archaeological Resources Protection Act (P.L. 95-96) permits for excavation and/or removal. Emphasize criminal and civil penalties for unauthorized removal or disturbance; monitor impacts to and condition of properties; provide physical protection measures; mitigate impacts, provide for adaptive reuse; and maintain locational confidentiality.

200 Plan Forest projects so impacts to significant cultural resource sites are avoided or develop appropriate and adequate mitigation plans where impacts are unavoidable

201 Priority will be given to preservation and maintenance, as opposed to removal of all historic structures.

202. Update the Forest's Cultural Resource Overview on a 5-year basis.

203. Remove backlog of unevaluated cultural resource properties. Target a specific number of Class II properties for evaluation each year. Nominate properties to National Register of Historic Places

204 Consult with California State Historic Preservation Office in developing management plans for all significant (Class I) properties.

205. Provide a program of cultural history interpretation.

4 5.2.16
Transportation and Facilities

206. Improve the arterial and collector road system to emphasize economic efficiency, user safety and protection of adjacent resources

207. Replace or rehabilitate major structures to support planned production activities or high use areas.

208 Build transportation system to standards that support planned uses and activities.

209 All system roads are assigned to one of five maintenance levels, and will be maintained and operated in accord with established road management objectives, signed by the District Ranger, on file at the District and Supervisor's headquarters.

210. Controlled use of the road system including road closures, may be triggered by:

a Wildlife protection

b. Snow or adverse weather

c. Hazardous fire conditions

d. Need for a full range of recreational facilities

e. Protection of private interests

f Mining claim access.

g. Protection of sensitive resources.

211 Road use will be limited by posted weight limits and special use (haul) seasons.

212 Encourage mass transit opportunities to major recreational destinations.

213. The arterial road system will be developed to an all-weather standard

214 Build facilities to support planned management activities and public services.

215 Forest Service management goals, with respect to owned or leased buildings, are to:

a. Discourage and eliminate housing for year-round occupancy.

b Meet all applicable air and water quality standards at all administrative and public service facilities.

c Remove, repair or replace all features adversely affecting or endangering the health and safety of Forest Service personnel.

d. Locate new administrative facilities for maximum economic efficiency and resource management needs.

4 5 2 17
Air Quality

216 Avoid cumulative impacts to air quality by coordinating prescribed burning activities within the Forest, with burning activities conducted by others.

217. Mitigate fugitive dust impacts on air quality by including dust abatement as a requirement for all construction activities that have potential to generate dust.

218. Avoid prolonged effects from prescribed burning activities on air quality by burning only on AQCB - approved burn days when satisfactory wind dispersion conditions prevail.

219. Participate with AQCB to qualitatively define air quality control regulations and guidelines and effects of air quality on the Forest, from sources outside the Forest.

220. Obtain appropriate permits prior to conducting prescribed burning activities.

4.5 2.18
Protection

221. Use natural fire management to maintain wilderness ecosystems

222. Unplanned lightning-caused ignitions, which occur where fire spread is effectively checked by natural barriers and where expected fire effects will not adversely affect the attainment of wilderness management objectives, can be managed under prescribed natural fire conditions If fires have to be suppressed, they will be suppressed using either or all of the control, confine, or contain strategies

223. Prescribed fire can be utilized to enhance wilderness values

224. Throughout the fire management plan, identify areas and conditions where unplanned ignitions will be allowed to burn and where confine, contain and control suppression strategies will be used to meet management objectives.

225. Encourage adequate fire prevention, fire-safe construction and presuppression systems on private land to be developed in wildfire-prone areas

226. Increase fire prevention, presuppression, fuelbreak systems and fire safety programs on Forest land.

227. Reduce activity fuels to acceptable levels in a cost effective manner Reduce natural fuels as part of other resource projects.

228. Encourage cooperation and coordination with appropriate fire management agencies.

229. Provide intensive law enforcement.

230. Incorporate air quality management considerations into fire management.

231. Emphasize a chaparral management and natural fuels reduction program that has multi-resource benefits, as well as meeting fire management objectives

232 Disposal of activity fuels will be economically feasible and commensurate with present and future fire risk hazard.

233. Fuelbreak systems will be completed in conjunction with timber harvest and range improvement projects.

4 5 3
Applicable to All Analysis Areas in Developed Recreation Management Area 1

234. Increase the number of camp units under the user fee system by at least 5% by 2000.

235 Permit day-only tie-up of pack and saddle stock no closer than 100 feet to lakes and streams, except in the Bass Lake area.

236. Allow overnight tie-up or tethering of pack and saddle stock no closer than 100 feet to lakes, streams or campsites, except in the Bass Lake, Huntington Lake, Shaver Lake and Dinkey Creek Analysis Areas, where overnight tie-up of pack, and saddle stock is prohibited.

237. Conduct regulated timber harvest where compatible with management standards and guidelines.

238 Conduct natural fuels reduction

239 Float aircraft will not be allowed on lakes or reservoirs.

240. Complete a study in the Bass Lake, Huntington Lake and Dinkey Creek areas to identify structures, other than the residences in recreational tracts, which have not already been identified for management activity. Notify existing permittees of requirements 10 years in advance of any planned removal.

4 5 4
Applicable to Developed Recreation Analysis Area 2 (Merced River Canyon)

241. Coordinate with other agencies in administering whitewater rafting permits on Merced River

4 5.5
Applicable to Developed Recreation Analysis Area 14 (Fish Camp)

242. Construct additional parking area for winter recreation in Fish Camp area.

243 Designate snowplay and cross-country ski areas.

244. Retain current capacity of Summerdale Campground and maintain its facilities at Development Level 3.

245. Limit overnight visits of a party to 7 consecutive nights in Summerdale Campground.

246. Maintain Camp Green Meadows at current capacity. Encourage year-round use of the facility.

247. Limit over-snow vehicles to designated routes and areas only.

4 5 6
Applicable to Developed Recreation Analysis Area 17 (Bass Lake)

248. Maintain recreational facilities at standard levels.

249 Encourage Madera County to continue limiting boat speeds to 40 mph from 8 a m to 8 p.m , and 5 mph from 8 p.m. to 8 a.m.

250. Encourage Madera County to limit maximum density of boats to one boat/4 acres of lake surface.

251. Restrict overnight boat mooring or anchoring on waters administered by the Forest to designated mooring sites or locations authorized by special use permit.

252 Allow limited expansion of boat dock, restaurant and grocery services at The Forks and Wishon Resorts. Maintain overnight facilities at present capacities

253. Exchange land occupied by Summit Expeditions under current special use permit.

254. Maintain Emerald Cove and Sky Lakes Camps at their current capacity, emphasizing short-term use by organized groups or individuals Require upgraded facilities and more year-round use.

255. Increase day-use parking capacity 50%.

256. Increase overnight campground capacity to 2,500 PAOT.

257. Prohibit overnight pack and saddle stock closer than 1/4-mile to the lakeshore, Willow Creek, and any Forest-developed recreational facilities Use closer than 1/4-mile is prohibited, except under special use permit.

258. Restrict or eliminate exclusive individual special uses that interfere with general public use and enjoyment of the lakeshore.

259. Construct a public day-use site for picnicking, swimming and fishing in the Willow Creek area.

260 Limit over-snow vehicles to designated routes and areas

4.5.7
Applicable to Developed Recreation Analysis Area 28 (Mammoth Pool)

261. On Mammoth Pool Reservoir, maximum boat speed is 5 mph from 8 p.m. to 6 a.m. Between 6 a.m and 8 p m. maximum boat speeds are:

a. September 11 to April 30 20 mph

b. May 1 to June 15: Reservoir is closed to boating

c. June 16 to June 30: Limit boat speeds to 20 mph.

d. July 1 to September 10: 35 mph between dam and the narrows above China Bar Campground; 20 mph above the narrows.

262. Maintain China Bar Boat Camp at current capacity.

263. Acquire Fuller Meadow for future public use.

264. Maintain all developed recreational facilities at standard levels.

265. Extend boat ramp to allow low water access during early spring and late fall.

266. Dam road and boat ramp will remain closed from May 1 through June 15, except for use by licensee and administrative vehicles.

4.5.8
Applicable to Developed Recreation Analysis Area 47 (Huntington Lake)

267 Limit motorboat speeds to 35 mph. For user safety, designate lower speed limits. Administrative boats are exempted.

268. Limit all expansion of overnight PAOT to that approved by existing project Environmental Assessments until completion of Huntington Lake Area Composite Plan.

269 Permit snow plowing on permittee roads under the following conditions:

a. Roads must be constructed to a standard that allows snowplowing

b Since the county road up to Deer Creek Tract access road near Lakeshore Resort has been plowed for many years, those recreational residence tract roads serviced by this portion of the county road may be plowed all winter.

c From the Deer Creek access road to the dam, permittee roads may be plowed from first snow through January 5 and again starting the weekend before Easter, provided snow is less than 2 feet deep.

270. Remove guest cabin on Lot 89 in Huckleberry Tract and Forest Service cabin at Billy Creek to avoid conflicts with policy and location in the public use areas.

271. Provide additional boat launching facilities.

272. Increase commercial boat slips and/or moorings only for short-term use. Emphasize slip development over open mooring.

273. Complete analysis and plan for Huntington Lake Recreation residence boat dock facilities by July 1, 1992. Adjust orientation and construction styles of docks to minimize impacts on the shoreline and lake, and other recreational uses of these areas. Tract associations will manage the docks for members only.

274. Prohibit pack and saddle stock closer than 1/4 mile to the lakeshore and any Forest Service developed recreational facilities. Use closer than 1/4 mile is prohibited, except under special use permit.

275. Reserve area between the dam and Lakeview Cabins for future recreational use. Encourage licensee to develop needed facilities as a condition of any project relicensing

276. Require Sierra Summit to provide parking and vehicle storage only during summer season. Require other permittees to use this parking area, where their own space is limited and causing traffic congestion

277. Limit over-snow vehicles to designated routes and areas.

278. Permit boat mooring and docking up to 14 days between July 1 and Labor Day, except at special use sites where limits are as specified in authorizing permits.

279. Encourage regional mass transit to Sierra Summit during winter months.

4 5.9
Applicable to Developed Recreation Analysis Areas 45 and 46 (Florence/Edison Lakes)

280. Permit boat speeds up to 15 mph Prohibit towing of aqua-planing devices

281 Limit overnight visits to 7 consecutive nights at boat camps.

282 Improve surface of Edison and Florence Lake roads as necessary for resource protection and user safety.

283. Discourage use of Edison and Florence Lake roads by trailers and motorhomes. Allow unrestrained access to any vehicle or combination of vehicle and towed trailer up to 40' long Access by vehicles or combinations over 40' long will be by special permit only.

284 South of San Joaquin River, retain Mono Hot Springs in a near-natural condition to ensure availability of the springs for traditional Native American use.

285 Allow over-snow and helicopter access to resorts during winter months.

286. In power project licensing or relicensing of any project in excess of 5mw installed capacity, advocate that the project licensee remove snow from and open Kaiser Pass Road to public use by Memorial Day weekend in years when snowfall is less than 120% of normal, as measured at the Kaiser Meadow Snow Course on April 1.

287 Limit over-snow vehicles to designated routes and areas.

288. Encourage or develop regularly scheduled regional public transit to Florence and Edison Lakes

289 Allow no regulated timber harvest Timber damaged by a catastrophic event may be salvaged if an environmental analysis indicates its removal is feasible and environmentally valid.

4 5 10
Applicable to Developed Recreation Analysis Area 36 (Shaver Lake)

290 Exchange Dorabelle Campground and two other lakeshore properties, provided their use will remain dedicated to public recreational facilities Until exchange with licensee occurs, manage Dorabelle at Development Level 4.

291. Advocate retention of licensee's lands for general public recreation.

4 5.11
Applicable to Developed Recreation Analysis Area 55 (Courtright/Wishon Reservoirs)

292 Limit boat speeds to 15 mph. Prohibit aqua-planing devices.

293. Limit overnight visits to 7 consecutive nights at boat camps

294 Maintain primitive and semiprimitive motorized and nonmotorized recreation by closing roads to general two-wheel traffic upon activity completion.

295 Prohibit construction of private boat docks at Courtright Reservoir.

296 Restrict additional commercial recreational special uses or services.

297. Allow no regulated timber harvest Timber damaged by a catastrophic event may be salvaged if an environmental analysis indicates its removal is feasible and environmentally valid.

4.5.12
Applicable to Developed Recreation Analysis Area 65 (Pine Flat Reservoir)

298. Renegotiate agreement with Corps of Engineers for recreational administration at Pine Flat Reservoir.

299 Maintain Forest's recreational sites at Development Level 3.

300. At designated locations which have been fireproofed, limit overnight camping in undeveloped areas to 4 nights

301. Allow noncommercial group activities, provided groups exceeding 25 persons furnish their own toilet and sanitation facilities at locations where such facilities are not sufficient.

302. The Kings River Special Management Area management plan will establish limits of recreational use and acceptable change on the river.

4 5 13
Applicable to All Dispersed Recreation Analysis Areas in Management Areas 2 and 11

303. Maintain semiprimitive recreational opportunities where they now occur by closing roads, except designated OHV routes, immediately following project activities.

304. Where possible, increase the acreage of primitive and semiprimitive recreation by closing unneeded local roads.

305. Allow cross-country, over-snow vehicle travel, except in areas where use is prohibited or restricted to designated routes or areas provided there are more than 6" snow cover and vehicle tracks do not touch the ground.

306 Designate 4WD and trailbike route termini at popular lake and stream locations. These termini will normally be a minimum of 300 feet to a

maximum of 1/4 mile from the attraction, and will have parking facilities with vehicle controls

307. Prohibit picketing or tethering of stock in meadows and overnight tie-ups within 100 feet of lakes, streams and campsites.

308 Provide corrals or hitching rails for pack and saddle stock in places where tie-up, hobbling or turning them loose is causing resource damage or user conflicts. Require such facilities to be used and that users bring sufficient feed for their stock.

309. Provide interpretive services, primarily brochures, maps and signs.

310 Restrict enduros to established travel routes in areas of light public use and to a time of year when interference with other activities and chance of environmental damage is minimized.

311. Regulated harvest is allowed in Analysis Areas 21, 23, and 58. Timber management is limited to salvage harvest following catastrophic events in Analysis Areas 3, 18, 48, 52 and 66.

4.5.14
Applicable to Analysis Areas 3 and 48 in Management Area 11

312. Construct trail/backcountry style bridges across South Fork Merced River to make river trail traversable year-long by hikers and horseback riders

313. Provide for expansion of Sierra Summit Ski Area in vicinity of Red Mountain near Strawberry Lake.

4 5 15
Applicable to All Timber Analysis Areas in Management Area 4

314 Close unneeded local roads to public use. Consider these roads for possible designation as OHV routes prior to closure

315. Allow cross-country, over-snow vehicle travel, except in areas where use is restricted to designated routes or areas, provided there are more than 6" snow cover and vehicle tracks do not touch the ground.

316. Allow enduros only on designated travel routes and require a special use permit for such events.

4.5.16
Applicable to Analysis Areas 22 and 49 in Management Area 4

317. Establish a 200-foot zone on each side of all reaches of tributaries to Portuguese and Cow Creeks where Lahontan cutthroat trout currently occur (January 1, 1989) and on all Class I, II and III tributaries above those reaches.

Apply the following standards within this zone:

a. Recommendations of a fisheries biologist must be considered prior to removal of any vegetation

b Trees must be felled and yarded away from the streamcourse.

c. No motorized vehicles will be allowed off permanent roads, except as authorized by permit or contract.

d. Slash and other debris will be kept out of streamcourses except for the purpose of fish habitat improvement Woody debris removed from stream courses will be disposed of by methods other than machine piling or broadcast burning

e Dust abatement within 200 feet of streamcourses will be with materials other than petroleum products and recommended by a fisheries biologist.

f. Ephemeral channels may be crossed with equipment after consultation with a fisheries biologist

g Prohibit drafting in or above stream reaches currently supporting pure populations of Lahontan Cutthroat Trout

4.5.17
Applicable to Analysis Area 70 in Management Area 9

318. Develop and implement a fuels reduction plan for Nelder Grove area by 1995.

319. Designate Nelder Grove a special interest area stressing historic, botanic and scenic features

320. Adopt Nelder Grove management plan as part of the Forest Plan and develop visitor facilities centers and trails called for in the Nelder Grove Plan.

4 5.18
Applicable to Analysis Area 15 in Management Area 4

321. Issue a 10-year permit for Camp Redwood specifying retention of tent platforms only, maintaining capacity at present level, and resolving health and safety problems.

4.5 19
Applicable to Analysis Area 35 in Management Area 4

322 To ensure continued availability of redbud and other plants for traditional Native American uses, coordinate vegetation manipulation projects in Jose Basin with the local Native American community.

4.5 20
Applicable to Analysis Area 75 in Management Area 9

323. Manage Crater Lake Meadow area to recognize its geological features

4 5.21
Applicable to Analysis Area 61 in Management Area 4

324. Close roads not necessary for administrative purposes in the area south of Rancheria Creek to maintain integrity of the Spanish Lakes OHV route.

4 5.22
Applicable to Analysis Area 73 in Management Area 9

325 Designate McKinley Grove a special interest area stressing botanic and scenic features.

4.5.23
Applicable to All Front Country Analysis Areas in Management Area 5

326. Close unneeded roads to motorized use to establish more areas for hiking, horseback riding, 4WD, trailbike use and other forms of recreation not normally associated with areas easily accessed by 2-wheel drive.

327 Maintain semiprimitive motorized and nonmotorized recreation where they now exist by closing roads immediately following project activities.

328. Projects will be planned to consider management of chaparral and associated ecosystems to increase multi-resource benefits, while continuing with reduction of wildfire conflagrations.

329. Chaparral management in Jose Basin and Sycamore Creek drainage (See Fire Element Map) will be given high priority for reducing buildup of naturally occurring fuels

4.5.24
Applicable to Analysis Area 1 in Management Area 5

330 Establish historic railroad logging special interest area at old Trumbull Peak Incline on Merced River in conjunction with Stanislaus National Forest.

4 5.25
Applicable to Analysis Area 29 in Management Area 5

331. Limit boat speeds to 35 mph on Redinger Lake.

332. Provide Development Level 3 recreational facilities at Kerckhoff Lake.

333. Restrict overnight camping to designated sites at Redinger and Kerckhoff Lakes.

4.5.26
Applicable to All Analysis Areas in Management Area 12

334. Manage special management area according to the direction established in special management area plan.

335. Allow no new special use permits within this special management area until completion and approval of management plan.

336. Hydroelectric power development is prohibited, except through specific authority of Congress

337. Allow no regulated timber harvest. Timber damaged by a catastrophic event may be salvaged if an environmental analysis indicates its removal is feasible and environmentally valid.

338 Allow no new mining claims.

4.5.27
Applicable to All Wilderness Analysis Areas in Management Area 3

339. Develop wilderness management plans utilizing limits of acceptable change

340. Restore impaired wilderness resources, managing or limiting use, as necessary.

341 Locate campsites more than 100 feet from lakeshores, streams and trails, terrain permitting.

342 Advocate and enforce "pack-it-in, pack-it-out" program.

343. Allow discharging of firearms only in emergencies or for taking wildlife as permitted under State game laws.

344. Wheeled mechanical devices used for transporting people (except handicapped), camping gear or game are prohibited regardless of the method used to move the device.

345. Construct a moderate amount of new trails annually. Complete trail rehabilitation by 2010, emphasizing resource protection, safety and visitor dispersal.

346. Signs will be rustic and mounted on trees, rocks or native wood posts. Signing and trail blazing will be done only as necessary to provide for progressive travel. Other than passes, features will not be identified with signs.

347 Trail bridges crossing major drainages must be constructed of materials and by methods that will create the least long and short-term impact.

348. Consider efficiency and aesthetics when proposing resource protection improvements made of materials not native to site or area.

349. Locate wilderness ranger and trail crew camps at least 200 feet from main trails, public campsites, streams and lakeshores.

350. Prohibit additional tables and benches and maintenance of existing ones.

351. Remove snow survey sites when they can be correlated with sites outside Wilderness If essential for safety purposes, allow cabins associated with snow measurement sites to remain in Wilderness until snow courses are correlated with and removed to sites outside Wilderness.

352. Prohibit loose herding of pack and saddle stock, except where area is signed

353 Prohibit picketing or tethering of stock in meadows or overnight tie-up within 100 feet of lakes, streams or campsites

354. Allow insect and disease infestations to run their natural courses, unless unacceptable loss will occur to wilderness resource, resources of adjacent lands, livestock or situation is hazardous to human health and welfare

355 Coordinate with other involved Federal and State agencies to monitor cloud seeding practices and their impact on Wilderness.

356. Require removal of aircraft wreckage.

357. Contact military aircraft bases every 2 years to discourage low flights over Wilderness.

358 Inventory all structures within Wilderness, appraise their historic value, and determine if needed for management purposes

359. Coordinate with CDFG on their aerial fish stocking program.

360. Maintain structural range improvements necessary to effectively manage range resources and protect wilderness values.

361. Determine the role of fire in the wilderness ecosystem and evaluate the need for applying wilderness fire policy in the John Muir, Ansel Adams, Kaiser, Dinkey and Monarch wildernesses. The evaluation will consider use of planned and unplanned ignitions and the options to use confine, contain or control strategies for suppression of wildfire.

362. The visual quality objective is Type I Visual Condition.

363 Commercial and noncommercial competitive events and events established for fund-raising (such as runs, hikes and trail rides) are incompatible with Wilderness and are not permitted.

364. Prohibit filing of new mining claims in designated Wilderness areas.

365. Minimize impacts of all mining activity on the wilderness resource.

366. Eliminate invalid mining claims and unauthorized occupancy.

4.5.28
Applicable to All Wilderness Analysis Areas Except 39 in Management Area 3 (John Muir, Ansel Adams, Dinkey Lakes, Monarch)

367. Limit party size and number of stock per party to a level that protects social and natural resource values. The level may vary within or between Wildernesses.

368. Limit overnight visits to 14 days in each Wilderness.

369. Permit maintenance of existing CDFG stream flow-regulation dams, weirs and control gates in Ansel Adams Wilderness.

370. The Pacific Crest Trail Management Plan and Management Direction is incorporated into this Plan as part of the standards and guidelines

371. Avoid any development at Blayney Hot Springs that will interfere with traditional Native American use of the spring

4 5 29
Applicable to Wilderness Analysis Area 39 in Management Area 3 (Kaiser)

372. Limit party size and number of stock per party to a level that protects social and natural resource values. The level may vary within or between Wildernesses

373. Limit overnight visits to 7 days.

374. Prohibit overnight camping closer than 200 feet to Upper Twin and Nellie Lakes.

375. Prohibit pack and saddle stock closer than 1/4 mile to Jewell, Campfire, Walling, Bill, Bobby and Bonnie Lakes. Use closer than 1/4 mile is

prohibited unless covered under a special use permit.

376. Issue no additional commercial packer or commercial backpacking permits, except for cross-country skiing activities.

377. Establish a Research Natural Area for white fir/red fir in Home Camp Creek area.

SECTION 4.6 - Summary of Acreage Distribution by Management Prescription and Areas

TABLE 4.01 - ACREAGE DISTRIBUTION BY MANAGEMENT PRESCRIPTION AND AREAS [1]

PRESCRIPTION	MANAGEMENT AREAS											
	1	2	3	4	5	6	7	8	9	10	11	12
WILDERNESS			527,938									
WILD & SCENIC [2]	3,840		13,760							640	6,080	2,720
MINIMUM LEVEL MANAGE-MENT [3]	14,430	650		23,800	4,070				330	290	20,030	1,200
LIMITED - TIMBER YIELD [3]	14,000	450		140,680	1,370				200			
MODIFIED - TIMBER YIELD [3]	7,670	1,030		50,640	5,760							
FULL-TIMBER YIELD [3]	3,030	640		101,170	2,260							
DEVELOPED RECREATION [4]	75,631	3		327	4							
ADMINISTRA-TION SITES	238			138	155	20	1	2			2	
SPECIAL INTEREST AREAS Botanical / Geological									5,093			
KINGS RIVER SPEC. MGMT. AREA												24,368
EXPERIMEN-TAL FOREST							3,200					
EXPERIMEN-TAL RANGE								4,580				
RNA			1,200					80		2,850		
LAND EXCHANGE												
Acquisition	200		560	2,150	1,350							
Base	3,200			11,640	26,320	310						
DISPERSED RECREATION [5]	56,887	33,609		200,760	11,292						57,758	24,368
FRONT COUNTRY					136,839	620						

[1] Numbers are approximate due to rounding.
[2] See appendix for specific recommendations and designations.
[3] Includes only CAS land.
[4] Includes water area.
[5] Includes both dispersed no harvest and dispersed with harvest

TABLE 4.02 - AVERAGE ANNUAL OUTPUTS DURING FIRST FIVE DECADES

RESOURCE ELEMENT	BASE YEAR 1982	1980 RPA Goals for		DECADES [1]				
		1990	2030	1991-2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
RECREATION								
Developed Public (M RVD)	750 0	1950.0	2880.0	781.7	407.1	441.6	478.4	519.8
Developed Private (M RVD)	830.0			923.3	1467 9	1593.4	1736 6	1890 2
Dispersed (M RVD)	2033.6	3360.0	4160.0	2095.8	2384.7	2652 4	2936.8	3330.7
Wilderness (M RVD)	220.0		462.8	518 3	567 6	617.0	617 0	617.0
Restricted, Usable OHV Areas (except Alt.B which is "Open")								
Summer (M Acres) [2]	346.0			285 0	280.0	280.0	275.0	275 0
Winter (a) (M Acres) [2]	83.8			73.0	70.0	65.0	60.0	55.0
Winter (b)(M Acres) [2]	168.5			110.5	105.5	105 5	105.5	105 5
Roads and Trails Open Only to OHV								
Summer (Miles) [3]	249.0			198.0	208.0	218 0	228.0	238 0
Winter (Miles) [3]	30 0 [4]			32.0	37 0	42.0	47 0	52 0
Roads and Trails Closed Only to OHV								
Summer (Miles)	160.0			30 0	30.0	32 0	32 0	34.0
Winter (Miles)	160.0			20.0	20.0	20.0	20.0	20 0
Visual Quality Index (%)	93.0			93 8	92 9	92.0	91.2	91.2
WILDLIFE AND FISH								
Bald Eagles (Wintering Indiv.)	5-10			5-10	5-10	5-10	5-10	5-10
Peregrine Falcon (Pairs)	0			3	3	3	3	3
Deer (Number x 1,000)	15.0			18 4	23.0	28.0	28.0	28.0
Spotted Owls (Pairs)	130			108	97	86	75	69
SOHAs	Nonexistent until 1984			29	29	29	29	29
Goshawk (Pairs)	50			50	50	50	50	50
Lahontan Cutthroat Trout (Pops.)	2			2	2	2	2	2
Paiute Cutthroat Trout (Pops.)	2			2	2	2	2	2
Resident Fish (M Pounds)	100			100	100	105	110	110
Wildlife User Days (M WFUD)	329.7			346.9	380.6	408 9	438.6	461 1
Fish User Days (M WFUD)	141.3			148.7	163.1	175 2	188.0	197.6
Direct Habitat Improvement								
Wildlife (M Acres)	2 6	12.7	5 45	2 0	2 0	2.0	2.0	2 0
Fish (Acres or Structures)	3 0			90.0	90.0	95.0	95.0	110.0
RANGE								
Grazing (M AUM)	35.0	38.1	40.2	37.5	30 0	40 0	40 6	40.6
TIMBER								
Allowable Sale Quantity (MMBF)	110 0	149.1	163.4	88.0	88 0	88.0	88 0	88 0
Allowable Sale Quantity (MMCF)	17.4	23.8	26.1	14.1	14.1	14 1	14.1	14.1
Reforestation (M Acres)	1.1	6 5	7 6	3 0	2.1	1.9	1.3	1 2
Timber Stand Improvement (MAcres)	0.5	4.9	5.0	4 1	4 1	4.4	3.2	2.6

[1] Decade 1 is the planning period 1991-2000. Decades 2-5 are projections only.
[2] Includes areas up to 30% slope located outside wilderness: (a) Winter = Areas suitable for 4WD and trailbike use, but not necessarily open to cross-country use; (b) Areas suitable for oversnow vehicle and open to cross-country use.
[3] Estimated number of miles, actual miles to be determined in Forest OHV Plan.
[4] Does not include 45 miles of designated snowmobile routes and undesignated routes in areas where cross-country over the snow vehicle travel is permitted

RESOURCE ELEMENT	BASE YEAR 1982	1980 RPA Goals for		DECADES [1]				
		1990	2030	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
WOOD PRODUCTS OTHER THAN SAWTIMBER								
Fuelwood (M Cords)	22.5			22.5	22.5	22.5	22.5	22.5
Biomass (M MCF)	0			No Projection Made				
WATER								
Quality (MM Ac.Ft. at Mtg Objectives)	2.514	1.882	1.903	2.559	2.555	2.552	2.544	1 538
Increased Quantity (MM Ac.Ft.)	2.565	270	310	.060	057	.054	.044	.035
Watershed Improvement (Acres)				226	226	---	---	---
LANDS AND MINERALS								
Minerals (Operating Plans)	21	53	69	15	18	20	20	20
Land Acquisition (Acres)	0	500	0	250	250	200	0	0
TRANSPORTATION								
Trail Const./Reconst. (Miles)	26	54	42	47	37	27	0	0
Road Construction (Miles)	36			17	6	2.5	1.5	0.5
Road Reconstruction (Miles)	41			7	7	16	5	4
Maintained Road System (Annual Miles)	2550			2720	2780	2805	2820	2825
FACILITIES								
Dams and Reservoirs								
Forest Service (Number)	0			0	0	0	0	0
Other Federal (Number)	0			0	0	0	0	0
Other State/Local (Number)	3			3	3	3	3	3
Private (Number)	25			25	25	25	25	25
Administrative Sites								
Forest Service Owned (Number)	26			20	20	20	20	20
Leased (Number)	6			6	5	5	5	5
PROTECTION								
Fuel Treatment (Acres) [2]	0	3000	2600	7020	6440	8090	6830	6310
(a) Fire-related Fuel Treatment				1000	1000	1200	1500	1500
(b) Timber-related Fuel Treatment				4990	4720	5520	3680	3180
(c) Fuel Treatment for Other Resources				2000	2000	2000	2000	2000
Expected Acres Burned by Wildfire								
Intensity Level 1	36			46	48	51	54	53
2	91			102	106	124	129	127
3	221			91	95	110	115	113
4	429			501	523	524	549	541
5	577			330	344	564	591	582
6	924			1093	1141	958	969	988
HUMAN RESOURCES								
Programs (Enrollees)	38	16	16	38	38	38	38	38
TOTAL BUDGET ($MM)								
	18.7	18.9	20.8	23.1	23.8	24.9	25.3	26.9

[1] Decade 1 is the planning period 1991-2000. Decades 2-5 are projections only.
[2] Combination of Wildlife and Protection (sum of a, b, and c).

TABLE 4.03 - FORESTWIDE SUMMARY OF ESTIMATED ANNUAL OUTPUTS AND ACTIVITIES DURING FIRST FIVE DECADES

ELEMENT/ACTIVITY	UNIT OF MEASURE	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Cultural Resource Inventories	M Acres	70	35	---	---	---
Cultural Resource Evaluation	Sites	6	6	6	6	6
Visual Resource Inventory and Planning	M Acres	157.5	---	---	---	---
Visual Resource Improvement	Acres	538	532	280	168	---
Developed Recreation Use	M RVDs	1705	1875	2035	2215	2410
Dispersed Recreation Use	M RVDs	2096	2385	2652	2937	3331
Trail Construction	Miles	3 0	2 0	1.0	---	---
Trail Reconstruction	Miles	45 0	35 0	26.0	---	---
Wilderness Areas Management [1]	M Acres	527.9	527.9	527.9	527.9	527 9
Wilderness Use	M RVDs	462 8	518.3	567.6	617.0	617.0
Habitat Improvement - Threatened, Endangered, Sensitive Species [2]	Structures	20 0	20 0	---	---	---
Habitat Improvement-Wildlife	Acres	2000	2000	2000	2000	2000
Habitat Improvement-Fish	Acres / Structures	100.0	90.0	95.0	95.0	110.0
Range Administration	M Acres	102.7	101.4	101.8	107.0	118.8
Range Forage Improvement	Acres	---	---	---	---	---
Range Improvements, Maintenance	Acres	100.0	100.0	100.0	100 0	100.0
Grazing Use	M AUMs	37.5	38 5	40 5	40.6	40.6
Planting & Replanting	Acres	2990	2090	1875	1335	1220

[1] Does not include 24,553 acres administrated by Inyo National Forest.
[2] Recovery goals for federally-listed Threatened and Endangered Species and viable populations for Sensitive Species will be met by the end of the 2nd decade.

Note: Decade 1 is the period 1991-2000. Decades 2-5 are projections only.

TABLE 4.03 - FORESTWIDE SUMMARY OF ESTIMATED ANNUAL OUTPUTS AND ACTIVITIES DURING FIRST FIVE DECADES

ELEMENT/ACTIVITY	UNIT OF MEASURE	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Site Preparation for Natural Seeding	Acres	500	1165	1005	560	530
Release and Weeding	Acres	2065	2645	1750	1425	1220
Precommercial Thinning	Acres	2005	1460	2645	1750	1425
Live Volume (Solid) Chargeable	MM BF	88.0	88 0	88.0	88 0	88.0
Personal Use Firewood	M Cords	22.5	22.5	22 5	22.5	22.5
Watershed Improvement	Acres	22.6	22.6	-	-	-
Annual Water Yield	MM Ac. Ft.	2.559	2.555	2.552	2.554	2.538
Nonrecreation Special Uses	Cases	750	900	900	900	900
Property Boundary Location	Miles	59	23	10	4	3
Land Exchange	Acres	400	400	400	400	400
Land Aquisition	Acres	250	250	200	-	-
Mineral Leases and Permits	Operating Plans	15	18	20	20	20
Road COnstruction	Miles	17	6	2.5	1.5	0.5
Road Reconstruction	Miles	7	7	6	4	4
Treatment of Activity Fuels	Acres	4990	4720	5520	3680	3180
Treatment of Natural Fuels	Acres	1000	1000	1200	1500	1500
Fuelbreak Construction	Acres	702	20	20	20	20
Fuel Treatment Maintenance	Acres	1000	1000	1000	1000	1000

Note: Figures beyond 1985 estimated average annual amounts.
Note: Decade 1 is the period 1991-1999. Decades 2-5 are projections only.

4.8
MANAGEMENT AREA PRESCRIPTIONS, PRACTICES, OUTPUTS, AND ACTIVITIES

4 8 1
Management Area 1 (Developed Recreation, 75,631 Acres)

This Management Area consists of Analysis Areas 2, 14, 17, 28, 36, 45, 46, 47, 51, 55 and 65. These units are land and water areas popular for recreation. Most have considerable amounts of capital investments in recreational facilities Upper Kings River and a portion of South Fork Merced River have been designated by California Fish and Game Commission as wild trout streams. The Merced River has been inventoried, recommended and designated as a National Wild and Scenic River. Program emphasis is on developed recreation at appropriate levels of development and intensity (see management standards and guidelines). Rural and roaded natural recreational opportunities are stressed Other very important considerations are water quality, visual conditions, and wildlife. Regulated timber harvest is allowed on suitable land where compatible with primary goals. The Kings River has been designated as a Wild and Scenic River.

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction and applicable management standards and guidelines Also shown is a list of activities and outputs [1] expected from applying the prescriptions. For specific fire management direction see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority. This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource situation
1. Developed recreation (includes water area)	75,631	See Alternative A map. Analysis Areas 2, 14, 17, 28, 36, 45, 46, 47, 55 and 65.
2. Dispersed recreation	56,887	See Recreation Opportunity Class Objectives and Wildlife Elenent maps. Analysis Areas 2, 14, 17, 28, 36, 45, 46, 47, 55 and 65.
3. Wild and Scenic River Designated	3,840	See W&S Element map Analysis Area 2 and 65.
4. Land exchange (acquisition) [2]	80	See private land in Analysis Area 47
Land exchange (base) [3]	3,200	See definition in prescription to identify land for exchange.
5. Administrative site	238	See Administrative Site Resource map located in Forest Facility Master Plan.
6. Minimum-level management	14,430	See SOHA and Furbearer Element map. Analysis Areas 17,45,47,55 and 65. Analysis Areas 45, 46 and 55 leading to Florence/Edison Lakes and Courtright/Wishon Reservoirs.
7. Limited-timber yield	14,000	See Visual Quality Objective, Soil Sensitivity, SOHA and Furbearer and Soil Erosion Hazard Element maps Analysis Areas 2, 14, 17, 28, 36, 45, 47, 55 and 65.
8. Modified - timber yield	7,670	See Visual Quality Objective and Wildlife Element maps. Analysis Areas 1, 14, 17, 28, 36, 45, 47, 55 and 65.
9 Full-timber yield	3,030	See Alternative A map. Analysis Areas 14, 17, 28, 36 and 47 This is the residual that is left after prescriptions 3, 5, 6, 7 and 8 have been applied.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence

[1] Some outputs are measured only on a forestwide basis and therefore, are not listed here (see Forestwide Summary Table 4 03).
[2] Acquisition - Land suitable for wildlife, timber, or riparian purposes and identified to acquire.
[3] Base - Existing National Forest land available for disposal.

Standards & Guidelines	Applicable Areas
1 - 240	Analysis Area 2, 14, 17, 28, 36, 45, 46, 47, 55 & 65
241	Analysis Area 2
242 - 247	Analysis Area 14
248 - 260	Analysis Area 17
261 - 266	Analysis Area 28
267 - 279	Analysis Area 47
280 - 289	Analysis Area 45 and 46.
290 - 291	Analysis Area 36
292 - 297	Analysis Area 55
298 - 302	Analysis Area 65

TABLE 4.04 - MANAGEMENT AREA 1: ESTIMATED AVERAGE ANNUAL OUTPUTS AND ACTIVITIES DURING NEXT FIVE DECADES

OUTPUT / ACTIVITY	UNIT	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Trail Reconstruction	Miles	3.7	1.5	0.6	-	-
Trail Construction	Miles	0.2	0.4	0 2	-	-
Habitat Improvement - Fish	Acres / Structures	10	9	9.5	9.5	11
Range Forest Improvement	Acres	-	-	-	-	-
Range Improvements, Maintenance	Acres	-	-	-	-	-
Range Administration	M Acres	6 4	6.4	6.4	6.4	6.4
Planting & Replanting	Acres	175	115	105	75	70
Sire Preparation for Natural Seeding	Acres	30	65	60	30	30
Release & Weeding	Acres	120	150	150	100	80
Precommercial Thinning	Acres	110	85	150	100	80
Watershed Improvement	Acres	38	-	-	-	-
Treatment of Activity Fuels	Acres	285	270	315	205	180
Treatment of Natural Fuels	Acres	80	80	80	80	90
Fulebreak Construction	Acres	-	-	-	-	-
Fuel tTreatment Maintenance	Acres	5	5	5	5	5

4 8.2
Management Area 2 (Dispersed Recreation, 33,609 Acres)

Management Area 2 consists of Analysis Areas 21, 23, and 58. These areas are used primarily for primitive and semiprimitive dispersed recreation and will remain generally nonroaded and undeveloped.

Primary emphasis for this management area is dispersed use, stressing semiprimitive nonmotorized and semiprimitive motorized recreation with Visual Condition Type III or better. Regulated timber harvest, grazing and wildlife management activities are allowed on suitable land. However, road construction will be held to a minimum and most new roads closed on completion of management activities to retain dispersed recreation. Use of existing 4WD and 2-wheel vehicle access routes into these areas will generally be allowed to continue.

The management prescriptions for this Management Area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. Also shown is a list of activities and outputs [1] expected from applying the prescriptions. For specific fire management direction see Appendix E.

The following general management prescriptions and acres in each prescription apply to this Management Area in order of priority This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Dispersed recreation	33,609	See Alternative A map. Analysis Areas 21, 23 and 58.
2. Minimum-level management	650	See SOHA and Furbearer Element map. Analysis Areas 21, 23 and 58.
3. Limited - timber yield	450	See Visual Quality Objective, SOHA and Furbearer, Soil Sensitivity, and Soil Erosion Hazard Element maps Analysis Areas 21, 23 and 58.
4. Modified-timber yield	1,030	See Visual Quality Objective Element map. Analysis Areas 21, 23 and 58.
5. Full-timber yield	640	See Alternative A map. Analysis Areas 21, 23 and 58.
6. Developed Recreation		See Alternative A map. Analysis Areas 21 and 58.
7. Administration Site		See Administrative Resource map located in Forest Facilities Master Plan.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

Standards & Guidelines	Applicable Areas
2, 4, 14 - 20, 22 - 29, 31 - 54, 56 - 206, 208 - 211, 213, 216 - 220, 222 - 233, 303 - 311	All S&Gs listed here apply to Analysis Areas 21, 23 and 58.

[1] Some outputs are measured only on a forestwide basis and therefore, are not listed here (see Forestwide Summary Table 4.03).

TABLE 4.05 - MANAGEMENT AREA 2: ESTIMATED AVERAGE ANNUAL OUTPUTS AND ACTIVITIES DURING NEXT FIVE DECADES

OUTPUT / ACTIVITY	UNIT	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Trail Reconstruction	Miles	2.2	1.2	1.3	-	-
Trail Construction	Miles	0.1	0 1	0.1	-	-
Habitat Improvement-Wildlife	Acres	50	50	50	50	50
Habitat Improvement-Fish	Acres / Structures	20	18	19	19	22
Range Forage Improvement	Acres	-	-	-	-	-
Range Improvements, Maintenance	Acres	-	-	-	-	-
Range Administration	M Acres	2 .6	2 6	2 6	2.7	2.5
Planting & Replanting	Acres	25	20	15	10	10
Site Preparation for Natural Seeding	Acres	-	-	-	-	-
Release & Weeding	Acres	20	25	15	15	10
Precommercial Thinning	Acres	20	15	25	15	15
Treatment of Activity Fuels	Acres	45	40	50	35	30
Treatment of Natural Fuels	Acres	6	4	4	2	2
Fuelbreak Construction	Acres	61	2	2	2	2
Fuel Treatment Maintenance	Acres	100	100	100	100	100

4.8 3
Management Area 3 (Wilderness, 527,938 Acres)

Management Area 3 is comprised of Analysis Areas 20, 39, 40, 41, 42, 43, 44, 53, 54, and 62. It consists of the Forest's portion of Ansel Adams, John Muir, and Monarch Wilderness areas and entire Dinkey Lakes and Kaiser Wilderness areas. These areas vary in use from John Muir, which is one of the most heavily used areas in the country, to Monarch which is one of the most lightly used. Dinkey Lakes Wilderness is expected to become one of the more heavily used areas, based on past history prior to Wilderness status.

Most of this Area is at high elevations and receives the majority of the Forest's snowpack, a very important water source for hydroelectric projects, recreation, and irrigation With many lakes and streams, water quality is also very important There is considerable hydroelectric potential within Kings River and San Joaquin River systems, however, major portions of these rivers were on the National Rivers Inventory and now have been recommended for or designated as Wild and Scenic Rivers

Other notable features include John Muir and Pacific Crest Trails, Paiute cutthroat trout populations in Stairway and Sharktooth Creeks, Minarets Peaks of the Ritter Range, San Joaquin River canyons featuring Balloon Dome, a red fir/white fir research natural area, the terrain in Kings River Canyon; and the extensive late successional stage forests.

The primary management emphasis is preservation and maintenance of wilderness character and values, high water quality, and options for future consideration of streams for National Wild and Scenic River status. Appropriate dispersed recreation with established capacities are very important, as is maintenance of habitat for late seral stage dependent wildlife and protection of the Paiute cutthroat trout. Grazing is allowed in suitable areas

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. Also shown is a list of activities and outputs [1] expected from applying the prescriptions. For specific fire management direction see Appendix E.

In those portions of Ansel Adams (formerly Minarets) and John Muir Wildernesses and all of Kaiser Wilderness designated as a Class I air quality area, visibility is the most sensitive indicator of air pollution Visibility monitoring in Yosemite National Park will be a proxy for trends in the Forest's wildernesses.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority. This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Wilderness	527,938	See Alternative A map. Analysis Areas 20, 39, 40, 41, 42, 43, 44, 53, 54 and 62
2. Wild and Scenic River		
Recommended	11,200	See Wild and Scenic River Element map.
Designated	2,560	Analysis Areas 20 and 54.
3. Research Natural Area [1]	1,200	See Alternative A map. Analysis Areas 7, 33, 41, 67 and 68.
4. Land exchange (acquisition)	560	See definition in prescription to identify land for exchange Analysis Area 54.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidlines used in that Analysis Area.

If there are conflicting Standard and Guidlines, the most restrictive will have precedence.

Standards & Guidelines	Applicable Areas
22, 25, 31, 32, 53, 56, 58, 69 - 75, 76, 79, 80, 89, 90, 122, 123, 124, 132, 134, 136 - 150, 193, 194, 199 - 201, 203, 204, 216, 218, 221, 230, 339 - 366	All S&Gs listed here apply to Analysis Areas 20, 39, 40, 41, 42, 43, 44, 53, 54 & 62.
367 - 371	Analysis Areas 20, 40, 41, 42, 43, 44, 53, 54 & 62
372 - 377	Analysis Area 39.

[1] Some outputs are measured only on a forestwide basis and therefore, are not listed here (see Forestwide Summary Table 4.03).

TABLE 4.06 - MANAGEMENT AREA 3: ESTIMATED AVERAGE ANNUAL OUTPUTS AND ACTIVITIES DURING NEXT FIVE DECADES

OUTPUT/ACTIVITY	UNIT	1990 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Trail Reconstruction	Miles	29 1	22.5	16 0	-	-
Trail Construction	Miles	2 0	1.2	0.6	-	-
Habitat Improvement - Threatened / Endangered, Sensitive Species	Structures	2.0	2.0	-	-	-
Range Administration	M Acres	8.5	8.5	8.5	8.5	8.5
Treatment of Natural Fuels	Acres	360	380	180	180	180

4 8.4
Management Area 4 (General Forest, 316,290 Acres) [1]

Management Area 4 consists of Analysis Areas 4, 6, 9, 15, 19, 22, 24, 27, 30, 35, 37, 38, 49, 50, 51, 56, 60 and 61. The northeast portion of Analysis Areas 22 and 38 and Analysis Area 61 is nonroaded and undeveloped. However, the primary road system in remainder of area is in place. Recreation is mostly dispersed, stressing roaded natural recreation, and some semiprimitive motorized recreation. Developed recreational facilities are small and scattered throughout the area to accomodate use. The area is highly productive and well suited to timber, wildlife and range activities. Tributaries to Cow Creek and Portuguese Creek currently contain Lahontan cutthroat trout. Moderate amounts of sensitive and highly erosive soils occur in the area Two notable redwood groves are located within the area.

Primary emphasis for this Management Area is regulated timber management, coordinated with wildlife needs, and maintenance and protection of sensitive soils. Designated OHV routes will remain open. Continued dispersed recreation, stressing roaded natural recreation, and maintenance of developed facilities are also management goals. Existing Lahontan cutthroat trout habitat and population will be maintained and protected as well as the Forest's sensitive plants. Range activities compatible with wildlife objectives are allowed on suitable land to maintain and improve forage conditions. Nelder and McKinley Groves of giant Sequoias will be studied for classification as special interest areas. Special recognition will be given Native American concerns when planning and conducting Forest activities in Analysis Area 35. Visual resources will be managed in accord with the Visual Resource Element Map. Wildlife habitat needs will be coordinated with management activities, as specified by standards and guidelines and the Wildlife Element Map

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. Also shown is a list of activities and outputs [2] expected from applying the prescriptions. For specific fire management direction see Appendix E

The following general management prescriptions and acres of each prescription apply to this management area in order of priority This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Full-timber yield [3]	101,170	See Alternative A map. Analysis Areas 4, 6, 9, 15, 22, 24, 27, 30, 35, 37, 38, 49, 50, 51, 56, 60 and 61. This is the residual that is left after prescriptions 2, 3, 7 and 8 are applied.
2. Modified - timber yield [3]	50,640	See Visual Quality Objective and Wildlife Element maps. Analysis Areas 4, 6, 9, 15, 22, 24, 27, 30, 35, 37, 38, 49, 50, 51, 56, 60 and 61.
3. Limited - timber yield [3]	140,680	See Visual Quality Objective and SOHA and Furbearer Element maps. Analysis Areas 6, 9, 15, 22, 27, 30, 35, 37, 38, 49, 50, 51, 56, 60 and 61.
4. Dispersed recreation	200,760	See Recreation Opportunity Class Objectives Element map. Analysis Areas 4, 6, 9, 15, 22, 24, 27, 30, 35, 37, 38, 49, 50, 51, 56, 60 and 61.
5. Administrative site	138	See Administrative Resource map located in Forest Facilities Master Plan
6. Land exchange (acquisition) [4]	2,150	See Forest Land Acquisition map.
Land exchange (base) [5]	11,640	See definition in prescription to identify land for exchange.
7. Developed recreation	327	See Alternative A map. Analysis Areas 9, 15, 22, 27, 35, 38, 50, 51 and 56.

[1] Includes CAS, non-forested and commercial forested land not suitable for timber management.
[2] Some outputs are measured only on a forestwide basis and therefore, are not listed here (see Forestwide Summary Table 4.03).
[3] Includes only CAS land.
[4] Acquisition - Land suitable for wildlife, timber or riparian purposes, and identified to acquire.
[5] Base - Existing National Forest land available for disposal.

8. Minimum - level management [1]	23,800	See SOHA and Furbearer Element map.

On this and the preceding page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

Standards & Guidelines	Applicable Areas
1 - 33, 36 - 220, 224 - 233, 314 - 316	All S&Gs listed here apply to Analysis Areas 4, 6, 9, 15, 22, 24, 27, 30, 37, 38, 49, 50, 51, 56, 60 and 61.
317	Analysis Areas 22 and 49
321	Analysis Area 15
322	Analysis Area 35
324	Analysis Area 61

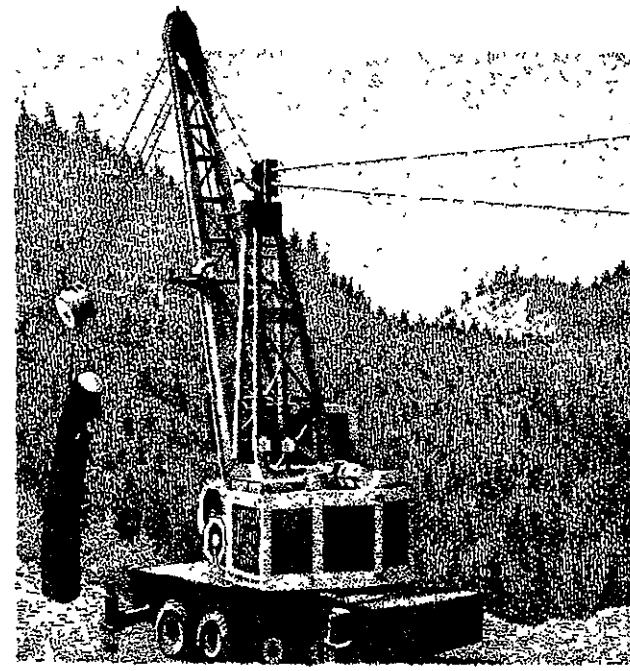


TABLE 4.07 - MANAGEMENT AREA 4: ESTIMATED AVERAGE ANNUAL OUTPUTS AND ACTIVITIES DURING NEXT FIVE DECADES

OUTPUT/ACTIVITY	UNIT	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Trail Reconstruction	Miles	6.0	7 0	7.0	-	-
Trail Construction	Miles	0 2	0.3	0.1	-	-
Habitat Improvement - Threatened / Endangered, Sensitive Species	Structures	8 0	8 0	-	-	-
Habitat Improvement-Wildlife	Acres	500	500	500	500	500
Habitat Improvement-Fish	Acres / Structures	40	36	38	38	44
Range Forage Improvement	Acres	-	-	-	-	-
Range Improvements, Maintenance	Acres	70.0	70.0	70.0	70.	70.0
Range Administration	M Acres	43.2	43.2	43.4	45.5	45.5
Planting & Replanting	Acres	2665	1865	1675	1195	1090
Site Preparation for Natural Seeding	Acres	465	1090	935	525	495
Release & Weeding	Acres	1840	2360	1510	1250	1080
Precommercial Thinning	Acres	1790	1300	2360	1560	1270
Watershed Improvement	Acres	101	101	-	-	-
Treatment of Activity Fuels	Acres	4450	4210	4925	3285	2835
Treatment of Natural Fuels	Acres	475	475	475	475	505
Fuelbreak Construction	Acres	206	8	8	8	8
Fuel Treatment Maintenance	Acres	380	380	380	380	380

[1] Includes only CAS land.

4.8.5
Management Area 5 (Front Country, 136,839 Acres)

Management Area 5 consists of Analysis Areas 1, 5, 8, 10, 12, 16 and 29. The area includes most of the low elevation foothill land in the Forest and many steep-walled canyons. Vegetation is primarily chaparral, with some areas of oak-grass, and a small amount of suitable timber land. Recreational uses are quite limited Access varies from well-roaded, urban situations to barely accessible. Much of the area has high erosion hazard and very heavy fuels. Where slopes and soils permit, suitability for range and wildlife activities is high.

Primary management emphasis is on wildlife and range management activities, with adequate protection of watershed values on highly erosive soils. Fire protection and natural fuels reduction are very important Multi-resource benefitting projects (wildlife, range and fire) are a management objective. Timber harvest is scheduled on land where slopes are generally less than 35%. Investments for future timber yields will be made only where risk of fire is comparable to that generally found in Management Area 4. Special recognition will be given to Native American concerns in Analysis Area 29 when planning and conducting Forest activities.

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines Also shown is a list of activities and outputs [1] expected from applying the prescriptions. For specific fire management direction, see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Front country	136,839	See Alternative A map. Analysis Areas 1, 5, 8, 12, 16 and 29.
2. Dispersed recreation	11,292	See Recreation Opportunity Class Objectives and Wildlife Element maps. Analysis Areas 1, 5, 8, 10, 16 and 29.
3. Administrative site	155	See Administrative Site Resource map located in Forest Facility Master Plan.
4. Minimum-level management	4,070	See SOHA and Furbearer Element map. Analysis Areas 5, 12, 16 and 29.
5. Limited-timber yield	1,370	See Visual Quality Objective, Soil Sensitivity and Soil Erosion Hazard Element maps. Analysis Areas 5, 8, 10, 12 and 16.
6. Modified-timber yield	5,760	See Visual Quality Objective and Wildlife Element maps. Analysis Areas 5,8,10,12,16 and 29.
7. Full-timber yield	2,260	See Alternative A map. Analysis Areas 5, 8, 12, 16 and 29. This is the residual that is left after prescriptions 3,4,5 and 9 have been applied
8. Land exchange (acquisition) [2]	1,350	See Forest Land Acqusition map.
Land exchange (base) [3]	26,320	See definition in prescription to identify land for exchange.
9. Developed recreation	4	See Alternative A map. Analysis Areas 5, 8 and 29.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

[1] Some outputs are measured only on a forestwide basis and therefore, are not listed here (see Forestwide Summary Table 4.03).
[2] Acquisition - Land suitable for wildlife, timber or riparian purposes, and identified to acquire
[3] Base - Existing National Forest land available for disposal.

Standard & Guidelines	Applicable Areas
1 - 29, 32 - 89, 91 - 220, 224 - 233, 326 - 329	All S&Gs listed here apply to Analysis Areas 1, 5, 8, 12, 16 and 29.
330	Analysis Area 1
331 - 333	Analysis Area 29

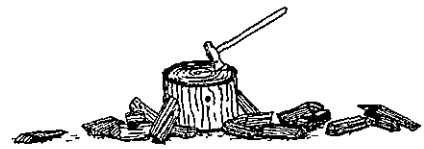


TABLE 4.08 - MANAGEMENT AREA 5: ESTIMATED AVERAGE ANNUAL OUTPUTS AND ACTIVITIES DURING NEXT FIVE DECADES

OUTPUT/ACTIVITY	UNIT	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Trail Reconstruction	Miles	3 0	2.3	1.1	-	-
Habitat Improvement - Threatened /Endangered, Sensitive Species	Structures	10.0	10.0	-	-	-
Habitat Improvement-Wildlife	Acres	300	300	300	300	300
Habitat Improvement-Fish	Acres / Structures	10	9	9.5	9.5	11
Range Forage Improvement	Acres	-	-	-	-	-
Range Improvements, Maintenance	Acres	30.0	30.0	30.0	30.0	30.0
Range Administration	M Acres	26 6	29.8	30.0	33.0	40.5
Planting & Replanting	Acres	125	90	80	55	50
Site Preparation for Natural Seeding	Acres	-	-	-	-	10
Release & Weeding	Acres	85	110	75	60	50
Precommercial Thinning	Acres	85	60	110	75	60
Watershed Improvement	Acres	20	50	50	-	-
Treatment of Activity Fuels	Acres	210	200	230	155	135
Treatment of Natural Fuels	Acres	2060	2060	2060	2060	2070
Fuelbreak Construction	Acres	435	10	10	10	10
Fuel Treatment Maintenance	Acres	515	515	515	515	515

4.8.6
Management Area 6 (Parcels Exterior to Forest Boundary, 620 Acres)

Management Area 6 consists of Analysis Areas 11, 13, 25, 26 and 31 These are isolated parcels outside the main Forest boundary. Analysis Areas 25 and 26 no longer contain National Forest land. One parcel is utilized as an administrative site, the others are subject to land exchange

Management emphasis is to retain the administrative site and continue to make the other parcels available for land exchange

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. For specific fire management direction, see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority. This priority may change due to individual project analysis If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Administrative site	28	See Administrative Site Resource map located in Forest Facilities Master Plan.
2. Land exchange (base) [1]	310	See definition in prescription to identify land for exchange.
3. Front country	620	See Alternative A map. Analysis 11, 13, 25, 26 and 31.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

Standards & Guidelines	Applicable Areas
25, 29	Analysis Areas 11, 13, 31
53	Analysis Areas 11, 31
51, 66, 68	Analysis Areas 13, 31
85, 91	Analysis Areas 31
124	Analysis Areas 11, 13, 31
127	Analysis Areas 11, 13, 15, 31
133, 135 - 142	Analysis Areas 11, 31
144 - 151	Analysis Areas 11, 31
159, 162	Analysis Areas 11, 31
165	Analysis Areas 11
193 - 199	Analysis Areas 11, 13, 31
214, 215	Analysis Areas 13
219, 220, 226, 228	Analysis Areas 11, 31
52, 225	Analysis Areas 25, 26

[1] Base - Existing National Forest land available for disposal.

487

Management Area 7 (Experimental Forest, 3,200 Acres)

Management Area 7 consists of Analysis Area 57, Teakettle Creek Experimental Forest. The Experimental Forest was established for watershed research dealing with water quality and quantity. Vegetation consists primarily of virgin, mature red and white fir. It provides highly suitable habitat for late successional stage, dependent wildlife species The area has high timber capability, but is unavailable for regulated harvest.

Management emphasis is to continue management as an experimental forest for watershed purposes under the guidance of the Pacific Southwest Forest and Range Experiment Station. The area will be managed in accord with its establishment report. Unregulated timber harvest may take place, when needed.

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. For specific fire management direction, see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Experimental forest	3,200	See Alternative A map. Analysis Area 57.
2 Administrative site	1	See Administrative Site Resource map located in Forest Facility Master Plan.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

Standards & Guidelines	Applicable Areas
25, 43, 53, 58 - 64, 68 - 69, 71 - 72, 74 - 77, 85 - 89, 91, 93, 120 - 129, 133, 139, 177 - 179, 182, 188, 193, 197, 199, 200, 210, 217, 220, 227, 230, 232	All S&Gs listed here apply to Analysis Area 57.

4.8.8
Management Area 8 (Experimental Range, 4,580 Acres)

Management Area 8 consists of Analysis Area 32, the San Joaquin Experimental Range The area is used for research purposes, under the direction of the Pacific Southwest Forest and Range Experiment Station. The area also contains an administrative site and a blue oak-digger pine Research Natural Area.

The management emphasis is to continue use of the range for research by the Experiment Station and California State University, Fresno to continue managing the RNA in accord with its establishment report.

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. For specific fire management direction, see Appendix E

The following general management prescriptions and acres in each prescription apply to this management area in order of priority. This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence

Prescription	Acres	Resource Situation
1. Experimental range	4,580	See Alternative A map. Analysis Area 32.
2. Research Natural Area	80	See Administrative Site Resource map located in Forest Facility Master Plan. Analysis Area 68.
3. Administrative site	2	See Alternative A map. Analysis Area 32.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence

Standards & Guidelines	Applicable Areas
17, 68, 125, 193, 199, 201, 209 - 211, 215, 218 - 220, 228, 230	All S&Gs listed here apply to Analysis Area 32

4.8.9
Management Area 9 (Special Interest Areas, 5,093 Acres)

Management Area 9 contains seven established special interest areas in Analysis Areas 34, 59, 69, 70, 71, 72 and 73. Analysis Area 34, Carpenteria Botanical Area was established as a special interest botanical area for Carpenteria californica. It is to be managed in accord with the establishment report. Analysis Area 69, Devils Peak Botanical Area is established to protect and conserve Yosemite onion, Congdon's wooly Eriophyllum and Congdon's lewisia. An establishment report will be prepared.

Analysis Area 59, the Kings Cavern Geological Area, contains several limestone caverns and was established to protect and maintain this geological feature. Analysis Area 72, the Courtright Intrusive Contact Zone Geological Area was established to preserve the scientific value of the bedrock exposure and provide interpretation of the features for the enjoyment of visitors. Within Analysis Area 71, the Dinkey Creek Roof Pendant Geological Area was established to preserve a metamorphosed remnant of sedimentary bedrock, which existed before granitic intrusion formed the modern Sierra Nevada Range. The management prescription for the Kings Cavern and Courtright Geological Areas is to continue management as geological areas in accord with implementation plans The Dinkey Creek Geological Area will have an implementation plan prepared.

Analysis Area 70, Nelder Grove Historical Area is established to preserve giant Sequoias, early railroad logging activity, and prehistoric habitation sites by Native Americans An establishment report will be prepared. Analysis Area 73, McKinley Grove Botanical Area is established to preserve giant Sequoias. An establishment report will be prepared

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. For specific fire management direction see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area [1] in order of priority This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Special Interest Areas	5,093	See Alternative A map. Analysis Areas 34, 59, 69, 70, 71, 72 and 73.
2 Minimum-level management	330	See SOHA and Furbearer Element map. Analysis Areas 59, 69, 70 and 73.
3. Limited-Timber Yield	200	See SOHA and Furbearer Element Map. Anaylsis Area 73.

On this page, a prescription was identified for each Analysis Area The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

Guidelines	Applicable Areas
5, 17, 22, 25, 51, 66, 85, 89	All S&Gs lisAnalysis Areas ted here apply to 34, 59, 69, 70, 71, 72 and 73.
43, 53, 56, 58 - 64, 69 - 82, 97, 113 - 116, 120 - 131, 133, 139, 193 - 201, 208, 210 , 217 - 220, 225 - 233	Analysis Areas 70 and 73
57	Analysis Area 70
204, 205	Analysis Area 70
318 - 320	Analysis Area 70
323	Analysis Area 75
325	Analysis Area 73

[1] Total acres of prescription exceed management area acres because part of the acres involve underground caves.

4.8.10
Management Area 10 (Research Natural Areas, 2,850 Acres)

Management Area 10 contains two existing and two recommended Research Natural Areas. It includes Analysis Areas 33 and 68 and Analysis Areas 7 and 67.

The existing Backbone Creek Research Natural Area for Carpenteria californica lies within Analysis Area 33. Within the San Joaquin Experimental Range is the existing blue oak-digger pine Research Natural Area (Analysis Area 68) Analysis Area 7 contains the recommended Bishop Creek Pacific Ponderosa Pine Research Natural Area and lies between South Fork Merced River and Yosemite National Park Within the Kaiser Wilderness is the recommended Home Camp Creek white fir/red fir Research Natural Area (Analysis Area 67).

The purpose and primary management emphasis of Research Natural Areas are to promote and protect natural diversity, to provide opportunities for study of plant succession and other biological and physical phenomenon over long periods of time, and for non-manipulative research observation and study in accord with their establishment report.

The management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. For specific fire management direction, see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority. This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1 Research Natural Areas	2,850	See Alternative A map. Analysis Areas 7,33,67 and 68.
2. Wild and Scenic Rivers (Designated)	640	See Wild and Scenic Rivers Element map. Analysis Area 7.
3. Minimum - level management	290	See SOHA and Furbearer Element map Analysis Area 67.

On this page, a prescription was identified for each Analysis Area The following list identifies Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence

Standards & Guidelines	Applicable Areas
22, 25, 31, 32, 58, 68, 133, 139	All S&Gs listed here apply to Analysis Areas 7, 33, 67 and 68
56	Analysis Area 67
57	Analysis Area 67
377	Analysis Area 67

4.8 11
Management Area 11 (Dispersed Recreation-No Timber Harvest, 57,758 Acres)

This Management Area consists of Analysis Areas 3, 18, 48, 52 and 66. The areas are characterized for the most part as being nonroaded and undeveloped and are used primarily for primitive and semiprimitive dispersed recreation. They have limited suitability for timber, range and wildlife management activities. Analysis Area 18 contains some suitable developed recreational opportunities, if demand occurs.

The area generally exhibits one or both of the following conditions:

1. High elevation with a short growing season and low timber productivity or

2. Inaccessability, which will result in high development costs.

South Fork of Merced River was designated as wild trout fishery by CDFG. Merced and South Fork Merced Rivers have also been designated as a Wild and Scenic Rivers

Primary management emphasis is dispersed recreation, stressing primitive and semiprimitive recreation with Visual Condition Type III or better. Other important considerations are wildlife (especially those species favoring late successional stage vegetation), grazing and watershed. Most OHV routes will remain open with reconstruction or relocation permitted, if necessary Any proposed OHV routes will be considered on a case-by-case basis and covered by a project environmental assessment. Timber harvest may be considered only if a catastrophic event occurs within the area.

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. Also shown is a list of activities and outputs [1] expected from applying the prescriptions. For specific fire management direction, see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority. This priority may change due to individual project analysis. If there are conflicting prescriptions, the most restrictive will have precedence.

Prescription	Acres	Resource Situation
1. Dispersed recreation	57,758	See Alternative A map. Analysis Areas 3, 18, 48, 52 and 66.
2. Wild and Scenic River (Designated)	6,080	See Wild and Scenic Rivers Element map. Analysis Area 3 and 18.
3. Minimum-level management	20,030	See SOHA and Furbearer Element map. Analysis Area 3 and 18.
4. Administrative Site	2	See Administrative Site Resource map located in Forest Facility Master Plan.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

Standards & Guidelines	Applicable Areas
2, 4, 14 - 20, 22 - 24, 27, 31, 32, 34 - 36, 38, 40 - 42, 51 - 63, 68 - 82, 88, 91, 92, 97, 122 - 124, 128, 131 - 152, 159, 161, 162, 165, 193 - 205, 216, 218 - 220, 224 - 233, 303, 311	All S&Gs listed here apply to Analysis Areas 3, 18,48, 52 and 66.
312, 313	Analysis Areas 3 and 48.

[1] Some outputs are measured only on a forestwide basis and therefore, are not listed here (See Forestwide summary 4. 03).

TABLE 4.09 - MANAGEMENT AREA 11: ESTIMATED AVERAGE ANNUAL OUTPUTS AND ACTIVITIES DURING NEXT FIVE DECADES

OUTPUT / ACTIVITY	UNIT	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Trail Reconstruction	Miles	1 0	0.5	-	-	-
Habitat Improvement-Wildlife	Acres	800	800	800	800	800
Habitat Improvement-Fish	Acres / Structures	20	18	19	19	22
Range Administration	M Acres	0 9	0.9	0.9	0.9	0.9
Watershed Improvement	Acres	0 1	-	-	-	-
Treatment of Natural Fuels	Acres	25	25	25	25	30

4 8.12
Management Area 12
(Special Management Area, 48,668 Acres)

Management Area 12, Kings River Special Management Area, is comprised of Analysis Areas 63 and 64 (24,368 acres) in the Sierra National Forest, and 24,300 acres in the Sequoia National Forest. Major activities occurring near and within the area are rafting, hunting, hiking and fishing. Some 50 miles of trails provide access to and along portions of the river. Topography, vegetation and difficult access restrict recreational opportunities Kings River above Pine Flat Reservoir supports excellent fisheries and has been designated a California Wild Trout Stream.

This area is characterized by steep slopes covered with dense brush interspersed with areas of rock outcrop and openings of annual grassland Occasional stands of timber occur at higher elevations particularly on north facing slopes The Kings River is an important water source for hydroelectric power generation at Pine Flat Dam and for recreation and downstream irrigation It is on the National Rivers Inventory with some sections being studied for National Wild and Scenic River status, while other sections have already been designated

The more noteworthy features, aside from the river, are Garlic Falls and several groves of giant Sequoia, including the Boole Tree.

Management emphasis will be recreation; protection of the area's natural, archaeological, and scenic resources; and management for fish and wildlife. Land is withdrawn from mineral entry, however, existing claims are permitted. Existing OHV routes will remain open. Timber harvest may be considered if a catastrophic event occurs within the area or for wildlife management.

Management prescriptions for this management area consist of the following general management prescriptions, forestwide management direction, and applicable management standards and guidelines. Also shown is a list of activities and outputs [1] expected from applying the prescriptions An implementation plan will be completed for the area which will contain site specific management direction [2] For specific fire management direction, see Appendix E.

The following general management prescriptions and acres in each prescription apply to this management area in order of priority This priority may change due to individual project analysis If there are conflicting prescriptions, the most restrictive will have precedence

Prescription	Areas	Resource Situation
1. Special Management Area	48,668	See Alternative A map. Analysis Area 63 and 64.
2. Dispersed Recreation	48,668	See Recreation Opportunity Class Objectives and Wildlife Element maps. Analysis Areas 63 and 64.
3. Wild/Scenic Rivers (Designated)	2,720	See Wild and Scenic Rivers Element map. Analysis Area 63 and 64.
4. Minimum - level management	1,200	See SOHA and Furbearer Element map. Analysis Area 63.

On this page, a prescription was identified for each Analysis Area. The following list identifies the Standard and Guidelines used in that Analysis Area. If there are conflicting Standard and Guidelines, the most restrictive will have precedence.

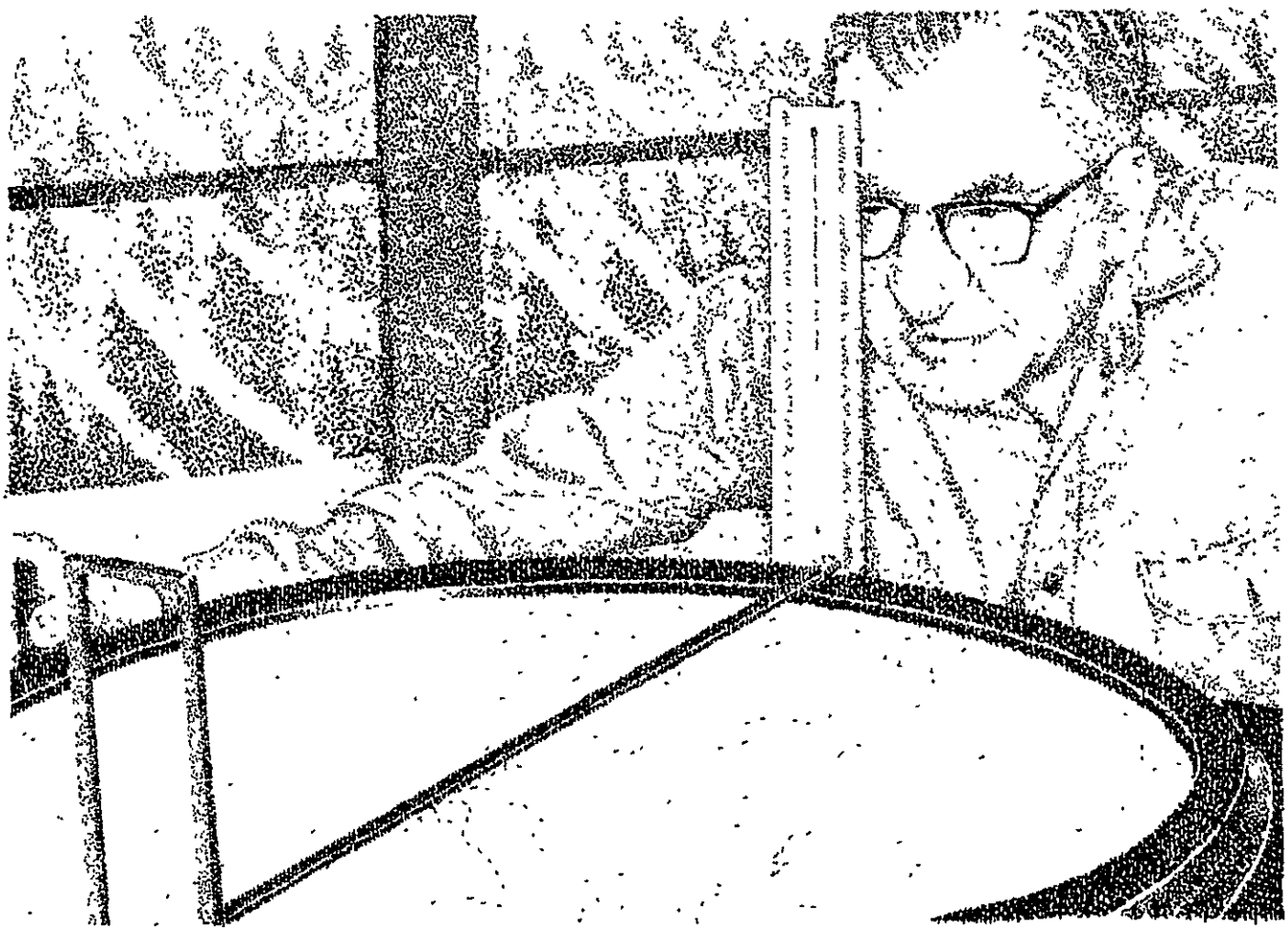
Standards & Guidelines	Applicable Areas
2, 3, 4, 14 - 16, 31 - 36, 38, 40, 53 - 55, 58 - 60, 63, 66c - 77, 80 - 82, 85, 86, 89 - 90, 92, 123, 128, 137 - 141, 143, 145 - 148, 150, 162, 166, 170, 194 - 202, 205 - 206, 217, 219 - 221, 228 - 231, 334 - 338	All S&Gs listed here apply to Analysis Areas 63 and 64

[1] Some outputs are measured only on a forestwide basis and therefore, are not listed here (see Forestwide Summary Table 4.03).
[2] A site specific implementation plan will be completed in 1991 containing direction for both the Sierra and Sequoia National Forests.

TABLE 4.10 - MANAGEMENT AREA 12: ESTIMATED AVERAGE ANNUAL OUTPUTS AND ACTIVITIES DURING THE NEXT FIVE DECADES

OUTPUT/ACTIVITY	UNIT	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030	2031 - 2040
Trail Reconstruction	Miles	5	3	3	-	-
Trail Construction	Miles	0 5	-	-	-	-
Habitat Improvement - Wildlife	Acres	350	350	350	350	350
Range Administration	M Acres	10.0	10.0	10.0	10.0	10 0
NOTE: Miles of trail reconstruction and trail construction are estimated. Actual miles will be determined during development and implementation of the Management Plan, to be completed by 1991.						

Chapter 5.0 - Monitoring and Evaluation Requirements



5.0
MONITORING AND EVALUATION REQUIREMENTS

5 1
ORIENTATION

The purpose of monitoring and evaluating is to provide information on results and progress of the Forest Plan in order to make revisions or amendments in a timely manner The Monitoring Plan in this chapter identifies activities, practices and effects to be measured as well as methods, frequencies and degree of variation which will require additional evaluation. It does not include the recurring monitoring associated with individual resource projects or activities, or the cost of this type of monitoring, nor does it include baseline data gathering, which is considered an activity in this Plan

There are three levels of monitoring with a direct, sequential relationship between levels, each requiring additional costs The first (Implementation) determines if plans, prescriptions, projects and activities are implemented as specified in project level environmental documents. The second (Effectiveness) determines if prescriptions and management activities meet management direction, objectives and standards and guidelines, The third (Validation) determines whether the initial data, assumptions and coefficients used in development of the Plan are correct.

This monitoring plan is designed to focus attention at the first level of monitoring, or implementation of Forest Plan The next level will only be initiated when it is determined additional resource monitoring is needed.

The goals of monitoring are to determine:

- if planned goals and objectives are being met,

- if planned programs and activities are resolving issues and concerns,

- if the effects of implementing the Forest Plan are as predicted,

- if the costs of implementation are as predicted, and

- if direction and standards and guidelines are being followed and if their purpose is effective

5.2
MONITORING SYSTEM

Results of monitoring and evaluation are reported on a fiscal year basis. The report summarizes the accomplishments of the previous fiscal year. The data sources for monitoring the Plan are as follows:

- Management Reviews

Management review includes General Management Review, Program Review and Activity Review.

- Other Ongoing Inventories and Monitoring Programs

These programs include, but are not limited to, soil productivity monitoring, water quality monitoring, forest inventory plots for timber, range utilization inventories, resident trout monitoring, and threatened and endangered species habitat monitoring.

- Management Attainment Reports

These reports are filed by District Rangers and various Forest Supervisor's staff. Targets are established at the beginning of the year and accomplishments are reported at the fifth, tenth and twelfth month of each year The reports are forwarded to the Regional Forester.

- Environmental Analysis Process

For site-specific monitoring, the responsible officer is the District Ranger. Forestwide data compilations, quality control, training, and spot checking is the responsibility of the Supervisor's staff

During the data acquisition phase of an analysis of the management situation, an assessment of project area data is completed. As necessary, data elements are updated to reflect current resource conditions

5 3
PRECISION AND VALIDITY

"Precision" is the exactness or accuracy of the measurement technique with which data are collected. "Validity" is the expected probability that information acquired through sampling reflects actual conditions, that is, the degree to which the monitoring procedures accurately reflect the Forest situation. Both precision and validity are qualitatively rated as either high, moderate or low. Components such as key targets - range forage utilization (in AUMs), miles of road construction, and timber offered (in MMBF), have a high level of accuracy and high probability of reflecting actual conditions. Other components, such as forage condition and trend, have a moderate or low level of precision and validity, based on monitoring techniques available. Standards for precision and validity accuracy levels are:

Level of Precision / Validity	Expected Accuracy
High (H)	Within 10%
Moderate (M)	Within 30%
Low (L)	Within 50%
N/A	Not determinable

5 4
EVALUATION

Evaluation of the results of the site-specific monitoring program will be documented in the annual evaluation report. The significance of the results of the monitoring program will be analyzed and evaluated by the Forest Supervisor Based on the evaluation, there may be a need for further action. These actions may include

- No action needed. Monitoring indicates goals, objectives and standards are achieved.
- Refer recommended action to the appropriate line officer for improvement of application of management prescriptions.
- Modify the management prescription as a Plan amendment.
- Modify the assignment of a prescription as a Plan amendment.
- Revise projected schedule of outputs.
- Initiate revision of the Plan.

Plan modification and/or revision will be made in accord with the NEPA process and NFMA regulations

The documented file of the Forest Supervisor's decision, based on monitoring and evaluation, is to be maintained for future use in amending or revising the Forest Plan. An annual evaluation report of these decisions will be prepared and sent to the Regional Forester.

The Monitoring Evaluation Process (Figure 5.01) illustrates the steps necessary for an effective monitoring and evaluation plan. Based on this process, a need for further action is recommended to the Regional Forester.

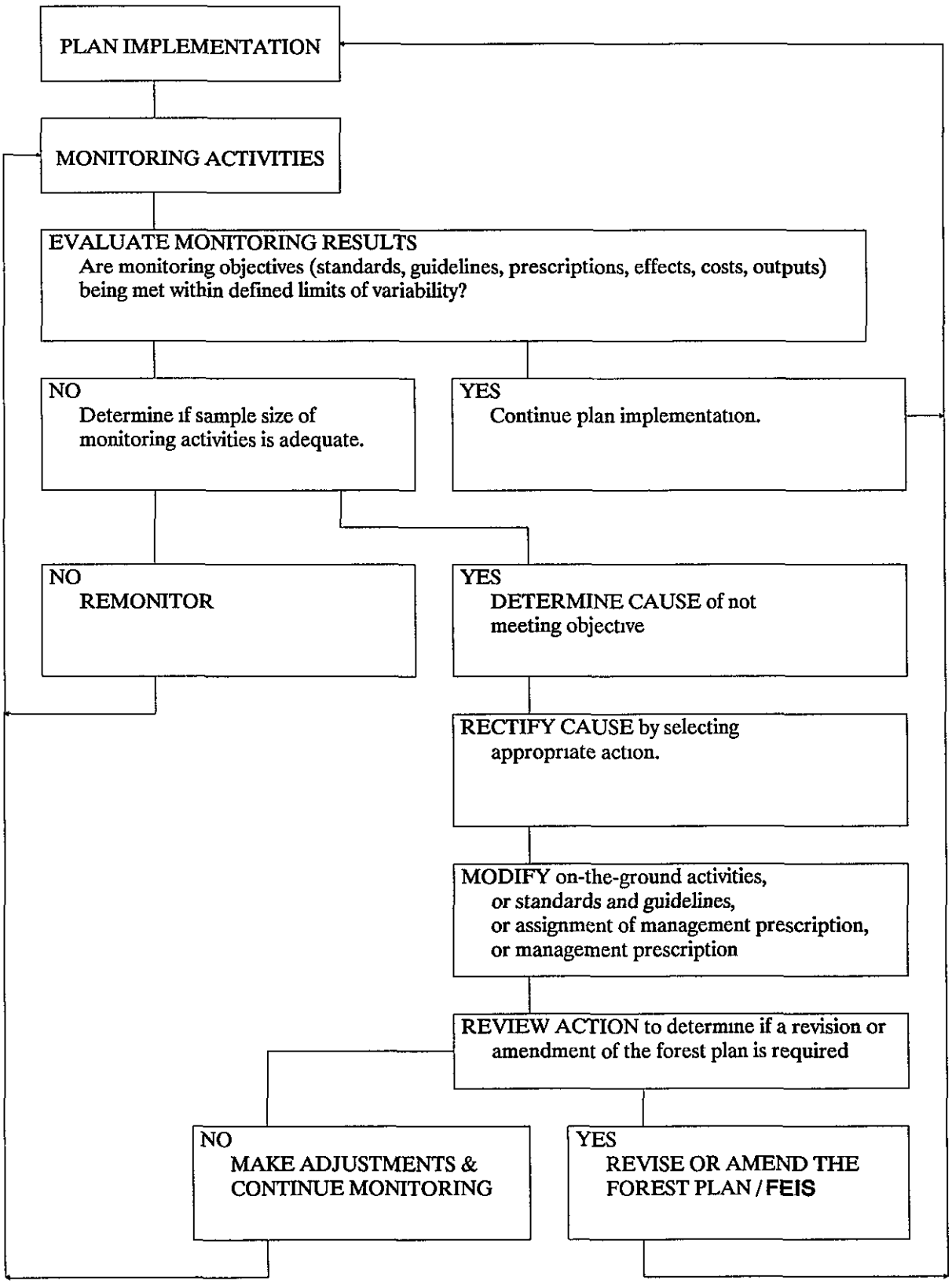
5 5
MONITORING ELEMENT DISPLAY

The Forest Plan's monitoring requirements are contained in the following Monitoring Plan illustrated in Table 5.01 For each activity, practice, or effect to be monitored, one or more measurement techniques and the standard to be met are specified. A frequency for measuring and reporting the monitored items is established and the expected precision and validity of that measurement is stated.

To ensure R-5 Minimum Management Requirements, Plan's Standards and Guidelines and Best Management Practices are being implemented as designed in the project NEPA documents, the minimum monitoring frequency will be at least 10% of the annual projects or 5 projects per year.

In Table 5.01, 16 resources are listed, each having 11 headings continuing across 2 concurrent pages.

FIGURE 5.01 MONITORING EVALUATION PROCESS



RESOURCE	ACTIVITY PRACTICE	MONITORING OBJECTIVE	MONITORING TECHNIQUE	PRECISION / VALIDITY
Recreation	1. Actual costs of implementing Plan	Are predicted costs realistic?	Expenditure reports	High
	2. Off-highway vehicle (OHV) use	Are management objectives of OHV plan met and receiving public acceptance?	Review complaints and violations of OHV management to assure management and regulations are meeting expected objectives	N/A
	3. Recreation Opportunity Spectrum (ROS) Class	Are acres in each ROS Class changing from one end of the spectrum to the other enough to cause a significant change in recreational experience levels?	Compare previous ROS Class map to new map that shows changes made during the previous 5 years	N/A
	4. Recreational visitor use (RVDs)	Maintain records of RVD by type of activity, area, and ROS Class	Obtain RVDs by variety of sampling methods to assure a representative sample	Moderate
Visuals	1 Visual condition of the Forest	Are VQOs being met?	Field reviews and photographs from landscape control points	High
	2. Visual resource improvement	Is an active program of visual resource improvement being carried out?	Field reviews and photographs from landscape control points	Moderate
	3. Trend of visual character	Approach or maintain desired character state of Plan	Field reviews and photographs from landscape control points	High
	4. Visual Quality Objectives (VQOs)	Are predicted environmental consequences being reached?	Field observations at fixed and moving view points	Moderate
Cultural	1. Cultural resource protection	Are sites protected from project impacts?	On-site inspection; photographing and mapping during inventory	High
	2. Cultural resource protection	Maintain site integrity	On-site inspection; photographing and mapping during inventory	Moderate

MONITORING PERIOD	REPORTING PERIOD	STANDARD OF COMPARISON	RESPONSIBLE STAFF	INDICATION FOR ACTION	ANNUAL COST
1. Annually	Every 5 years	Predicted costs	Planning Officer and Budget Analyst	Average annual costs over first 5 years exceeds 10% of predicted costs	$ 1,000
2. Annually	Annually	Average number of complaints or violations related to OHV use during first 2 years of the Plan	District Ranger	Greater than 20% increase in violations of zoning rules or complaint letters	$ 4,500
3. 100% every 5 years	Every 5 years	Current acres of land by ROS Class as compared to previous acres of land by ROS Class	Recreation Officer	Loss of 10% of projected semiprimative motorized or semiprimitive nonmotorzed ROS Class areas	$ 400
4. Annually	Annually	RVDs by activity, type, area, and ROS Class, as compared to previous years	District Ranger	5-year average more than 10% of projected use in any activity by ROS Class	$ 10,000
1. Annually	Every 2 years	EVC and Forest Plan VQOs are defined in PSM 2380	Recreation Officer	5% failure to achieve planned VQO	$ 2,000
2. Annually	Annually	Forest Plan Planning Records, Forest Plan VQOs & FSM 2380	Recreation Officer	Less than 50% of visual resource improvement projects accomplished in any year	$ 500
3. Every 5 years	Every 5 years	Forest Plan and PSW-91 of 1973	Recreation Officer	Trend in direction away from goal	$ 1,500
4 Designated Recreational area: annually, Sensitive travel corridors: every 2 years; Non-sensitive travel corridors: every 5 years	End of each decade	Preservation (Predominately ecological change) Retention (Changes not evident) Partial Retention (Changes evident, attention not attracted) Modification (Changes are noticed and attract attention) Maximum Modification (Changes are obvious and attract attention) Unacceptable Modification (Changes are glaring in contrast and disharmony with natural patterns	Recreation Officer	Visual conditions in any corridor or designed recreational area falls by more than 10% to meet VQ)s stated in the Plan	
1. After projects	Annually or immediately in case of damage	FSM 2361, P.L. 96-95. P.L. 89-665	Resource Officer	No diviation allowed	$ 3,000
2. Every 10 years	Annually (for 10% of sites)	FSM 2361, P.L. 96-95. P.L. 89-665	Resource Officer	Any significant loss of intergrity or any vandalism or damage	$ 7,000

RESOURCE	ACTIVITY PRACTICE	MONITORING OBJECTIVE	MONITORING TECHNIQUE	PRECISION / VALIDITY
Fish and Wildlife	1. Lahontan and Paiute Cutthroat Trout - habitat quality [1]	Detect declines in habitat quality	USDA Forest Service Region 5 Fish Habitat Assessment	Moderate
	2. Resident Trout - fish abundance and fish habitat [1]	Monitor trends in fish abundance and fish habitat	Habitat typing, residual pool volume measurements, and direct observation fish counts	Moderate
	3. Goshawk - habitat utilization [1]	Evaluate habitat utilization. Assess effectiveness of S&Gs	Nest site surveys of suitable habitat	High
	4. Peregrine falcon - habitat utilization [1]	Evaluate habitat utilization Assess effectiveness of S&Gs	Nest site surveys	High
	5. Bald eagles / osprey - habitat utilization [1]	Evaluate habitat utilization. Assess effectiveness of S&Gs	Annual co-op survey with U. S. Fish and Wildlife Service	High
	6. Spotted owls - habitat utilization [1]	Evaluate habitat utilization. Assess effectiveness of S&Gs	Census by recording owl vocalizations	High
	7. Willow flycatcher - habitat utilization [1]	Evaluate habitat utilization. Assess effectiveness of S&Gs	Census by recording flycatcher vocalizations	High
	8. Mule deer - animal numbers [1]	Monitor population trends. Assess effectiveness of S&Gs	Annual deer herd summary reports from Department of Fish and Game	Moderate
	9. Bear - animal numbers	Monitor population trends. Assess effectiveness of S&Gs	Annual bear harvest summary reports from Dept. of Fish and Game	Moderate
	10. Riparian species - avian numbers [1]	Monitor population trends Assess effectiveness of S&Gs	Field counts of avian species	High
	11. Oak woodland species - avian numbers [1]	Monitor population trends. Assess effectiveness of S&Gs	Field counts of avian species	High

[1] Management Indicator Species - Species or groups of species dependent upon specfic habitat that will be monitored.

MONITORING PERIOD	REPORTING PERIOD	STANDARD OF COMPARISON	RESPONSIBLE STAFF	INDICATION FOR ACTION	ANNUAL COST
1. Annually for 2 years then every 2 years	Every 2 years	Critical habitat components	Resource Officer	Detection of declines in critical habitat elements	$ 7,000
2. Annually for 5 years then every 2 years	Every 2 years	5-year baseline information	Resource Officer	20% decline away from baseline information	$20,000 first year then $15,000 annually
3. Annually for 5 years then every 2 years	Annually for 5 years then every 2 years	Occupied habitat	Resource Officer	Abandonment of territories	$ 5,000 annually
4. Annually for 5 years then every 3 years	Annually for 5 years then every 3 years	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	Failure of reintroductions or abandonment of nest sites	$ 2,000
5. Annually	As requested by U S Fish and Wildlife Service	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	Notify and complete action suggested by U.S. Fish and Wildlife Service	$ 500
6. Annually for 5 years then every 2 years	Annually for 5 years then every 2 years	Occupied management territories	Resource Officer - tied to Tri-Forest Monitoring Plan	Abandonment of territories during 2 successive samples	$91,400
7. Annually for 4 years then every 2 years	Annually for 4 years then every 2 years	Occupied habitat	Resource Officer - tied to Tri-Forest Monitoring Plan	10% decline in occupied habitats for 2 successive samples	$ 4,000 first year then $3,000 annually
8. Annually	Annually	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	20% population decline for 2 successive years	$ 200
9. Annually	Annually	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	20% decline from base population for 2 successive years	$ 200
10. Annually for 5 years then every 2 years	Year 5, then every 2 years	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	20% decline from base population for 2 successive samples	$17,000 first year then $10,000 annually
11. Annually for 5 years then every 2 years	Year 5, then every 2 years	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	20% decline from base population for 2 successive samples	$17,000 first year then $10,000 annually

RESOURCE	ACTIVITY PRACTICE	MONITORING OBJECTIVE	MONITORING TECHNIQUE	PRECISION / VALIDITY
Fish and Wildlife	12. Meadow edge species - avian numbers [1]	Monitor population trends. Assess effectiveness of S&Gs	Field counts of avian species	High
	13. Mature mixed-conifer species-avian numbers [1]	Monitor population trends. Assess effectiveness of S&Gs	Field counts of avian species	High
	14. Selected furbearers - habitat utilization [1]	Evaluate habitat utilization. Assess effectiveness of S&Gs	Survey suitable habitat	High
	15. Residual density of snags and down logs after timber harvest - number per acre	Verify compliance with standards and guidelines	Field counts in ongoing and recently completed timber sales	Moderate
	16. Individual projects - variable	Are project objectives being met?	Field surveys of a representative range of projects	Moderate
	17. Proportions of habitat stages	Verify FORPLAN outputs for habitat diversity	Assessment of timber stand records and other field data	Moderate
Sensitive Plants	1 Sensitive plants	Assess current status and potential effects of management	Field surveys of past activities on selected populations of sensitive plants	Moderate
Range	1. Livestock production (AUM)	Determine livestock production if actual outputs meet planned outputs	Sum of actual-use records	High
	2. Condition and Trend of Range Forage Resource	Effect of long-term livestock use on the vegetative resource	Reanalysis of key areas and establish photo points. Species composition frequency, measure RDM in annual grass range	High/Moderate
Timber	1. Area of regeneration harvest sold by harvest method, Regulation Class & timber type	Is the Forest meeting the Plan's timber regeneration goal by management area?	Review of Annual Program Harvest Statements	High
	2. Timber volume sold by harvest method, Regulation Class & timber type	Is the Forest meeting the Plan's timber output goal?	Review of Annual Program Harvest statements	High

[1] Management Indicator Species - Species or groups of species dependent upon specfic habitat that will be monitored

MONITORING PERIOD	REPORTING PERIOD	STANDARD OF COMPARISON	RESPONSIBLE STAFF	INDICATION FOR ACTION	ANNUAL COST
12. Annually for 5 years then every 2 years	Year 5, then every 2 years	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	20% decline from base population for 2 successive samples	$17,000 first year then $10,000 annually
13. Annually for 5 years then every 2 years	Year 5, then every 2 years	Base population	Resource Officer - tied to Tri-Forest Monitoring Plan	20% decline from base population for 2 successive samples	$17,000 first year then $10,000 annually
14. Inventory for 1 year annually for 5 years; then once every 3 years	R-5 Standards	R-5 Standards	Resource Officer - tied to Tri-Forest Monitoring Plan	R-5 Standards	$ 5,000 year 1 $ 3,000 year 2 After year 2, $2,000 annual
15. Annually	Annually	Standards and guidelines	Resource Officer - tied to Tri-Forest Monitoring Plan	20% decline in required densities	$ 4,000
16. Annually	Annually	Project objectives	Resource Officer	Variable	$ 4,000
17. Every 10 years starting in year 5	Every 10 years starting in year 5	FORPLAN data base	Resource Officer	10% error between field data and FORPLAN data	$ 5,000
1. Annually	Annually	Base population	Resource Officer	Noncompliance with prescribed mitigation measures	$ 4,000
1. Annually	Annually	Planned output in AUMs	Resource Officer	More than 15% variation between planned output and actual output	$ 500
2. Every 3 years	Every 5 years	R-5 standards and current monitoring techniques	Resource Officer	Change is significant when species composition is outside 95% confidence interval of species composition determined at critical sampling Photo comparison	$20,000
1 Every 5 years	Annually	FSM 2497.11c	Timber Management Officer	When acres sold varies by more than 10% from the planned target for the monitoring period	$ 5,000 [1]
2. Every 5 years	Annually	FSM 2497.32c	Timber Management Officer	When volume sold varies by more than 15% from the planned target for the monitoring period	$ 5,000 [1]

[1] Includes all costs of preparing, editing, ADP, storing and printing individual sale reports

RESOURCE	ACTIVITY PRACTICE	MONITORING OBJECTIVE	MONITORING TECHNIQUE	PRECISION / VALIDITY
	3. Reforestation success	Is regeneration of harvested acres meeting Regional standards?	Annual review of stocking surveys taken on each harvested acre, Surveys are conducted lst, 2nd, and 5th year following planting or seeding	High
	4. Land suitability for timber production	Verify land classified for timber production is capable and suitable	Field inspection of timber sales	High
	5. Timber stand improvements	Verify success or failure of timber stand improvement practices	Field inspection of units	High
Integrated Pest Management	1. Forest pest damage	Detection, evaluation, and treatment of pest-related damage	Aerial and ground surveys; stand and resource exams	Moderate
Soil	1. Soil productivity	Verify adequacy of Forest's prescriptions and standards and guidelines in maintaining and improving soil productivity (See FSH 2509 18)	Use areal extent sampling for a general condition assessment. Use point transect method for discrete variables for a general assessment of standard compliance. Use random grid method for continuous variables for a more precise estimate of standard compliance.	High
Water	1. Change in water quality	Assess compliance with BMP directtion and continue to evaluate effectiveness of BMP.	Visual observation with random sample analysis	Moderate
	2. Water quality management during activities	Evaluate compliance with Plan policy and effectiveness of standards and guidelines	Review of prepared EAs, review of contract provisions, field activities, reviews, water quality analysis, and field observations	High
Air	1. Air quality maintenance in designated airsheds	Determine existing conditions from which trend can be projected to maintain air quality related values including visibility in Class I areas Evaluate compliance with State and Federal standards	Use Yosemite National Park automated background site as a surrogate for Sierra National Forest Class I areas	High
Geology	1. Effectiveness of the modified shelterwood prescriptions in maintaining slope stability on unstable land (reducing landslides)	Are management activities minimizing soil loss and water quality degradation resulting from mass movement on sensitive watershed lands?	Document monitoring locations and base conditions after harvest. Compare average number of landslides between areas with this prescription and similar uncut areas.	Moderate to high, increasing with time

MONITORING PERIOD	REPORTING PERIOD	STANDARD OF COMPARISON	RESPONSIBLE STAFF	INDICATION FOR ACTION	ANNUAL COST
3 Annually	Annually	FSM 2472.03 and FSM 2497.52	Timber Management Officer	When "Annual Reforestation & Timber Stand Improvement Needs Report" indicates there are more than 9,000 acres in the current needs category requiring reforestation	$40,000 [1]
4. Annually	Annually	FSM 2410	Timber Management Officer	During project planning and reviews	$ 5,000
5. Annually	Annually	FSM 2410	Timber Management Officer	During annual timber stand examination	$ 5,000
1. Annually	Annually	Pest-related damage does not exceed levels that interfere with the attainment of management goals and objectives Staff	Forest Silviculturist, RO-FPM	When damage appears to interfere with or threaten the attainment of management goals or objectives	$ 500
1. 10% of major projects annually for 5 years	Annually	Objectives are met	Resource Officer	Less than 90% of standards and guidelines are implemented Whenever standards and guidelines are ineffective for the intended purpose Whenever improvement and maintenance measures are not successful	$ 9,500/year
1. Annually	Annually	State and Federal objectives being met	Resource Officer	Suspended sediment exceeds State and Federal objectives	$ 9,000
2. Annually	Annually	BMP identified as project mitigation requirements; forestwide standards and guidelines; water quality objectives of beneficial users	Resource Officer	Implementing documents for 3 projects are missing needed water quality mitigation measures or water quality objectives violated or 2 field reviews identify mitigation measures are not being implemented	$12,500 (for 5 years)
1. Contin-uously for 2 years	Every 2 years	Federal and State air quality standards (background data needed first)	Forest Engineer	4 years of continuous decline in visibility	$ 6,000
1. Every 5 years	Every 5 years	No statistical difference between average number of landslides in cut and uncut areas	Resource Officer	Statistically significant difference between the average number of landslides in cut and uncut area	$ 1,000

[1] Includes all costs for stocking surveys, preparing data, editing data, ADP, storing and printing individual stand reports

RESOURCE	ACTIVITY PRACTICE	MONITORING OBJECTIVE	MONITORING TECHNIQUE	PRECISION / VALIDITY
Minerals	1. Mining operations	Assure surface resources are protected	Review all EAs and Plans of Operation; field review of implementation (one operation per district per year)	Moderate
Lands	1. Administrative effectiveness of landownership adjustments	To determine whether land adjustments have decreased administrative concerns and/or increased efficiency	Compare management efficiencies of resultant landownership pattern with the "before condition"	N A
	2. Landline location	Ascertain if priority projects are being given priority	Review work accomplishment	High
	3. R/W Acquistion	Evaluate progress of R/W acquistion	Project accomplished	High
	4. Land use	Determine if instruments authorizing land occupancy and use are consistent with Forest Plan	Review authorizing instruments	High
Transportation	1. Road construction, management and maintenance	Assess effectiveness of road impact prediction	Forest activity review of selected roads	Moderate
	2. After construction and maintenance of administrative sites	Assess effectiveness of Forest's needs assessment process	Forest activity review of facilities	Moderate
Protection	1. Resource loss to wildfire	Evaluate the consequences of the Plan	Fire and resource damage reports	High
	2. Area of fuel treatment	Are ouput objectives in Plan being met? Evaluate the consequences of the Plan	Annual accomplishment report	High

MONITORING PERIOD	REPORTING PERIOD	STANDARD OF COMPARISON	RESPONSIBLE STAFF	INDICATION FOR ACTION	ANNUAL COST
1. Annually	Annually	Forestwide direction	Lands Officer	Any variation from the authorized operation plan or insufficiently mitigated, significant effects	$ 1,000
1. 5 year summary	5 years	FSM 5430 Forest Standards and Guidelines	Lands Officer	N.A	$ 200
2 Annually	Annually	FSM 7150 Forest Standards and Guidelines	Lands Officer	N.A	$ 400
3. Annual use 3 year average	Annually	Annual Work Plan Forest standards and guidelines	Lands Officer	33% variation in any one year 10% variation over 3 year average	$ 200
4. Annually	Annually	FSM 2700 Forest standards and guidelines	Lands Officer	30% after 2 years 10% after 4 years none after 5 years	$ 500
1. 3 years	3 years	Forest policy on erosion control, size of system and cost	Forest Engineer	20% variation from the Plan	$ 500
2. 3 years	3 years	Administrative sites, energy goals and value/cost ratio in the Plan	Forest Engineer	10% variation from the Plan	$ 1,000
1 Annually	5 years	1982 base areas projected burned and predicted cost and value loss	Fire Management Officer	Losses or costs exceeding 20% of the predicted annual, burned acres, and costs	$ 1,000
2. Annually	5 years	Program - predicted fuels treatment	Fire Management Officer	Less than 15% of predicted outputs	$ 1,000

CHAPTER 6.0 – APPENDICES

6.0
APPENDICES

A.0
APPENDIX A - RESOURCE IMPLEMENTATION PLANS AND TECHNICAL PLANNING NEEDS

The data and information collection phase of the Forest planning process was designed to meet the intent of NFMA and to help address local issues, concerns, and opportunities. This phase was very lengthy and time-consuming. Although a very detailed data base was developed from a wide array of inventory information, several areas will need to be addressed more thoroughly during the next cycle of land and resource management planning for the Forest As a result of this Plan, several resource implementation plans will need to be developed or revised and some additional studies conducted. Resource implementation plans and resource inventories will be used to augment and/or monitor and update the Plan. Existing resource implementation plans (prior to their revision) will be used to augment the Plan where there is no conflict. Where there is conflict, the direction in the Plan will prevail

The following list of plans and studies need to be revised or completed within the planning period:

1. Merced Wild Scenic River Plan.
2. Kings Wild Scenic River Plan
3. John Muir Wilderness Plan.
4. Ansel Adams Wilderness Plan.
5. Kaiser Wilderness Plan.
6. Dinkey Lakes Wilderness Plan.
7. Monarch Wilderness Plan
8. Kings River Special Management Area Plan
9. Off Highway Vehicle Travel Plan.
10. Bass Lake Recreation Area Composite Plan
11. Huntington Lake Recreation Area Composite Plan.
12. Grazing Allotment Plans.
13. San Joaquin Deer Herd Plan.
14. Huntington Lake Deer Herd Plan.
15. Spotted Owl Habitat Area Plans.
16. Upper Kings River Fishery Habitat Management Plan.
17. South Fork Merced River Fishery Habitat Management Plan.
18. Lahontan Cutthroat Trout Recovery Plan.
19. Land Adjustment Plan.
20. Viewshed Corridor Plans for major forest highways.
21. Woodlands Management Plan for all woodlands not presently managed for sawtimber.
22. South Fork Merced River and Home Camp Creek RNA Management Plans
23. Fire Management Action Plan.

The following is a list of data-gathering needs and inventory or survey requirements:

1. All Forest withdrawals will be reviewed, as required by the Federal Land Policy and Management Act of 1976 (Public Law 94-579, Section 204) by October 21, 1991.
2. Detailed cumulative watershed effects, as necessary, when approved methodology becomes available.
3. Order II Soil Surveys in conjunction with compartment planning and individual projects to ensure continued soil productivity.
4. Groundwater situation and demands for the next planning cycle.
5. Establishment reports by 1992 for the candidate RNAs.
6. Nelder and McKinley Groves studies for possible classification as SIAs
7. Effects of mountain lions on Forest deer herds
8. Plots and 5-year baseline data to begin monitoring avian guilds, as specified in the Monitoring Plan.
9. Cultural resource inventories and evaluations, with a goal of a complete Forest inventory by the next planning cycle.
10. Necessary data and complete assessment by 1988 for a Woodlands Management Plan for all woodlands not presently managed for sawtimber.
11. The President's August 2, 1979 Environmental Program directed the Forest Service and Bureau of Land Management to study possible boundary adjustments between the two agencies. A National study is underway to determine what adjustments should take place. Action will require an act of Congress following full public involvement.

B.0
APPENDIX B - RESEARCH NEEDS

It is anticipated that additional research needs will surface during Plan monitoring and evaluation. Some research has already been initiated and will continue to be coordinated by the Pacific Southwest Experiment Station and the Regional Office. The following needs have been identified during the Forest Planning process:

1 Conduct research to determine optimum stream canopy shading requirements for Forest streams

2. Conduct research to determine relationships between stream flow regimes, distribution and abundance of riparian vegetation, and large woody debris in stream channels.

3 Develop methods to quantitatively assess sedimentation impacts on fish developmental stages.

4. Coordinate with California Department of Fish and Game in research to determine trophic relationships between trout and nongame species in upper Kings River.

5. Continue research to determine biotic responses to cumulative watershed effects

6. Develop methodology to determine the amount of bank disturbance from intensive grazing that can be tolerated before water quality and fishery values are seriously affected.

7. Continue studies to determine if significant social conflict exists between deer and cattle.

8. Continue investigations of habitat needs for individual species of birds, mammals, amphibians, and reptiles under the framework of the Wildlife Habitat Relationship Program.

9. Continue research in the relationships between deer population trends and predation by mountain lions and coyotes.

10. Research the relationships between down log densities and population trends in dependent species.

11. Research fire frequencies and intensities on north-facing chaparral slopes and assess this relationship with plant and animal community structure.

12. Determine the ability of sensitive plants, such as Trifolium bolanderi, to withstand the effect of grazing.

13. Continue research to identify the type, timing, and extent of vegetative control necessary to assure reforestation success on a variety of timber units.

14. Continue research to improve seedling survival and growth of planted red and white fir.

15. Continue research into computer methodology and programming that will simultaneously and cost-effectively produce both timber harvest levels and spatial location of harvest areas.

16. Continue research to improve growth and yield predictions in second growth timber stands being managed under various intensity levels.

17 Continue research into the characteristics and dynamics of Heterobasidiom annosum root disease in second growth timber stands.

18 Continue research to determine the effect that periodic biomass removal, including physical activities and fire activity, has on soil productivity.

19. Determine the relationship between losses in soil productivity and conventional logging practices and sensitive soils.

20 Continue research to determine the value and role fertilization has in increasing growth of regenerated timber stands and forage production, utilizing methods which are cost-effective

21. Conduct studies and develop a process to establish the threshold of concern that controls increase of cumulative impacts from management activities on watersheds.

22 Conduct research in the central Sierra Nevada Range to show the relationship of silvicultural practices and other vegetative modification projects to water increases.

23. Develop a cost-effective methodology to determine rates of natural erosion and sedimentation, and rates resulting from land-disturbing activities.

24. Develop methodology to determine, on a regional basis, significance of cultural resource sites.

25. Conduct research identified in the Forest Cultural Research Overview that can be completed within the life of this Plan:

    a. Investigate historic period events and patterns which altered aboriginal population, settlement and resource use.

    b. Build an ethnographic data base comparable to that for archaeological resources.

c Investigate entry of Western Mono to the west of the Sierra Nevada Range.

d Identify what characteristics non-ambiguously describe archaeological properties associated with specific cultural groups and time periods

C.0
APPENDIX C - TIMBER MANAGEMENT TABLES

C 1
INTRODUCTION

This appendix presents a discussion of the determination of suitability and six tables and two figures, which are required by Forest Service directive, to complete the Forest Plan. These tables provide useful information concerning the dominant activity of the Forest and the one that has the greatest potential for influencing other Forest resources.

Figure C1, PROCESS FOR IDENTIFICATION OF LAND SUITABLE FOR TIMBER PRODUCTION, identifies the criteria and explains the step-by-step process for the determination of land suitable for timber production

Table C.01, LAND PRODUCTION CLASSIFICATION, classifies land areas within the Forest into several categories, suitable and unsuitable land, for timber production and management

Table C.02, SILVICULTURAL MANAGEMENT PRACTICES FOR SUITABLE LAND, shows how the suitable timber land will be managed to meet harvesting objectives.

Table C.03, TIMBER PRODUCTIVITY CLASSIFICATION, displays the distribution of suitable and unsuitable land on the basis of potential growth or production.

Table C 04, ALLOWABLE SALE QUANTITY AND TIMBER SALE PROGRAM QUANTITY, presents the volume of timber sold in terms of the harvesting methods used. These figures are estimates of average annual production during the first decade, 1991-2000.

Table C 05, SUMMARY OF PRESENT AND FUTURE FOREST STOCK CONDITION, tabulates the current and anticipated status of the age and volume of all forest stock in Sierra National Forest.

Figure C2, LONG-TERM SUSTAINED YIELD AND ALLOWABLE SALE QUANTITY, displays and compares the difference between the amount of timber that could be harvested under a long-term sustained yield management program and the amount of timber that will be sold and harvested under current management policies.

Table C.06, TEN-YEAR COMPARTMENT HARVEST SCHEDULE, summarizes the basic information and scheduling of timber sales over the next ten years. This information includes the expected volume of timber and the compartment name and management area.

C.2
DETERMINATION OF LAND SUITABILITY

Indentification of Land Tentatively Capable, Available, and Suitable for Timber Management

Section 6 (g) (2) (A) of the Resource Planning Act of 1974, as amended by the National Forest Management Act of 1976, is quoted as follows:

> "Require the identification of suitability of land for resource management "

Section 6 (g) (3) (A) states that guidelines for land management plans developed to achieve the goals of the program (RPA), which insures consideration of the economic and environmental aspects of various systems of renewable resource management, including the related systems of silviculture and protection of forest resources, will provide for outdoor recreation including wilderness, range, timber, watershed, wildlife, and fish. The land suitability assessments required under the RPA/NFMA planning process state there shall be a systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences

The Act provides very little direction as to what form this "Systematic interdisciplinary approach" plan shall take. The Secretary is directed under Section 6 (g) to issue regulations which set forth the process for developing land management plans, which provide guidelines and standards for analyzing suitability of various forms of resource management.

Under Section 219.3, Definitions of National Forest Management Act Regulations (9/17/79), the definition of suitability is provided. Also, the amended version of 36 CFR 219 (11/1/82) has the same definition of suitability which is·

> "The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices."

Furthermore, under 36 CFR 219.3 of the National Forest Management Act Regulations (9/17/79) and the amended Regulations (effective 11/1/82) referenced above, state capability as follows:

> "Capability· the potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices at a given level of management intensity. Capability depends upon current conditions and site conditions, such as climate, slope, landform, soils, and geology as well as the application of management

practices, such as silvicultural or protection from fire, insects, and disease "

Procedure

Figure C1 illustrates the process for identifying land suitable for timber production. The following text describes the process.

Step 1. Forested land - land where trees cover at least 10 percent of the area

Step 2. Land withdrawn - land where formal, legal or administrative direction prohibits timber management (e.g , Wilderness).

Step 3. Industrial wood - lumber from those species currently utilized for commercial purposes.

Step 4. Irreversible damage - damage consideration of soil, watershed, wildlife, and any other resource affected by timber management.

Step 5. Restocking within five years - regeneration of commercial timber species

Step 6. Tentatively suitable land - all land that passes through Steps 1 to 5.

Step 7. Land selected - portion of tentatively suitable land base selected for timber production and not constrained by economics or other resource needs in FORPLAN model

Step 8 Suitable land - difference between tentatively suitable (6) and land excluded from regulated timber production by FORPLAN (7).

Step 1 was the mapping of Forest land. Differences in vegetation were identified and delineated on aerial photos covering nearly the entire Forest. Land with at least 10% crown closure in conifer timber or clearly visible evidence of having been forested were further delineated by forest type and condition. The resulting maps were digitized for data processing by Wildland Resource Information System (WRIS). WRIS produces a listing for each mapped timber stand and summaries by forest type and condition.

The 562,900 acres of mapped timber stands were carried forward to Step 2.

Step 2 is land withdrawn from timber production Designated Wilderness areas and Kings River Special Management Area have been legislatively withdrawn from timber production. Areas withdrawn were determined by summarizing acres of mapped timber stands within each Wilderness area plus the previously published estimates of forest covered land on unmapped older Wilderness areas. Also, the Teakettle Experimental Forest has been administratively withdrawn. Published estimates of forest covered land were used for this land.

Thus, 420,500 acres were carried forward to Step 3.

Steps 3 and 5, began in November - December 1979, using available soil information, a data base printout of every timber-type polygon on the Forest, and a random number list. The team selected 42 Condition Class 2 stands totaling 1,072 acres Each stand was then located on an aerial photo For any stands where suitability was questionable, a 1 inch = 111 feet photo enlargement of the stand was obtained.

A team consisting of Dave Smith, District Silviculturist from Minarets; Robert Zwirtz, Silviculturist from Kings River; Ken Denton, Forest Silviculturist; and Bruce Moyle, Forest Timber Staff Officer, (the first three people listed are certified silviculturists) reviewed the photos and for each stand determined if they were

"High Site": Average looking Forest land where poor stocking was attributable to non-site related factors such as recent timber harvesting.

"Low Site": Forest land where poor stocking was a natural, site-related condition, but condition and amount of stocking indicated it could grow more than 20 cubic feet per acre per year, and soil conditions appeared to be good enough for successful reforestation (although regeneration costs of about twice the normal forest average were permitted).

"Non-Commercial". Land that appeared to meet either of the following conditions: 1) It would not grow at least 20 cubic feet per acre per year MAI at culmination, even at maximum stocking, or 2) It could not be regenerated with a reasonable cost or chance of success. For reasonable cost; two times the Forest average cost for regeneration was used.

Factors, such as access, economics (other than the above test of reasonableness) logging systems, and distance from other stands were not included in this step The 1" = 111' aerial photos worked very well for determining rockiness of the site, vigor of tree crowns, skid trails and stumps, and other site-indicating features. Also, individual team members had previously visited a few of the sites.

The team determined 15.4% of the acreage in our sample was non-commercial, and thus 15 4% of the entire Forest acreage in Condition Class 2. Some stands met both non-commercial criteria above, so a 50/50 split between Step 3 and Step 5 is as close as the team could approximate with the sample.

The small size of the sample could be a concern, however, two previous steps had already pointed to a non-commercial percentage in the 15% range These steps were:

1. We originally randomly selected 200 sample stands and took them through this entire process, and the non-commercial percentage was determined to be 26%. A subsequent review of the process revealed a serious bias in the way stands were selected. This bias was weighted totally toward the non-commercial stands. At the time this bias was estimated to account for 5-15% of the 26%. Correcting the bias resulted in only 42 of the original 200 samples being left in the data

2. Prior to sampling, a telephone poll was conducted with 4 of the 5 Ranger Districts Personnel were asked "What percentage of your poorly stocked strata is non-commercial?" Results of the poll may be found in the Forest's planning records.

Step 4 considers all current technology, regardless of cost, available to manage timber without appreciable productivity loss in timber, soil, watershed, or other resources as determined by an interdisciplinary team. Eighty-two hundred acres were removed at this step, primarily because of unstable soils.

Step 6 is the final test of suitability. Here land not suitable for timber production are identified in FORPLAN and restricted by:

1. Other resource constraints make it inappropriate in the alternative.

2. The economics of timber production as constrained by even-flow non-declining yield

FIGURE C1 - PROCESS FOR IDENTIFICATION OF LAND SUITABLE FOR TIMBER PRODUCTION

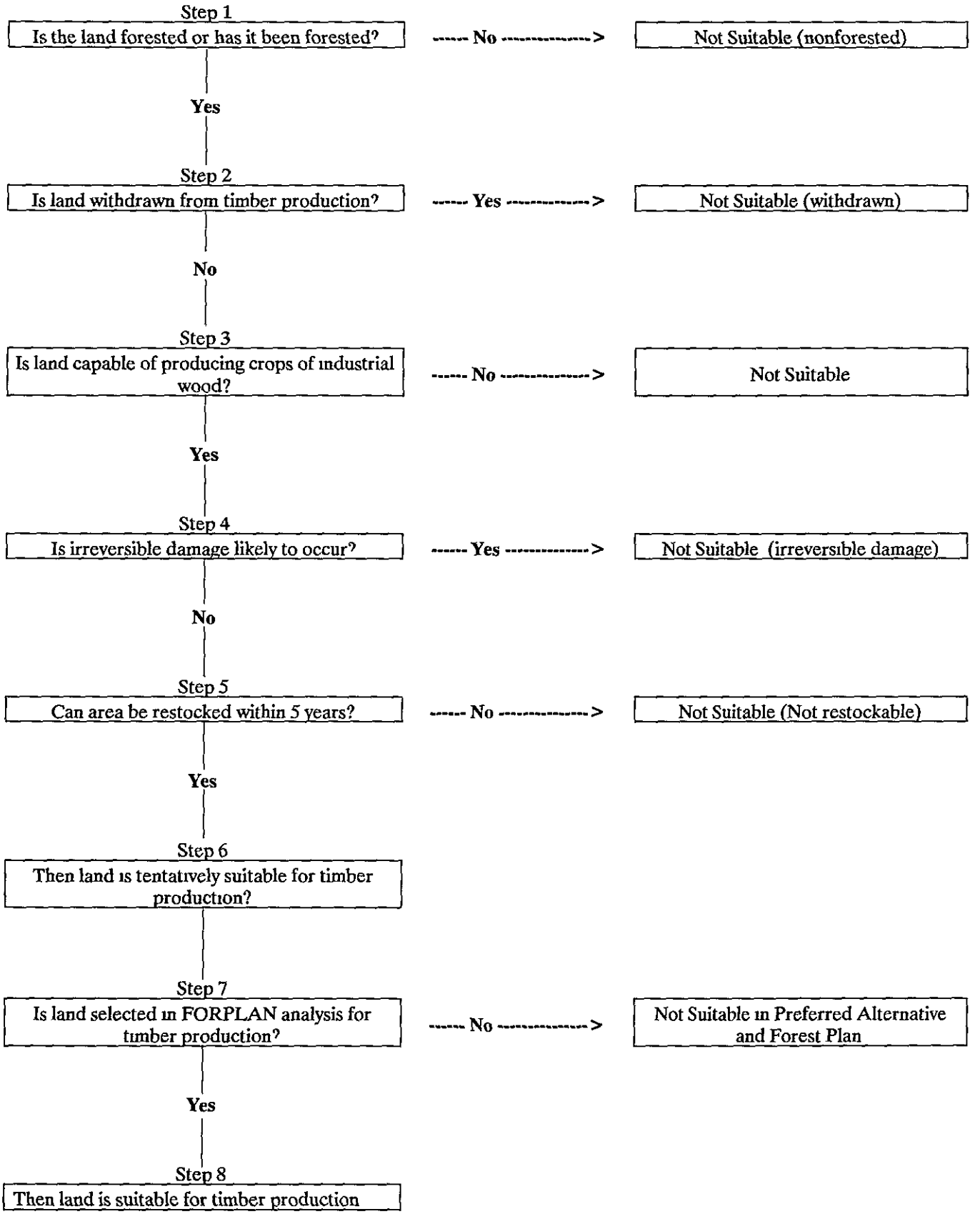


TABLE C.01 - LAND PRODUCTION CLASSIFICATION

CLASSIFICATION	ACRES
1. Nonforest land (includes water)	712,300
2. Forest land	562,900
3. Forest land withdrawn from timber production	142,400
4. Forest land not capable of producing crops of industrial wood (otherwise available land)	9,300
5. Forest land physically unsuitable:	
a) Irreversible damage likely to occur	8,200
b) Not stockable within 5 years	9,300
6. Forest land - inadequate information	0
7. Tentatively suitable Forest land (Item 2 Minus Items 3, 4, 5, and 6)	393,700
8. Forest land not appropriated for timber production:	
a) Assigned to California spotted owl habitat preservation	35,000
b) Assigned to other resource uses in Forest Plan	29,800
9. Unsuitable Forest land (Sum of Items 3, 4, 5a, 5b, 8a, and 8b)	234,000
10. Total suitable Forest land (Item 2 minus item 9)	328,900
11. Total National Forest land (Sum of Items 1 and 2)	1,275,200

TABLE C.02 - SILVICULTURAL MANAGEMENT PRACTICES FOR SUITABLE LAND (Average annual activity during first decade)

PRACTICE	ACRES
Regeneration Harvest:	
Clearcut	1,550
Shelterwood and Seed Tree	
- Preparatory Cut	0
- Seed Cut	1,170
- Removal Cut	0
Selection	
-Group	250
-Individual Tree	2,720 [1]
Intermediate Harvest:	
Commercial Thinning / Salvage / Sanitation	2,000
Timber Stand Improvement	2,000 [2]
Reforestation [3]	2,970

[1] Not included in reforestation acres
[2] Does not include release for survival
[3] Includes natural and artificial reforestation

TABLE C.03 - TIMBER PRODUCTIVITY CLASSIFICATION

POTENTIAL GROWTH [1] (cubic feet / acre / year)	SUITABLE LAND (acres)	UNSUITABLE LAND (acres)
< 20	0	19,000
20 - 49	45,000	30,000
50 - 84	50,500	27,500
85 - 119	125,000	81,000
120 - 164	102,000	67,000
165 - 224	6,500	3,500
225 +	0	0

[1] All trees 2.0 inches d.b.h. and larger.

TABLE C.04 - ALLOWABLE SALE QUANTITY AND TIMBER SALE PROGRAM QUANTITY (Annual average quantity for first decade)

HARVEST METHOD	ALLOWABLE SALE QUANTITY	
	SAWTIMBER (MM CF)	OTHER PRODUCTS (MM CF)
Regeneration Harvest:		
Clearcut	4.1	0
Shelterwood and Seed Tree:		
- Preparatory Cut	Nominal	0
- Seed Cut	5.2	0
- Removal Cut	0	0
Selection		
- Group	1.9	0
- Individual	1.3	
Intermediate Harvest:		
Thinning / Salvage / Sanitation	1 6 [1]	0
Totals	14.1	0
AVERAGE ANNUAL	ADDITIONAL SALES	
	SAWTIMBER (MM CF/BF)	OTHER PRODUCTS (MM CF)
Total for all Harvest Methods	0	2 2 [2]
Allowable Sale Quantity	14.1 (88.0)	0
Timber Sale Program Quantity	14.1 (88.0)	0

[1] Combination of commercial thinning and salvage / sanitation
[2] Firewood and cull logs

TABLE C.05 - SUMMARY OF PRESENT AND FUTURE FOREST STOCK CONDITION

	UNIT OF MEASURE	SUITABLE LAND		UNSUITABLE LAND
		CONIFER	HARDWOOD	CONIFER ONLY
PRESENT FOREST:				
Growing Stock	MMCF	1,017.0	47.8	1,160 0
	MMBF	6,365 6	47.8	1,160.0
Live Cull	MMCF	1.2	78.9	1 8
	MMBF	5 8	381 6	9.3
Salvable Dead		Not Available		Not Available
Annual Net Growth [1]	MMCF	12.7	-	13.8
	MMBF	79.5	-	86.2
Annual Mortality [1]	MMCF	6.3	-	17.6
	MMBF	37.3	-	103.7
FUTURE FOREST: [2]				
Growing Stock [1]	MMCF	1,494 0		
Annual Net Growth [1]	MMCF	19.6		

ROTATION AGE: [3]

Mixed Conifer Type	70 - 80 Years
Ponderosa Pine Type	60 - 70 Years
Red Fir Type	110 - 120 Years
Low Site	70 - 80 Years

	Age Class	Present Forest	Future Forest
Age Class Distribution [4]	0 - 20	20,000	25,400
	21 - 40	19,000	46,900
	41 - 60	0	47,900
	61 - 80	0	45,700
	81 - 100	2,200	36,300
	101 - 120	30,100	33,000
	121 - 140	62,200	30,300
	141 - 160	0	8,600
	161 - 180	38,400	19,800
	181 - 200	208,400	0
	200 +	13,400	99,800

[1] In trees over ll 0 inches d b.h.
[2] Future forest conditions are those predicted to exist prior to the 17th decade
[3] Weighted average age of regenerated timber being clearcut in the 16th decade.
[4] The acres of age classes for the present and future forests is for the tentatively available and suitable.

Figure C2 - Long-Term Sustained Yield and Allowable Sale Quantity

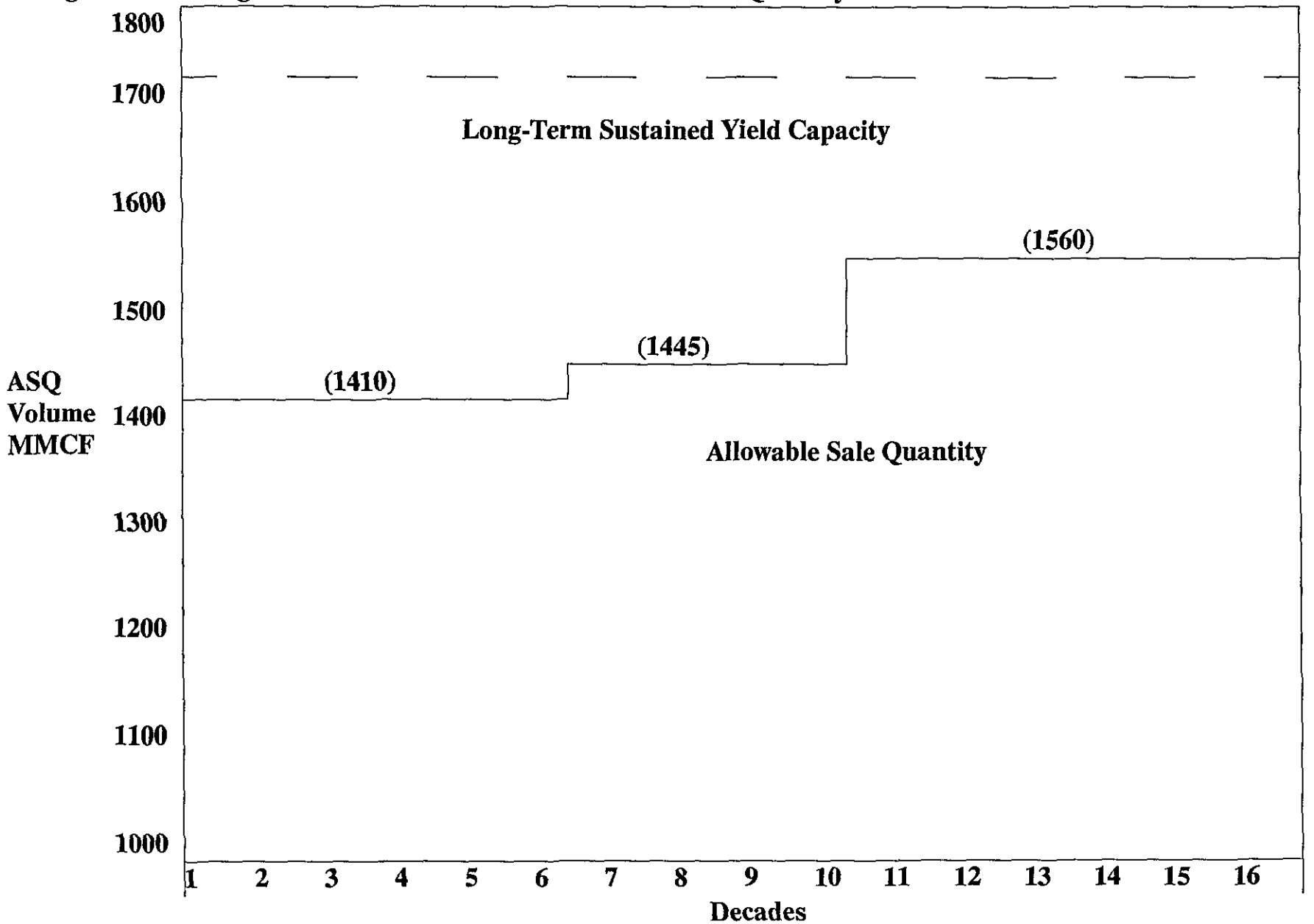


TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL
51	700	Iorn	11	No scheduled timber harvest this planned period										
	702	Grizzly	4	5			6							
	702	Biledo	4		5			10						
	706	Big Creek	4							X				
	708	Summer	1									X		
	710	Silver	4				3						X	
	712	Westfall	4			7						X		
	714	Speckerman	4							X				
	716	Sandy	4							X				
	718	Kelty	4								X			
	720	Texas	4										X	
	722	Soquel	4			8					X			
	724	Nelder	4	No scheduled timber harvest (SOHA)										
	726	Lewis	4			3					X			
	728	Miami	4									X		
	730	Carter	4 & 5									X		
	732	Forks	4				3				X			
	734	Sivels	4									X		
	736	Chilkoot	4						X					
	738	Vista	4		6									
	740	Chepo	5									X		
	742	Pines	1								X			
	744	Spillway	1				1							
	746	Goat	1				4							
	748	Teaford	4				2							
	750	China Creek	4	No scheduled timber harvest (SOHA)										
	752	Merced	11	No scheduled timber harvest this planned period										
	754	Sweetwater	4							X				
	756	Midpines	5											
	758	Jerseydale	4							X				
	760	Kirby Peak	5										X	
	762	Barite	4	No scheduled timber harvest (SOHA)										
	764	Iron Creek	4								X			

TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL
	766	Stovepipe	4					8						
	768	Laurel	4						X					
	770	Sunny	4											
	Misc.	Salvage		20	10	5	1	2						
Annual Volume Target, MMBF				25	21	23	20	20	17	16	18	17	16	193

TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL
	308	Edison	1	No scheduled timber harvest this planned period.										
	309	Mill	1 & 4		3				6					
	310	Hoffman	4								X			
	311	Crater	4		6								X	
	312	Corral	4			7								
	313	Rattlesnake	4	No scheduled timber harvest (SOHA)										
	314	Florence	1	No scheduled timber harvest this planned period.										
	315	Daulton	1 & 4			6						X		
	316	Kaiser	4	7									X	
	317	Pryor	4		1					X				
	318	Westfall	4		2						X			
	319	L.Horsethief	4						X					
	320	U.Horsethief	4				X							
53	321			No compartment delineated.										
	322			No compartment delineated										
	323	Chawankee	5 & 4						X					
	324	Mushroom	4							X				
	325	Huntington	1							X				
	326	Badger	1 & 4										X	
	327			No compartment delineated.										
	328			No compartment delineated.										
	329	Powerhouse	5											
	330	Pitman	4					4						
	331	Red	4	No scheduled timber harvest (furbearers)										
	332			No compartment delineated.										
	333	Musick	4				7						X	
	334	Tamarack	4						6	X		X		X
	335	Sugar loaf	5											
	336	Jose	4	1				5						
	337	Shaver	1 & 4								X			
	338	Bald	4				4	5						
	Misc	Salvage		4	5	3	2	1						
Annual Volume Target, MMBF				12	17	16	15	15	15	16.5	15	16 5	18	156

TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL

TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL
54	401	Peterson	4 & 5											
	402	Rush	4									X		
	403	Blue	4									X		
	404	Soaproot	5										X	
	405	Duff	4								X			
	406	Summit	4						X					
	407	Rock	4					5						
	408	Cow	4										X	
	409	Willow	4					8						
	410	Reese	4		6									
	411	Lost	4											
	412	Nutmeg	4							X				
	413	Oakflat	4								X			
	414	Ross	4	6										
	415	Bearwallow	4								X			
	416	Turtle	4											
	417	Muley	4											
	418	Cabin	4						X					
	419	Nelson	4							X				
	420	Snow Corral	4			13						X		
	421	Deer	4		9									
	422	Bull	4					6		X				
	423	Patterson	4		8									
	424	Hall	4			5								
	425	Shorthair	4				8							
	426	Hoffman	4				5							
	427	Sugar	4				4							
	428	3 - Springs	4										X	
	429	Rogers	4				2							
	430	Smith	4									X		
	431	Statham	4										X	
	432	Williams Cr.	4	10										
	433	Eagle	4											

TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL
	434	Swamp	4											
	435	Dinkey Cr.	4						X			X		
	436	Courtright	1	No scheduled timber harvest this planned period.										
	437	Black Rock	2	No scheduled timber harvest this planned period.										
	438	McKinley	4											
	439	Teakettle	7	No scheduled timber harvest this planned period										
	Misc.	Salvage		20	10	3	1	1						
Annual Volume Target, MMBF				36	3	21	20	20	14	14	14	20	23	215

TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL
55	501	Strawberry	2 & 4						X					
	501	Cattle	4		3					X		X		
	503	Jackass L.	4											
	504	Norris	4		7	3								
	505	McCreary	4				9							
	506	Portuguese	4						X				X	
	507	Graveyard	4		4			8	X				X	
	508	Fuller Butte	4					5				X		
	509	Buchenau	4	3				3					X	
	510	Kates	4							X			X	
	511	Arnold	4								X	X		
	512	Summit	4	4										
	513	Mammoth P.	1 & 5								X			
	514	Soda Springs	4								X			
	515	Camino	4				8							
	516	Shuteye R.	2						X					
	517	Shake Flat	4			3		5	X					
	518	Central C.	4			6				X				
	519	Sand Creek	4	2		2				X				
	520	Rock Creek	4			9							4	
	521	Whiskey Falls	4					6			X			
	522	Roush	4	2			6				X			
	523	Fish Creek	4				1							
	524	Ross Creek	4				3							
	525	Morman	4						X		X			
	526	South Fork	5											
	527	Corrine	5											
	Misc.	Salvage		10	7	3	1	2						
Annual Volume Target, MMBF				21	21	26	28	29	37	40	37	40	37	316
Forest Grand Total Target, MMBF				94	92	86	83	84	83	86.5	84	93 5	94	880

TABLE C.06 - TEN-YEAR TIMBER COMPARTMENT HARVEST SCHEDULE

District	Compartment Number	Compartment Name	Management Areas	Year										
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL

D.0
APPENDIX D - TIMBER INVENTORY ADJUSTMENT

D.1
Overview

The Forest Plan is based upon a timber inventory that was completed in 1974. The inventory has been adjusted for timber harvest and growth through 1985. Timber stands were delineated on 1970 aerial photos having a scale of 1:15,840. Delineated timber stands were classified following Region 5 timber stand classification standards. Delineated timber stands were plotted by Township. Location, size and configuration of each delineated timber stand was retained in the Wildland Resource Inventory System (WRIS) by township WRIS provides for listing, summarizing and plotting selected stand characteristics and appropriate land classification, for example, wilderness, private and all other National Forest.

The total Forest timber volume, growth (cubic feet and board feet) and other data for mapped land was determined using a sampling procedure developed by Langely (1968, 1970).

For analysis and Forest Plan development, the inventory data was then stratified by forest type and stand class. Timber stands with similar volume, growth and management opportunities were grouped into 18 Condition Classes. The acres of each condition class were summarized for 120 separate analysis areas. A conversion factor from cubic to board feet was calculated for each condition class to determine board feet in trees over 11 0 inches diameter at breast height (d b.h.). Growth and yields for each condition class were determined using the Regional growth and yield model commonly referred to as RAM PREP. Thus, the total Forest timber volume and growth in trees over 11 0 inches d.b h. can be determined by multiplying the stratified inventory volume and growth per acre figures by the acres in each respective condition class.

The timber inventory reduction for each analysis area was determined for the period between 1970 through 1985 from the Forest Timber Management Control Record of actual volume (MBF) harvested. An estimate of total area harvested during this period, using average volume cut per acre, was made based upon professional judgement. The total estimated area harvested was then allocated to each District as per their share of the Forest's harvest. District personnel then adjusted acres by condition class by analysis area based on timber sale records and personal knowledge.

The total Forest sawtimber inventory on tentative capable, available and suitable (CAS) land, after the adjustments were made, was then subtracted from the sawtimber inventory before the adjustments. The differences between these two inventory estimates represent the new sawtimber reduction for the period 1970 through 1985. The difference between the new reduction and harvest therefore represents the estimated net growth included in the Forest Plan analysis. No further adjustment to the net sawtimber reduction was made for the difference between the before and after inventory. The following is the result of that comparison

Sawtimber Inventory on Tentative CAS Land 1970	= 10,255 MMBF
Estimated Sawtimber Inventory on Tentative CAS Land, 1985	= 9,193 MMBF
Net Reduction	= 1,062 MMBF
Harvested olume 1970 - 1985	= 2,116 MMBF
Estimated Growth	= 1,054 MMBF

E.0
APPENDIX E - FIRE OBJECTIVES AND STRATEGIES

The following table summarizes fire suppression strategies planned for each Management Area. Table E.01 is required for this Plan.

TABLE E.01 - FIRE SIZE OBJECTIVES AND SUPPRESSION STRATEGIES

MANAGEMENT AREA	FMAZ*	MAXIMUM ACRE SIZE OBJECTIVE (90% OF THE TIME)	FIRE INTENSITY LEVEL	SUPPRESSION RESTRICTION	SUPPRES-SION STRATEGY
1	2	5	1-6	Minimize Visual Impact	Control
		5			Control
2	3	10	1-6	None	Control
		10			Control
3	4	See management standards and guidelines 4.5.18 - #222			
4	1	20	1-2	None	Contain
		10	3-6	None	Control
5	5	100	1-2	None	Control
		50	3-6	None	Control
6	5	10	1-2	None	Control
		5	3-6	None	Control
7	1	5	1-6	Experimental Forest	Control
8	5	10	1-2	Experimental Forest	Contain
		5	3-6		Control
9	1, 5	5	1-6	Minimize Dozer Impacts	Control
10	1, 5	5	1-6	Minimize Dozer Impacts	Control
11	2	20	1-2	Minimize Visual Impact	Contain
		10	3-6		Control
12 north	4	200	1-2	None	Control
12 south	4	200	3-6	None	Confine
			1-2	Minimize Visual and Dozer Impacts	Control
			3-6		Control

* Fire Management Analysis Zone

F.0
APPENDIX F - WATER QUALITY MANAGEMENT - BEST MANAGEMENT PRACTICES AND PROCESS

F.1
INTRODUCTION

The Forest Service water quality maintenance and improvement measures, called Best Management Practices (BMP), were developed in compliance with Section 208 of the Federal Clean Water Act, PL 92-500, as amended. After a lengthy development and public review process from 1977 to 1979, the practices developed by the Forest Service were certified by the State Water Resources Control Board and approved by EPA. The signing of a 1981 Management Agency Agreement (MAA) resulted in the formal designation of the Forest Service as the water quality management agency for the public domain lands it administers The BMP are the measures both the State and Federal water quality regulatory agency expect the Forest Service to implement to meet water quality objectives and to maintain and improve water quality. There are currently 98 practices documented, 96 which are certified and approved as BMP. The two remaining practices are under review before referral to the State and EPA for certification and approval. Work continues on developing new management practices and evaluating the effectiveness of the existing BMP. Due to the dynamic nature of management practice development and refinement, the original Forest Service publication documenting BMP is continually revised. The current publication reference is: WATER QUALITY MANAGEMENT FOR NATIONAL FOREST SYSTEM LANDS IN CALIFORNIA, USDA Forest Service, Pacific Southwest Region Publication, 1979. This publication is incorporated by reference into this document. Work is underway to publish the revised version of this document as a Soil and Water Conservation Handbook.

Water quality management is administered in National Forests through the continued implementation of BMP and through the guidance of a 1981 MAA with the State of California Water Resources Control Board

F.2
IMPLEMENTATION PROCESS

Forest Plans are broad level planning documents that encompass the entire forest and a multitude of different management activities. Because of the diversity of any given National Forest (different soils, vegetation, slopes, presence of surface water, etc) and the mixture of activities that occur, site specific methods and techniques for implementing the BMP are not identified at the Forest's planning level. For each individual project that is initiated to implement the Forest Plan, a separate site-specific environmental assessment is conducted. The appropriate BMP necessary to protect or improve water quality and the methods and techniques of implementing the BMP are identified at the time of this on-site, project-specific assessment. In this manner the methods and techniques can be tailored to fit the specific environment, as well as the proposed project activities. There are commonly many methods available for implementing a BMP, and not all are applicable to every site.

An example is BMP 2.7, Control of Road Drainage. This BMP dictates that roads will be correctly drained to disperse water runoff, which minimizes the erosive effects of concentration. There are many ways to drain a road correctly; such as, outslope the road surface, install water bars, install French drains, inslope the road surface, and install culverts. It is during the on-site environmental assessment of a specific road construction project proposal that the appropriate method or combination of methods, to correctly drain the road, are identified.

After the methods and techniques of implementing the appropriate BMP are identified, they are discussed by the project ID team. As a result, the appropriate mix of implementation methods and techniques are selected and incorporated into the environmental document as required mitigation measures These mitigation measures are then carried forward into project plans and implementation documents, such as contract language and design specifications, which assures they are part of the project work. Implementation on the ground is assured by the Forest Service official who is responsible for on-site administration of the project. Supervisory quality control of BMP implementation is attained through review of environmental assessments and contracts, field reviews of projects, and when warranted, monitoring the quality of the water in the project area

F.3
THE BEST MANAGEMENT PRACTICES

There are 98 practices identified in eight resource categories. Two practices (marked with asterisks) have not been recommended for certification and approval at this time. The practices are listed in the following table:

TABLE F.01 - RECOMMENDED BEST MANAGEMENT PRACTICES

TIMBER	
1 1	Timber Sale Planning Process
1.2	Timber Harvest Unit Design
1 3	Use of Erosion Hazard Rating for Timber Harvest Unit Design
1 4	Use of Sale Area Maps for Designating Water Quality Protection Needs
1.5	Limiting Operating Period of Timber Sale Activities
1.6	Protection of Unstable Areas
1 7	Prescribing the Size and Shape of Clearcuts
1 8	Streamside Management Zone Designation
1 9	Determining Tractor Loggable Ground
1 10	Tractor Skidding Design
1 11	Suspended Log Yarding in Timber Harvesting
1.12	Log Landing Location
1 13	Erosion Prevention and Control Measures During Timber Sale Operations
1 14	Special Erosion Prevention Measures on Disturbed Land
1.15	Revegetation of Areas Disturbed by Harvest Activities
1 16	Log Landing Erosion Prevention and Control
1.17	Erosion Control on Skid Trails
1.18	Meadow Protection During Timber Harvesting
1 19	Streamcourse Protection
1 20	Erosion Control on Skid Trails
1.21	Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
1 22	Slash Treatment in Sensitive Areas
1.23	Five-Year Reforestation Requirements
1 24	Nonrecurring "C" Provision That Can Be Used For Water Quality Protection
1.25	Modification of the Timber Sale Contract
ROAD AND BUILDING SITE CONSTRUCTION	
2 1	General Guidelines for the Location and Design of Roads
2.2	Erosion Control Plan
2 3	Timing of Construction Activities
2 4	Road Slope Stabilization (Prevention Practices)
2.5	Road Slope Stabilization (Administrative Practice)
2.6	Dispersion of Subsurface Drainage from Cut and Fill Slopes
2 7	Control of Road Drainage
2.8	Constraints Related to Pioneer Road Construction
2 9	Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
2.10	Construction of Stable Embankments
2 11	Minimization of Sidecast Material
2.12	Servicing and Refueling Equipment
2 13	Control of Construction in Streamside Management Zones
2 14	Controlling In-channel Excavation
2 15	Diversion of Flows Around Construction Sites
2 16	Streamcrossings on Temporary Roads
2.17	Bridge and Culvert Installation
2.18	Regulation of Streamside Gravel Borrow Areas
2.19	Disposal of Right-of-Way and Roadside Debris
2.20	Specifying Riprap Composition
2.21	Water Source Development Consistent with Water Quality Protection
2.22	Maintenance of Roads
2.23	Road Surface Treatment to Prevent Loss of Materials
2 24	Traffic Control During Wet Periods
2 25	Snow Removal Controls to Avoid Resource Damage
2.26	Obliteration of Temporary Roads
2.27	Restoration of Borrow Pits and Quarries
2.28	Surface Erosion Control at Facility Sites
MINING	
3.1*	Administering Terms of the U S Mining Laws (Act of May 10, 1872) for Mineral Exploration and Extraction on National Forest System Lands (PRACTICE NEEDS IMPROVEMENT)
3.2	Adminstering Terms of BLM Issued Permits or Leases for Mineral Exploration and Extraction on National Forest System Lands
3.3	Administering Common Variety Mineral Removal Permits
RECREATION	
4.1	Sampling and Surveillance of Designated Swimming Sites
4.2	On-site Multidisciplinary Sanitary Surveys Will be Conducted to Augment the Sampling of Swimming Waters
4 3	Provide Safe Drinking Water Supplies
4 4	Documentation of Water Quality Data
4.5	Control of Sanitation Facilities
4 6	Control of Refuse Disposal
4 7	Assuring that Organizational Camps Have Proper Sanitation and Water Supply Facilities
4.8	Water Quality Monitoring Off-Road Vehicle Use According to a Developed Plan
4 9	Sanitation at Hydrants and Faucets Within Developed Recreation Sites
4.10	Protection of Water Quality Within Developed and Dispersed Recreation Areas
4.11	Location of Pack and Riding Stock Facilities in Wilderness, Primitive, and Wilderness Study Areas

VEGETATIVE MANIPULATION	
5.1	Seed Drilling on the Contour
5.2	Slope Limitations for Tractor Operation
5.3	Tractor Operation Excluded from Wetlands and Meadows
5.4	Revegetation of Surface Disturbed Areas
5.5*	Tractor Windrowing on the Contour (PRACTICE NEEDS IMPROVEMENT)
5 6	Soil Moisture Limitations for Tractor Operation
5.7	Contour Disking
5.8	Pesticide Use Planning Process
5.9	Apply Pesticide According to Label and EPA Registration Directions
5.10	Pesticide Application Monitoring and Evaluation
5.11	Pesticide Spill Contingency Planning
5.12	Cleaning and Disposal of Pesticide Containers and Equipment
5.13	Untreated Buffer Strips for Riparian Area and Streamside Management Zone (SMZ) Protection During Pesticide Spraying
5.14	Controlling Pesticide Drift During Spray Application
FIRE SUPPRESSION AND FUELS MANAGEMENT	
6.1	Fire and Fuel Management Activities
6.2	Consideration of Water Quality in Formulating Fire Prescriptions
6 3	Protection of Water Quality from Prescribed Burning Effects
6.4	Minimizing Watershed Damage from Fire Suppression Efforts
6.5	Repair or Stabilization of Fire Suppression Related Watershed Damage
6.6	Emergency Rehabilitation of Watersheds Following Wildfires
WATERSHED MANAGEMENT	
7.1	Watershed Restoration
7.2	Conduct Floodplain Hazard Analysis and Evaluation
7.3	Protection of Wetlands
7.4	Oil and Hazardous Substance Spill Contingency Plan
7.5	Control of Activities Under Special Use Permit
7.6	Water Quality Monitoring
7.7	Management by Closure to Use (Seasonal, Temporary, and Permanent)
GRAZING	
8.1	Range Analysis, Allotment Management Plan, Grazing Permit System, and Permittee Operating Plan
8.2	Controlling Livestock Numbers and Season of Use
8.3	Controlling Livestock Distribution Within Allotments
8.4	Rangeland Improvements

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The "Sierra" Team

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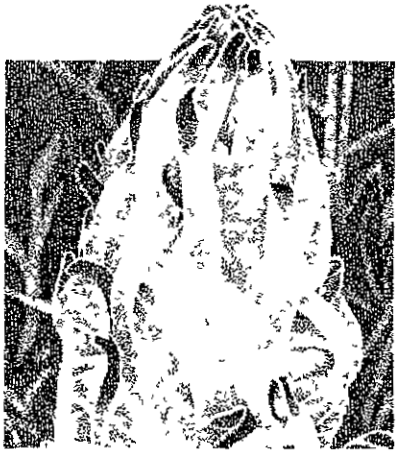

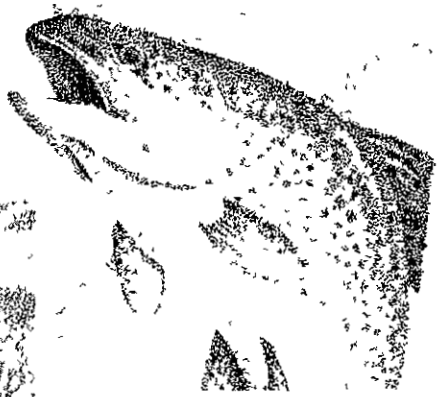

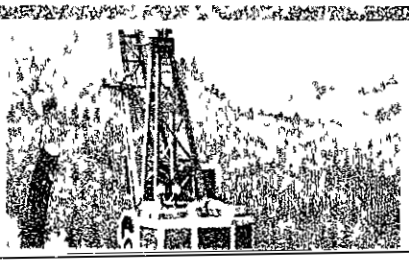

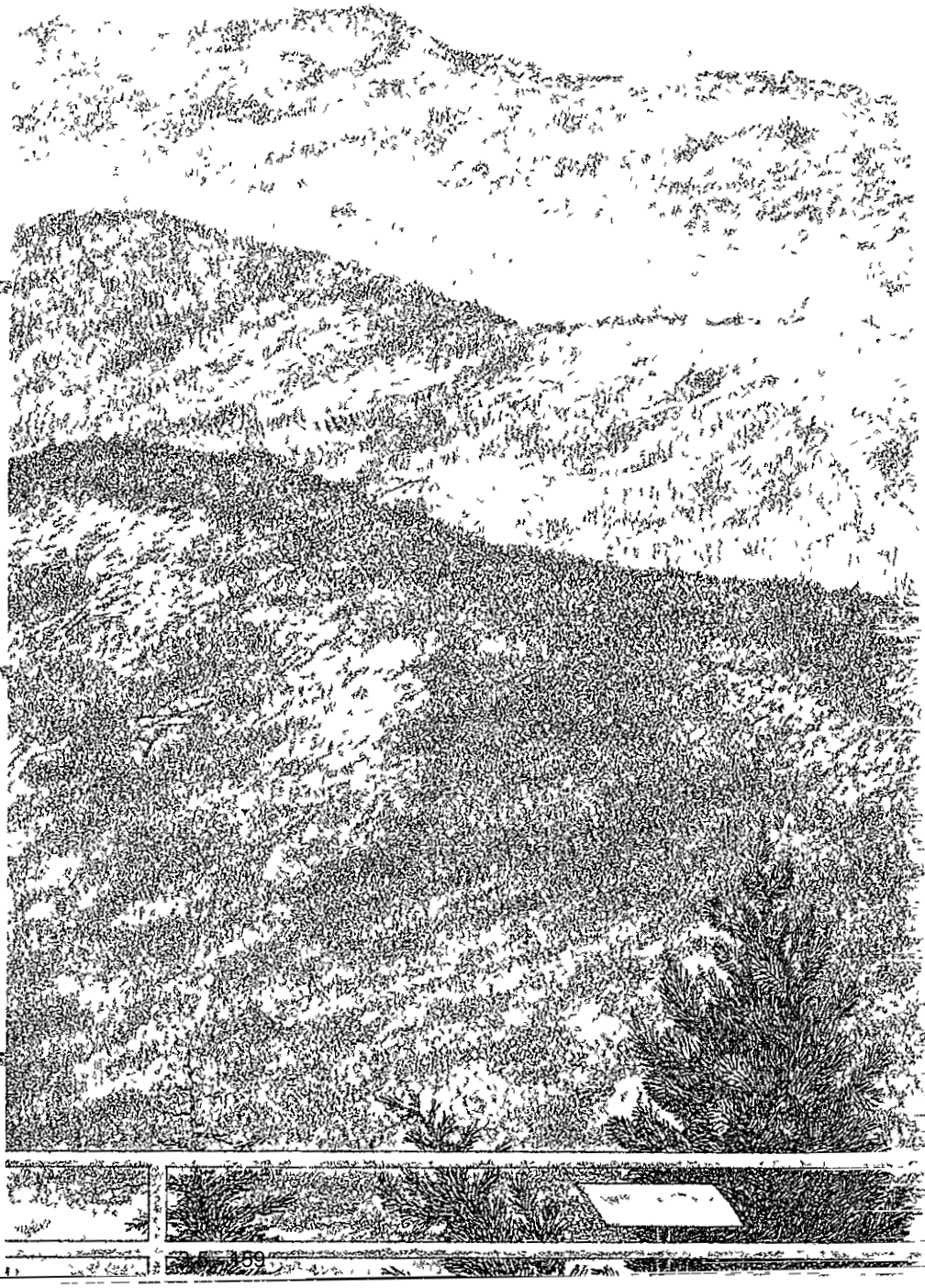

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Attachment 3.5, 2004 Sierra Nevada Forest Plan Amendment Record of Decision

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Record of Decision

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Record of Decision

I. The Decision

This decision adopts an integrated strategy for vegetation management that is aggressive enough to reduce the risk of wildfire to communities in the urban-wildland interface while modifying fire behavior over the broader landscape. With the careful placement of thinning projects, we can make significant progress in reducing the threat of catastrophic fires to wildlife and watersheds.

My decision vitally improves the land and resource management plans (LRMPs) for the Sierra Nevada national forests based on Alternative S2, as described in the Final SEIS. This Record of Decision (ROD) replaces the January 2001 ROD for the Sierra Nevada Forest Plan Amendment (SNFPA 2001 ROD) in its entirety. All of the management direction for this decision is included in this document (Appendix A). The SEIS represents an analysis and planning document and does not provide management direction.

I am making this decision in the aftermath of the tragic southern California fire season where 26 people died, over 3,600 homes were destroyed, and peoples' lives were turned upside down. In addition, precious wildlife habitat was destroyed. These catastrophic events, which I personally witnessed for 11 days, could also occur in the Sierra Nevada. I will not let that happen on my watch. These events may happen again anyway, because our forests are unnaturally overstocked. But there are reasonable changes that can be made to the SNFPA to help prevent them. I am determined to make those improvements.

In my judgment, the changes are not large, but they are extremely important. This decision retains the overall goals of the SNFPA 2001 ROD and its land allocations. It retains the overall strategy for addressing the fire situation in the Sierra in combination with key components of the conservation strategy for old forest dependent species. The integrated strategy includes methods of thinning of trees and brush removal, known as "fuels treatments," that is, reducing the amount of burnable material. Fuels treatments will occur more effectively on roughly the same number of acres and cover only 25-30% of the landbase. However, I am changing the way management occurs in those treated areas and directing field personnel to develop projects that make sense from an ecological and financial perspective. I expect that they will make the right decisions in the design and implementation of projects consistent with the direction and intent of this decision.

Much more remains to be done to bring our forests back to more normal conditions. There is a huge job at hand to reduce a massive build up of biomass covering nearly 8 million acres of forestland in this region. Working steadily, we will need at least 20 years to begin to reverse this situation. Even still, each year the proposed thinning will remove less than .3% of the standing inventory and only 1/5 of the net annual growth. So, while the proposed treatments will make our communities and forests safer, the forests will continue to become denser. Over time, it is my belief that there will be better public understanding of the need to thin our forests and retain their open, big tree character. I am troubled that this need is not more widely understood by our publics today.

This decision is based on careful consideration of the scientific reviews and public comments on the Draft Supplemental Environmental Impact Statement (SEIS) prepared pursuant to the National Environmental Policy Act (NEPA). I have reviewed the Final SEIS, including the land allocation maps and the standards and guidelines for each alternative. I have also reviewed the comments of the Science Consistency Review prepared by the Pacific Southwest Research Station (October 2003) and included in the Final SEIS, Appendix E. I am satisfied that the available science has been used appropriately in the analysis of the environmental effects of the alternatives in the Final SEIS.

Although this decision is grounded in the best available scientific information, it is impossible to have perfect knowledge about how management actions will play out in complex ecosystems. I want to make steady progress in closing that gap. The Region will work in close partnership with the Pacific Southwest Research Station to address some of the management uncertainties we've been wrestling with for years. My decision embraces the concept of active adaptive management and I fully intend to expand upon opportunities to gather information and understanding as this decision is implemented.

This decision replaces the standards and guidelines of the SNFPA 2001 ROD to ensure that fuels treatments will effectively modify wildland fire behavior. In addition, the basic strategy is broadened to include other management objectives such as reducing stand density for forest health, restoring and maintaining ecosystem structure and composition, and restoring ecosystems after severe wildfires and other large catastrophic disturbance events.

This decision also addresses the need to retain industry infrastructure by allowing more wood by-products to be generated from fuels treatments and dead and dying trees to be harvested during salvage operations. It acknowledges that the Forest Service has a role to play in providing a wood supply for local manufacturers and sustaining a part of the employment base in rural communities. In some cases, these wood by-products will also help to offset the cost of fuels treatments.

This decision adopts standards and guidelines for willow flycatcher habitat, Yosemite toad habitat, great gray owl protected activity centers, and grazing utilization standards that better reflect the wide array of site conditions encountered in the field and the management opportunities they may provide.

This decision clarifies management intent for off-highway vehicles, limits the requirement for limited operating periods to vegetation management activities only, and clarifies how several of the riparian standards and guidelines apply to recreation activities, uses, and projects. These changes will give local managers the opportunity to develop mitigation measures for small and varied recreation projects on a project- and site-specific basis.

The management direction for sensitive species habitat is designed with the primary objective to conserve rare and likely important components of the landscape such as stands of mid- and late-seral forests with large trees, structural diversity and complexity, and moderate to high canopy cover. Thinning from below and uneven-age management are the principal silvicultural prescriptions to achieve immediate objectives. Thinning trees and removing underbrush in strategic locations, whether by mechanical means or wildfire, will be the primary processes that create forest openings to encourage regeneration of shade-intolerant species and maintain gene pools of these species.

The decision is described in detail under Alternative S2, chapter 2, in the Final SEIS. In summary, it:

- Adopts an approach for modifying wildland fire behavior across broad landscapes through the strategic placement of area treatments, including direction to avoid California spotted owl protected activity centers (PACs) and northern goshawk PACs wherever possible,
- Requires a landscape level assessment of opportunities and constraints to be completed as a first step in designing the pattern of fuels treatments needed to implement the fire and fuels strategy,
- Provides mechanisms for more efficiently using appropriated funds,
- Provides opportunities to reduce stand density and improve tree vigor and overall forest health,
- Provides for ecosystem restoration following catastrophic disturbance events,
- Allows for salvage of dead and dying trees for both economic value and fuels reduction purposes,
- Incorporates new fuels and vegetation management standards and guidelines,
- Re-establishes the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project consistent with the HFQLG Forest Recovery Act, and
- Adopts an active and focused adaptive management and monitoring strategy.

II. Rationale For Decision

I want to ensure a better future for the forests in the Sierra Nevada. The Sierra Nevada Forest Plan Amendment of 2001 is a good plan, except that its methods and standards cannot reverse the damage, and growing threat, of catastrophic fires quickly enough. Large, old trees, wildlife habitat, homes and local communities will be increasingly destroyed unless the Plan is improved.

“We have dropped the proposed thinning activity, since under the current standards, no project can achieve conscientious forest managment objectives,” reported one District Ranger two years ago. Other Rangers concurred, they could not perform their duty.

The 2001 Plan prescribed technical solutions that do not produce needed results, or offered methods we often dare not attempt in the current Sierra Nevada. In particular, the directive of using fire itself to thin the forest is too risky to attempt many cases. The thinning guidelines were too meager. Forest protection against devastating fires in the time frame needed would not and could not occur.

Old forests, wildlife and people living in and around these forests need results. Our District Rangers in the field need results. In forest time, good results or tragic consequences are measured in decades. We must take a first step now.

I recognize that there is a broad base of support within the Forest Service, among the public, scientific community, and among regulatory agencies for the vision and goals established by the SNFPA 2001 ROD. I believe that Alternative S2 will best achieve those goals. Alternative S2 also allows for full implementation of the HFQLG Forest Recovery Act and allows knowledge to be gained from moving foward with the pilot project, as it was originally envisioned.

A year-long management review, as well as the insight gained from nearly three years of implementing the ROD, including input from stakeholders, highlighted the need for refining the existing managment direction for 1) old forest ecosystems; 2) aquatic, riparian, and meadow ecosystems; 3) and fire, fuels and forest health. The following sections describe my rationale for selecting Alternative S2 for each of these subject areas.

Old Forest Ecosystems and Associated Species

One of the most difficult balancing tasks has been to find the best way to protect old forest dependent species and to increase and perpetuate old forest ecosystems, while we face a desperate need to intervene in the forest to reduce the fuel loads feeding catastrophic fires. Recent fire seasons illustrate the risks from inaction as the number and severity of acres burned in wildfires continues to increase, with tragic losses to communities, their people and resources, as well as to wildland firefighters.

My first emphasis is on reducing fuels in the wildland urban interface (WUI). I am adopting a regional goal that 50% of initial fuels treatments in the Sierra Nevada be located in the WUI until all treatments in the WUI have been completed. This will postpone some of the direct impacts in old forest emphasis areas except where the WUI crosses this land allocation. I expect that during that time we will gain experience from implementing treatments in the highest priority fuel reduction areas, monitor and learn from these actions, and change course where needed.

Where we actively manage forest vegetation, we will keep the largest trees in place. Trees 30 inches dbh and larger will be retained in all thinning projects. However, equally important is the standard for retaining 40 percent basal area in the largest trees in all treated areas. This effectively means that trees 25 inches dbh and above will be retained in most treated areas. Collectively, the standards and guidelines for mechanical treatments ensure that there will be a continuous supply of large trees in all managed areas to provide for future old forest stand structure. The management direction in this ROD is consistent with the

requirements for old growth stands and large tree retention in the Healthy Forests Restoration Act of 2003.

One thing that was overlooked in the original SNFPA decision was the influence of drought and climatic variances throughout the range of the Sierra Nevada. These conditions influence the resilence and sustainability of forests in the long-term, especially in forests that are overstocked with too many trees. Over the last 300 years, the climatic condition in California has been one of an extended period of moisture surplus, punctuated by drought periods. The moisture surplus combined with fire suppression and selective logging practices in the late 1800s and early 1900s increased forest density and changed species composition. Increasingly, the land cannot supply enought moistrure during drought conditions to supply all of the trees growing on it. This makes forests more susceptible to drought, insects, diseases, air pollution and, of course, catastrophic wildfire. Mountain pine beetle outbreaks have increased five fold over the last five years. Mortality from bark beetles is increasing exponentially in the state. The current situation in Southern California shows the type of catastrophic impact that drought and bark beetles can have on forest vegetation. Sierra Nevada forests are unhealthy today and susceptable to the same widespread dieback that is occuring in Southern California.

This decision improves our ability to respond to deteriorating forest health by allowing more latitude in the amount and type of vegetation that can be removed within treated areas. This decision allows for consideration of stand density during the design of fuels treatment patterns. Vegetation treatments in old forest emphasis areas are no longer restricted to prescribed fire. Some trees larger than 12 inches dbh, but smaller than 30 inches dbh, may be removed mechanically. This flexibility will provide district rangers the opportunity to manage tree density on individual sites and to improve the forest's resilience to drought, and insect and disease conditions.

Restoration

This decision also incorporates an element missing from the SNFPA 2001 ROD. It provides for ecosystem restoration following catastrophic events. These restoration activities are included in all land allocations and call for managing disturbed areas for long-term fuels profiles, restoring habitat, and recovering the value of some dead and dying trees. Restoration projects can include salvage of dead and dying trees for economic value as well as for fuels reductions. Well-thought-out restoration will keep us on the path of achieving old forest conditions and of re-establishing connectivity between patches of habitat in a proactive manner.

California Spotted Owls

Over the past year, we have taken a hard look at the available science about the California spotted owl. I am still uncertain what to conclude from the relatively limited science available about this species. While a number of studies have been completed and we're still actively engaged in others, I find that there is still much more to learn and understand about the linkages between management activities, and their effects on owl habitat and population dynamics. Science alone, does not provide a solution to this long-standing mangement dilemma; it only provide hints at what the answers might be. Some of those hints are that canopy cover, big trees and stand structure are important to owls. This decision maintains or increases all of these things. However, given that valuable habitat is at high risk of being lost to wildfire, I cannot conclude that maintaining higher levels of canopy closure and stand density everywhere is the right thing to do.

These thoughts have led me to be willing to allow District Rangers to have more treatment options in order to provide habitat for owls and other old forest-dependent species in the long-term, and to gradually restore fire to the ecosystem in its more natural form. I note that management direction in this decision is consistent with the approach recommended by research scientists in the CASPO technical report.

However, subsequent suggestions made by these researchers were incorporated into the management direction in this decision to improve upon this earlier work. Additional components of the conservation strategy adopted in this decision include: 1) identifying home range core areas (HRCAs) and managing these areas to retain their value as suitable owl habitat; 2) providing direction to retain understory structure within treated areas; and 3) applying diameter limits and canopy closure considerations to a wider range of tree size classes.

Following are other key elements in my decision that will improve effectiveness and implementation of the fuels strategy, while protecting habitat components important to the California spotted owl:

PAC Treatment

- Mechanical treatments in PACs in the WUI threat zone will only be allowed when necessary to ensure the overall effectiveness of the landscape fire and fuels strategy. This evaluation will take into account the condition of the PAC and its use by spotted owls and its expected resiliency to treatment.
- My decision makes no changes to the type of treatment that may be used in PACs outside the WUI. Where PACs cannot be avoided outside the WUI, prescribed fire is still the only treatment option.

Home Range Areas

- Standards and guidelines for mechanical thinning are modified to reduce complexity of implementation rules and to improve the overall effectiveness of the fire and fuels strategy.
- Home Range Core Area (HRCA) Habitat Quality: My decision provides habitat quality goals for HRCAs. It requires the HRCA to be managed for canopy closures of at least 50-70 percent. This quantification of habitat quality reflects conditions presently mapped.

Other important direction for ensuring the viability of the California spotted owl is still in place. Overall, management activities in PACs will be minimized. Within the HFQLG Pilot Project Area, vegetation and fuels treatments will not be conducted within PACs during the life of the pilot project, with the exception of light underburning to enhance habitat suitability. SOHAs are also off limits for treatments. Outside of PACs, all trees greater than or equal to 30 inches dbh will be retained, changes to canopy cover are limited and basal area retention standards apply to all mechanical thinning. Following the completion of the pilot project, the same direction for the rest of the Sierra Nevada will apply to the HFQLG Pilot Project Area.

Finally, the FEIS for the SNFPA 2001 ROD, evaluated the viability of California spotted owls based soley on the availablity of habitat on National Forest System lands. However, the California Forest Practices Act regulations also require private industrial timberlands to be managed in a sustainable manner. Currently, 17% of spotted owl PACs in the Sierra Nevada are on private lands. Although not a basis for my decision, I believe that private land could be an important contribution to California spotted owl habitat and that this should be further investigated in future planning efforts.

Pacific Fisher

The Pacific Fisher is another old forest dependent species. Many of the habitat attributes discussed above for the California spotted owl are important to the fisher as well. Thus, a lot of the protections for the owl will also benefit the fisher. An important change that I am making between the draft and final SEIS is to reinstitute the desired conditions for the Southern Sierra Fisher Conservation Area. These conditions along with management objectives will guide project level planning in the area and provide important habitat elements for the fisher. Old forest habitat fragmentation will be minimized. In addition, because there is some uncertainty about the habitat needs of the fisher, as part of my adaptive management proposal, I am recommending the continuation of existing status and change monitoring and the

completion of a number of research studies currently under way. There is concern about persistence of the species because of its limited and fragmented distribution. Therefore, I am initiating discussion with the California Department of Fish and Game to explore re-introduction opportunities.

Fire and Fuels Management

The SNFPA goals for fire and fuels management are still valid. These goals are so important that issues that have impeded implementation during the past three years cannot be ignored. Doing little or nothing is not acceptable. Actions are needed to effectively treat vegetation in key areas to reduce the risk of future tragedies, like the 2003 fires in Southern California and elsewhere in the west. I am willing to take a more active approach to this problem because of the significant risks catastrophic fire poses to firefighter safey and communities. This approach still provides for the canopy cover, big trees and understory required by the California spotted owl and other species. I have considered input from Forest Supervisors, District Rangers, the SNFPA Management Review, and a Washington Office Review of the fuel management strategy. All have consistently made similar findings. We cannot do the job we need to do with the direction in the SNFPA 2001 ROD.

Nearly 8 million acres are in condition class 2 and 3. Condition class 3 represents those areas at greatest risk of ecological collapse because it has been so long since fire operated as a process in the ecosystem. Condition class 2 lands are those areas where fire regimes have been so altered from their historic range of fire return interval that they are at moderate risk of losing key ecosystem components as a result of wildfire. The situation is ripe for more firestorms, like we experienced in southern California in 2003 and throughout the west in recent years. We find ourselves needing more and more elite fire crews because of the complexity of fighting fire and the dangerous situations it puts fire fighting forces in. We have over 5,100 fire fighters in Region 5. These forces are being stretched thin across long fire seasons nationwide and by State budget crises that affect their ability to marshall forces. Despite the heroic efforts of our elite firefighters and the most advanced fire fighting technology in the world, we continue to suffer unacceptable loss of life, property and critical habitat. Under these circumstances we cannot expect our suppression forces to continue to be effective if vegetation conditions aren’t altered.

Our ability to strategically place fuel treatments for optimum effectiveness has been compromised by the set of complicated rules in the SNFPA 2001 ROD. The standards and guidelines in that ROD are applied at the stand level, rather than by land allocations. An individual area treatment generally encompasses numerous individual stands, requiring each stand to be delineated so that the appropriate standards and guidelines could be applied. Some of the rules are so detailed that they prescribe down to one acre what is allowed, and require measuring change in canopy to ten percent increments, which is not consistently practical with existing measurement tools. This fine-scale approach limits our ability to make significant progress.

To allow more flexibility to strategically locate fuel treatments and implement effective treatments, this decision adopts standards and guidelines for mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones. These standards and guidelines specify (1) minimum canopy cover levels, basal area of trees to retain following mechancial thinning treatments, and retention of all trees 30 inches or larger in diameter, (2) surface and ladder fuel post-treatment conditions in fuels treatment units, and (3) guidelines for post-fire restoration activities, general salvage, and snag and down woody material retention. Modified standards and guidelines are established for eastside pine vegetation types.

Depending on which timeframe is referenced (the past eight years, or past four years), 2.5 to 4.5 California spotted owl PACs are being lost to wildfire each year. Standards and guidelines in the SNFPA 2001 ROD were intended to provide protection for PACs. However, when these standards and guidelines are applied collectively, the threat to PACs from wildfire is increasing in both the short and long term. Once again, our ability to strategically place fuels treatments on the landscape has been compromised by

the complexity of rules. And, as more habitat is lost to wildfire, the opportunity to relocate PACs becomes more limited and results in more fragmentation of habitat. This decision is intended to reverse that trend. It allows mechancial treatments, where necessary in PACs in threat zones. Outside the wildland urban interface zone where necssary, PACs may be treated with prescribed fire.

PACs are still recognized as sensitive places on the landscape. We will continue to limit the total number of PAC acres treated annually and per decade. We will continue to avoid treatments in PACs to the greatest extent possible. Based on the landscape analyses done for the Middle Fork Consumnes River and two other watersheds, we can conclude that, although potentially 26% of the spotted owl PACs or 4% of PAC acreage could be affected by mechanical fuels and prescribed burn treatments in the next 20 years, in reality PAC locations can often be avoided. Further, if treated, only portions of PACs would be treated. A more accurate measure of monitoring the degree of habitat alteration appears to be acres treated rather than numbers of PACs entered.

Modifications to some of the diameter size limits imposed by the SNFPA 2001 ROD will improve the cost-effectiveness of projects. Despite these modifications, the net growth of our forests continues to far outpace harvest. This decision allows local managers to consider the removal of medium-sized trees (less than 30 inches diameter) at the site-specific project level, rather than to implement a uniform fuel hazard reduction prescription for the entire Sierra bioregion. We can make better choices by having the ability to consider crown positions and the numbers of trees within each diameter class and their contribution to ladder and crown fuels in the fuel profile at the project level. We can also factor in the frequency of entries to the site that will be needed to achieve desired reductions in condition class. Expanded use of mechanical treatments can be used to set the stage for prescribed fire as a follow-up treatment, or to deal with those specific situations when we are concerned about smoke or available burn days.

The emphasis in the SNFPA 2001 ROD to focus on removing small fuels, outside the threat and defense zones, effectively precludes most commercial options for removing fuels. The potential supply of raw material for biomass far exceeds regional market demand and is costly to get to market. We're losing the capacity to remove larger diameter fuels.

As the timber industry has waned, there have been situations in the west where markets simply were not available to accept the vast quantities of fuel that needed to be removed from the forest to make them resistant to fires and insects. When the predictable flow of wood products is lost, the cost of doing business increases, and wood processing facilities close. The result is that cost-effective marketing options for fuel treatments are also lost. Southen California forests struggled to dispose of thousands of acres of bark beetle- and drought-killed timber prior to the most catastrophic fire event in California's history. Similar scenarios occured in other communities in California, Colorado, and Arizona following large fires and insect outbreaks. This decision is intended to keep some market options alive and enhance the profitability of removing the small fuels.

The total sale volume of green volume for the 11 national forests is estimated to be approximately 330 million board feet (MMBF) for the first decade, which includes approximately 210 MMBF from the pilot project for the Herger-Feinstein Quincy Library Group. Volume from salvage harvest is estimated to potentially contribute an additional 90 MMBF per year. This decision does not change the capable, available, and suitable timber land determinations made in individual forest plans. This decision does not schedule any regulated timber harvest from these lands. Scheduling regulated timber harvest and the associated Allowable Sale Quantity (ASQ) is part of the land and resource management planning process and will be addressed in forest plan revisions. During these plan revisions, long range forest sustainability and forest health considerations can be addressed. This decision is focused on some immediate short-term actions to begin to create conditions to restore fire in the ecosystem. At a minimum, in five years we will evaluate this decision as information from adaptive management experiments becomes available.

Aquatic, Riparian and Meadow Ecosystems

The SNFPA goal of protecting and restoring desired conditions of aquatic, riparian and meadow ecosystems and providing for the viability of species associated with those ecosystems remains unchanged. With this decision, I am retaining the Critical Aquatic Refuges, the Riparian Conservation Areas, and the goals of the Aquatic Management Strategy established in the SNFPA 2001 ROD.

We now have two years of field surveys to advance our conservation efforts for the Yosemite toad and willow flycatcher and have completed a conservation assessment for the willow flycatcher. Significant progress has been made toward the completion of conservation assessments for other riparian dependent species including the foothill and mountain yellow-legged frogs, cascades frog, Yosemite toad and northern leopard frog. Standards and guidelines for grazing utilization, streambank trampling, and willow browse remain essentially unchanged. These guidelines, coupled with our existing direction for grazing management, give assurances that meadow hydrology and important habitat attributes will be managed to support these sensitive species.

I am concerned about the degree to which the existing direction impacts small ranching operations. We now have specific information about the extent that Yosemite toad and willow flycatcher habitat overlap with active grazing allotments and packstock operations. This information was not available to be considered in the 2001 SNFPA ROD. Eleven percent of the active allotments are impacted by standards and guidelines for willow flycatcher, Yosemite toad, and great gray owl. Modifying standards and guidelines to allow for more site-specific considerations reduces negative impacts to grazing operations on 14 allotments. The overall result is that by developing site-specific strategies and relaxing restrictions where sensitive species are not present, economic losses can be reduced.

Again, there is much to learn about whether and how different grazing practices affect the Yosemite toad and willow flycatcher. My decision maintains the habitat components that have been identified as being important to these species, but I want to do more. For the willow flycatcher, as described in chapter 2 of the Final SEIS, I will initiate a conservation strategy to build upon the recently-completed conservation assessment. The conservation strategy will include specific management recommendations for such issues as meadow condition, monitoring, nest predation, habitat restoration, and cowbird paratism. The conservation strategy will be an interagency product, incorporating input from the State of California, as well as the U.S. Fish and Wildlife Service. I am also allowing year-round grazing in meadows occupied by willow flycatchers where site-specific management plans can be developed to ensure adequate protection for the species and its habitat. I firmly believe that, in some cases, by working together, permittees and local managers can develop site-specific solutions that are superior to broad regional guidelines. My expectation is that some of these solutions will provide a cornerstone for testing, monitoring, and perhaps changing these broader guidelines over time.

For the Yosemite toad, I am directing the completion of on-going surveys of suitable habitat within the species' historic range to be completed within two years of this decision. Additionally, in collaboration with the Pacific Southwest Research Station, affected permittees, and local managers, the Region will initiate a study or series of studies of the effects of ongoing grazing practices on habitat attributes important to the species.

Willow Flycatcher

This decision puts protective measures in place for the willow flycatcher and introduces a proactive approach to managing habitat while reducing impacts to grazing permittees. I am continuing the four-year survey cycle of all occupied and historically occupied willow flycatcher sites and requiring that meadows be assessed for potential restoration needs when they are no longer used as nesting locations.

My decision draws a distinction between occupied habitat and unoccupied habitat and applies different levels of management on the basis of occupancy. In part, I am doing this for clarity and to ensure that

newly discovered sites and long-term nest locations are managed similarly. Direction in the SNFPA 2001 ROD excluded grazing in most of these meadows. The underlying objective was to optimize protection of the resource elements that provide quality willow flycatcher habitat (i.e. hydrology, willows, grass and grass-like plants). I believe we can still provide for high quality habitat without total exclusion of livestock by controlling the season of use and by continuing to employ conservative utilization standards on willows, grass and grass-like plants. Therefore, my decision allows late-season grazing (after August 15) in meadows with occupied willow flycatcher habitat.

Yosemite Toad

This decision excludes grazing from occupied Yosemite toad habitat except where an interdisciplinary team has developed a site-specific plan to successully manage stock around these areas. In doing so, I am allowing field managers to capitalize on site conditions and characteristics that cannot be foreseen at a regional scale. These grazing restrictions do not apply to packstock or saddle stock. Given the relatively low concentration of these animals in the affected areas and the disparate characteristics and needs of this user group, I believe that this management direction is most appropriately developed as part of individual forest plan direction.

Recreation

This decision reaffirms that providing recreation opportunities is one of the Forest Service's major missions in California, along with providing sustainable, healthy ecosystems. Many recreation experiences in the Sierra Nevada are provided under special use authorizations. Many facilities, some representing investments of hundreds of millions of dollars, have been constructed by permit holders. Authorized recreation businesses contribute significantly to the economic base of communities and counties that rely on national forest recreation for employment, wages, and taxes. Projected population growth in the United States and increasing tourism in this region, along with other factors, clearly contribute to increasing demand for recreation facilities and services throughout the Sierra Nevada national forests. My decision reverses unintended impacts to recreation.

Decisions for recreation activities will be made at the local level to reflect site-specific conditions. My decision clarifies that standardized limited operating periods for old forest dependent species apply only to vegetation management activities. Similarly, vegetation management standards and guidelines (e.g., canopy cover retention) only apply to mechanical thinning and not to recreation and special use projects. Clarification is made that a landscape analysis is not a pre-requisite for project analysis and implementation. Existing uses in CARs and RCAs will be evaluated at the time of permit re-issuance to correct problems and achieve consistency with the land management plan. These minor changes will reduce the unintended and adverse impacts on recreation users and permit holders.

Implementation of the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project

The HFQLG Pilot Project was designed and intended to provide information needed to reduce scientific uncertainty regarding the environmental outcomes of certain forest management activities. However, the changes overlaid by the SNFPA prevented full implementation of the Forest Recovery Act. This eliminated our ability to study and understand the consequences of certain forest management practices in the Pilot Project Area. The goal of commodity production, associated with this Act, was also affected by the SNFPA 2001 ROD.

This decision provides for implementation of the HFQLG Forest Recovery Act Pilot Project, consistent with the HFQLG Forest Recovery Act. Upon conclusion of the pilot project, management activities on the Plumas and Lassen National Forests and the Sierraville Ranger District of the Tahoe National Forest will

be guided by direction under Alternative S2 for the Sierra Nevada national forests, pending forest plan revisions. Thus, this pilot project is back on track and meets one of the cornerstone objectives of the SNFPA for adaptive management.

Adaptive Management and Monitoring

Throughout the development of the Final SEIS and the formulation of this decision, I insisted that this amendment be scientifically credible. To help achieve that goal, I asked the Pacific Southwest Experiment Station to conduct a science consistency review (SCR, Final SEIS, Appendix E) of the draft SEIS. The report submitted to me in October, 2003 was used by the interdisciplinary team to improve the environmental analysis and to acknowledge scientific uncertainty and differing points of view. With these improvements, I believe the final SEIS is generally consistent with available science.

One key finding in the science consistency review was that there is a degree of uncertainty in a number of areas, especially related to the relationship between management activities and their effects on wildlife habitat and populations. A strong recommendation in that report was to use an adaptive management approach to move forward with some level of management coupled with experimentation and learning. I adopt that recommendation.

Another area of uncertainty that surfaced in the science consistency report and in other public comments relates to the long-term projections for vegetation conditions and events like wildfire. The forecast period of the first 20 years, used during the analysis is a fair projection of these conditions and events and are used to identify near term effects. Longer term forecast periods (eg. 120 years) have greater uncertainty and reliability. The longer term modeling is useful to identify general trends, and not quantifiable targets. Hence, I did not rely on these longer term projections in my decision.

I want to set realistic expectations about this decision and commitments that I am making for an adaptive management and monitoring program. It is a system that can help us learn, it provides us the opportunity to interact with stakeholders to share and interpret data, and it can lead to creative solutions that fit ecosystem processes within the context of law and cost-effective management. However, it may be easier to promise than it is to deliver. It sounds good to say that we can create a feedback loop that will inform us about when to stop or modify activities that are showing signs of adverse impact, or are taking us off the path of the stated goals for desired conditions, but, in reality, knowing when and how to respond to trigger points is difficult. Long-term consequences and impacts of cause and effect relationships beyond local areas will also be difficult to interpret and may be confounded by statistical error terms that are larger than the trends we are trying to measure.

The Forest Service has a long history of investing in monitoring data and research studies, such as the California spotted owl demography studies, which have been conducted for the past 15-20 years. The Kings River Project is an excellent example of a cooperative research study conducted by the Pacific Southwest Experiment Station and the Sierra National Forest that is evaluating response of forests to applied uneven-aged silviculture and prescribed fire activities. The Plumas and Lassen National Forests Case Study is another example. We have made very large investments in all types of data collection and databases. However, a weakness in all our systems has been that information is not readily available out of individual program databases, data isn’t timely or published for managers to utilize, and the long-term commitment to funding isn’t made.

Given that, it is my intent initially to focus on a few things with this program that institutionalize adaptive management and monitoring, rather than add a lot more to existing obligations.

- I will centralize activity reporting in the region in the FACTS database. Every forest will begin using this system in 2004. A backlog of historic data is being entered into the system to provide a baseline for evaluating what activities are occuring and where.

- I will establish an evaluation process, to be conducted annually, that informs management of 1) whether direction is being implemented as prescribed, 2) whether desired conditions are being met, and 3) if management practices are resulting in expected outcomes.
- I will provide for bioregion-wide tracking of key attributes of fuels reduction projects to 1) monitor achievement of the landscape-level desired conditions and 2) based on changes observed at the project-level, assess the need for modifications to the standards and guidelines at the forest and bioregion level. Organizational roles and responsibilities will be defined to institutionalize this.

In the Final SEIS, chapter 2, Description of Alternative S2, there is a lengthy, more detailed discussion of a proposed adaptive management program designed to address high priority, key questions that relate to the uncertainties associated with manamgement activities and their effects on wildife habitat and modified wildfire behavior. There is a description and status report for ongoing monitoring and research underway in the Sierra Nevada. I am directing the Sierra Nevada implementation team to complete an assessment of the cost of initiating the new work identified in chapter 2nd to develop recommendations on whether and/or how to adjust existing research and monitoring work to better integrate these new infomation needs. Additional analysis and staff work should be completed to include recommendations on the policy and technical arrangements to implement this adaptive management program in collaboration with others. These analyses and recommendations should be completed within 6 months of the date of this decision.

III. Public Involvement and Public Comment

Public Involvement

During the public comment period from early June through August 2003, each forest supervisor strongly attempted to engage the local communities through a variety of comment opportunities. The majority of those contacted were interested in the proposals and clearly some groups expressed high interest in the proposed management actions.

Each national forest worked with the general public, elected officials, Resource Advisory Councils (RAC's), Native Americans, special interest groups, the media and other people in their local area.

Supervisor's and their staffs hosted field trips, attended and presented programs to special interest or local groups, submitted opinion editorials, provided written material or audio visual programs, talked with the media, and discussed with a wide variety of interests the proposals for future management. In addition, a web site was available for further information on management proposals. Citizen participation varied ranging from minimal at some public meetings, to greater participation at special interest group presentations, or at specific events.

USFS employees also were briefed or requested to monitor the development of the Draft SEIS to more adequately discuss the project with the public or participate in its development.

The intent of the public involvement program was to inform people of the opportunity to review the Draft SEIS and to comment on it. The activities focused on explaining the need for action to improve accomplishments of Framework goals, National Fire Plan, HFGLG Pilot Projects and means to reduce impacts of recreation and grazing activities. The public involvement activities explained the proposed changes and compared them to the current SNFPA rules, especially as they accomplished habitat protection and reduced wildfire losses.

A sample of the methods used by each national forest for public involvement includes the following:

- Elected officials – letters or meetings to federal, state, or county government leaders, field trips.
- Public meetings – open house, collaborative or formal meetings.

- Special interest groups – group meetings, field trips, presentations, individual leadership meetings.
- Fire Safe Councils – presentations to council or key leaders.
- Service Clubs – presentations.
- Media – Opinion editorial's, electronic media interviews, reporter briefings, accompaniment on field trips, news releases.
- Native Americans – presentations to tribal leaders, letters of notification on public comment periods,
- Employees – letters or briefings.
- Federal/State/County/City Agency – letters or briefings.

Public Comment

The Draft SEIS was available for public review and comment from June 13, 2003, to September 12, 2003. During the comment period, the Forest Service heard from nearly 56,000 people. The agency received approximately 1,300 individual letters, 3 resolutions, and approximately 600 different form letters. Organized response campaigns accounted for 97.5 percent of the total pieces of mail (53,866 form letters out of a total of 55,258) received during the public comment period. These response campaigns generally fell into one of two categories: forms or multi-signature letter (numerous signatures on one letter). Over 400 public concerns were identified from the comments.

Public concerns reflected a broad range of views relative to the proposed action and analysis of alternatives presented in the Draft SEIS. Numerous concerns were raised about the purpose and need for the proposed amendment and many questioned the agency's decision to propose an amendment. The Forest Service received a wide variety of comments regarding the adequacy of the environmental analysis presented in the Draft SEIS. Generally, the public expressed a desire to see more information in the Final Supplemental Environmental Impact Statement, such as information regarding impacts to recreation, grazing, timber production, cultural resources, and socio-economics.

Many comments expressed concerns that the Draft SEIS did not adequately address impacts to at-risk Sierra Nevada wildlife species, including the California spotted owl, fisher, marten, willow flycatcher, and amphibians, such as the mountain yellow-legged frog and the Yosemite toad. Changes in grazing restrictions and projected increases in mechanical harvesting under the preferred alternative raised concerns about potential fragmentation of important habitats for these species and possible adverse impacts. Concerns were raised that the proposed amendment could undermine the Forest Service's mandate under the National Forest Management Act to maintain viable populations of designated sensitive species. Others asserted that improving forest health should not be overridden by wildlife habitat objectives, and requested the Forest Service to craft an amendment that provides for maximum flexibility in carrying out fuels reduction and forest health projects.

The public expressed a broad range of concerns relative to fire and fuels management. Goals for protecting communities from wildfire and for preserving species and ecosystems were often viewed as conflicting. Public comments regarding fire and fuels management reflected this conflict with comments that were often polarized in a "protect people" versus a "protect the environment" stance. Broad themes in public concerns relative to fire and fuels management included: a need to harmonize planning efforts with national direction, a need to clarify and justify information presented in the SEIS, a need to ensure funding for fire and fuels management, and a need to better define where treatments will occur and what techniques will be used for fire and fuels treatments.

IV. Application of Decision

Application to Land and Resource Management Plans

This decision amends existing national forest land and resource management plans by establishing:

- Management direction and goals;
- Land Allocations
- Desired future conditions expected over the next 50 to 100 years;
- Standards and guidelines to be used in designing and implementing future management actions;
- A strategy for inventory, monitoring, and research to support adaptive management.

This management direction is described in the ROD, Appendix A, and is incorporated into the existing land and resource management plans for the Modoc, Lassen, Plumas, Lake Tahoe Basin Management Unit, Tahoe, Eldorado, Stanislaus, Sequoia, Sierra, and Inyo National Forests of California, and that portion of the Humboldt-Toiyabe National Forest that is in the Sierra Nevada. This ROD replaces, in its entirety, the SNFPA ROD of January 2001.

This decision does not change the capable, available and suitable (CAS) lands determination made in forest plans. This decision does not schedule any regulated timber harvest from these lands. Scheduling of regulated timber harvest and its associated Allowable Sale Quantity (ASQ) will be addressed as part of forest plan revisions. The schedule for forest plan revision is available on the web at http://fsweb.wo.fs.fed.us/em/nfma/index2.htm.

Relationship of Standards and Guidelines to Existing Plans

The existing land and resource management plans contain many standards and guidelines that are not amended by this decision. All standards and guidelines ftom the 2001 SNFPA ROD are replaced by the standards and guidelines in Appendix A. This decision does not affect the direction in the following plans and projects:

- Upper Pit River Watershed Restoration Project
- Hackamore Ecosystem Restoration and Enhancement Project
- Warner Mountain Rangeland Management Planning
- Experimental Stewardship Project, Mood National Forest joint with Bureau of Land Management at Surprise Resource Area
- Big Valley Sustained Yield Unit
- Wetlands Development and Maintenance, primarily for Waterfowl and Birds of Prey – Modoc Plateau
- Juniper Sage Steppe Ecosystem area, Modoc National Forest
- Giant Sequoia National Monument Management Plan
- Lake Tahoe Basin Management Unit Presidential Commitments
- Experimental Forest and Ranges (Blacks Mountain, Teakettle, Challenge, Stanislaus, Kings River, San Joaquin, Goosenest, and Swain Mountain)
- Those portions of the Lassen and Modoc National Forests covered by the NWFP ROD

V. Alternatives Considered

I have considered a broad range of alternatives, including those alternatives analyzed in the SNFPA FEIS and this Final SEIS. I have reviewed these alternatives and the effects analysis in light of the purpose and need for this supplement and in light of public comment.

A. Alternatives Considered in Detail

Nine alternatives are considered in detail: the no action alternative (Alternative S1), the proposed action (Alternative S2), and seven action alternatives from the FEIS (Alternatives F2-F8). The no action alternative (Alternative S1) continues management in the 11 Sierra Nevada national forests consistent with the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001). Alternative S2 proposes specific changes to the SNFPA ROD.

Alternative S1: Theme - Continue management in existing national forest land and resource management plans; manage sensitive wildlife cautiously

Alternative 1 is the no action alternative required by the National Environmental Policy Act. Management in the planning area would continue under existing decisions and management direction in the Records of Decision for existing land and resource management plans, as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001).

Alternative S1's approach for conserving old forest ecosystems and associated species and managing fire and fuels responds to concerns that impacts from mechanical fuels treatments may pose greater risks to habitats, particularly in the short-term, than the risks posed by potential wildland fires and the mechanical treatments themselves. Alternative S1 applies a cautious approach for conducting activities in habitats for sensitive species, particularly species associated with old forest ecosystems. Alternative S1 retains canopy cover and limits the sizes of trees that can be removed during fuels treatments. Vegetation treatments are focused on fire hazard reduction, maintenance activities, and public health and safety. Implementation of S1 relies largely on appropriated funds to accomplish fuel hazard reduction.

The No Action Alternative also provides direction for limiting and, in some cases, eliminating grazing from habitat that is or has been occupied by the Yosemite toad and willow flycatcher. This alternative applies limited operating periods to vegetation management activities in the vicinity of California spotted owl and northern goshawk nest sites and forest carnivore den sites. Limited operating periods may apply where analysis of proposed projects or activities determines that such activities are likely to result in nest or den site disturbance.

Alternative S2: Theme - Proposed Action, the Selected Alternative

Under the proposed action (Alternative S2), Forest Service managers would use thinning, salvage, and prescribed and natural fires to make forests less susceptible to the effects of uncharacteristically severe wildfires, as well as invasive pests and diseases. Goals established in the SNFPA ROD for conservation of old forest ecosystems and associated species would be retained. However, this alternative also provides for other important elements of old forest ecosystems, including the objectives of reducing stand density and regenerating shade intolerant species.

Alternative S2 would adopt an integrated vegetation management strategy with the primary objective of protecting communities and modifying landscape-scale fire behavior to reduce the size and severity of wildfires. This alternative would provide for the removal of some medium-sized trees to increase the likelihood of accomplishing program goals with limited funding. Alternative S2 acknowledges the role that the Forest Service plays in providing a wood supply for local manufacturers and sustaining a part of the employment base in rural communities. This alternative would address the need to retain industry infrastructure by allowing wood by-products to be generated from fuels treatments and for dead and dying trees to be salvaged after wildfires. This active approach to vegetation and fuels management accepts the risks of temporarily changing some habitat for California spotted owls and other species to reduce the future risk of wildfire to habitat and human communities.

Alternative S2 would include the SNFPA ROD's network of land allocations, with some modification and clarification of the associated desired conditions. Alternative S2 would replace many of the standards and guidelines in the SNFPA ROD pertaining to old forest ecosystems, associated species conservation, and fire and fuels management. Alternative S2's replacement standards and guidelines would give greater flexibility to local managers to design projects to respond to local conditions, while meeting desired future conditions unique to each land allocation.

Pending completion of the forest plan amendments/revisions required by the HFQLG Forest Recovery Act, vegetation management activities on the Plumas and Lassen National Forests and the Sierraville Ranger District of the Tahoe National Forest would be guided by the direction of Alternative S2. Alternative S2 provides for implementation of the HFQLG Forest Recovery Act Pilot Project and employs the land allocations specified in the Act for the life of the pilot project. As in Alternative S1, vegetation management in riparian areas within the HFQLG Pilot Project Area would be handled under the SAT guidelines for the life of the pilot project.

Alternative S2 also includes standards and guidelines for managing grazing within habitat that is or has been occupied by the Yosemite toad and willow flycatcher. This management direction is designed to allow local managers to develop site-specific approaches to meet overall program goals for species conservation. Some flexibility is provided to allow managers to take advantage of unique opportunities that can only be identified at the project-level. This alternative would invoke limited operating periods for vegetation treatments in the vicinity of nest sites for California spotted owl and northern goshawk and near furbearer den sites.

Alternative F2: Theme - Establish large reserves where management activities are very limited

Alternative F2 establishes large reserves, where human management is very limited, to maintain and perpetuate old forest, aquatic, riparian, meadow, and hardwood ecosystems. Alternative F2 responds to views that ecosystems should be protected from all but minimal human-caused disturbances and conditions that "nature" delivers are desired.

Alternative F3: Theme - Actively manage to restore ecosystems. Use local analysis and collaboration

Alternative F3 emphasizes restoration of desired ecosystem conditions and ecological processes through active management determined through landscape analysis, monitoring, and local collaboration. Management activities would promote ecosystem conditions and ecological processes expected within natural ranges of variability under prevailing climates.

Alternative F4: Theme - Develop ecosystems that are resilient to large-scale, severe disturbances

Alternative F4 emphasizes the development of forest ecosystem conditions that anticipate and are resilient to large-scale, severe disturbances, such as drought and high intensity wildfire, common to the Sierra Nevada. The alternative is consistent with the view that ecosystems should be actively managed to meet ecological goals and socioeconomic expectations. Alternative F4 would have the greatest number of acres available for active management including timber harvest.

Alternative F5: Theme - Preserve existing undisturbed areas and restore others to achieve ecological goals. Limit impacts from active management through range-wide management standards and guidelines

Alternative F5 preserves existing undisturbed areas and restores others to achieve ecological goals. Alternative F5 emphasizes reintroducing fire as a natural process and using fire to reduce fire and fuel accumulations.

Unroaded areas larger than 5,000 acres, ecologically significant unroaded areas between 1,000 and 5,000 acres, and inner zones of riparian areas would be preserved and left to develop under natural processes. Other areas, including old forest emphasis areas and general forest, would be restored under a limited active management approach to increase the amount of, and enhance processes associated with, old forest conditions. Alternative 5 limits impacts from management activities by specifying range-wide management standards and guidelines.

Alternative F6: Theme - Integrate desired conditions for old forest and hardwood ecosystems with fire and fuels management goals. Reintroduce fire into Sierra Nevada forest ecosystems

Alternative F6 integrates desired conditions for old forest and hardwood conservation with fire and fuels management. This alternative provides direction for implementing a landscape-scale strategic fuels treatment program in high-risk vegetation types across Sierra Nevada landscapes to: (a) reduce the potential for large severe wildfires, and (b) increase and perpetuate old forest and hardwood ecosystems, providing for the viability of species associated with these ecosystems.

Alternative F6 emphasizes re-introducing fire into Sierra Nevada ecosystems, particularly old forest ecosystems. It uses active management to protect and restore desired ecosystem conditions. Prescribed fire is emphasized in old forest emphasis areas, while a mix of prescribed fire and mechanical treatments may be used in general forest areas to move toward and maintain desired conditions.

Alternative F7: Theme - Actively manage entire landscapes to establish and maintain a mosaic of forest conditions approximating patterns expected under natural conditions.

Alternative F7 aims to establish and maintain a diversity of forest ages and structures over the landscape in a mosaic approximating patterns that would be expected under natural conditions, that is conditions characterized by current and expected future climates, biota, and natural processes. Ecosystems and ecological processes would be actively managed to maintain and restore them to desired conditions. Silvicultural treatments could produce timber and other forest products.

Alternative F7 relies on few land allocations, applying what is commonly termed a “whole forest approach.” Most lands are designated in the “general forest” land allocation where active management is used to move landscapes toward desired conditions. Management is linked to desired conditions for California Wildlife Habitat Relationships (CWHR) stages and old forest condition goals, specific to the major Sierra Nevada forest types.

Alternative F8: Theme - Manage sensitive wildlife habitat cautiously. Develop new information to reduce uncertainty about the effects of management on sensitive species.

Alternative F8 emphasizes a cautious approach to treating fuels in sensitive wildlife habitat. New information from research and administrative studies would be developed to reduce uncertainty about the effects of management on sensitive species. Until further guidelines were developed, treatments in suitable California spotted owl habitat would retain specific levels of large trees, canopy cover, canopy layers, snags, and down woody material.

B. Alternatives Not Considered In Detail

Seven additional alternatives were considered, but eliminated from detailed study. Alternatives were considered that would stage implementation of the Proposed Action for the first five years; would set a smaller diameter limit on tree removal; would apply the standards and guidelines of the proposed action to the Herger-Feinstein Quincy Library Group Act Pilot Project Area; would limit group selection in the Pilot Project Area to the area planned for the administrative study; would apply the standards and guidelines in the proposed action only to the urban-wildland interface; would include forest products as a primary management objective; and would make minor changes to individual standards and guidelines. Alternatives were eliminated because they did not respond to the purpose and need for action, new information, and/or implementation concerns. Some of these alternatives were also embedded in the Alternatives considered in detail

C. The Environmentally Preferable Alternative

The Council on Environmental Quality (CEQ) regulations for implementing the NEPA require that the ROD specify “the alternative or alternatives which were considered to be environmentally preferable” (40 CFR 1505.2(b)). This alternative has generally been interpreted to be the alternative that will promote the national environmental policy as expressed in NEPA's Section 101 (CEQ's “Forty Most-Asked Questions,” 46 Federal Register, 18026, March 23, 1981). Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources.

In the short term, Alternative 5 of the Final SEIS, could be considered the environmentally preferable alternative. This is defined as the alternative having the least adverse effects to the physical and biological (as opposed to the social and economic) environments. The impacts from vegetation and fuels management activities in this alternative would pose the least risk to habitat in the short term, but may result in greater impacts in the long term. Alternative S2, while having some short term effects, may result in fewer long term impacts (see Final SEIS Chapter 2, Comparison of Alternatives).

VI. Means to Avoid Environmental Harm

Extensive measures to avoid or minimize environmental harm are being continued in this decision. These measures have been discussed previously, and include forest-wide standards and guidelines, which at a minimum meet all requirements of applicable laws, regulations, State standards, and additional standards and guidelines for each land allocation. Mitigation measures are an integral part of the standards and guidelines. Singularly and collectively, they avoid, rectify, reduce, or eliminate potential adverse environmental impacts of forest management activities.

VII. Findings Related To Other Requirements

The Forest Service manages the Sierra Nevada national forest in conformance with many Federal laws. In this section some of the more important laws pertinent to this programmatic-level decision are discussed.

A. National Environmental Policy Act (NEPA)

NEPA requires that Federal agencies prepare detailed statements on proposed actions that significantly affect the quality of the human environment to provide decision makers with a detailed accounting of the likely environmental effects of a proposed action prior to its adoption, and to inform the public of, and allow comment on, such efforts.

The Sierra Nevada Forest Plan Amendment Project has compiled and generated an enormous amount of information relevant to the effects of each of the alternatives considered in the Final SEIS. Such information builds on the data, analysis, and public involvement set forth in the documents prior to this Final SEIS, which include the 1995 Draft EIS for Conservation of California Spotted Owl Habitat, the 1996 Revised Draft EIS for Conservation of California Spotted Owl Habitat, the 1996 Sierra Nevada Ecosystem Project Reports, the 1997 Federal Advisory Committee Report, the 1998 PSW Sierra Nevada Science Review publication, the 1998

USDA Forest Service Summary of Existing Management Direction, the 1998 California Forest EIS Review Committee Report, the SNFPA FEIS, Washington Office Fuels Review Report, and the Sierra Nevada Forest Plan Amendment Management Review and Recommendations report.

All substantive comments, written and oral, made on the Draft SEIS have been summarized and responded to in Volume 2 of the Final SEIS.

I find that the environmental analysis and public involvement process complies with each of the major elements of the requirements set forth by the CEQ for implementing NEPA (40 CFR 1500-1508).

This ROD does not authorize timber sales or any other specific activity on the Sierra Nevada national forests. Site-specific decisions will be made on projects in compliance with NEPA, ESA, and other environmental laws following applicable public involvement and administrative appeal procedures.

B. National Forest Management Act (NFMA)

My decision conforms with the 1982 planning regulations (36 CFR 219) that implement the National Forest Management Act. I have been delegated the authority from the Chief to make the decision for amending the Humboldt-Toiyabe National Forest Plan for the Regional Forester of the Intermountain Region. I have determined that this decision is a significant forest plan amendment.

Diversity and Viability Provisions for Fish and Wildlife

The National Forest Management Act (NFMA) requires the Secretary of Agriculture to specify "guidelines for land management plans developed to achieve the goals of the [RPA] Program which provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (16 U.S.C. 1604(g)(3)(B)). In accord with this diversity provision, the Secretary promulgated a regulation that provides in part: "[f] ish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (36 CFR 219.19, 1982 edition).

The scientific community and judicial courts recognize that NFMA does not create a concrete, precise standard for diversity. The Committee of Scientists that provided scientific advice to the Forest Service on the drafting of the 1979 NFMA regulations stated that "it is impossible to write specific regulations to 'provide for' diversity" and "there remains a great deal of room for honest debate on the translation of policy into management planning requirements and into management programs" (44 Federal Register 26600-01 & 26608).

In this planning context, absolute certainty is not possible. This has led to a planning process that involves projections regarding the distribution and abundance of ecological conditions needed to maintain viable populations of species well distributed throughout their range, in the planning area, over the next 50 years. Numerous factors, which vary according to the characteristics of the species and ecosystems examined, are considered. Some common factors include the life history of the species, the current and projected amount, and distribution of habitat, the distribution of species' ranges within the planning area, and principal risk factors to the species. I am adopting conservation measures to address these risk factors to provide biological conditions for species viability and persistence. In as biologically diverse and expansive an area as the Sierra Nevada, much of this type of information is evolving. Moreover, even absent any human-induced effects, the likelihood that habitat will continue to support a species' persistence can vary among species. Some species are inherently rare, such as locally endemic plants, and despite substantial protection may remain at risk. Other species may be at risk primarily due to factors beyond the Forest Service's control such as: (1) the effects of dams and diversions on at risk aquatic species, (2) the effects of limited or intermingled National Forest System land ownership, and (3) species only peripherally occurring on National Forest System lands. Thus, compliance with the regulation is a matter of assessing risk, which is not subject to precise numerical interpretation and cannot be fixed at any one single threshold.

In determining compliance with the NFMA fish and wildlife resource regulations, I considered existing and reasonably foreseeable conservation measures and factors under Forest Service authority or control. In addition to these land allocations and standards and guidelines that are part of my decision, other measures will affect species' conservation, including activities undertaken pursuant to internal policy directives (like the Forest Service's sensitive species program) and steps taken during project planning. Moreover, interagency efforts may identify additional conservation measures that may be discovered to be necessary as a result of the Conservation Assessments, inventory and monitoring, or other new information relative to the conservation of at risk species.

Based on my review of the record, including the Final SEIS, Biological Assessment (BA), Biological Evaluation (BE) and Biological Opinion (BO), I believe that the management approach embodied in this ROD represents a balance of wildlife habitat conservation measures that considers the available science and the risks associated with wildfires. It will provide the fish and wildlife habitat and other ecological conditions necessary to maintain well-distributed viable populations of vertebrate species in the planning area, and maintain the diversity of plants and animals.

C. Endangered Species Act (ESA)

Consultation requirements under Section 7 of the ESA, as amended have been completed with the Fish and Wildlife Service and the National Marine Fisheries Service (NMFS). Both the Fish and Wildlife Service and the NMFS reviewed the Biological Assessment for the proposed threatened and endangered species under their regulatory jurisdiction. Consistent with direction in "Memorandum of Agreement, Endangered Species Act Section 7 Programmatic Consultations and Coordination among Bureau of Land Management, Forest Service, National Marine Fisheries Service and Fish and Wildlife Service, August 30, 2000," the Fish and Wildlife Service included candidate species in their Biological Opinion. The Fish and Wildlife Service concluded that this decision is "not likely to jeopardize the continued existence of threatened and endangered species" ocurring on the Sierra Nevada national forests. The NMFS concluded that the decision is "not likely to adversely affect" listed species based on previous consultations with the Lassen National Forest. Neither agency authorized incidental take of listed species, which will be addressed in required future consultations on LRMPs and projects as appropriate. Copies of correspondence with each agency are included in the administrative record.

D. Clean Water Act

Full implementation of this decision is expected to maintain and improve water quality and satisfy all State water quality requirements. This finding is based on the standards and guidelines contained in the decision, the application of State approved Best Management Practices specifically designed to protect water quality, and the discussion of water quality and beneficial uses contained in the Final SEIS. Examples include (1) stream-type flexible width riparian areas, (2) critical aquatic refuges, (3) comprehensive landscape level analysis including existing uses, (4) Conservation Assessments of threatened and endangered species, and (5) incorporation of established recovery plans. Additionally, project-level analyses for activities subsequent to the decision will be required to demonstrate compliance with Clean Water Act and State water quality standards.

E. Clean Air Act

At the scale of a programmatic plan such as this, the overall level of activities proposed under this decision is not anticipated to violate ambient air quailty standards. This finding is based on information presented in the Final SEIS. The Sierra, Sequoia, and Inyo National Forests are in non-attainment for PM_{10} while the Sierra, Sequoia, Eldorado, and Tahoe National Forests are in non-attainment for Ozone. Conformity determinations will be made at subsequent levels of planning and analysis where emissions can be more accurately quantified and reasonably forecasted, and local impacts assessed.

F. Flood Plains and Wetlands (Executive Orders 11988 and 11990)

These Executive Orders require Federal agencies to avoid, to the extent possible, short- and long-term effects resulting from the occupancy and modification of flood plains, and the modification or destruction of wetlands. Standards and guidelines are provided for soil, water, wetlands, and riparian areas to minimize effects to flood plains and wetlands. They incorporate the Best Management Practices of the Soil and Water Conservation Handbook. The standards and guidelines apply to all floodplains and wetlands where less restrictive management might otherwise occur.

G. Environmental Justice (Executive Order 12898)

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that Federal agencies make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority populations and low-income populations. As concluded in the FSEIS, no diparate or adverse effects are indentified to groups of people identified in Civil Rights statutes or Executive Order 12989 (Environmental Justice) from the Proposed Action.

H. Civil Rights

Civil Rights are defined as "the legal rights of United States citizens to guaranteed equal protection under the law" (USDA Forest Service Manual 1730). Civil rights impact analysis for environmental or natural resource actions is a necessary part of the social impact analysis package in environmental impact statement and is not a separate report (USDA FSH 1709.11).

The Forest Service is committed to equal treatment of all individuals and social groups in its management programs in providing services, opportunities, and jobs. Because no actual or projected violation of legal rights to equal protection under the law is foreseen for any individual or category of people, no civil rights impacts are reported in the Final SEIS.

I. Magnuson-Stevens Act

The Forest Service is complying with the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1801 et seq.) that requires Federal action agencies to consult with the Secretary of Commerce regarding any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). Consultation has occurred with the U.S. Department of Commerce, National Marine Fisheries Service (NMFS) regarding salmon species included in the Pacific Salmon Fishery Management Plan. The Forest Service will comply with the EFH Conservation Recommendations provided by NMFS.

J. Healthy Forests Restoration Act

On December 3, 2003, the Healthy Forests Restoration Act of 2003 was signed into law. The legislation provides new tools and additional authorities to treat more acres more quickly. The Act is intended to help expedite projects aimed at restoring forest and rangeland health by providing streamlined administrative decisions and provide courts direction when reviewing fuel reduction or forest health projects. The National Fire Plan and the Comprehensive Strategy is consistent with this Act. The Final SEIS and this decision provide direction to design and implement hazardous fuels reduction projects consistent with this law.

VIII. Implementation

I am providing the following transition direction to ensure the orderly implementation of the Forest Plan amendments that are made in this Record of Decision. My intention is to provide for ecological restoration of processes and enhance long-term ecological integrity, assure the most efficient and

appropriate use of government resources, minimize costs to holders of existing government contracts and permits, avoid disruptions to local communities, and reduce the likelihood of confusion. I have considered and balanced each of these concerns in making my decision to issue this direction.

The amended Sierra Nevada National Forest Land and Resource Management Plans will be effective 30 days from the date on which notice of this decision is published in a newspaper of record. The new direction will apply to all project decisions made on or after the effective date of this amendment. The new direction does not apply to any projects that have decisions made prior to the effective date of this amendment. Projects currently under contract, permit, or other authorizing instrument, are not affected by the Forest Plan amendments. However, projects may be modified to adopt all or part of this direction where Forest officers deem it appropriate. Reissuance of existing authorizations will be treated as new decisions, which must be consistent with the new direction of the plan amendments adopted by this decision.

A. Transition to the Amended Plans

The amended Forest Plans provide a programmatic framework within which project-level decisions are designed and implemented. As noted above, all projects for which a decision has not been made prior to the effective date of these amendments must be consistent with the new direction of the plan amendments. The amended Forest Plans themselves do not provide final authorization for any activity, nor do they compel that any contracts or permits be advertised or awarded.

B. Incorporation of Standards and Guidelines and Monitoring Requirements

Each Forest Supervisor will assess their existing standards and guidelines to identify those that are superceded by the provisions of this decision and those that will remain operational. It is my intention that the adaptive management strategy developed for this Forest Plan Amendment will provide the coordinated foundation upon which all Sierra-wide monitoring required of the Forest Service in this ecoregion will be executed.

C. Map Errata

The land allocations in the Final SEIS and this decision were developed using small-scale Sierra Nevada wide maps similar to those included in the map packets of the Final EIS. The level of inaccuracy of a line on a map at such a scale is approximately plus or minus 500 feet. Enlargements of this map were also sometimes used in land allocation development, but these maps contained no additional detail or accuracy; they were just larger scale. This approach was appropriate for the development of the maps, which is a permissive, zoning map. It is the role of subsequent project planning to resolve, within the overall intent of the mapped land allocations, the actual location of activities on the ground.

When utilizing these maps during the development of project plans, some variation in the boundaries of the land allocations may be identified. In some situations, there is a lack of precise map correlation or registration of a land allocation boundary between two GIS maps. Most of these variations are minor and are due to the combining of map covers of varying resolutions. This situation results in remnants, or “slivers” of small acreages of land appearing on the maps between mapped polygons.

In other situations during project planning land allocation boundaries may be indefinite or illogical if located literally on the ground as depicted on the Forest Plan Amendment map. In some instances

boundaries may appear to bisect an existing or mapped harvest unit; or, while paralleling an existing or mapped road, boundaries may appear to cross and recross the road randomly.

Dealing with these types of map inconsistencies is not considered to be a “change” in the Forest Plan. These are considered to be the correction or errata on an as-needed basis when it occurs during project planning or other analyses. These situations will be fully discussed and described in the project-level environmental analysis documentation.

Resolution of the occurrences discussed above will be guided by (1) following physical and other identifiable on-the-ground features, (2) considering assigning the land allocation that comes nearer to maintaining the natural setting of the area, or (3) using professional management judgement regarding the resource situation, in consultation with other agencies, with documented rationale.

D. Collaboration

As part of implementation of this Forest Plan Amendment, the Forest Supervisors and District Rangers will increase their collaborative efforts within the communities of the Sierra Nevada. Much of this effort will focus around implementing the Healthy Forest Restoration Act and the National Fire Plan. With less of the “how to do” prescribed and more emphasis on choosing the right tool to achieve the desired condition, there is more opportunity for interaction among interested people that can lead to mutually acceptable resolution of resource issues. I am hopeful that such interaction and participation will lead to better acceptance of national forest management activities and improve relations among competing interests.

E. Native American Relations

The relationship of the Forest Service with American Indians is important in the management and restoration of ecosystems in the Sierra Nevada and Modoc Plateau. To meet our trust responsibilities and to encourage the participation of American Indians in national forest management, I am making the following commitments on behalf of the Forest Service:

- We will work with tribal governments and tribal communities to develop mutually acceptable protocols for government-to-government and tribal community consultations. These protocols will emphasize line officers' and tribal officials' roles and responsibilities.
- We will consult with appropriate tribal governments and tribal communities regarding fire protection and fuels management activities that potentially affect rancherias, reservations, and other occupied areas. We will develop fire protection plans for such areas in consultation with appropriate tribal or intertribal organizations. We will coordinate with tribes and appropriate tribal organizations regarding training, outreach, and other items of mutual interest in order to support tribal and national forest fire programs.
- Traditional American Indian land use practices, tribal watershed and other ecosystem restoration practices and priorities will be considered early in national forest planning, analyses, decision making, and adaptive management processes. During landscape analyses and similar activities, we will assess vegetation community conditions where a specific area has an identified importance to an affected tribe or tribal community. We will consult with affected tribes, and, or tribal communities to consider traditional and contemporary uses and needs.
- We will consider traditional American Indian vegetation management strategies and methods, and integrate them, where appropriate, into ecosystem restoration activities. We will cooperate with tribes, tribal communities, and intertribal organizations to develop ecosystem stewardship projects.

- We will consider the relationship between fire management and plants culturally important to American Indians. Where fuels treatments may affect tribes or tribal communities, or plants culturally important to them, we will consult on the development of burn plans, and consider approaches that accommodate traditional scheduling and techniques of fire and vegetation management.
- When implementing noxious weed management programs we intend to maintain or, if appropriate, increase the availability of plants traditionally used by American Indians. We will consult with appropriate tribes, tribal communities, or tribal organizations to identify areas of new or worsening weed infestations and develop plans for appropriate weed control.
- We will, where appropriate, include culturally significant species in monitoring protocols related to management activities.
- We will maintain appropriate access to sacred and ceremonial sites and to tribal traditional use areas. We will consult with affected tribes and tribal communities to address access to culturally important resources and culturally important areas when proposing management that may alter existing access. After appropriate assessment and consultation, we will consider proposing mineral withdrawals and other protection of inventoried sacred sites.
- We will protect all sensitive and proprietary information to the greatest extent permitted by law. We will secure permission to release information from the tribe, tribal community, or individual who provided it prior to release to others.

IX. Appeal Rights

This decision is subject to appeal in accordance with the provisions of 36 CFR 217 by filing a written notice of appeal within 90 days of the date specified in the published legal notice of this decision, as provided in 36 CFR 217.5(b) and 36 CFR 217.8(a)(3). The appeal must be filed with the Reviewing Officer:

Chief
USDA Forest Service
Attn: Appeals – Barbara Timberlake (Mail Stop 1104)
1400 Independence Avenue, SW
Washington, D.C. 20250-1104

Email: appeals-chief@fs.fed.us

FAX: 202-205-1012

Office hours are 8 am to 4:30 pm Monday through Friday.

Acceptable formats for appeals filed electronically are .doc and .rtf.

A copy must simultaneously be sent to:

Regional Forester
USDA Forest Service
Pacific Southwest Region
1323 Club Drive
Vallejo, Ca. 94592

Email: appeals.pacificsouthwest-regional-office@fs.fed.us

FAX: 707-562-9091

Office hours are 8 am to 4:30 pm Monday through Friday.

The notice of appeal must include sufficient narrative evidence and argument to show why this decision should be changed or reversed (36 CFR 217.9). Requests to stay approval of the Forest Plans will not be granted (36 CFR 217.10(b)). For a period not to exceed 20 days following the filing of a Notice of Appeal, the Reviewing Officer shall accept requests to intervene in the appeal from any interested or potentially affected person or organization (36 CFR 217.14(a)).

Decisions on site-specific projects are not made in this document. Decisions on proposed projects will not be made until completion of environmental analyses and documentation for the specific project, in compliance with the NEPA.

X. Contact Persons

If you would like more information on the Forest Plan Amendments or the Final SEIS, please contact the following officials:

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Signatures

January 21, 2004

JACK BLACKWELL Date
Regional Forester,
Pacific Southwest Region

January 21, 2004

for JACK D. TROYER Date
Regional Forester,
Intermountain Region

Appendix A: Management Direction

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Appendix A: Management Direction

Introduction

This appendix provides management direction for the Record of Decision. It is attached to and part of the Record of Decision for the Final Supplemental Environmental Impact Statement (SEIS) for the Sierra Nevada Forest Plan Amendment (SNFPA), 2004.

This appendix has six parts. **Part A** presents broad management goals and strategies for addressing the five problem areas: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; noxious weeds; and lower westside hardwood ecosystems. **Part B** describes desired conditions for land allocations across Sierra Nevada national forests. **Part C** describes management intents and objectives. Management standards and guidelines in **Part D** provide direction for specific aspects of project planning and analysis. **Part E** sets forth management direction for the Herger-Feinstein Quincy Library Group Pilot Project Area during the life of the pilot project. **Part F** describes the monitoring plan for this Decision.

A. Management Goals and Strategies

The Record of Decision lays out broad management goals and strategies for addressing the five problem areas: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; noxious weeds; and lower westside hardwood ecosystems.

Old Forest Ecosystems and Associated Species

Goals

The broad goals of the old forest and associated species conservation strategy are to:

- protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve species associated with these ecosystems while meeting people's needs for commodities and outdoor recreation activities;
- increase the frequency of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape; and
- restore forest species composition and structure following large scale, stand-replacing disturbance events.

Strategy

The old forest ecosystem strategy has the following key elements:

- a network of land allocations, including California spotted owl and northern goshawk protected activity centers (PACs), California spotted owl home range core areas, forest carnivore den sites, and the southern Sierra fisher conservation area, with management direction specifically aimed at sustaining viable populations of at-risk species associated with old forest ecosystems well-distributed across Sierra Nevada national forests;

- a network of old forest emphasis areas managed to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest and areas that provide old forest functions (such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species);
- direction for restoring ecosystems across all land allocations following large-scale catastrophic disturbance events; and
- a proactive approach for improving forest health with management objectives to reduce susceptibility of forest stands to insect and drought-related tree mortality by managing stand density levels.

Aquatic, Riparian, and Meadow Ecosystems and Associated Species

Goals

The strategy for aquatic management provides broad goals (listed below), which are endpoints toward which management moves watershed processes and functions, habitats, attributes, and populations. The goals provide a comprehensive framework for establishing desired conditions at larger scales, including river basin, watershed, and landscape scales. Moving ecosystem conditions toward these goals will restore and maintain the physical, chemical and biological integrity of the region's waters as mandated by the Clean Water Act, and will support the Forest Service's mission to provide habitat for riparian - and aquatic-dependent species under the National Forest Management Act, Organic Act, Safe Drinking Water Act, Endangered Species Act, and Electric Consumers Protection Act. The following goals are part of the Aquatic Management Strategy:

- **Water Quality**: Maintain and restore water quality to meet goals of the Clean Water Act and Safe Drinking Water Act, providing water that is fishable, swimmable, and suitable for drinking after normal treatment.
- **Species Viability**: Maintain and restore habitat to support viable populations of native and desired non-native plant, invertebrate, and vertebrate riparian-dependent species. Prevent new introductions of invasive species. Where invasive species are adversely affecting the viability of native species, work cooperatively with appropriate State and Federal wildlife agencies to reduce impacts to native populations.
- **Plant and Animal Community Diversity**: Maintain and restore the species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows to provide desired habitats and ecological functions.
- **Special Habitats**: Maintain and restore the distribution and health of biotic communities in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes) to perpetuate their unique functions and biological diversity.
- **Watershed Connectivity**: Maintain and restore spatial and temporal connectivity for aquatic and riparian species within and between watersheds to provide physically, chemically and biologically unobstructed movement for their survival, migration and reproduction.
- **Floodplains and Water Tables**: Maintain and restore the connections of floodplains, channels, and water tables to distribute flood flows and sustain diverse habitats.
- **Watershed Condition**: Maintain and restore soils with favorable infiltration characteristics and diverse vegetative cover to absorb and filter precipitation and to sustain favorable conditions of stream flows.

- **Streamflow Patterns and Sediment Regimes**: Maintain and restore in-stream flows sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.
- **Stream Banks and Shorelines**: Maintain and restore the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity.

Strategy

The aquatic, riparian, and meadow ecosystem strategy has the following key elements:

- a description of desired conditions for aquatic, riparian, and meadow habitats developed from the AMS goals (see Part B of this appendix);
- a set of land allocations, specifically riparian conservation areas and critical aquatic refuges, that delineate aquatic, riparian, and meadow habitats, which are to be managed consistent with the following riparian conservation objectives (RCOs) and associated standards and guidelines (see Part D of this appendix);
- a long-term strategy for anadromous fish-producing watersheds for the Lassen National Forest, as presented in Appendix I of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement;
- an adaptive management program that includes monitoring and research activities specifically aimed at assessing effects of management activities on the willow flycatcher and Yosemite toad (see Part E of this appendix); and
- the use of landscape analysis as a tool for assessing existing uses and identifying restoration and enhancement projects.

Riparian Conservation Objective #1: Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses. (RCO #1 is linked to the following AMS goals: #1: Water Quality; #2: Species Viability; #7: Watershed Condition)

Riparian Conservation Objective #2: Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species. (RCO #2 is linked to the following AMS Goals: #2: Species Viability; #3: Plant and Animal Community Diversity; #4: Special Habitats; #5: Watershed Connectivity; #6: Floodplains and Water Tables; #8: Streamflow Patterns and Sediment Regimes; #9: Streambanks and Shorelines)

Riparian Conservation Objective #3: Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the RCA. (RCO #3 is linked to the following AMS goals: #2: Species Viability; #3: Plant and Animal Community Diversity)

Riparian Conservation Objective #4: Ensure that management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species. (RCO #4 is linked to the following AMS Goals: #2: Species Viability, #7: Watershed Condition)

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. (RCO #5 is linked to the

following AMS goals: #1: Water Quality, #2 Species Viability, #3 Plant and Animal Community Diversity, #4 Special Habitats; #7: Watershed Condition; #9: Stream Banks and Shorelines)

Riparian Conservation Objective #6: Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species. (RCO # 6 is linked to all AMS goals)

Fire and Fuels Management

Goals

Goals for fire and fuels management include reducing threats to communities and wildlife habitat from large, severe wildfires and re-introducing fire into fire-adapted ecosystems. Broad-scale goals include:

- treating fuels in a manner that significantly reduces wildland fire intensity and rate of spread, thereby contributing to more effective fire suppression and fewer acres burned;
- treating hazardous fuels in a cost-efficient manner to maximize program effectiveness; and
- actively restoring fire-adapted ecosystems by making demonstrated progress in moving acres out of unnaturally dense conditions (in other words, moving acres from condition class 2 or 3 to condition class 1).

This Decision includes managing hazardous fuels in and around communities combined with strategic placement of fuels treatments across broad landscapes to modify wildland fire behavior. Goals for fuels treatments include:

- strategically placing treatment areas across landscapes to interrupt potential fire spread,
- removing sufficient material in treatment areas to cause a fire to burn at lower intensities and slower rates of spread compared to untreated areas, and
- considering cost-efficiency in designing treatments to maximize the number of acres that can be treated under a limited budget.

Strategy

The fire and fuels management strategy is integrated with the strategy for conserving old forest ecosystems. In wildland urban intermix (WUI) defense zones, management activities are focused on protecting life and property. Outside of WUI defense zones, strategic placement of area treatments occurs across all land allocations. Desired conditions, management intents, management objectives, and standards and guidelines guide managers in placing and designing effective area treatments while incorporating needs for retaining key habitat elements for sensitive species.

The landscape-scale fire modification strategy adopted in this Decision is based on the premise that disconnected fuel treatment areas overlapping across the general direction of fire spread are theoretically effective in changing fire spread. Research conducted by Dr. Mark Finney (1999) suggests that fire spread rates can be reduced, even outside of treated areas, if a fire is forced to flank areas where fuels have been reduced or otherwise modified. Hence, the treated areas would function as “speed bumps,” slowing the spread and reducing the intensity of oncoming fires and thereby reducing damage to both treated and untreated areas and the impacts of large, uncharacteristically severe wildfires. Maintenance treatments are important to minimize grass and shrub colonization that could increase fire spread rates again.

Dr. Finney’s research findings indicate that, given an effective treatment area shape and pattern, only a fraction of the landscape needs to be treated and maintained to produce the desired modifications in

wildfire behavior over the entire landscape. This hypothesis underpins the Decision's fire and fuels strategy. As such, the Decision explicitly recognizes two criteria that must be met for the strategy to be effective: the *pattern* of area treatments across the landscape must interrupt fire spread, and treatment *prescriptions* must be designed to significantly modify fire behavior within the treated area. The Decision directs strategic placement of area treatments, ranging in size from 50 to over 1,000 acres (generally averaging between 100 to 300 acres), across landscapes to interrupt fire spread and thereby reduce the size and severity of wildfires.

Outside the HFQLG Pilot Project Area, 50 percent of initial fuels treatments will be located in the WUI. This percentage applies at the bioregional scale until all treatments in the WUI have been completed.

Direction for locating area treatments is included in the standards and guidelines in Part D of this appendix. Treatment patterns are to be developed using a collaborative, multi-stakeholder approach. Resource considerations factored into the strategic placement of fuels treatments include objectives for locating treatments to overlap areas of condition class 2 and 3, high density stands, and pockets of insect and disease. Treatment areas are located to avoid PACs to the greatest extent possible.

Site-specific fuels treatment prescriptions are designed to modify fire intensity and spread in treated areas. Managers consider topographic position; slope steepness; predominant wind direction; and the amount and arrangement of surface, ladder, and crown fuels in developing fuels treatment prescriptions for each treatment area. Fuels treatments are intended to reduce surface, ladder, and crown fuels. Crown fuels are modified to reduce the potential for spread of crown fire.

Fuels objectives have first priority in developing treatment area prescriptions. However, prescriptions for treatment areas may also address identified needs for increasing stand resistance to mortality from insects and disease. Thinning densely stocked stands may be used to reduce competition and improve tree vigor thereby reducing levels of insect- and disease-caused mortality.

Revenues from the sale of commercial forest products may be obtained from some fuels treatments. This increases the likelihood of accomplishing the projected acres of treatment, an essential first step in achieving the desired reductions in acres burned. Where consistent with desired conditions, area treatments are designed to be economically efficient and meet multiple objectives.

Lightning-caused fires may be used to reduce fuel loads or to provide other resource benefits, such as conserving populations of fire-dependent species. Before wildland fires can be used, national forest managers must prepare a fire management plan that describes how prescribed fires and naturally caused wildland fires will achieve resource management objectives.

Lower Westside Hardwood Ecosystems

For purposes of this decision, vegetation communities dominated by California black oak, canyon live oak (tree form), Pacific madrone, or tanoak, are collectively referred to as montane hardwood forests. Ecosystems dominated by blue oak, valley oak, interior live oak (tree form), or Oregon white oak are referred to as blue oak woodlands. Collectively, these are referred to as hardwood ecosystems.

Goals for lower westside hardwood forest ecosystems include establishing and maintaining:

- a diversity of structural and seral conditions in landscapes in proportions that are ecologically sustainable at the watershed scale;
- sufficient regeneration and recruitment of young hardwood trees over time to replace mortality of older trees; and
- sufficient quality and quantity of hardwood ecosystems to provide important habitat elements for wildlife and native plant species.

This Decision relies on a set of forest-wide standards and guidelines for managing lower Westside hardwood forest ecosystems in concert with the above goals.

Noxious Weed Management

Goals for noxious weed management are to manage weeds using an integrated weed management approach according to the priority set forth in FSM 2081.2:

- **Priority 1.** Prevent the introduction of new invaders.
- **Priority 2.** Conduct early treatment of new infestations.
- **Priority 3.** Contain and control established infestations.

Provisions for implementing these goals are embodied in the noxious weeds management standards and guidelines of this Decision.

B. Land Allocations and Desired Conditions

The Decision relies on a network of land allocations and has an associated set of desired conditions, management intents, and management objectives. These three elements provide direction to land managers for designing and developing fuels and vegetation management projects. In designing the strategic layout of treatments, managers ensure that treatment area patterns and prescriptions are consistent with desired conditions, management intents, and management objectives for the relevant land allocations. This part describes how the different land allocations are designated and the desired conditions for each allocation. Relevant management intents and objectives for land allocations are described in Part C.

Desired condition is a statement describing a common vision for a specific land area. These statements are made in the present tense indicating a condition that managment will be designed to maintain or move toward in each land allocation. Statements of desired condition take into account the natural range of variability typical for the Sierra Nevada landscape, the uncertainty of natural disturbances, effects of past management, unique features or opportunities that the Sierra Nevada national forests can contribute, and human desires and uses of the land.

Wilderness Areas and Wild and Scenic Rivers

Designation

Wilderness Areas and Wild and Scenic River Areas exist as designated by Congress. (See the Modified Alternative 8 map for the FEIS.)

Desired Condition

Wilderness is a unique and vital resource. It is an area where the earth and its community of life are untrammeled by humans, where humanity itself is a visitor who does not remain. It retains its primeval character and influence, without permanent improvements or human habitation. Natural conditions are protected and preserved. Consistent with the National Fire Plan’s goal for restoring fire-adapted ecosystems, fire is restored as a natural process through wildland fire use. The area generally appears to have been affected primarily by the forces of nature, with the imprint of humanity’s work substantially

unnoticeable. It offers outstanding opportunities for solitude, or a primitive and unconfined type of recreation. Human influence does not impede or interfere with natural succession in the ecosystems.

The outstandingly remarkable values for which wild and scenic rivers have been established, are candidates for designation, or are under study, are protected and preserved for the benefit and enjoyment of present and future generations. Free-flowing conditions of wild and scenic rivers, candidate or study rivers, are preserved. Human influence may be evident, but does not interfere with, or impede the natural succession of river ecosystems.

California Spotted Owl Protected Activity Centers (PACs)

Designation

California spotted owl protected activity centers (PACs) are delineated surrounding each territorial owl activity center detected on National Forest System lands since 1986. Owl activity centers are designated for all territorial owls based on: (1) the most recent documented nest site, (2) the most recent known roost site when a nest location remains unknown, and (3) a central point based on repeated daytime detections when neither nest or roost locations are known.

PACs are delineated to: (1) include known and suspected nest stands and (2) encompass the best available 300 acres of habitat in as compact a unit as possible. The best available habitat is selected for California spotted owl PACs to include: (1) two or more tree canopy layers; (2) trees in the dominant and co-dominant crown classes averaging 24 inches dbh or greater; (3) at least 70 percent tree canopy cover (including hardwoods); and (4) in descending order of priority, CWHR classes 6, 5D, 5M, 4D, and 4M and other stands with at least 50 percent canopy cover (including hardwoods). Aerial photography interpretation and field verification are used as needed to delineate PACs.

As additional nest location and habitat data become available, boundaries of PACs are reviewed and adjusted as necessary to better include known and suspected nest stands and encompass the best available 300 acres of habitat.

When activities are planned adjacent to non-national forest lands, available databases are checked for the presence of nearby California spotted owl activity centers on non-national forest lands. A 300-acre circular area, centered on the activity center, is delineated. Any part of the circular 300-acre area that lies on national forest lands is designated and managed as a California spotted owl PAC.

PACs are maintained regardless of California spotted owl occupancy status. However, after a stand-replacing event, evaluate habitat conditions within a 1.5-mile radius around the activity center to identify opportunities for re-mapping the PAC. If there is insufficient suitable habitat for designating a PAC within the 1.5-mile radius, the PAC may be removed from the network.

Desired Conditions

Stands in each PAC have: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

Northern Goshawk Protected Activity Centers (PACs)

Designation

Northern goshawk protected activity centers (PACs) are delineated surrounding all known and newly discovered breeding territories detected on National Forest System lands. Northern goshawk PACs are designated based upon the latest documented nest site and location(s) of alternate nests. If the actual nest site is not located, the PAC is designated based on the location of territorial adult birds or recently fledged juvenile goshawks during the fledgling dependency period.

PACs are delineated to: (1) include known and suspected nest stands and (2) encompass the best available 200 acres of forested habitat in the largest contiguous patches possible, based on aerial photography. Where suitable nesting habitat occurs in small patches, PACs are defined as multiple blocks in the largest best available patches within 0.5 miles of one another. Best available forested stands for PACs have the following characteristics: (1) trees in the dominant and co-dominant crown classes average 24 inches dbh or greater; (2) in westside conifer and eastside mixed conifer forest types, stands have at least 70 percent tree canopy cover; and (3) in eastside pine forest types, stands have at least 60 percent tree canopy cover. Non-forest vegetation (such as brush and meadows) should not be counted as part of the 200 acres.

As additional nest location and habitat data become available, PAC boundaries are reviewed and adjusted as necessary to better include known and suspected nest stands and to encompass the best available 200 acres of forested habitat.

When activities are planned adjacent to non-national forest lands, available databases are checked for the presence of nearby northern goshawk activity centers on non-national forest lands. A 200-acre circular area, centered on the activity center, is delineated. Any part of the circular 200-acre area that lies on national forest lands is designated and managed as a northern goshawk PAC.

PACs are maintained regardless of northern goshawk occupancy status. PACs may be removed from the network after a stand-replacing event if the habitat has been rendered unsuitable as a northern goshawk PAC and there are no opportunities for re-mapping the PAC in proximity to the affected PAC.

Desired Conditions

Stands in each PAC have: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

Great Gray Owl Protected Activity Centers (PACs)

Designation

Protected activity centers (PACs) are established and maintained to include the forested area and adjacent meadow around all known great gray owl nest stands. The PAC encompasses at least 50 acres of the highest quality nesting habitat (CWHR types 6, 5D, and 5M) available in the forested area surrounding the nest. The PAC also includes the meadow or meadow complex that supports the prey base for nesting owls.

Desired Conditions

Meadow vegetation in great gray owl PACs supports a sufficiently large meadow vole population to provide a food source for great gray owls through the reproductive period.

Forest Carnivore Den Site Buffers

Designation

Fisher den sites are 700-acre buffers consisting of the highest quality habitat (CWHR size class 4 or greater and canopy cover greater than 60 percent) in a compact arrangement surrounding verified fisher birthing and kit rearing dens in the largest, most contiguous blocks available.

Marten den sites are 100-acre buffers consisting of the highest quality habitat in a compact arrangement surrounding the den site. CWHR types 6, 5D, 5M, 4D, and 4M in descending order of priority, based on availability, provide highest quality habitat for the marten.

Desired Conditions

Areas surrounding fisher den sites include 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.

Areas surrounding marten den sites have (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.

California Spotted Owl Home Range Core Areas (HRCAs)

Designation

A home range core area is established surrounding each territorial spotted owl activity center detected after 1986. The core area amounts to 20 percent of the area described by the sum of the average breeding pair home range plus one standard error. Home range core area sizes are as follows: 2,400 acres on the Hat Creek and Eagle Lake Ranger Districts of the Lassen National Forest, 1,000 acres on the Modoc, Inyo, Humboldt-Toiyabe, Plumas, Tahoe, Eldorado, Lake Tahoe Basin Management Unit and Stanislaus National Forests and on the Almanor Ranger District of Lassen National Forest, and 600 acres of the Sequoia and Sierra National Forests.

Aerial photography is used to delineate the core area. Acreage for the entire core area is identified on national forest lands. Core areas encompass the best available California spotted owl habitat in the closest proximity to the owl activity center. The best available contiguous habitat is selected to incorporate, in descending order of priority, CWHR classes 6, 5D, 5M, 4D and 4M and other stands with at least 50 percent tree canopy cover (including hardwoods). The acreage in the 300-acre PAC counts toward the total home range core area. Core areas are delineated within 1.5 miles of the activity center.

When activities are planned adjacent to non-national forest lands, circular core areas are delineated around California spotted owl activity centers on non-national forest lands. Using the best available habitat as described above, any part of the circular core area that lies on national forest lands is designated and managed as a California spotted owl home range core area.

Desired Conditions

HRCAs consist of large habitat blocks that have: (1) at least two tree canopy layers; (2) at least 24 inches dbh in dominant and co-dominant trees; (3) a number of very large (greater than 45 inches dbh) old trees; (4) at least 50 to 70 percent canopy cover; and (5) higher than average levels of snags and down woody material.

Wildland Urban Intermix: Defense Zones

Designation

The wildland urban intermix zone (WUI) is an area where human habitation is mixed with areas of flammable wildland vegetation. It extends out from the edge of developed private land into Federal, private, and State jurisdictions. The WUI is comprised of two zones: the defense zone and the threat zone.

The WUI defense zone is the buffer in closest proximity to communities, areas with higher densities of residences, commercial buildings, and/or administrative sites with facilities. Defense zones generally extend roughly ¼ mile out from these areas; however, actual defense zone boundaries are determined at the project level following national, regional and forest policy. In particular, the Healthy Forest Restoration Act of 2003 identifies areas to be included in the WUI. Local fire management specialists determine the extent, treatment orientation, and prescriptions for the WUI based on historical fire spread and intensity, historical weather patterns, topography, access. Defense zones should be of sufficient extent that fuel treatments within them will reduce wildland fire spread and intensity sufficiently for suppression forces to succeed in protecting human life and property.

Desired Conditions

- Stands in defense zones are fairly open and dominated primarily by larger, fire tolerant trees.
- Surface and ladder fuel conditions are such that crown fire ignition is highly unlikely.
- The openness and discontinuity of crown fuels, both horizontally and vertically, result in very low probability of sustained crown fire.

Wildland Urban Intermix Threat Zones

Designation

The WUI threat zone typically buffers the defense zone; however, a threat zone may be delineated in the absence of a defense zone under certain conditions, including situations where the structure density and location do not provide a reasonable opportunity for direct suppression on public land, but suppression on the private land would be enhanced by fire behavior modification on the adjacent public land.

Threat zone boundaries are determined at the project level following national, regional and forest policy. Threat zones generally extend approximately 1¼ miles out from the defense zone boundary; however, actual extents of threat zones are based on fire history, local fuel conditions, weather, topography, existing and proposed fuel treatments, and natural barriers to fire. Fuels treatments in these zones are designed to reduce wildfire spread and intensity. Strategic landscape features, such as roads, changes in fuels types, and topography may be used in delineating the physical boundary of the threat zone.

Desired Conditions

Under high fire weather conditions, wildland fire behavior in treated areas within the threat zone is characterized as follows: (1) flame lengths at the head of the fire are less than 4 feet; (2) the rate of spread at the head of the fire is reduced to at least 50 percent of pre-treatment levels; (3) hazards to firefighters are reduced by managing snag levels in locations likely to be used for control of prescribed fire and fire suppression consistent with safe practices guidelines; (4) production rates for fire line construction are doubled from pre-treatment levels; and (5) tree density has been reduced to a level consistent with the site's ability to sustain forest health during drought conditions.

Southern Sierra Fisher Conservation Area

Designation

The southern Sierra fisher conservation area encompasses the known occupied range of the Pacific fisher in the Sierra Nevada. The southern Sierra fisher conservation area is shown on the Modified Alternative 8 map included in the FEIS. This Decision allows for minor adjustments to correct the boundaries of the southern Sierra fisher conservation area.

Desired Conditions

Within known or estimated female fisher home ranges outside the WUI, a minimum of 50 percent of the forested area has at least 60 percent canopy cover. Where home range information is lacking, use HUC 6 watershed as the analysis area for this desired condition.

Old Forest Emphasis Areas

Designation

Old forest emphasis areas are shown on the Modified Alternative 8 map included in the FEIS. This Decision allows for minor adjustments to correct the boundaries of old forest emphasis areas.

Desired Conditions

Forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape-scale (roughly 10,000 acres).

Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species.

Where possible, areas treated to reduce fuel levels also provide for the successful establishment of early seral stage vegetation.

General Forest

Designation

The general forest is a mapped land allocation shown on the Modified Alternative 8 map included in the FEIS. This Decision includes allows for minor adjustments to correct the boundaries of the general forest allocation.

Desired Conditions

Desired conditions for the general forest allocation are identical to those described above for old forest emphasis areas.

Riparian Conservation Areas

Designation

Riparian conservation area (RCA) widths are described below. RCA widths shown below may be adjusted at the project level if a landscape analysis has been completed and a site-specific RCO analysis demonstrates a need for different widths.

Perennial Streams: 300 feet on each side of the stream, measured from the bank full edge of the stream

Seasonally Flowing Streams (includes intermittent and ephemeral streams): 150 feet on each side of the stream, measured from the bank full edge of the stream

Streams in Inner Gorge[1]: top of inner gorge

Special Aquatic Features[2] or Perennial Streams with Riparian Conditions extending more than 150 feet from edge of streambank or Seasonally Flowing streams with riparian conditions extending more than 50 feet from edge of streambank: 300 feet from edge of feature or riparian vegetation, whichever width is greater

Other hydrological or topographic depressions without a defined channel: RCA width and protection measures determined through project level analysis.

Desired Conditions

Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act; it is fishable, swimmable, and suitable for drinking after normal treatment.

Habitat supports viable populations of native and desired non-native plant, invertebrate, and vertebrate riparian and aquatic-dependent species. New introductions of invasive species are prevented. Where invasive species are adversely affecting the viability of native species, the appropriate State and Federal wildlife agencies have reduced impacts to native populations.

[1] Inner gorge is defined by stream adjacent slopes greater than 70 percent gradient
[2] Special Aquatic Features include: lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs

Species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows provide desired habitat conditions and ecological functions.

The distribution and health of biotic communities in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes) perpetuates their unique functions and biological diversity.

Spatial and temporal connectivity for riparian and aquatic-dependent species within and between watersheds provides physically, chemically and biologically unobstructed movement for their survival, migration and reproduction.

The connections of floodplains, channels, and water tables distribute flood flows and sustain diverse habitats.

Soils with favorable infiltration characteristics and diverse vegetative cover absorb and filter precipitation and sustain favorable conditions of stream flows.

In-stream flows are sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.

The physical structure and condition of stream banks and shorelines minimizes erosion and sustains desired habitat diversity.

The ecological status of meadow vegetation is late seral (50 percent or more of the relative cover of the herbaceous layer is late seral with high similarity to the potential natural community). A diversity of age classes of hardwood shrubs is present and regeneration is occurring.

Meadows are hydrologically functional. Sites of accelerated erosion, such as gullies and headcuts are stabilized or recovering. Vegetation roots occur throughout the available soil profile. Meadows with perennial and intermittent streams have the following characteristics: (1) stream energy from high flows is dissipated, reducing erosion and improving water quality, (2) streams filter sediment and capture bedload, aiding floodplain development, (3) meadow conditions enhance floodwater retention and groundwater recharge, and (4) root masses stabilize stream banks against cutting action.

Critical Aquatic Refuges

Designation

Critical aquatic refuges (CARs) are subwatersheds, generally ranging between 10,000 to 40,000 acres, with some as small 500 acres and some as large as 100,000 acres, that contain either:

- known locations of threatened, endangered, or sensitive species,
- highly vulnerable populations of native plant or animal species, or
- localized populations of rare native aquatic- or riparian-dependent plant or animal species.

Critical aquatic refuges are shown on maps in Volume 4, Appendix I of the SNFPA FEIS (January 2001), beginning on page I-53. The boundaries of CARs may be refined during landscape analysis based on the findings from conservation assessments or verification of the presence and condition of habitat for threatened, endangered, and sensitive species. Additional CARs may be added by individual national forests.

Desired Conditions

Critical aquatic refuges provide habitat for native fish, amphibian and aquatic invertebrate populations. Remnant plant and animal populations in aquatic communities are maintained and restored.

Streams in meadows, lower elevation grasslands, and hardwood ecosystems have vegetation and channel bank conditions that approach historic potential.

Water quality meets State stream standards.

C. Management Intents and Objectives

Each land allocation has a set of desired conditions, management intents, and vegetation and fuels management objectives. These three elements provide direction for designing and developing fuels and vegetation management projects that are consistent with the Decision's goals and strategies for the active management of fire and fuels, old forest ecosystems, and California spotted owl habitat.

Table 1 displays desired conditions, management intents, and management objectives for fuels and vegetation management activities within each land allocation.

Table 1. Desired Conditions, Management Intent, and Management Objectives by Land Allocation.

Land Allocation	Desired Conditions	Management Intent	Management Objectives
California spotted owl and northern goshawk PACs	At least two tree canopy layers are present. Dominant and co-dominant trees average at least 24 inches dbh. Area within PAC has at least 60 to 70 percent canopy cover. Some very large snags are present (greater than 45 inches dbh). Levels of snags and down woody material are higher than average.	Maintain PACs so that they continue to provide habitat conditions that support successful reproduction of California spotted owls and northern goshawks.	Avoid vegetation and fuels management activities within PACs to the greatest extent feasible. Reduce hazardous fuels in PACs in defense zones when they create an unacceptable fire threat to communities. Where PACs cannot be avoided in the strategic placement of treatments, ensure effective treatment of surface, ladder, and crown fuels within treated areas. If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acreage wherever possible. Add adjacent acres of comparable quality wherever possible.
WUI *Defense Zones*	Stands are fairly open and dominated primarily by larger, fire tolerant trees. Surface and ladder fuel conditions are such that crown fire ignition is highly unlikely. The openness and discontinuity of crown fuels, both horizontally and vertically, result in very low probability of sustained crown fire.	Protect communities from wildfire and prevent the loss of life and property. WUI defense zones have highest priority for treatment (along with threat zones). The highest density and intensity of treatments are located within the WUI.	Create defensible space near communities, and provide a safe and effective area for supressing fire. Design economically efficient treatments to reduce hazardous fuels.

Land Allocation	Desired Conditions	Management Intent	Management Objectives
HRCAs	Within home ranges, HRCAs consist of large habitat blocks having: ▪ at least two tree canopy layers. ▪ at least 24 inches dbh in dominant and co-dominant trees. ▪ a number of very large (>45 inches dbh) old trees. ▪ at least 50-70% canopy cover. ▪ higher than average levels of snags and down woody material.	Treat fuels using a landscape approach for strategically placing area treatments to modify fire behavior. Retain existing suitable habitat, recognizing that habitat within treated areas may be modified to meet fuels objectives. Accelerate development of currently unsuitable habitat (in non-habitat inclusions, such as plantations) into suitable condition. Arrange treatment patterns and design treatment prescriptions to avoid the highest quality habitat (CWHR types 5M, 5D, and 6) wherever possible	Establish and maintain a pattern of fuels treatments that is effective in modifying wildfire behavior. Design treatments in HRCAs to be economically efficent and to promote forest health where consistent with habitat objectives.
WUI *Threat Zones*	Under high fire weather conditions, wildland fire behavior in treated areas is characterized as follows: ▪ Flame lengths at the head of the fire are less than 4 feet. ▪ The rate of spread at the head of the fire is reduced to at least 50% of pre-treatment levels. ▪ Hazards to firefighters are reduced by managing snag levels in locations likely to be used for control in prescribed fire and fire suppression, consistent with safe practices guidelines. ▪ Production rates for fire line construction are doubled from pre-treatment levels.	Threat zones are priority area for fuels treatments. ▪ Fuels treatments in the threat zone provide a buffer between developed areas and wildlands. ▪ Fuels treatments protect human communities from wildland fires as well as minimize the spread of fires that might originate in urban areas. ▪ The highest density and intensity of treatments are located within the WUI.	Establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior. Design economically efficient treatments to reduce hazardous fuels.

Land Allocation	Desired Conditions	Management Intent	Management Objectives
Southern Sierra Fisher Conservation Area	Within known or estimated female fisher home ranges outside the WUI, a minimum of 50 percent of the forested area has greater than or equal to 60 percent canopy cover. Where home range information is lacking, use HUC 6 watershed as the analysis area for this desired condition.	Maintain high quality fisher habitat in the SSFCA to support successful reintroduction of fisher and a source population for recolonization of unoccupied, suitable habitat throughout the Sierra Nevada. Retain existing suitable habitat to the extent possible (CWHR 4D, 5D and 6), recognizing that habitat within treated areas may be modified to meet fuels objectives. Provide for heterogenous landscapes that may allow torching and small stand-replacing fire events but will be resilient and retain large tree elements to provide for future habitat and seed trees.	When high quality fisher habitat in defense zones is treated, ensure effective treatment of surface, ladder, and crown fuels to create defensible space around communities. Within treated areas outside the defense zone, use irregular or clumpy treatments to maintain well dispersed or potential den sites. Moderate effects of fuels treatments on fisher wherever possible. Consider lighter treatments with a higher return interval to retain important habitat elements (e.g. retention of higher volume of down logs or shrub components) followed by treatments at 5 year intervals to reduce surface fuels as needed to achieve desired fuel conditions. Where high quality fisher habitat cannot be avoided during the strategic placement of treatments, consider scheduling the pace of treatments to spread impacts over a longer period of time.

Land Allocation	Desired Conditions	Management Intent	Management Objectives
Old Forest Emphasis Areas	Forest structure and function generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist within 10,000 acre landscapes. Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Where possible, areas treated for fuels also provide for the successful establishment of early seral stage vegetation.	Maintain or develop old forest habitat in: ▪ areas containing the best remaining large blocks or landscape concentrations of old forest and/or ▪ areas that provide old forest functions (such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species). Establish and maintain a pattern of area treatments that is effective in: ▪ modifying fire behavior. ▪ culturing stand structure and composition to generally resemble pre-settlement conditions. ▪ reducing susceptibility to insect/pathogen drought-related tree mortality. Focus management activities on the short-term goal of reducing the adverse effects of wildfire. Acknowledge the need for a longer-term strategy to restore both the structure and processes of these ecosystems.	Establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior. Maintain and/or establish appropriate species composition and size classes. Reduce the risk of insect/pathogen drought-related mortality by managing stand density levels. Design economically efficient treatments to reduce hazardous fuels.
General Forest	Same as above	Actively manage general forest areas to maintain, and enhance a variety of vegetative conditions. Strategically place fuels treatments to modify wildfire behavior. Reduce hazardous fuels in key areas to lessen the threat of high severity fire.	Establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior. Reduce the risk of insect/pathogen drought-related mortality by managing stand density levels. Design economically efficient treatments to reduce hazardous fuels.

D. Management Standards and Guidelines

Management direction for carrying out this Decision includes standards and guidelines for project design and implementation. Note that some standards and guidelines apply to specific land allocations while others apply forest-wide (across all land allocations). The vegetation and fuels treatment standards and guidelines are intended to (1) act as sideboards for local managers as they design projects to meet fuels and vegetation management objectives and respond to site-specific conditions, and (2) retain important components of habitat that are believed to be important to species associated with old forests, including large trees, structural diversity and complexity, and moderate to high canopy cover. At the project level, these standards and guidelines are used in conjunction with desired conditions, management intents, and management objectives for the relevant land allocation to determine appropriate treatment prescriptions.

Forest-wide Standards and Guidelines

Standards and guidelines described in this section apply to all land allocations (other than wilderness areas and wild and scenic river areas) unless stated otherwise.

Fire and Fuels Management

1. Strategically place area fuels treatments across the landscape to interrupt fire spread and achieve conditions that: (1) reduce the size and severity of wildfire and (2) result in stand densities necessary for healthy forests during drought conditions. Complete a landscape-level design of area treatment patterns prior to project-level analysis. Develop treatment patterns using a collaborative, multi-stakeholder approach. Determine the size, location, and orientation of area fuels treatments at a landscape-scale, using information about fire history, existing vegetation and fuels condition, prevailing wind direction, topography, suppression resources, attack times, and accessibility to design an effective treatment pattern. The spatial pattern of the treatments is designed to reduce rate of fire spread and fire intensity at the head of the fire.

   Strategic placement of fuels treatments should also consider objectives for locating treatment areas to overlap with areas of condition class 2 and 3, high density stands, and pockets of insect and disease. Avoid PACs to the greatest extent possible when locating area treatments. Incorporate areas that already contribute to wildfire behavior modification, including timber sales, burned areas, bodies of water, and barren ground, into the landscape treatment area pattern. Identify gaps in the landscape pattern where fire could spread at some undesired rate or direction and use treatments (including maintenance treatments and new fuels treatments) to fill identified gaps.

2. Vegetation within treatment areas should be modified to meet desired surface ladder, and crown fuel conditions as well as stand densities necessary for healthy forests during drought conditions. Site specific prescriptions should be designed to reduce fire intensity, rate of fire spread, crown fire potential, mortality in dominant and co-dominant trees, and tree density. Managers should consider such variables as the topographic location of the treatment area, slope steepness, predominant wind direction, and the amount and arrangement of surface, ladder, and crown fuels in developing fuels treatment prescriptions.

3. Where young plantations (generally Pacific Southwest Region size classes 0x, 1x, 2x) are included within area treatments, apply the necessary silvicultural and fuels reduction treatments to: (1) accelerate the development of key habitat and old forest characteristics, (2) increase stand heterogeneity, (3) promote hardwoods, and (4) reduce risk of loss to wildland fire. In size class 2x

plantations, treatments should be designed to reduce fire intensity, rate of fire spread and tree mortality. Design a sequence of fuel reduction projects to achieve the standards below.

Plantations (0x-2x):

- 3 inches and smaller surface fuel load: less than 5 tons per acre,
- less than 0.5 foot fuel bed depth,
- stocking levels that provide well-spaced tree crowns (for example, approximately 200 trees per acre in 4 inch dbh trees),
- less than 50 percent surface area with live fuels (brush), and
- tree mortality less than 50 percent of the existing stocking under 90th percentile fire weather conditions (2x type only)

4. Design mechanical treatments in brush and shrub patches to remove the material necessary to achieve the following outcomes from wildland fire under 90th percentile fire weather conditions: (1) wildland fires would burn with an average flame length of 4 feet or less and (2) fire line production rates would be doubled. Treatments should be effective for more than 5 to 10 years.
5. Design a sequence of fuel reduction treatments in conifer forest types (including 3x plantation types) to achieve the following standards within the treatment area:
   - an average of 4-foot flame length under 90th percentile fire weather conditions.
   - surface and ladder fuels removed as needed to meet design criteria of less than 20 percent mortality in dominant and co-dominant trees under 90th percentile weather and fire behavior conditions.
   - tree crowns thinned to meet design criteria of less than 20 percent probability of initiation of crown fire under 90th percentile weather conditions.

Mechanical Thinning Treatments

6. For all mechanical thinning treatments, design projects to retain all live conifers 30 inches dbh or larger. Exceptions are allowed to meet needs for equipment operability.
7. For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) **outside WUI defense zones:**
   - Design projects to retain at least 40 percent of the existing basal area. The retained basal area should generally be comprised of the largest trees.
   - Where available, design projects to retain 5 percent or more of the total treatment area in lower layers composed of trees 6 to 24 inches dbh within the treatment unit.
   - Design projects to avoid reducing pre-existing canopy cover by more than 30 percent within the treatment unit. Percent is measured in absolute terms (for example, canopy cover at 80 percent should not be reduced below 50 percent.)
   - Within treatment units, at a minimum, the intent is to provide for an effective fuels treatment. Where existing vegetative conditions are at or near 40 percent canopy cover, projects are to be designed remove the material necessary to meet fire and fuels objectives.
   - **Within California spotted owl Home Range Core Areas:** Where existing vegetative conditions permit, design projects to retain at least 50 percent canopy cover averaged within the treatment unit. Exceptions are allowed in limited situations where additional trees must be

removed to adequately reduce ladder fuels, provide sufficient spacing for equipment operations, or minimize re-entry. Where 50 percent canopy cover retention cannot be met for reasons described above, retain at least 40 percent canopy cover averaged within the treatment unit.

- **Outside of California spotted owl Home Range Core Areas:** Where existing vegetative conditions permit, design projects to retain at least 50 percent canopy cover within the treatment unit. Exceptions are allowed where project objectives require additional canopy modification (such as the need to adequately reduce ladder fuels, provide for safe and efficient equipment operations, minimize re-entry, design cost efficient treatments, and/or significantly reduce stand density.) Where canopy cover must be reduced below 50 percent, retain at least 40 percent canopy cover averaged within the treatment unit.
- **Within California spotted owl PACs**, where treatment is necessary, remove only material needed to meet project fuels objectives. Focus on removal of surface and ladder fuels.

The standards in the bulleted list above *do not apply* to the eastside pine type.

8. For mechanical thinning treatments **outside defense zones in the eastside pine type:** in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6), design projects to retain 30 percent of the existing basal area. The retained basal area should be generally comprised of the largest trees. Projects in the eastside pine type have no canopy cover retention standards and guidelines.
9. Standards and guidelines # 6, 7, and 8 above apply only to mechanical thinning harvests specifically designed to meet objectives for treating fuels and/or controlling stand densities.

Snags and Down Woody Material

10. Determine down woody material retention levels on an individual project basis, based on desired conditions. Emphasize retention of wood in the largest size classes and in decay classes 1, 2, and 3. Consider the effects of follow-up prescribed fire in achieving desired down woody material retention levels.
11. Determine snag retention levels on an individual project basis for vegetation treatments. Design projects to implement and sustain a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife across a landscape. Retain some mid- and large diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure. When determining snag retention levels and locations, consider land allocation, desired condition, landscape position, potential prescribed burning and fire suppression line locations, and site conditions (such as riparian areas and ridge tops), avoiding uniformity across large areas.

General guidelines for large-snag retention are as follows:

- **westside mixed conifer and ponderosa pine types** - four of the largest snags per acre
- **red fir forest typ**e - six of the largest snags per acre
- **eastside pine and eastside mixed conifer forest types** - three of the largest snags per acre
- **westside hardwood ecosystems** - four of the largest snags (hardwood or conifer) per acre
    - **where standing live hardwood trees lack dead branches** - six of the largest snags per acre (where they exist to supplement wildlife needs for dead material).

Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI. When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.

Tree Species Composition

12. Promote shade intolerant pines (sugar and Ponderosa) and hardwoods.

Salvage

13. Determine the need for ecosystem restoration projects following large, catastrophic disturbance events (wildfire, drought, insect and disease infestation, windstorm, and other unforeseen events). Objectives for restoration projects may include limiting fuel loads over the long term, restoring habitat, and recovering economic value from dead and dying trees. In accomplishing restoration goals, long-term objectives are balanced with the objective of reducing hazardous fuel loads in the short-term.

    Salvage harvest of dead and dying trees may be conducted to recover the economic value of this material and to support objectives for reducing hazardous fuels, improving forest health, re-introducing fire, and/or re-establishing forested conditions.

    - Design projects to reduce potential soil erosion and the loss of soil productivity caused by loss of vegetation and ground cover. Examples are activities that would: (1) provide for adequate soil cover in the short term; (2) accelerate the dispersal of coarse woody debris; (3) reduce the potential impacts of the fire on water quality; and (4) carefully plan restoration/salvage activities to minimize additional short-term effects.
    - Design projects to protect and maintain critical wildlife habitat. Examples are activities that would: (1) avoid areas where forest vegetation is still largely intact; (2) provide for sufficient quantities of large snags; (3) maintain existing large woody material as needed; (4) provide for additional large woody material and ground cover as needed; (5) accelerate development of mature forest habitat through reforestation and other cultural means; and (6) provide for a mix of seral stages over time.
    - Design projects to manage the development of fuel profiles over time. Examples are activities that would: (1) remove sufficient standing and activity generated material to balance short-term and long-term surface fuel loading; and (2) protect remnant old forest structure (surviving large trees, snags, and large logs) from high severity re-burns or other severe disturbance events in the future.
    - Design projects to recover the value of timber killed or severely injured by the disturbance. Examples are activities that would: (1) conduct timber salvage harvest in a timely manner to minimize value loss; (2) minimize harvest costs within site-specific resource constraints; and (3) remove material that local managers determine is not needed for long-term resource recovery needs.

14. In post fire restoration projects for large catastrophic fires (contiguous blocks of moderate to high fire lethality of 1,000 acres or more), generally do not conduct salvage harvest in at least 10 percent of the total area affected by fire.

15. Use the best available information for identifying dead and dying trees for salvage purposes as developed by the Pacific Southwest Region Forest Health Protection Staff.

16. Outside of WUI defense zones, salvage harvests are prohibited in PACs and known den sites unless a biological evaluation determines that the areas proposed for harvest are rendered unsuitable for the purpose they were intended by a catastrophic stand-replacing event.
17. Consider ecological benefits of retaining small patches of mortality in old forest emphasis areas.

Hardwood Management

18. Where possible, create openings around existing California black oak and canyon live oak to stimulate natural regeneration.
19. Manage hardwood ecosystems for a diversity of hardwood tree size classes within a stand such that seedlings, saplings, and pole-sized trees are sufficiently abundant to replace large trees that die.
20. Retain the mix of mast-producing species where they exist within a stand.
21. Retain all blue oak and valley oak trees except: (1) stand restoration strategies call for tree removal; (2) trees are lost to fire; or (3) where tree removal is needed for public health and safety.
22. When planning prescribed fire or mechanical treatments in hardwood ecosystems: (1) consider the risk of noxious weed spread and (2) minimize impacts to hardwood ecosystem structure and biodiversity.
23. During mechanical vegetation treatments, prescribed fire, and salvage operations, retain all large hardwoods on the westside except where: (1) large trees pose an immediate threat to human life or property or (2) losses of large trees are incurred due to prescribed or wildland fire. Large montane hardwoods are trees with a dbh of 12 inches or greater. Large blue oak woodland hardwoods are trees with a dbh of 8 inches or greater. Allow removal of larger hardwood trees (up to 20 inches dbh) if research supports the need to remove larger trees to maintain and enhance the hardwood stand.
24. Prior to commercial and noncommercial hardwood and fuelwood removal in hardwood ecosystems, pre-mark or pre-cut hardwood trees to ensure that stand goals are met. Retain a diverse distribution of stand cover classes.
25. During or prior to landscape analysis, spatially determine distributions of existing and potential natural hardwood ecosystems (Forest Service Handbook (FSH) 2090.11). Assume pre-1850 disturbance levels for potential natural community distribution. Work with province ecologists or other qualified personnel to map and/or model hardwood ecosystems at a landscape scale (approximately 30,000 to 50,000 acres). Include the following steps in the analysis: (1) compare distributions of potential natural hardwood ecosystems with existing hardwood ecosystems; (2) identify locations where existing hardwood ecosystems are outside the natural range of variability for potential natural hardwood ecosystem distribution; and (3) identify hardwood restoration and enhancement projects.
26. Include hardwoods in stand examinations. Encourage hardwoods in plantations. Promote hardwoods after stand-replacing events. Retain buffers around existing hardwood trees by not planting conifers within 20 feet of the edge of hardwood tree crowns.

Habitat Connectivity for Old Forest Associated Species

27. Minimize old forest habitat fragmentation. Assess potential impacts of fragmentation on old forest associated species (particularly fisher and marten) in biological evaluations.

28. Assess the potential impact of projects on the connectivity of habitat for old forest associated species.
29. Consider retaining forested linkages (with canopy cover greater than 40 percent) that are interconnected via riparian areas and ridgetop saddles during project-level analysis.
30. If fishers are detected outside the southern Sierra fisher conservation area, evaluate habitat conditions and implement appropriate mitigation measures to retain suitable habitat within the estimated home range. Institute project-level surveys over the appropriate area, as determined by an interdisciplinary team.
31. Identify areas for acquisition, exchange, or conservation easements to enhance connectivity of habitat for old forest associated species.

Wolverine and Sierra Nevada Red Fox Detections

32. Detection of a wolverine or Sierra Nevada red fox will be validated by a forest carnivore specialist. When verified sightings occur, conduct an analysis to determine if activities within 5 miles of the detection have a potential to affect the species. If necessary, apply a limited operating period from January 1 to June 30 to avoid adverse impacts to potential breeding. Evaluate activities for a 2-year period for detections not associated with a den site.

California Spotted Owl Surveys

33. Conduct surveys in compliance with the Pacific Southwest Region's survey protocols during the planning process when proposed vegetation treatments are likely to reduce habitat quality in suitable California spotted owl habitat with unknown occupancy. Designate California spotted owl protected activity centers (PACs) where appropriate based on survey results.

Northern Goshawk Surveys

34. Conduct surveys in compliance with the Pacific Southwest Region's survey protocols during the planning process when vegetation treatments are likely to reduce habitat quality are proposed in suitable northern goshawk nesting habitat that is not within an existing California spotted owl or northern goshawk PAC. Suitable northern goshawk nesting habitat is defined based on the survey protocol.

Great Gray Owl Surveys

35. Conduct additional surveys to established protocols to follow up reliable sightings of great gray owls.

Noxious Weeds Management

36. Inform forest users, local agencies, special use permittees, groups, and organizations in communities near national forests about noxious weed prevention and management.
37. Work cooperatively with California and Nevada State agencies and individual counties (for example, Cooperative Weed Management Areas) to: (1) prevent the introduction and establishment of noxious weed infestations and (2) control existing infestations.

38. As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.
39. When recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both Forest Service and contracted) used for project implementation to be weed free. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
40. Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
41. Conduct follow-up inspections of ground disturbing activities to ensure adherence to the Regional Noxious Weed Management Strategy.
42. Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees, and local, State, and Federal agencies.
43. Include weed prevention measures, as necessary, when amending or re-issuing permits (including, but not limited to, livestock grazing, special uses, and pack stock operator permits).
44. Include weed prevention measures and weed control treatments in mining plans of operation and reclamation plans. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy. Monitor for weeds, as appropriate, for 2 years after project implementation (assuming no weed introductions have occurred).
45. Conduct a risk analysis for weed spread associated with burned area emergency rehabilitation (BAER) treatments. The BAER team is responsible for conducting this analysis. Monitor and treat weed infestations for 3 years after the fire.
46. Consult with American Indians to determine priority areas for weed prevention and control where traditional gathering areas are threatened by weed infestations.
47. Complete noxious weed inventories, based on regional protocol. Review and update these inventories on an annual basis.
48. As outlined in the Regional Noxious Weed Management Strategy, when new, small weed infestations are detected, emphasize eradication of these infestations while providing for the safety of field personnel.
49. Routinely monitor noxious weed control projects to determine success and to evaluate the need for follow-up treatments or different control methods. Monitor known weed infestations, as appropriate, to determine changes in weed population density and rate of spread.

Grazing

50. To protect hardwood regeneration in grazing allotments, allow livestock browse on no more than 20 percent of annual growth of hardwood seedlings and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met.

51. Grazing utilization in annual grasslands will maintain a minimum of 60 percent cover. Where grasslands are in satisfactory condition and annual precipitation is greater than 10 inches, manage for 700 pounds residual dry matter (RDM) per acre. Where grasslands are in satisfactory condition and annual precipitation is less than 10 inches, manage for 400 pounds RDM per acre. Where grasslands are in unsatisfactory condition and annual precipitation is greater than 10 inches, manage for 1,000 pounds RDM per acre; manage for 700 pounds RDM per acre where grasslands are in unsatisfactory condition and precipitation is less than 10 inches. Adjust these standards, as needed, based on grassland condition. This standard and guideline only applies to grazing utilization.
52. Where professional judgment and quantifiable measurements find that current practices are maintaining range in good to excellent condition, the grazing utilization standards above may be modified to allow for the Forest Service, in partnership with individual permittees, to rigorously test and evaluate alternative standards.

Yosemite Toad

53. Exclude livestock from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as “essential habitat” in the conservation assessment for the Yosemite toad during the breeding and rearing season (through metamorphosis). Wet meadow habitat for Yosemite toads is defined as relatively open meadows with low to moderate amounts of woody vegetation that have standing water on June 1 or for more than 2 weeks following snow melt. Specific breeding and rearing season dates will be determined locally. If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow. This standard does not apply to pack and saddle stock.
54. Exclusions in standard and guideline #53 above may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to the Yosemite toad and its habitat by managing the movement of stock around wet areas. Such plans are to include a requirement for systematically monitoring a sample of occupied Yosemite toad sites within the meadow to: (1) assess habitat conditions and (2) assess Yosemite toad occupancy and population dynamics. Every 3 years from the date of the plan, evaluate monitoring data. Modify or suspend grazing if Yosemite toad conservation is not being accomplished. Plans must be approved by the authorized officer and incorporated into all allotment plans and/or special use permits governing use within the occupied habitat.
55. Complete one survey cycle in suitable habitat for the Yosemite toad within this species’ historic range to determine presence of Yosemite toads.

Willow Flycatcher

The following definitions are needed to apply the standards and guidelines for willow flycatcher conservation. See Appendix D of the Final SEIS for a complete listing of existing willow flycatcher sites.

Definitions of Willow Flycatcher Site Occupancy

Occupied Willow Flycatcher Site: a site where willow flycatcher(s) have been observed sometime during the breeding season since 1982. For a site to be designated as an occupied site, it must meet the following criteria:

- Observation date(s) between 1982 and 2000:
    1. Willow flycatcher observed between 15 June and 1 August;

OR

2. Willow flycatcher observed between June 1 - June 14 or August 2 –August 15, unless the willow flycatcher was:
    - Absent during surveys conducted between June 15 and July 15 in the same year
    - Absent during June 15 –July 15 surveys in multiple subsequent years; or
    - Detected at a site that is clearly outside of known habitat requirements.

- For inclusion as an occupied willow flycatcher site, willow flycatcher(s) must be identified by the *Fitz-bew* song or in-hand examination. Museum skins that are identified as willow flycatchers may also be used if the collection date falls within the range of dates listed above.
- Nests and egg sets in museum collections infer site occupancy, regardless of collection month and day.
- All sites where willow flycatchers were identified using these criteria are included in the dataset, unless the site is known to have undergone an extreme site conversion rendering it incapable of supporting willow flycatchers currently and in the future (e.g., wetland conversions or inundation by reservoir).

- Observation date(s) in 2001 or later:
    - Willow flycatcher site occupancy will be determined based upon the criteria defined in the standardized protocol.

Historically Occupied Willow Flycatcher Site: a site where occupancy is only known from pre-1982 or one that has been surveyed for at least six years over a 10-year period and consistently found to contain no willow flycatchers during the breeding season. For a site to be designated as historically occupied, it must meet the following criteria:

- Sighting meets the criteria of an occupied willow flycatcher site but the most recent date of detection is prior to 1982

  OR
- Surveys across a minimum of six separate years during a 10-year period must have been performed (alternatively, surveys may be conducted annually for six years within a six- to 10-year period).
    - Surveys conducted since June 2000 must be in compliance with the current standardized willow flycatcher survey protocol guidelines.
    - If a historically occupied site is determined as occupied, the site is upgraded to occupied status until or unless the site meets the definition of historically occupied again.

Conditionally Occupied Willow Flycatcher Site: a site documented in the willow flycatcher database at the time of the Record of Decision that does not meet the criteria for an occupied site or a historically occupied site. For these sites, either the month and date of detection are not known or the month and date occur outside of the breeding season as defined in the survey protocol.

There are five sites in the existing database where survey documentation necessary to determine if the observation meets the criteria for an occupied site is missing or incomplete. These sites are assigned to a temporary category of conditionally occupied until either they receive one survey cycle or the missing information is discovered and documented, at which time they will either be found to be occupied or they will be dropped from the database. Once these sites are resolved, this category is no longer used.

Standards and Guidelines

56. **For occupied and historically occupied willow flycatcher sites:** Initiate a 4-year cycle for willow flycatcher surveys. Conduct surveys to established protocols in all sites the first year. Second year surveys will be conducted in those sites where willow flycatchers were not found. Surveys will not be conducted in the third and fourth years. The survey cycle will then be repeated. **For conditionally occupied sites:** Surveys will be conducted in the first year. If willow flycatchers are found, these sites will be managed as occupied sites. If not found, these sites will be surveyed in the second year. If birds are not found in the second year, these sites will be dropped from the willow flycatcher site database.

57. In meadows with **occupied willow flycatcher sites**, allow only late-season grazing (after August 15) in the entire meadow.

58. Standard and guideline #57 above may be waived if an interdisciplinary team has developed a site-specific meadow management strategy. This strategy is to be developed and implemented in partnership with the affected grazing permittee. The strategy objectives must focus on protecting the nest site and associated habitat during the breeding season and the long-term sustainability of suitable habitat at breeding sites. It may use a mix of management tools, including grazing systems, structural improvements, and other exclusion by management techniques to protect willow flycatcher habitat.

59. In willow flycatcher sites receiving late-season grazing, monitor utilization annually using regional range analysis and planning guide. Monitor willow flycatcher habitat every 3 years using the following criteria: rooting depth cores for meadow condition, point intercepts for shrub foliar density, and strip transects for shrub recruitment and cover. Meadow condition assessments will be included in a GIS meadow coverage. If habitat conditions are not supporting the willow flycatcher or trend downward, modify or suspend grazing.

60. For **historically occupied willow flycatcher sites**, assess willow flycatcher habitat suitability within the meadow. If habitat is degraded, develop restoration objectives and take appropriate actions (such as physical restoration of hydrological components, limiting or re-directing grazing activity, and so forth) to move the meadow toward desired conditions.

61. Evaluate site condition of **historically occupied willow flycatcher sites**. Those sites that no longer contain standing water on June 1 and a deciduous shrub component and cannot be reasonably restored may be removed from the willow flycatcher site database.

62. As part of the project planning process, survey **emphasis habitat** within 5 miles of occupied willow flycatcher sites to determine willow flycatcher occupancy. Emphasis habitat is defined as meadows larger than 15 acres that have standing water on June 1 and a deciduous shrub component. Use established protocols to conduct these surveys. If these surveys determine willow flycatcher occupancy, add these to the database of occupied willow flycatcher sites and include them in the 4-year survey cycle of willow flycatcher sites described above.

63. Evaluate proposals for new concentrated stock areas (for example, livestock handling and management facilities, pack stations, equestrian stations, and corrals) located within 5 miles of occupied willow flycatcher sites.

Mining

64. Ensure that plans of operation, reclamation plans, and reclamation bonds address the costs of: (1) removing facilities, equipment, and materials; (2) isolating and neutralizing or removing toxic or

potentially toxic materials; (3) salvaging and replacing topsoil; and (4) preparing the seed bed and revegetating to meet the objectives of the land allocation in which the operation is located.

65. Ensure that mine owners and operators limit new road construction, decommission unnecessary roads, and maintain needed roads consistent with Forest Service roads policy and management direction for the land allocation.

66. Require mine reclamation to be conducted in a timely manner.

67. Inspect and monitor mining-related activities on a regular basis to ensure compliance with laws, regulations, and operating plans. Base the frequency of inspections and monitoring on the potential severity of mining activity-related impacts.

68. During mining-related activities, limit the clearing of trees and other vegetation to the minimum necessary. Clearing of vegetation should be pertinent to the approved phase of mineral exploration and development.

Wheeled Vehicles

69. Prohibit wheeled vehicle travel off of designated routes, trails, and limited off highway vehicle (OHV) use areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by over-snow vehicles would continue.

Road Construction, Reconstruction, and Relocation

70. To protect watershed resources, meet the following standards for road construction, road reconstruction, and road relocation: (1) design new stream crossings and replacement stream crossings for at least the 100-year flood, including bedload and debris; (2) design stream crossings to minimize the diversion of streamflow out of the channel and down the road in the event of a crossing failure; (3) design stream crossings to minimize disruption of natural hydrologic flow paths, including minimizing diversion of streamflow and interception of surface and subsurface water; (4) avoid wetlands or minimize effects to natural flow patterns in wetlands; and (5) avoid road construction in meadows.

Standards and Guidelines for California Spotted Owl and Northern Goshawk Protected Activity Centers

71. Within the assessment area or watershed, locate fuels treatments to minimize impacts to PACs. PACs may be re-mapped during project planning to avoid intersections with treatment areas, provided that the re-mapped PACs contain habitat of equal quality and include known nest sites and important roost sites. Document PAC adjustments in biological evaluations.

    When treatment areas must intersect PACs and choices can be made about which PACs to enter, use the following criteria to preferentially avoid PACs that have the highest likely contribution to owl productivity.

    - **lowest contribution to productivity:** PACs presently unoccupied and historically occupied by territorial singles only.
    - PACs presently unoccupied and historically occupied by pairs,
    - PACs presently occupied by territorial singles,

- PACs presently occupied by pairs,
- **highest contribution to productivity:** PACs currently or historically reproductive.

Historical occupancy is considered occupancy since 1990. Current occupancy is based on surveys consistent with survey protocol (March 1992) in the last 2-3 years prior to project planning. These dates were chosen to encompass the majority of survey efforts and to include breeding pulses in the early 1990s when many sites were found to be productive. When designing treatment unit intersections with PACs, limit treatment acres to those necessary to achieve strategic placement objectives and avoid treatments adjacent to nest stands whenever possible.

If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible.

72. Mechanical treatments may be conducted to meet fuels objectives in protected activity centers (PACs) located in WUI defense zones. In PACs located in WUI threat zones, mechanical treatments are allowed where prescribed fire is not feasible and where avoiding PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Mechanical treatments should be designed to maintain habitat structure and function of the PAC.

73. While mechanical treatments may be conducted in protected activity centers (PACs) located in WUI defense zones and, in some cases, threat zones, they are prohibited within a 500-foot radius buffer around a spotted owl activity center within the designated PAC. Prescribed burning is allowed within the 500-foot radius buffer. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), may be conducted prior to burning as needed to protect important elements of owl habitat. Treatments in the remainder of the PAC use the forest-wide standards and guidelines for mechanical thinning.

74. In PACs located outside the WUI, limit stand-altering activities to reducing surface and ladder fuels through prescribed fire treatments. In forested stands with overstory trees 11 inches dbh and greater, design prescribed fire treatments to have an average flame length of 4 feet or less. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), may be conducted prior to burning as needed to protect important elements of owl habitat.

75. **For California spotted owl PACs:** Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the activity center during the breeding season (March 1 through August 31), unless surveys confirm that California spotted owls are not nesting. Prior to implementing activities within or adjacent to a California spotted owl PAC and the location of the nest site or activity center is uncertain, conduct surveys to establish or confirm the location of the nest or activity center.

76. **For northern goshawk PACs:** Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the nest site during the breeding season (February 15 through September 15) unless surveys confirm that northern goshawks are not nesting. If the nest stand within a protected activity center (PAC) is unknown, either apply the LOP to a ¼- mile area surrounding the PAC, or survey to determine the nest stand location.

77. The LOP may be waived for vegetation treatments of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be modified.

78. Breeding season limited operating period restrictions may be waived, where necessary, to allow for use of early season prescribed fire in up to 5 percent of **California spotted owl PACs** per year on a forest.

79. Breeding season limited operating period restrictions may be waived, where necessary, to allow for use of early season prescribed fire in up to 5 percent of **northern goshawk PACs** per year on a forest.

80. **For California spotted owl PACs:** Conduct vegetation treatments in no more than 5 percent per year and 10 percent per decade of the acres in California spotted owl PACs in the 11 Sierra Nevada national forests. Monitor the number of PACs treated at a bioregional scale.

81. **For northern goshawk PACs:** Conduct mechanical treatments in no more than 5 percent per year and 10 percent per decade of the acres in northern goshawk PACs in the 11 Sierra Nevada national forests.

82. Mitigate impacts where there is documented evidence of disturbance to the nest site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites.

Standards and Guidelines for Great Gray Owl

Protected Activity Centers

83. Apply a limited operating period, prohibiting vegetation treatments and road construction within ¼ mile of an active great gray owl nest stand, during the nesting period (typically March 1 to August 15). The LOP may be waived for vegetation treatments of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be reduced.

84. In meadow areas of great gray owl PACs, maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species. Follow regional guidance to determine potential prey species and associated habitat requirements at the project level.

Standards and Guidelines for Fisher Den Sites

85. Protect fisher den site buffers from disturbance with a limited operating period (LOP) from March 1 through June 30 for vegetation treatments as long as habitat remains suitable or until another Regionally-approved management strategy is implemented. The LOP may be waived for individual projects of limited scope and duration, when a biological evaluation documents that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing, and specific location.

86. Avoid fuel treatments in fisher den site buffers to the extent possible. If areas within den site buffers must be treated to achieve fuels objectives for the urban wildland intermix zone, limit treatments to mechanical clearing of fuels. Treat ladder and surface fuels to achieve fuels objectives. Use piling or mastication to treat surface fuels during initial treatment. Burning of piled debris is allowed. Prescribed fire may be used to treat fuels if no other reasonable alternative exists.

87. Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites.

Standards and Guidelines for Marten Den Sites

88. Protect marten den site buffers from disturbance from vegetation treatments with a limited operating period (LOP) from May 1 through July 31 as long as habitat remains suitable or until another Regionally-approved management strategy is implemented. The LOP may be waived for individual projects of limited scope and duration, when a biological evaluation documents that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing, and specific location.
89. Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites.

Standards and Guidelines for the Southern Sierra Fisher Conservation Area

90. Prior to vegetation treatments, design measures to protect important habitat structures as identified by the wildlife biologist, such as large diameter snags and oaks, patches of dense large trees typically ¼ to 2 acres, large trees with cavities for nesting, clumps of small understory trees, and coarse woody material. For example, use firing patterns, place fire lines around snags and large logs, and implement other prescribed burning techniques to minimize effects to these attributes.

    Use mechanical treatments when appropriate to minimize effects on preferred fisher habitat elements.

Standards and Guidelines for Riparian Conservation Areas and Critical Aquatic Refuges

91. Designate riparian conservation area (RCA) widths as described in Part B of this appendix. The RCA widths displayed in Part B may be adjusted at the project level if a landscape analysis has been completed and a site-specific RCO analysis demonstrates a need for different widths.
92. Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species.
93. Identify existing uses and activities in CARs and RCAs during landscape analysis. At the time of permit reissuance, evaluate and consider actions needed for consistency with RCOs.
94. As part of project-level analysis, conduct peer reviews for projects that propose ground-disturbing activities in more than 25 percent of the RCA or more than 15 percent of a CAR.

Standards and Guidelines Associated with RCO #1

95. For waters designated as "Water Quality Limited" (Clean Water Act Section 303(d)), participate in the development of Total Maximum Daily Loads (TMDLs) and TMDL Implementation Plans. Execute applicable elements of completed TMDL Implementation Plans.

96. Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages.

97. Limit pesticide applications to cases where project level analysis indicates that pesticide applications are consistent with riparian conservation objectives.

98. Within 500 feet of known occupied sites for the California red-legged frog, Cascades frog, Yosemite toad, foothill yellow-legged frog, mountain yellow-legged frog, and northern leopard frog, design pesticide applications to avoid adverse effects to individuals and their habitats.

99. Prohibit storage of fuels and other toxic materials within RCAs and CARs except at designated administrative sites and sites covered by a Special Use Authorization. Prohibit refueling within RCAs and CARs unless there are no other alternatives. Ensure that spill plans are reviewed and up-to-date.

Standards and Guidelines Associated with RCO #2

100. Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity.

101. Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.

102. Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.

103. Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites, sites authorized under Special Use Permits and designated off-highway vehicle routes.

104. In stream reaches occupied by, or identified as "essential habitat" in the conservation assessment for, the Lahonton and Paiute cutthroat trout and the Little Kern golden trout, limit streambank disturbance from livestock to 10 percent of the occupied or "essential habitat" stream reach. (Conservation assessments are described in the record of decision.) Cooperate with State and Federal agencies to develop streambank disturbance standards for threatened, endangered, and sensitive species. Use the regional streambank assessment protocol. Implement corrective action where disturbance limits have been exceeded.

105. At either the landscape or project-scale, determine if the age class, structural diversity, composition, and cover of riparian vegetation are within the range of natural variability for the vegetative community. If conditions are outside the range of natural variability, consider implementing mitigation and/or restoration actions that will result in an upward trend. Actions could include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem.

106. Cooperate with Federal, Tribal, State and local governments to secure in stream flows needed to maintain, recover, and restore riparian resources, channel conditions, and aquatic habitat. Maintain in stream flows to protect aquatic systems to which species are uniquely adapted. Minimize the effects of stream diversions or other flow modifications from hydroelectric projects on threatened, endangered, and sensitive species.

107. For exempt hydroelectric facilities on national forest lands, ensure that special use permit language provides adequate in stream flow requirements to maintain, restore, or recover favorable ecological conditions for local riparian- and aquatic-dependent species.

Standard and Guideline Associated with RCO #3

108. Determine if the level of coarse large woody debris (CWD) is within the range of natural variability in terms of frequency and distribution and is sufficient to sustain stream channel physical complexity and stability. Ensure proposed management activities move conditions toward the range of natural variability.

Standards and Guidelines Associated with RCO #4

109. Within CARs, in occupied habitat or “essential habitat” as identified in conservation assessments for threatened, endangered, or sensitive species, evaluate the appropriate role, timing, and extent of prescribed fire. Avoid direct lighting within riparian vegetation; prescribed fires may back into riparian vegetation areas. Develop mitigation measures to avoid impacts to these species whenever ground-disturbing equipment is used.

110. Use screening devices for water drafting pumps. (Fire suppression activities are exempt during initial attack.) Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats.

111. Design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs. In burn plans for project areas that include, or are adjacent to RCAs, identify mitigation measures to minimize the spread of fire into riparian vegetation. In determining which mitigation measures to adopt, weigh the potential harm of mitigation measures, for example fire lines, against the risks and benefits of prescribed fire entering riparian vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could be damaging to habitat or long-term function of the riparian community.

112. Post-wildfire management activities in RCAs and CARs should emphasize enhancing native vegetation cover, stabilizing channels by non-structural means, minimizing adverse effects from the existing road network, and carrying out activities identified in landscape analyses. Post-wildfire operations shall minimize the exposure of bare soil.

113. Allow hazard tree removal within RCAs or CARs. Allow mechanical ground disturbing fuels treatments, salvage harvest, or commercial fuelwood cutting within RCAs or CARs when the activity is consistent with RCOs. Utilize low ground pressure equipment, helicopters, over the

snow logging, or other non-ground disturbing actions to operate off of existing roads when needed to achieve RCOs. Ensure that existing roads, landings, and skid trails meet Best Management Practices. Minimize the construction of new skid trails or roads for access into RCAs for fuel treatments, salvage harvest, commercial fuelwood cutting, or hazard tree removal.

114. As appropriate, assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and mountain yellow-legged frogs, and northern leopard frog.

115. During fire suppression activities, consider impacts to aquatic- and riparian-dependent resources. Where possible, locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of RCAs or CARs. During pre-suppression planning, determine guidelines for suppression activities, including avoidance of potential adverse effects to aquatic- and riparian-dependent species as a goal.

116. Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions.

Standards and Guidelines Associated with RCO #5

117. Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) “Process for Assessing PFC” TR 1737-9 (1993), “PFC for Lotic Areas” USDI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” USDI TR 1737-11 (1994).

118. Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. 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. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (*Spagnum spp*.), (2) mosses belonging to the genus *Meessia*, and (3) sundew (*Drosera spp*.) Complete initial plant inventories of bogs and fens within active grazing allotments prior to re-issuing permits.

119. Locate new facilities for gathering livestock and pack stock outside of meadows and riparian conservation areas. During project-level planning, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities located in riparian conservation areas with riparian conservation objectives.

120. Under season-long grazing:

- For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height).
- For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).

  Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in

regional range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database.

Under intensive grazing systems (such as rest-rotation and deferred rotation) where meadows are receiving a period of rest, utilization levels can be higher than the levels described above if the meadow is maintained in late seral status and meadow-associated species are not being impacted. Degraded meadows (such as those in early seral status with greater than 10 percent of the meadow area in bare soil and active erosion) require total rest from grazing until they have recovered and have moved to mid- or late seral status.

121. Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.

Standard and Guideline Associated with RCO #6

122. Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables, or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing, and timber harvests, that may be contributing to the observed degradation.

Standards and Guidelines for Critical Aquatic Refuges

123. Determine which critical aquatic refuges or areas within critical aquatic refuges are suitable for mineral withdrawal. Propose these areas for withdrawal from location and entry under U.S. mining laws, subject to valid existing rights, for a term of 20 years.

124. Approve mining-related plans of operation if measures are implemented that contribute toward the attainment or maintenance of aquatic management strategy goals.

E. Management Direction for the Herger-Feinstein Quincy Library Group Pilot Project Area

The Lassen and Plumas National Forests and the Sierraville Ranger District of the Tahoe National Forest will implement the HFQLG Forest Recovery Act Pilot Project, consistent with the HFQLG Forest Recovery Act and Alternative 2 of the HFQLG EIS.

The HFQLG Forest Recovery Act pilot project is designed to test and demonstrate the effectiveness of certain fuels and vegetation management activities in meeting ecologic, economic, and fuel reduction objectives. Fuels and vegetation management activities include constructing a strategic system of defensible fuels profile zones (DFPZs), group selection, and individual tree selection. A management program for riparian areas is also included in the pilot project.

This Decision includes the following direction for the HFQLG Forest Recovery Act Pilot Project activities[3], and non-pilot project activities, where specifically noted:

- Apply land allocations to the Lassen and Plumas National forests, and the Sierraville Ranger District of the Tahoe National Forest, which are described in the HFQLG Forest Recovery Act ROD and FEIS, with the exception that the land allocation for goshawk territories and marten and fisher habitat management areas do not apply. Apply the standards and guidelines displayed in Table 2 below to the applicable land allocations. The direction in Table 2 applies when a conflict arises between existing forest plan standards and guidelines and the management direction in Table 2.
- Apply the standards and guidelines detailed in this appendix for management of goshawk PACs and forest carnivore den sites. Standards and guidelines for management of goshawk PACs apply with the caveat that DFPZs may be constructed within goshawk PACs, subject to the following limitations. In goshawk PACs, prohibit mechanical treatments within a 500-foot radius buffer around nest trees. Allow prescribed burning within the 500-foot radius buffer. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), as needed to protect important elements of goshawk habitat. The remaining area of the PAC may be mechanically treated to achieve the fuels reduction strategy for the DFPZ. Conduct mechanical treatments in no more than 5 percent per year and 10 percent per decade of the total acres in goshawk PACs within the 11 Sierra Nevada national forests.
- Implement the resource management activities mandated by the HFQLG Forest Recovery Act.
- Apply SAT Guidelines, as set forth in the HFQLG EIS and ROD to vegetation management actions that are proposed for fuels reduction, timber management, area thinning, prescribed fire and salvage harvest within the Pilot Project Area for the life of the pilot project. Continue the long-term strategy for anadromous fish-producing watersheds for the Lassen National Forest, as set forth in Appendix I of the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement.

For forest management activities on the Lassen and Plumas National Forests and the Sierraville Ranger District of the Tahoe National Forest that are not part of the HFQLG Pilot Project or addressed in Table 1, follow the land allocations and standards and guidelines set forth in Parts B and C of this appendix, as for other regions of the Sierra Nevada.

Standards and guidelines for fuels and vegetation management for the pilot project are shown in Table 2. This table includes direction for designing and implementing fuels and vegetation management activities within the various land allocations of the HFQLG Pilot Project Area for the life of the pilot project. After completion of the pilot project, vegetation and fuels management activities on the Plumas and Lassen National Forests and the Sierraville Ranger District of the Tahoe National Forest will be guided by the direction described for the other Sierra Nevada national forests. The future forest plan amendment or revisions required by the HFQLG Act may, however, eventually modify this direction.

[3] "HFQLG Forest Recovery Act Pilot Project activities" are those activities set forth in the HFQLG Forest Recovery Act and Alternative 2 of the HFQLG EIS, such as DFPZ construction, group selection, individual tree selection, and riparian restoration.

Table 2. Standards and guidelines applicable to the HFQLG Pilot Project Area for the life of the pilot project.

HFQLG Land Allocation	Standards and Guidelines
Offbase and deferred areas	The following HFQLG resource management activities are prohibited: DFPZ construction, group selection, individual tree selection, all road building, all timber harvesting activities, and any riparian management that involves road construction or timber harvesting.
Late successional old growth (LSOG) rank 4 and 5	Group selection and individual tree selection are not allowed in LSOG 4 and 5 stands. DFPZ construction is allowed in LSOG 4 and 5 stands. Design DFPZs to avoid old forest stands (CWHR classes 5M, 5D, 6) within this allocation.
California spotted owl PACs	The following resource management activities - DFPZs, group selection, individual tree selection, and riparian restoration projects and other timber harvesting - are not allowed within spotted owl PACs.
California spotted owl habitat areas (SOHAs)	The following resource management activities - DFPZs, group selection, individual tree selection, and riparian restoration projects and other timber harvesting - are not allowed within spotted owl SOHAs.
National forest lands outside of the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act	**DFPZs**
	Eastside pine types and all other CWHR 4M and 4D classes: ▪ Design projects to retain at least 30% of existing basal area, generally comprised of the largest trees. ▪ Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable. ▪ For CHWR 4M and 4D classes that are not eastside pine types, retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6 - 24-inches dbh. ▪ No other canopy cover requirements apply.
	CWHR 5M, 5D, and 6 classes except those referenced above: ▪ Design projects to retain a minimum of 40% canopy cover. ▪ Design projects to avoid reducing pre-treatment canopy cover by more than 30%. ▪ Design projects to retain at least 40% of existing basal area, generally comprised of the largest trees. ▪ Design projects to retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6-24 inches dbh. ▪ Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	All other CWHR class stands: ▪ Retain all live trees ≥30 inches dbh, except to allow for operations. Minimize operations impacts to ≥30-inch trees as much as practicable.
National forest lands outside of the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act	**Group selection**
	Design projects to retain all live trees ≥30 inches dbh, except allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.
	Area thinning (individual tree selection)
	All eastside pine types: ▪ Design projects to retain at least 30% of existing basal area, generally comprised of the largest trees ▪ Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable. ▪ Canopy cover change is not restricted.

HFQLG Land Allocation	Standards and Guidelines
	CWHR classes 4D, 4M, 5D, 5M and 6 (except eastside pine type): ▪ Where vegetative conditions permit, design projects to retain ≥50% canopy cover after treatment averaged within the treatment unit, except where site-specific project objectives cannot be met. Where 50 percent canopy cover retention cannot be met as described above, design projects to retain a minimum of 40% canopy cover averaged within the treatment unit. ▪ Design projects to avoid reducing canopy cover by more than 30% from pre-treatment levels. ▪ Design projects to retain at least 40% of the existing basal area, generally comprised of the largest trees. ▪ Design projects to retain, where available, 5% of total post-treatment canopy cover in lower layers comprised of trees 6-24 inches dbh. ▪ Design projects to retain all live trees ≥30 inches dbh; exceptions allowed for operability. Minimize impacts to ≥30-inch trees as much as practicable.

HFQLG Land Allocation	Standards and Guidelines
National forest lands outside of the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act	**Down wood and snags**
	▪ Determine retention levels of down woody material on an individual project basis. Within westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre. Within eastside vegetation types, generally retain an average of three large down logs per acre. Emphasize retention of wood that is in the earliest stages of decay. Consider the effects of follow-up prescribed fire in achieving desired retention levels of down wood. ▪ Determine snag retention levels on an individual project basis. Design projects to sustain across a landscape a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife. Retain some mid and large diameter live trees that are currently in decline, have substantial wood defect, or have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure. When determining snag retention levels, consider land allocation, desired condition, landscape position, and site conditions (such as riparian areas and ridge tops), avoiding uniform distribution across large areas. During project-level planning, consider the following guidelines for large-snag retention: ▪ In westside mixed conifer and ponderosa pine types, four of the largest snags per acre. ▪ In the red fir forest type, six of the largest snags per acre. ▪ In eastside pine and eastside mixed conifer forest types, three of the largest snags per acre. ▪ In westside hardwood ecosystems, four of the largest snags per acre (hardwood or conifer). ▪ Where standing live hardwood trees lack dead branches, six of the largest snags per acre to supplement wildlife needs for dead material. ▪ Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the WUI and DFPZs. While some snags will be lost due to hazard removal or use of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.
	Spotted owl surveys
	▪ Prior to undertaking vegetation treatments in spotted owl habitat having unknown occupancy, conduct surveys in compliance with the Pacific Southwest Region survey direction and protocols, and designate PACs where appropriate according to survey results.

F. Monitoring Plan

This Decision adopts the Monitoring Plan presented in Appendix E of the SNFPA FEIS. See Chapter 2 of the Final SEIS for the focus of and priorities for monitoring under the selected alternative (Alternative S2).

Appendix B: Glossary

This glossary replaces both the Glossary in the FEIS and the January 2001 SNFPA ROD in their entirety.

canopy cover: Also referred to as canopy closure. The ground area covered by tree crowns. Canopy cover is expressed as a percent of the area. Values for percent canopy cover can be derived in many ways.

ground disturbing activities: Activities that result in detrimental soil compaction or loss of organic matter beyond the thresholds identified by soil quality standards.

hand treatments: Hand treatments can include the use of chainsaws or other hand operated mechanical tools.

limited operating period: A specified period of time during which identified activities are restricted or prohibited.

mechanical treatments: Examples of mechanical treatments include: pre-commercial thinning, biomass thinning, commercial thinning, salvage harvesting, group selection, piling, crushing, and mastication.

prescribed burning treatments: Includes all of the steps necessary to prepare and implement a prescribed burn. Examples include line construction, ignition, and mop-up of prescribed burns.

vegetation treatments: Includes both mechanical treatments and prescribed burning treatments.

Attachment 3.5, Willow Creek Landscape Analysis

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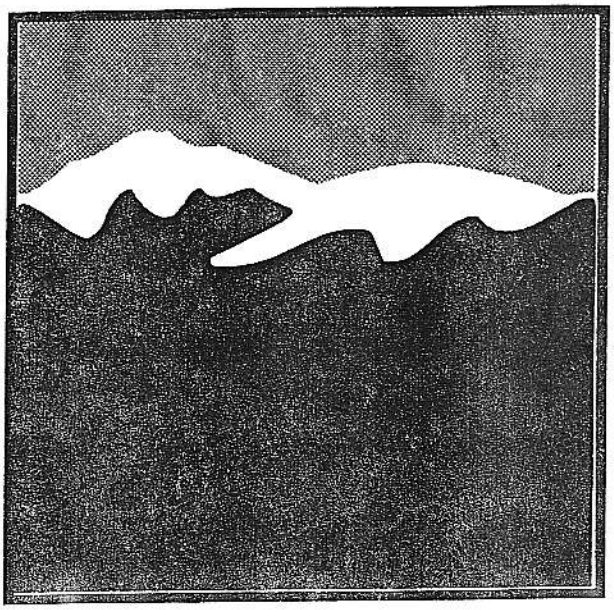
Chris Note

Willow Creek Landscape Analysis



Sierra National Forest

Mariposa and Minarets

Ranger Districts

June 1995

An Ecosystem Analysis

APPENDIX K

FUELS SITUATION AND TABLES

Ecological Unit 2: Ponderosa Pine

Additional Fire/Fuels, Vegetative Mosaic, and Wildlife Habitat Data for Desired Condition

Fire/Fuels Indicators

Indicator	Existing	Reference Variability	Desired
Fuel Loading (tons/acre)	40	5-10	10
Flame Length (feet)	6	0-3	3
Rate of Spread (chains/hr)	9	0-3	3

Desired Fuel Profile (3-PP-3)

Size Class (DBH)	Height	Crown Height	AverageHeight	# Trees/Acre	% cover
1"-24"	6'-140'	60'	100'	116	40%
24"+	140'+	62'	120'	36	30%
TOTAL				152	70%

Vertical Diversity References (FSSC 4)

Size Class (DBH)	# of Trees/Acre	Height Class	% cover
0-1"	30-300	Bare 0-1' 1'-6'	0-10 10-70 10-90
1"-10"	60-325	6'-40'	10-60
10"-24"	30-60	40'-140'	20-45
24"+	7-60	140'+	15-100
TOTAL	127 to unsustainable		10-100% canopy closure

Ecological Unit 3: Mixed Conifer

Additional Fire/Fuels, Vegetative Mosaic, and Wildlife Habitat Data for Desired Condition

Fire/Fuels Indicators

Indicator	Existing	Reference Variability	Desired
Fuel Loading (tons/acre)	50	11-21	21
Flame Length (feet)	4	0-3	3
Rate of Spread (chains/hr) Open Grasses Overstory Brush	 46 3 13	 0-23 0-2 0-7	 23 2 7

Desired Fuel Profile (1-MC-4)

Size Class (DBH)	Height	Crown Height	# Trees/Acre	% Cover
1"-10"	6'-70'	34'	120'	50
10"-24'	70'-130'	28'	80'	20
24"+	130'+	28'	25'	20
TOTAL			177	90

Vertical Diversity References (FSSC 4)

Size Class (DBH)	# of Trees/Acre	Height Class	% cover
0-1"	50-400	Bare 0-1' 1'-6'	0-10 10-50 20-80
1"-10"	100-300	6'-70'	20-80
10"-24"	60-90	70'-130'	20-40
24"+	10-90	130'+	10-100
TOTAL	220 to unsustainable		10-100% canopy closure

Ecological Unit 4: Front Country - Bluffs

Additional Fire/Fuels, Vegetative Mosaic, and Wildlife Habitat Data for Desired Condition

Fire/Fuels Indicators - Open Grassy Areas (LTA's 3, 4, & 6)

Indicator	Existing	Reference Variability	Desired
Fuel Loading (tons/acre)	0	0-0.25	0.25
Flame Length (feet)	0	0-3	3
Rate of Spread (chains/hr)	0	0-23	23
Percent of Area	0-5	35	35

Fire/Fuels Indicators - Ponderosa Pine Area (LTA's 4 & 6)

Indicator	Existing	Reference Variability	Desired
Fuel Loading (tons/acre)	30	0-20	20
Flame Length (feet)	6	0-5	5
Rate of Spread (chains/hr)	9	0-7	7
Percent of Area	0-5	35	35

Fire/Fuels Indicators - Brush and Oaks Area (LTA 3)

Indicator	Existing	Reference Variability	Desired
Fuel Loading (tons/acre)	90	0-20	20
Flame Length (feet)	7	0-5	5
Rate of Spread (chains/hr)	13	0-7	7
Percent of Area	95	35	35

These figures are based upon no slope, 4 mile per hour midflame wind and 4 percent fuel moisture. Rates of spread and flame lengths would dramatically increase as slopes and winds increase and fuel moistures drop below 4 percent.

Ecological Unit 5: Front Country - Private Intermix

Additional Fire/Fuels, Vegetative Mosaic, and Wildlife Habitat Data for Desired Condition

Fire/Fuels Indicators

Indicator	Existing	Reference Variability	Desired
Fuel Loading (tons/acre) Size Class 9"-20" Size Class >20"	40 22 3	6-15 0 0	50 0 0
Flame Length (feet)	7	0-5	5
Rate of Spread (chains/hr) Open Grasses Overstory Brush	46 3 13	0-23 0-2 0-7	23 2 7

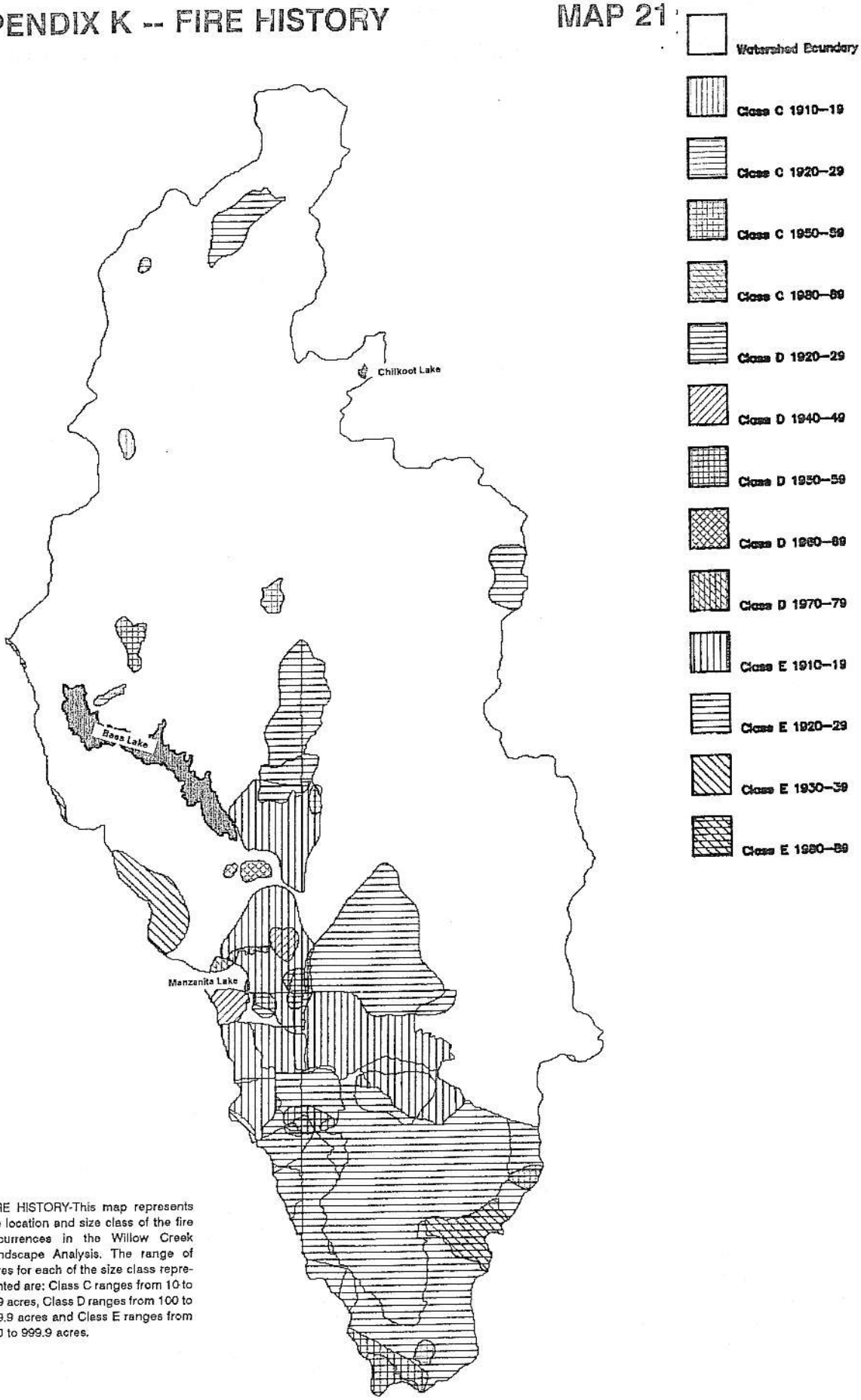
Brush exists in 2 to 5 acre patches.

Vertical Diversity References (FSSC 4)

Size Class (DBH)	# of Trees/Acre	Height Class	% cover
0-1"	30-300	Bare 0-1' 1'-6'	0-10 10-70 10-90
1"-10"	60-325	6'-40'	10-60
10"-24"	30-60	40'-140'	20-45
24"+	7-60	140'+	15-100
TOTAL	127 to unsustainable		10-100% canopy closure

APPENDIX K -- FIRE HISTORY

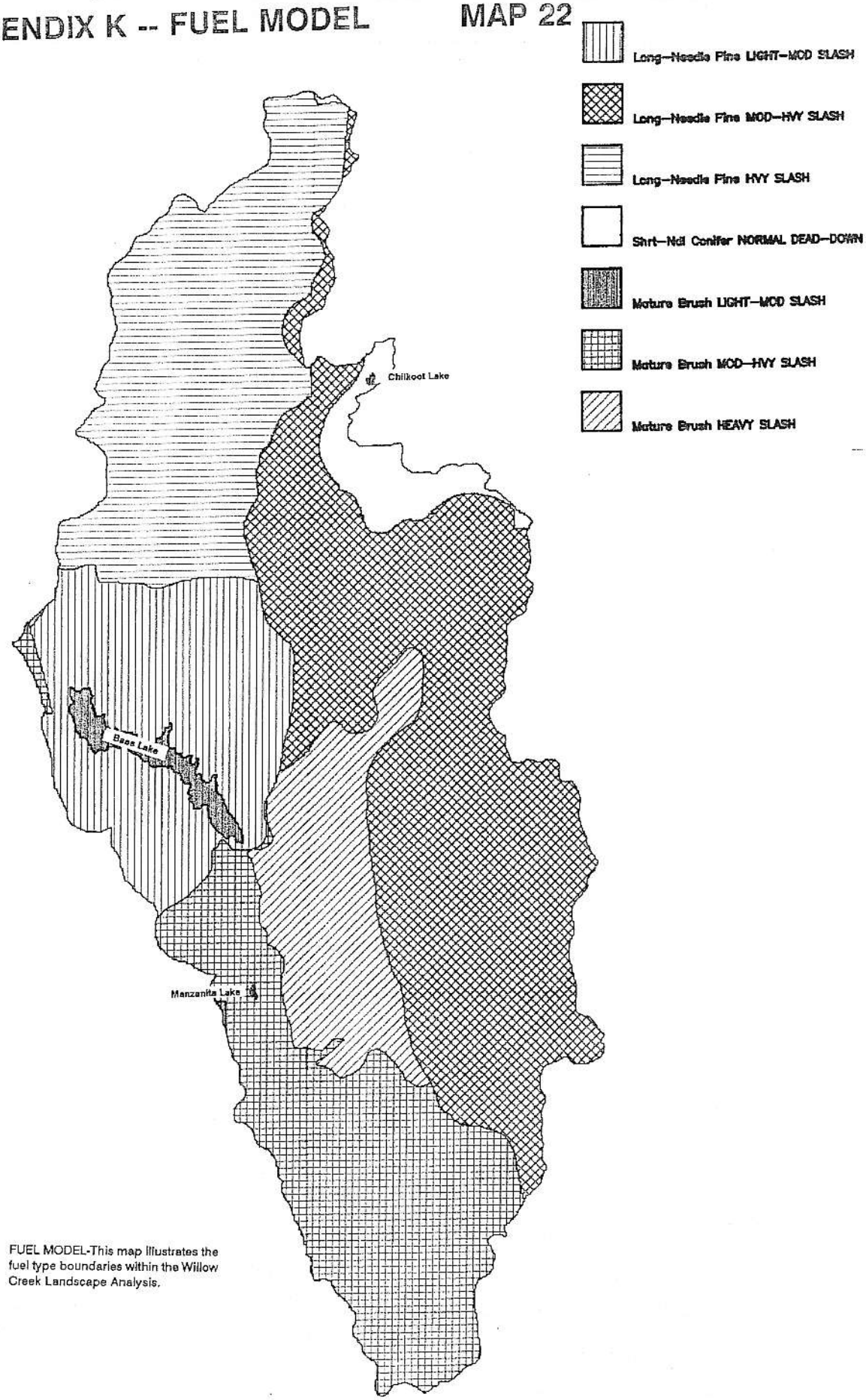
MAP 21



FIRE HISTORY-This map represents the location and size class of the fire occurrences in the Willow Creek Landscape Analysis. The range of acres for each of the size class represented are: Class C ranges from 10 to 999 acres, Class D ranges from 100 to 299.9 acres and Class E ranges from 300 to 999.9 acres.

APPENDIX K -- FUEL MODEL

MAP 22



FUEL MODEL-This map illustrates the fuel type boundaries within the Willow Creek Landscape Analysis.

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Attachment 3.5, Fresno River Landscape Analysis

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FRESNO RIVER LANDSCAPE ANALYSIS

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Chapter 1 Setting the Stage Fresno River Landscape Analysis

A. Landscape Selection

The Fresno River Landscape Analysis began in 1996 and was abandoned uncompleted in 1997. The Fresno River Landscape Analysis was restarted in 2002 and a new team was formulated. In 2003 the team process was re-initiated.

B. Landscape Location and Boundaries

The Fresno Watershed Analysis (WA) area is approximately 36,955 acres and is located in the northwest corner of the Sierra National Forest near the communities of Oakhurst, Ahwahnee and North Fork (see Fresno WA Area General Location map). The Fresno WA area includes the headwaters of the Fresno River and Fine Gold Creek watersheds and has six perennial streams. These channels include; Miami Creek, Lewis Fork, Nelder Creek, California Creek, Carter Creek, Fine Gold Creek and Little Fine Gold Creek (see Fresno WA Area Major Stream map).

C. Landscape Analysis Process

The basic strategy is derived from several sources: Sierra National Forest Land and Resource Management Plan (LRMP), as amended by the Sierra Nevada Forest Plan Amendment Record of Decision 2001 (Framework), and the 2001 Federal Wildland Fire Management Policy, also known as the National Fire Plan (NFP).

The LRMP provides the overall guidance for management of the Sierra National Forest and includes basic direction for all resource programs with associated Standards and Guidelines, to address the entire mix of activities and protection of resources for sustained use.

The Framework amended the LRMP, providing new guidance and direction for program management with a certain emphasis on 5 major problem areas which projects should address:

1. Old Forest Ecosystems and associated species,
2. Aquatic, Riparian, and Meadow Ecosystems and associated species,
3. Fire and Fuels,
4. Noxious Weeds,
5. Lower Westside Hardwood Ecosystems.

The Framework did not alter the basic program mix or mission of the Sierra National Forest. The mission of the National Forest is driven by legislation and congressional budget. The Framework emphasizes species management in relation to resource utilization and provided new guidance in the delivery of National Forest programs, activities, and utilization. It emphasizes a response to meeting multiple needs, sustainable ecosystems, the five emphasis areas, and providing a sustainable supply of goods and services.

Management direction for riparian/aquatic areas is a combination of the Sierra National Forest Land and Resources Management Plan (LRMP) (USFS 1992) and the Sierra Nevada Forest Plan Amendment (Framework) (USFS 2002). The Framework is an amendment to the Forest LRMP. However, Framework standards and guidelines apply unless the existing LRMP places a great restriction on the management activity. Forest wide Goals and Objectives include: identification and enhancement of low to moderate quality fish habitat; management of fish to maintain viable populations of all resident or indigenous fish; emphasize habitat improvements for sensitive, threatened, endangered and harvest species; and managing habitat for sensitive species in a manner that prevents any species from becoming a candidate for threatened or endangered status.

The Sierra Nevada Forest Plan Amendment provides an Aquatic Management Strategy (AMS). The fundamental principle of the AMS is to retain, restore, and protect the processes and landforms that provide habitat for aquatic and riparian-dependent organisms, and produce and deliver high-quality waters. Site-specific adjustments to the overarching provisions of this AMS will be provided through project level analysis and ensuing decisions that are informed by landscape analyses. The strategy explicitly recognizes that Sierra Nevada landscapes are dynamic and subject to frequent large disturbances, such as fire and flooding. The AMS provides management direction that is intended to maintain these disturbances within natural ranges of variability at the watershed scale. Consideration for the protection of human life and property is provided during implementation of the AMS.

The Record of Decision for the Sierra Nevada Forest Plan Amendment includes core elements of the AMS, Riparian Conservation Areas, Riparian Conservation Objectives, and Critical Aquatic Refuges. AMS goals relate to maintaining or restoring (1) Water Quality; (2) Species Viability; (3) Plant and Animal Community Diversity; (4) Special Habitats; (5) Watershed Connectivity; (6) Floodplains and Water Tables; (7) Watershed Condition; (8) Streamflow Patterns and Sediment Regimes; and (9) Stream Banks and Shorelines.

Among the elements of the AMS are Riparian Conservation Areas (RCAs). RCAs are land allocations that are managed to maintain or restore the structure and function of aquatic, riparian and meadow ecosystems. Under the Forest LRMP they were designated Streamside Management Zones. Riparian conservation areas overlap all land allocations. The standards and guidelines for riparian conservation areas apply in these areas except in cases where the standards and guidelines of the overlapping land allocation place greater restrictions on management activities. The intent of management direction for RCAs is to: (1) preserve, enhance, and restore habitat for riparian- and aquatic-dependent species; (2) ensure that water quality is maintained or restored; (3) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas; and (4) provide greater connectivity within the watershed. RCAs are delineated and managed consistent with riparian conservation objectives as described in the standards and guidelines under Riparian Conservation Objectives. There are no Critical Aquatic Refuges in either the Fresno River of Fine Gold Creek watersheds.

AMS goals do not provide the necessary detail for prescribing management practices at a site-specific scale. Where a proposed project encompasses an RCA, a site-specific project area analysis is conducted to determine the appropriate level of management. Determining the type and level of allowable management activities is done by assessing how proposed activities measure against the Riparian Conservation Objectives (RCOs) and their associated standards and guidelines. The RCOs serve as a checklist for evaluating management prescriptions to determine if a proposed activity will move an area toward the desired conditions described by the AMS goals. Analyze all RCOs and their associated standards and guidelines for projects in RCAs. The RCOs to be evaluated are:

1. Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.

2. Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.

3. Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the RCA.

4. Ensure that management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.

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.

6. Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.

Fire was as much a part of life in earlier days as it is today although the emphasis has changed to an even more defensive posture against fire. The forest, which was once sparsely populated and used primarily for subsistence by Native Americans, miners, loggers and ranchers has changed. The Oakhurst Basin, like similar foothill communities throughout California, has experienced a dramatic increase in population growth and become mixture of wildland and urban developments. The rapid growth of the wildland-urban intermixes where homes and businesses are intermingled with wildland fuels increase the risk of fire and firefighter safety.

All humans living in this landscape have experienced the benefit, the threat and the force of fire. Native Americans had sophisticated knowledge of fire and fire effects using it to enrich their material culture. Ranchers and sheep herders burned large tracts of land regularly to improve annual feeding grounds for cattle and sheep, and loggers and miners feared and fought the timber fires caused by sparks from saw mills and logging operations.

Wildfire has always been a concern to those living and working within the Fresno River watershed. The most devastating example was the catastrophic Harlow Fire. In July of 1961, The Harlow Fire caused widespread damage to the Oakhurst Basin. The fire, which was started on the Harlow Ranch by a ranch hand burning brush, began at 10:00 the morning of July 10. It defied initial suppression efforts and burned intensely throughout the night and following day. Historical accounts describe a fire storm beginning about 4:00 the afternoon of July 11. The fire traveled ten miles in the two hours that followed, consuming approximately 19,000 acres. By midnight July 11, the fire storm had abated and burning conditions allowed for full containment on July 12th. By the time the fire was controlled, it had burned 41,200 acres, 106 homes and had a final perimeter of 74 miles. Two lives were lost. The fire damage was estimated at 1.5 million dollars.

Large fires still occur today. Unfortunately, as the population continues to swell the potential for human caused fires also increases. A recent study involving a portion of the Bass Lake Ranger District fire history indicated that 59% of all fires occurring within the area were human caused. This is a major cause for concern considering the population in the Oakhurst Basin in 1961 was approximately 3,000. Today that total is approximately 30,000 and is expected to increase to over 80,000 by the year 2010. As a result, the potential for loss of lives, homes and business from a large fire similar to the Harlow Fire would be tremendously compounded.

Settlements within the Fresno River landscape include the communities of Sugar Pine, Cedar Valley, Redwood, Ponderosa and Yosemite Mountain Ranch. Economic stature varies across the entire spectrum. Newer developments provide good road systems, water sources and fire protection potential. Many of the older developments have smaller lots and much older homes or trailers. One lane road systems are common, providing restricted access for residents and emergency vehicles leaving them with very poor fire protection potential. Some have homes built on mid and upper slopes making protection by fire personnel difficult to impossible. Many of developments have very little "defensible space" built in or around them to help slow or stop a wildfire or facilitate effective fire suppression

Chapter 2 Key Ecosystem Environmental Indicators

This chapter identifies the Key Ecosystem Elements and Environmental Indicators selected for the Fresno River Landscape Analysis.

A. Key Ecosystem Elements

The most common components, structures and processes for the Sierra National Forest were selected from the array in "Sustaining Ecosystems" (1995) and from Sierra National Forest personnel, and from that list, the following key elements (and associated environmental indicators) were identified by four separate systems:

I. Terrestrial System

1. Vegetation Mosaic
2. Plant Species
3. Soil Erosion and Productivity
4. Fire
5. Wildlife Species
6. Water Quality
7. Water Yield
8. Watershed Condition
9. Channel Morphology

II. AQUATICS SYSTEM

10. Riparian/Aquatics
11. Riparian Vegetation

III. HUMAN DIMENSION

12. Transportation
13. Recreation
14. Contemporary Native American Use
15. Economics
16. Special Uses and Adjacent Land Use

IV. ATMOSPHERIC

17. Atmospheric Particulates

B. Environmental Indicators for the Key Ecosystem Elements

Environmental Indicators are used to measure Key Ecosystem Elements. They are the framework for this analysis and are tracked through out it. They can be used to assess ecosystem health. The Team relied solely on existing data or data that was readily available for this analysis. Our list of indicators and measures was limited; reduced to provide a manageable yet meaningful analysis of the Fresno River Landscape. The following section discusses the indicators selected for each Key Ecosystem Element

1. Vegetation Mosaic

Indicators: a. Vegetation Species Composition
b. Horizontal Diversity
c. Vertical Diversity

This refers to diversity, condition, and distribution of plants and plant communities within a landscape. The indicators identified for this key ecosystem element are: Species diversity within the community, development and condition within the community, and the diversity between the plant community distribution. These indicators were chosen because they represent a practical and efficient way of characterizing the diversity of conditions existing on the landscape. Also, these indicators have implications for other components of the ecosystem such as fire, and distribution of animal and plant species.

Distribution of plant communities such as Ponderosa pine and Sierra Nevada mixed conifer are important because plant community distribution is an indication of ecological conditions on the landscape. Each plant community is defined by the presence of a few dominant species. Because each species has a distribution prescribed by environmental conditions, if conditions change, a change in distribution of species will follow. At the general scale, the change in distribution of the dominant species, reflect a change in distribution of the plant community it represents.

Canopy layering and tree density are two important structural attributes. They both have direct implications for fire management and distribution of animal and plant species. Measures of these attributes are derived from a number of primary and secondary sources. Primary sources include Region 5 Forest Inventory Analysis (FIA) and Ecology plot data. Secondary sources are the WHR habitat type seral stage descriptions (Mayer and Laudenslayer Jr. eds 1988), Ecology old growth descriptions (USDA 1992), and expert opinion.

Vertical Diversity is a variation in vertical composition of vegetation from forest floor to top of canopy within the vegetation stand. Density, expressed as trees per acre (T/A) or canopy closure (canopy cover %), and by diameter breast height (DBH) size class or percent cover by height of the vegetation. These, and the species grouping, define two systems used by the forest Service to manage vegetation; Region 5 vegetation strata and the California Wildlife Habitat Relationships (CWHR) model. A crosswalk of size and density is published in the SNF EIS ROD Appendix B-3.

Horizontal Diversity is viewing the vegetation at the landscape level, horizontal diversity is described in terms of opening size or canopy closure. This will provide an overview of the vegetation mosaic in terms of the vegetation's bole or stem size, height, and density, between stands

The Vegetation Mosaic Element will track changes in the horizontal and vertical structure of the live and dead vegetation, focusing on vegetation types and seral stages as defined by dominant plant species.

2. Plant Species

Indicators: a. Floristic Diversity

Vegetation Species Element serves to track more fine-grained changes in plant life than the Terrestrial Vegetation (Vegetation Mosaic) Element. The plant species element will focus on how individual species are distributed within the watershed, especially in relation to vegetation types, habitat conditions, seral stages, fire cycle, and level of human disturbance. The distribution of rare elements of the flora will be tracked, as will the proportion of non-native to native plant species.

Floristic Diversity. Plant species are dependent upon environmental factors for their survival and, in turn modify their environment in many ways. For example, plants are the basis for the production of all organic material in the ecosystem, and provide habitat and forage for animals. Plant species are affected by all other ecosystem elements, for example air pollution, soil condition, fire, and moisture and temperature regimes. Certain species of plants may be considered valuable or beneficial to humans, while others may be considered undesirable or detrimental (modified from USDA, 1996) The Floristic Diversity indicator allows the consideration of all plant species across the landscape. Based on ideas presented in the Granite Basin Landscape Analysis and previous discussions among Sierra National Forest resource managers and botanists in Region 5, the various possible indicators were combined into one: Floristic Diversity.

A precise definition of what is meant by "Floristic Diversity" will set the stage for its use as an indicator in this analysis. In plant ecology, the term species diversity refers to an index of diversity that is calculated by considering species richness (the number of species in a given area) weighted by species evenness. Species evenness is the distribution of individuals among species, and is greatest when all species in an area have the same number of individuals (Barbour et al, 1987). Because we do not have quantitative sampling data on the number of individuals for each species known to occur in the Fresno Watershed, we cannot know species evenness, thus we cannot truly calculate species diversity. Species diversity is a measure of the heterogeneity of plant species populations within a plant community, and has often been correlated with ecosystem stability, or resilience to disturbance.

We will use floristic diversity as an approximation of the variety of plants in the watershed. This is a proxy for tracking the presence and functioning of all ecosystem components and processes that keep ecosystems healthy and resilient (e.g., pollinators, decomposers, herbivores, predators). When floristic diversity is broken down into subsets of the flora occupying various habitats and niches, as we have attempted in this analysis, we can then consider how to manage these habitats and niches to enhance floristic diversity.

High levels of floristic diversity are assumed to be beneficial, and floristic diversity reflects the ability of the ecosystem to provide a variety of intact, but different habitat types (e.g, moist, shaded, dry, open, rocky –WORK ON THIS) on a sustained basis.

These conditions, in turn, require processes of pollination, seed dispersal, water, sunlight, and nutrient supply and cycling that are vigorous and ongoing.

In the early stages of this watershed analysis, we considered using an indicator called "floristic diversity", modeled after the Granite Basin Landscape Analysis done by the Plumas National Forest in 1996. This approach required having enough data from field surveys and herbarium specimens to create a reasonably complete list of all vascular plant species in the watershed, and to assign each species to habitat categories (e.g., meadows, rock outcrops, forest openings). The Granite Basin analysis concluded that for some habitat categories, species diversity is currently lower than would have been the case prior to European contact. This information was used to list specific management opportunities for increasing plant species diversity. Because the type of information needed for this floristic approach is not readily available for the Fresno River Watershed, and because this analysis includes part of the Finegold Creek watershed (thus is not a naturally defined watershed), we decided to abandon this idea and to focus on rare plants and the most significant noxious weeds known to occur in the analysis area.

Although the indicators have been narrowed down to rare plants and noxious weeds, there is still a need to consider the effects of past and future management on the diversity of the native flora, and to design projects to favor the suite of native species that evolved in the watershed and discourage non-native species that tend to displace the native species. This is reflected in Chapter 6, Management Opportunities.

Distribution and abundance of Sensitive plant species. Two Forest Service sensitive plant species are known to occur in the Fresno River watershed: Rawson's flaming trumpet (*Collomia rawsoniana),* and mountain lady's slipper orchid (*Cypripedium montanum).* The number of occurrences and a subjective assessment of habitat condition will be used as measures to assess whether desired condition is being achieved.

Distribution and abundance of invasive non-native plants (noxious weeds). Although there are numerous non-native plant species found within the analysis area, the following species were chosen because of their tendency to be especially aggressive and harmful to native ecosystems: Yellow starthistle (*Centaurea solstitialis),* tocalote (*Centaurea melitensis),* Scotch broom *(Cytisus scoparius),* klamathweed (*Hypericum perforatum),* bull thistle (*Cirsium vulgare),* Italian thistle (*Carduus pycnocephalus),* medusahead (*Taenatherium caput-medusae),* and himalaya blackberry (*Rubus discolor).* All of these are considered to be noxious weeds by the State of California ("C" rating, meaning they are already widespread in California so statewide eradication is not likely) (CDFA, 2004) Himalaya blackberry is not State-listed but is a serious pest worthy of prompt attention because of its potential to cause economic and ecological damage (CalIPC, 2004).

Measures: The number of species of noxious weeds, number of existing and eradicated infestations for each species, and, as the data becomes available; area occupied by each species will be used as measures to assess progress towards desired conditions. Any California Department of Food and Agriculture "A" or "B" listed species that appear in the analysis area in the future will be tracked ("A" or "B" ratings indicate a high priority

for immediate eradication because of the potential to harm California's natural resources and economy).

3. Soil Erosion and Productivity

Indicators: a. Soil Cover
b. Soil Porosity
c. Down Logs

Soil Productivity Element – The indicators below were selected to measure soil properties and conditions that influence long term soil productivity and soil hydrologic function. A complete description of soil quality standards is given in FSH 2509.18 , R5 Supplement No. 2509.18-95-1 (Soil Management Handbook).

Soil Cover Indicator- Soil cover can consist of living vegetation, non-living organic material, and coarse rock fragments on the soil surface. The level of soil cover indicates several things related to long term productivity and the hydrologic function of soil. First, the percentage of effective soil cover is a significant factor determining the erosion hazard potential. The higher the level of soil cover the lower the potential for raindrop impact and destruction of surface soil structure. Soil cover enables more water to enter (infiltrate) the soil rather than run over the surface and cause erosion.

The amount (mass) of soil cover in the form of living and non-living organic materials is an indication of amount of food sources for soil organisms. Soil organisms decompose and transform organic materials in the soil and in close contact with the soil surface. Their activities result in nutrient mineralization as well as the formation of very stable forms of soil carbon, such as humus.

Soil cover is measured using randomly located transects across the activity areas. Generally undisturbed forested areas have 100% soil cover. It is a Sierra NF LMP Standard and Guideline that at least 50% well distributed soil cover be maintained during management activities. This should be considered a minimum. The level of soil cover generally will increase with time and natural revegetation.

The thickness of the litter and duff layers generally increase with increasing elevation due to cooler average air and soil temperatures and reduced microbial activity. The thickness of the litter and duff layer is also dependent upon the soil productivity and vegetation type at various sites as well.

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Soil cover is measured using randomly located transects across the activity areas. Generally undisturbed forested areas have 100% soil cover. It is a Sierra NF LMP Standard and Guideline that at least 50% well distributed soil cover be maintained during management activities. This should be considered a minimum. The level of soil cover generally will increase with time and natural revegetation.

The thickness of the litter and duff layers generally increase with increasing elevation due to cooler average air and soil temperatures and reduced microbial activity. The thickness of the litter and duff layer is also dependent upon the soil productivity and vegetation type at various sites as well.

Soil Porosity Indicator (Hydrologic Function) - This is the inherent capacity of the soil for water intake at the surface, retention for plant growth and internal permeability for the downward movement of water to the water table or lateral movement toward open streamflow. Soil porosity together with soil cover are two of the most important factors that affect the soil hydrologic function. Soil porosity would be measured by taking fixed interval samples of soil density along randomly located transects across the landscape.

Large Woody Material Indicator - In some ecosystems, large woody material on the soil surface can provide important sites for microbial activity and nutrient availability. The R-5 Soil Quality Standards call for leaving 5 well distributed logs per acre representing the range of decomposition classes. Desired logs are at least 20 inches in diameter and 10 feet long. This differs slightly from the size of logs desired for wildlife but wildlife logs would generally fit the desired quality and size for soil quality. Some ecosystems are not capable of producing the number of logs or the natural fire return interval would preclude the persistence of large woody material long enough to reach the higher decomposition classes. Previous monitoring on the Sierra NF has indicated that the number and range of decomposition classes called for under the R-5 soil quality standards probably can only be reached in true fir stands. At lower elevations in the Mixed Conifer and Ponderosa pine stands the natural fire return interval would probably only permit the occurrence of Class I to III logs. This indicator needs to be evaluated further for the Fresno Watershed using available fuel loading surveys.

4. Fire

Indicators: a. Fire Return Rate and Severity
b. Fire Seasonality
c. Fire Size and Distribution

Severity is a qualitative measure of the immediate effects of fire on the ecosystem. It relates to the extent of mortality and survival of plants and animal life both aboveground and belowground and to loss of organic matter. It is determined by heat released aboveground and belowground. Ryan and Noste (1985) describe a method for rating fire severity based on flame length and depth of burn.

In the spring shrubs often are at yearly lows in terms of carbohydrate reserves in the root because of the demand to produce new shoots, leaves, and flowers. Burning in spring will weaken and can occasionally kill sprouting shrubs, and burning when the soil is moist can kill seeds of native herbaceous perennials

Fire Size Fire size is derived from historical records of the Sierra National Forest and Personal Computer Historical Analysis (PCHA) information of National Fire History. PCHA data indicates most of the fires in the Fresno River watershed were of small nature (A and B size) with some fires reaching E size (see attached chart).

Distribution Geographical Information System (GIS) data shows that large fires encroached into the analysis area consistently beginning in the early 1900's. Every decade from 1910 shows fire in or around the Fresno River area. Most large fires approached the area from the lower foothills located generally to the west and south. Fires of a 1000 ac+ were shown to start in the project area. These were mainly on the south and west sides of the basin and generally started in the foothills.

Fire Return Interval is a part of a fire Regime. The number of years between two successive fires documented in a designated area (i.e., the interval between two successive fires occurrences per stand); the size of the area must be clearly specified (units—years).

Seasonality Season of burning can be very important in determining fire effects. Spring burning occurs at a time when buds are flushing and are very susceptible to damage. Late in the season, buds have hardened and are much more capable of withstanding heat (Agee 1993).

5. Wildlife Species

Indicators:
a. Spotted Owls
b. Furbearers
c. Deer
d. Goshawks

Spotted Owls can represent mature, mixed conifer habitats. It is important as an indicator because of the extensive survey information available, the ease of surveying for this species, the current management requirements (CASPO and the future Cal Owl EIS), and its relatively well understood natural history and habitat requirements.
a) Occupied Sites. Are currently known spotted owl sites occupied? Are new sites being discovered? This measures existing population and infers habitat suitability.
b) Reproduction and Fledging. Are owl pairs successfully breeding and fledging young? Indicates population trend (gain or loss), nesting habitat suitability. As a proxy we can incorporate data from existing demography studies by PSW.
c) Habitat. Are current habitat levels being maintained over time? By classifying habitat using the WHR habitat typing system, and tracking changes over time, we can answer that question. Are habitat characteristics such as canopy cover, snag levels, downed logs levels, and average stand diameter appropriate for suitable spotted owl and owl prey habitats? Using field stand data will provide us with that information.

Furbearer species (pine marten and fisher) can represent mature mixed conifer habitat. Fishers are important because a portion of the Southern Sierra Fisher Management Area (SSFMA) lies within the Fresno River analysis area, and the fact that the fisher population in the Sierra NF is a subpopulation isolated from the fisher populations in northern California. Fishers have been positively identified to occur within the Fresno River analysis area near Westfall Station (OHV monitoring surveys, 2002 and 2003).
a) Presence. Do sensitive furbearers actually occur within the NFMA? This would indicate that the habitat is truly suitable.
b) Habitat. What is the current habitat condition as it relates to suitable furbearer habitat characteristics? Is this habitat being maintained over time? Are habitat characteristics such as canopy cover, snag and log levels, and average stand diameter appropriate for suitable furbearer and furbearer prey habitats? Use field stand data.

Mule Deer are the most important game species within the Fresno River analysis area. Current populations are far below levels targeted in the Oakhurst Deer Herd Management Plan (CDF&G, 1984).
a) Population. Relative deer population levels can be inferred by hunting success and fawn production. CDF&G takes this data yearly. This mainly tracks population increases or decreases. Significant population trends can be an indicator of increases or decreases of habitat quality.
b) Habitat. Deer habitat is measured by quantity and quality. Quantity is acres of thermal cover, hiding cover, water, fawning areas, and forage areas. Quality is the juxtaposition of these habitat types relative to one another, connectivity (migration routes), forage quality, and amounts of disturbance factors (such as roads, trails, human developments, and levels and seasonality of human use).

Northern Goshawk can also represent mature mixed conifer habitats. It is required under the LRMP to manage for this species by establishing a goshawk habitat network. A base of survey data exists, but it is not as extensive as that for the spotted owl.
a) Occupied Sites. Are currently known goshawk sites occupied? Are new sites being discovered? This measures existing population and infers habitat suitability.
b) Reproduction and Fledging. Are goshawk pairs successfully breeding and fledging young? Indicates population trend (gain or loss), and nesting habitat suitability.
c) Habitat. Are current habitat levels being maintained over time? Use WHR habitat typing system. Are habitat characteristics such as canopy cover, snag levels, downed logs levels, and average stand diameter appropriate for suitable goshawk and goshawk prey habitats? Use field stand data.

6. Water Quality

Indicators: a. Turbidity

Water quality has been measured several times in the Fresno Watershed in the last 20 years. (Appendix X) It is an important constituent of watershed condition. Depending on the parameters measured and the analysis result, conditions within the watershed can be

estimated. Under normal conditions turbidity, pH, conductivity, can indicate a potential problem usually associated with human habitation and activity.
Turbidity is an excellent indicator of water quality in a forest environment where erosion is the main degrader of quality. Turbidity is easy to see with the naked eye and easy to measure by the use of a portable turbidimeter. The amount of turbidity above a background level indicates erosion is occurring somewhere in the watershed. If a problem is indicated, other parameters can then be measured. Conductivity can help indicate a sewage discharge and can be easily measured with a hand-held meter. If a health hazard is suspected turbidity in the water gives bacteria a substrate on which to grow. Therefore turbidity can be used as a health indicator.

The indicators below were selected to measure soil properties and conditions that influence long term soil productivity and soil hydrologic function. A complete description of soil quality standards is given in FSH 2509.18, R5 Supplement No. 2509.18-95-1 (Soil Management Handbook).

Soil cover can consist of living vegetation, non-living organic material, and coarse rock fragments on the soil surface. The level of soil cover indicates several things related to long term productivity and the hydrologic function of soil. First, the percentage of effective soil cover is a significant factor determining the erosion hazard potential. The higher the level of soil cover the lower the potential for raindrop impact and destruction of surface soil structure. Soil cover enables more water to enter (infiltrate) the soil rather than run over the surface and cause erosion.

The amount (mass) of soil cover in the form of living and non-living organic materials is an indication of amount of food sources for soil organisms. Soil organisms decompose and transform organic materials in the soil and in close contact with the soil surface. Their activities result in nutrient mineralization as well as the formation of very stable forms of soil carbon, such as humus.

Soil cover is measured using randomly located transects across the activity areas. Generally undisturbed forested areas have 100% soil cover. It is a Sierra NF LMP Standard and Guideline that at least 50% well distributed soil cover be maintained during management activities. This should be considered a minimum. The level of soil cover generally will increase with time and natural revegetation.

The thickness of the litter and duff layers generally increase with increasing elevation due to cooler average air and soil temperatures and reduced microbial activity. The thickness of the litter and duff layer is also dependent upon the soil productivity and vegetation type at various sites as well.

Soil Porosity is the inherent capacity of the soil for water intake at the surface, retention for plant growth and internal permeability for the downward movement of water to the water table or lateral movement toward open streamflow. Soil porosity together with soil cover are two of the most important factors that affect the soil hydrologic function.

Soil porosity would be measured by taking fixed interval samples of soil density along randomly located transects across the landscape.

7. Water Yield

Indicators: a. Stream Flow

The amount of water produced by a watershed is important for in-stream and down stream uses and needs. The Fresno River is a major tributary to the San Joaquin River which supplies water to a $ 4 billion/year agricultural industry in the Central Valley. Water yield varies with annual precipitation and vegetative cover on the watershed. Channel flow is the amount of annual precipitation minus evaporation, evapo-transpiration by vegetation and runoff. The two main variables are precipitation and vegetative cover. Precipitation cannot be controlled but the amount of vegetation can. The more deep rooted vegetation over 3 feet in height remains on the land, the less annual runoff is realized. Timber harvesting in the past removed this transpiring vegetation and allowed more stream flow.

In some ecosystems, large woody material on the soil surface can provide important sites for microbial activity and nutrient availability. The R-5 Soil Quality Standards call for leaving 5 well distributed logs per acre representing the range of decomposition classes. Desired logs are at least 20 inches in diameter and 10 feet long. This differs slightly from the size of logs desired for wildlife but wildlife logs would generally fit the desired quality and size for soil quality. Some ecosystems are not capable of producing the number of logs or the natural fire return interval would preclude the persistence of large woody material long enough to reach the higher decomposition classes. Previous monitoring on the Sierra NF has indicated that the number and range of decomposition classes called for under the R-5 soil quality standards probably can only be reached in true fir stands. At lower elevations in the Mixed Conifer and Ponderosa pine stands the natural fire return interval would probably only permit the occurrence of Class I to III logs. This indicator needs to be evaluated further for the Fresno Watershed using available fuel loading surveys.

Stream flow is the direct result and an excellent indicator of water yield. A USGS gauging station (11-2571) is located on Miami Creek near Oakhurst, Fresno River (11-2575) near Knowles and fine Gold Creek (11-2480) near Friant. None of these stations are currently active but historical data is available. Appendix XX lists water yields computed using regression equations for the three main watersheds composing Fresno River.

8. Watershed Condition

Indicators: a. CWE Methodology/Equivalent Roaded Acres

Sedimentation is an important process that will be evaluated for the Fresno Watershed Planning Area. Increased sedimentation can result in sediment loading of stream channels. Increased sedimentation occurs from disturbances that include: roads and

OHV trails, timber harvest areas, grazing, wildfire and other disturbances. Increased sedimentation can be determined from estimates of sediment yield, which is the amount of material eroded from the land surface by runoff, introduced into a stream system, and delivered at the mouth of a given subwatershed. The potential for increased sedimentation rates can also be determined from measurements of total watershed disturbance. This can occur as cumulative watershed effects (CWE) which are defined as: "all effects on beneficial uses of water that occur away from the locations of actual land use which are transmitted through the fluvial system." CWE assessment is designed to ensure that adverse impacts do not occur within watersheds due to the cumulative effect over time and space of land disturbing activities. It is recognized that Best Management Practices implemented at the location of actual land use may be insufficient to avoid a downstream impact if the land disturbance within the watershed occurs over a concentrated period of time or affects too great a proportion of the watershed.

The Clean Water Act of 1972 as amended requires States to address non-point source pollution. Through the Porter-Cologne Act passed by the State of California, the authority and responsibility for Clean Water Act enforcement was delegated to the State of California. The Regional Water Quality Control Board, as the designated State agency, and the Environmental Protection Agency accepted the methodology developed by the USDA Forest Service (R-5) for cumulative watershed effects as a Best Management Practice (BMP). Implementing the methodology as described in R-5 FSH 2509.22 satisfies this Best Management Practice.

Sediment Delivery Rate (SDR) Sediment delivery rates will be determined in terms of tons/acre/year for each landtype ecological unit. In addition, SDR's will be determined for roads in terms of tns/mile/year for each ecological unit. The SDR will be an estimate of sediment that is generated from data collected in the field and used in an empirical model that is designed to calculate sediment yield. Several of these models are available and include the Watershed Erosion Prediction Project.

Using the SDR as an indicator of watershed condition will have to be done in conjunction with other indicators that measure down stream channel condition. These indicators include VSTAR ratings at selected channel reaches and channel condition ratings (CDR) using the current CDR system. In addition, existing SDR's will be determined for each subwatershed and compared to the reference variability for that subwatershed.

The objective of monitoring these ecological indicators is to identify those upland watershed areas that may be the source of sediment that is contributing to high sediment loads. Once areas or subwatersheds are identified then we can identify the sediment sources. For example, "what is the condition of roads and are the roads the problem"? What else is going on in the subwatershed? Focusing on specific areas and evaluating the existing condition against expected conditions will allow us to test our assumptions. One of those assumptions is that accelerated erosion and sedimentation is not coming from disturbances other then roads.

CWE Methodology The CWE methodology is a decision model that provides a consistent means for identifying subwatersheds where a cumulative watershed effects response may occur based on several factors including: 1) the amount and timing of past land disturbing activity, 2) the natural sensitivity of the subwatershed, and 3) the thresholds associated with them. The impact of land disturbing activity is represented through Equivalent Roaded Acres (ERAs). Through the use of coefficients, all land disturbing activities are related to a common denominator, i.e., an acre of road (an acre of impervious surface). By this mechanism, actions as diverse as developed camping, cable clearcutting, and wildfires can be equated using a single measure.

The impact of land disturbing activities is recognized to be both the amount of area involved and the timing of those activities. Timing is incorporated into the analysis by addressing natural recovery from the land disturbing activity. It is recognized that natural recovery lessens the impact of land disturbing activities. Natural recovery assumes that only five (5) percent of the effect would persist thirty years later. Over the thirty-year period, recovery is projected as a straight-line relationship with time.

Equivalent Roaded Acres: Equivalent roaded acres are a measurement of the total disturbance in a watershed and an indicator of cumulative watershed effects.

Equivalent Roaded Acres (ERAs) are determined for a subwatershed by compiling a management history of the land disturbing activities which occurred from the base year to thirty years in the past. For this project, the base year is 2003. The number of acres involved in each activity is multiplied by the coefficient developed for that activity, e.g., 1 acre of tractor clear-cutting which has a coefficient of 0.5 will yield 0.5 ERAs. The coefficient applied depends on both the kind of activity and the soil type present. These ERA values are then multiplied by the recovery coefficient. This adjusts the ERAs to represent the residual effect in 2003. If our tractor clear-cutting example occurred in 1970, the recovery coefficient is 0.1. This means the final ERAs for this activity will be 0.1 ERAs (1 acre x 0.5 activity coefficient x 0.1 recovery coefficient = 0.1 ERAs).

ERAs for all the past management activities are added to the ERAs for system roads present within the subwatershed. ERAs for system roads are simply the number of feet of road times the width (dependant on road type). There is no recovery for roads. The total ERAs are then divided by the number of acres in the subwatershed to establish the percent ERAs (%ERAs). This enables comparison of impacts between subwatersheds of differing size.

9. Channel Morphology

Indicators: a. Sediment Delivery Rate (SDR)/Residual Pool Depth

Channel morphology is the description of dimension, pattern and profile of a stream system. The interrelationship between channel processes affects channel morphology. Measuring one aspect of channel morphology can often serve as a surrogate for others. Channel morphology can be expressed in terms of channel slope, channel width, channel

depth, channel sinuosity, channel type, channel bed surface materials, and many more. There are several methods available to classify channels based on channel morphology and the current, most widely accepted methodology is Rosgen's River Classification System (Rosgen, 1994). The strength of Rosgen's Classification System is that it can be done by different people consistently, allows an interpretation of channel behavior, and indicates potential restoration approaches in degraded systems. The classification system describes channel reaches that very from a few hundred feet to a quarter of a mile. The system does not describe a whole drainage system. The classification system is based on channel slope gradient, bed material, channel width to depth ratio, amount or degree of meandering (value of sinuosity), and degree of confinement or constraint to lateral movement.

Another method to describe channel condition is Pfankuch's Stream Reach Inventory and Channel Stability Evaluation (Pfankuch, 1975). This method is a procedure to systemize measurements and evaluations of the relative capacity of mountain stream channels to the detachment of bed and bank materials and to provide information about the capacity of streams to adjust and recover from potential changes in flow and/or increases in sediment production.

The Rosgen River Classification System and Pfankuch's Stream Reach Inventory and Channel Stability Evaluation will be used to describe the channels in the Fresno Watershed and to target degraded channels for potential restoration and to identify where VSTAR reaches and Stream Condition Inventory (SCI) reaches should be established. The classification system and stream stability rating will not be used as an indicator of channel morphology.

Residual Pool Depth (VSTAR): Problems with management of channels and channel morphology in the Fresno Watershed Analysis Area are mostly related to high amounts of sand-size sediment filling pools. Pools are limited habitats for aquatic species in several stream systems in the analysis area. A methodology has been developed to measure the amount of sediment in a pool. The methodology is called VSTAR and results in a rating that indicates residual pool depth. The VSTAR rating provides a cross-sectional sample of the depth of fine sediment at the bottom of a stream. It is obtained by pushing a slender, steel rod vertically through the sediment to bedrock or bed load at regular intervals perpendicular to the stream's course and recording the depth of sediment at each point. These data then permit estimation of the fraction of a pool's volume that is filled with fine sediment – an index of sediment supply, water quality, and stream habitat (Lisle and Hilton, 1992).

10. Riparian/Aquatics

Indicators: a. Macro invertebrates Community
b. Vertebrates

The riparian zone represents an important area of interchange between the aquatic system and the terrestrial. The availability of water provides a moist microclimate which results

in a unique plant association. The resulting zone is attractive to animals for water, food, migration corridors, and cover. As a result, the riparian areas have a greater mix of animal species (higher biodiversity) than the adjacent aquatic and upland systems.

Habitat for aquatic/riparian species is a combination of complexity and diversity. Riparian habitat condition considers amount of canopy cover; presence of deciduous species; vertical diversity observed; and amount of past disturbance within the riparian zone. Aquatic conditions can be evaluated in terms of channel stability, stream shading, habitat complexity and habitat diversity. Habitat complexity considers observed water depth, substrate, cover, and availability of large woody debris (LWD). Habitat diversity considers observed availability of habitats for all life phases of fish and is controlled by channel morphology, pool-riffle ratios, riparian vegetation, flows and availability of LWD. Elements of channel morphology (channel gradient; geology; and sinuosity) are described under the Rosgen (1996) stream classification system. Leopold (1994) notes that mesohabitats tend to repeat themselves across the channel reaches at intervals of between 5-7 bankfull channel widths, thus habitat diversity is dependant on channel morphology. Habitat complexity is affected by availability of cover elements such as adjacent vegetation on stream banks; water depth; boulders; bubble curtains; or presence of large woody debris. LWD are delivered to the riparian system as tree die and fall adjacent to or within stream channels. Aquatic habitat quality can be negatively affected by events that reduce canopy cover; increase compaction adjacent to stream channels; reduce channel stability; accelerate levels of sedimentation, or introduce non-native species.

Macroinvertebrates: Aquatic macroinvertebrates are a primary food source for many aquatic and terrestrial species. The diversity and condition of biological communities reflect overall ecological integrity (i.e., chemical, physical, and biological integrity). In addition to being a measure of aquatic system productivity, macroinvertebrates are also widely used as indicators of water quality. There are several reasons why macroinvertebrates are considered good water quality indicators:

- They are sensitive to changes in the ecosystem.
- Many live in an aquatic ecosystem for over a year.
- They cannot easily escape changes in the water quality.
- They can be collected very easily from most aquatic systems with inexpensive equipment.

Biological communities integrate the effects of nutrients, toxics, and water temperature. Macroinvertebrate community changes can also be detected with increases in sedimentation, resulting in decreases of species diversity; decreases in the abundance of mayflies, stoneflies, and caddisflies; or increases in sediment tolerant taxa (such as black flies; earthworms; dragonfly or damselfly; and midges).

Macroinvertebrate Community: Previous monitoring approaches sought insight into the nature of stream disturbance through an examination of the predominant feeding patterns (functional feeding groups) of macroinvertebrate groups present (Merritt and Cummins 1996). Increased proportions of scrapers may indicate nutrient runoff, while

increased numbers of collectors may show organic enrichment. These techniques divide stream macroinvertebrates into four main feeding groups: shredders, collectors, scrapers, and predators. One difficulty in dealing with increased levels of sedimentation as an impact is that water quality variables such as dissolved oxygen and water temperature may not substantially change. The indices further may be insensitive to changes that have already occurred in the community. Thus, many indices utilized in the past would not indicate levels of impairment. The primary impact of sedimentation is loss of habitat through filling of pools and covering of riffles.

The Pacific Southwest Region of the Forest Service is currently developing a Riverine Invertebrate Prediction and Classification System (RIVPAC) Model to assess the biological conditions of the streams within Forest Service lands in California. The intent of this bioassessment model is to compare biota observed to those expected to occur in undisturbed systems. The expected taxa are predicted from statistical models that are based on variance in biotic composition relating to environmental gradients, thus taxa occurrence varies by site. In 2001-2002 sampling was conducted across Forest Service lands in California (200+ sites). At each sample site data was collected on invertebrates present, along with environmental gradients such as latitude; longitude; elevation; water conductivity; watershed area; substrate; channel gradient; sampling date, and mean water depth. Compilation of the data will provide a predictive community based on the site attributes. Biocriteria are narrative descriptions or numerical values adopted into water quality standards that can factually and quantitatively describe a desired condition of aquatic life. The purpose of biocriteria is to establish standards based on biological characteristics that will protect the designated aquatic life use that can be used to direct water quality management. The predictive community may provide a better indication to evaluate the effects of sedimentation than other diversity indices utilized in the past. An advantage to this approach is that inferences regarding impairment are made independently of knowledge of stressors that might be affecting streams. This modeling approach has been widely utilized in Great Britain and Australia and many states are adopting the approach to evaluate compliance with the Clean Water Act.

11. Riparian Vegetation

Indicators: a. Canopy Cover
b. Large Woody Debris

Riparian vegetation is an important component and structure of the aquatic system. Riparian vegetation regulates the exchange of nutrients and materials from upland forest to streams (Gregory et al. 1991). During floods, water moving at high velocity transports large amount of sediments within steams. As it rises up and then over the banks, it flattens flexible streamside vegetation such as willows and grasses into mats that hug the stream bank and adjacent ground. . A compact mass of stream bank vegetation can contribute substantially to the acquisition of sediments needed to build and maintain productive stream banks (Platts 1991). Most large woody debris (important to the proper functioning of small stream channels) enters from a 20 to 30 m wide band of riparian forest on each side of a stream (McMahon and Hartman 1989). Streamside vegetation

shades the stream and therefore influences water temperature. Vegetation provides a temperature moderating effect by intercepting solar radiation in the summer and reducing back-radiation during cold months (Platts 1991). Streamside vegetation provides habitat for terrestrial insects, which are important food for trout, and other fish species (Platts 1991). This vegetation also directly provides organic material to the stream, which makes up about 50% of the stream's nutrient supply for the food chain (Cummins 1974).

Canopy Cover: Water temperature is a limiting variable for fish species. Water temperature influences fish migration, egg maturation, spawning, incubation success, growth, competition, diseases; and pollutants (Armor 1988). The Fresno River watershed is primarily within the "rainbow trout zone" as described by Moyle (2002). Water temperatures are characterized as being generally less than 21° C. The lower elevational portions of the watershed represent a transitional zone between cold and warm water species and might best be described as "cool" water, as temperatures exceed 21° C. Stream shading influences habitat for both aquatic and riparian species. Manipulation of streamside vegetation alters the physical and chemical properties of the stream. Water temperature is correlated closely with levels of dissolved oxygen, and both water quality elements can be limiting factors for aquatic species. Water temperature is affected by upstream water temperatures; discharge; length of reach; stream width; amount of daylight; shading; radiation penetration; channel friction; and air temperature (USGS 1997). Of these elements, stream shading is that most susceptible to change. The reduction or removal of riparian vegetation increases solar radiation. Increased solar radiation affects stream temperature and primary productivity. Changes may be expressed as events that result in total loss of vegetation (fire) or a closed canopy due to stand density.

Canopy cover can be measured by the percent of solar radiation blocked by riparian vegetation. This is easily accomplished with the Solar Pathfinder (Platts et al. 1987).

Large Woody Debris: Large woody debris (LWD) is integral to structure and functioning of forest stream ecosystems (Maser et. al. 1988). LWD influences physical form of the channel, movement and retention of sediment and organic matter, and biological community composition. The natural process for debris input is blow-down, debris torrents, debris avalanches, and undercutting of stream banks (Keller and Swanson 1979). Studies in the Pacific Northwest indicate that LWD influences pool formation, pool size and location, deposition of spawning gravels, and cover for fish (Sedell et al. 1988). However, Sierran Nevada studies (Berg et al. 1993; Ruediger and Ward 1996) have not indicated LWD play as significant a function in pool forming or sediment trapping. Both studies also indicate that LWD presence is independent of stream order and channel type. However, LWD is an important component in Sierra Nevadan aquatic/riparian systems due to cover provided; habitat complexity; and nutrient inputs.

Large woody debris is described by the number of pieces greater than 30 cm diameter and 3 m in length, with at least one end located within the active channel, over a 100 m reach. This is easily quantified by counting pieces of wood over a measured distance on a reach of stream (Ruediger and Ward 1996). These size criteria are based on the results

of Ruediger and Ward, which indicates those LWD > 30 cm provided 92% of the overall volume of woody debris, were more stable and were those more likely to form pools and retain sediment.

12. Transportation

Indicator: a. Infrastructure, Roads

The number of miles of National Forest System Roads, by functional class, which meet current operational maintenance standards, is reviewed

13. Recreation

Indicator: None

14. Contemporary Native American Use

Indicator: None

15. Economic

Indicator: None

16. Special Uses and Adjacent Land Uses

Indicator: None

17. Atmospheric Particulates

Indicator: a. PM10

PM10 defines air quality in terms of the creation of dust and smoke particles (particulate matter- PM) 10 microns is size. This is measurable with current technology and there are models which will predict emissions generated by various projects such as burning (smoke) or road use (fugitive dust.)

Chapter 3 Reference Variability

A. Reference Variability

Reference variability has often been referred to as the "natural range of variability" or the 'historic range of variability". It is the distribution of values for an Environmental Indicator over a selected period of time. The concept of reference variability plays a major role in developing desired conditions.

Reference variability in this landscape analysis is based on the following premises: 1) ecosystems adapted over an extended period of time and present the best chance for sustainability through the future; and 2) management designed to maintain or reproduce key ecosystem components, conditions, structures, and processes is the most likely management approach to sustain ecosystem integrity and productivity (Sustaining Ecosystems: A Conceptual Framework, 1995).

For most of this landscape analysis, the temporal period used to evaluate the environmental indicators is the 150 year period preceding 1850, when extensive Euro-American settlement brought impacts upon the landscape with the advent of the California gold rush. This period would also incorporate the effects of Native American activities upon the landscape.

B. Reference Variability's for the Fresno River landscape

1. Vegetation Mosaic

Indicators for terrestrial features are discussed on the basis of major vegetation types and this referencing system is expanded upon in the Fire and Wildlife Element Sections.

Indicators: a. Vegetation Species Composition
b. Vertical Diversity
c. Horizontal Diversity

Chaparral Structural Group: This structural type is dominated by shrubs and small trees. Conifers may be present, but conifer cover is less than 10 percent (Mayer and Laudenslayer Jr. eds. 1988).

A typical montane hardwood habitat is composed of a pronounced hardwood tree layer. Tree heights tend to be uniform, up to approximately 20 meters (60 feet). On poorer sites, mature trees typically are 10 to 15 meters (33 to 49 feet) tall with dome-shaped crowns almost as wide as the trees are tall. On rocky summits, (and canyon side slopes) canyon live oak (and interior live oak) is a shrub of small diameter, usually lass than 4 meters (13 feet) in height. Also included may be the Interior live oak plant community as the sole or dominant shrub in canopy. Birchleaf mountain-mahogany, California coffeeberry, canyon live oak, chamise, manzanitas, poison-oak, and or wedgeleaf ceanothus may be present. Emergent California buckeye and foothill pine may be

present. The shrubs are generally less than 6 meters tall with a continuous or intermittent canopy.

Mixed Chaparral is a structurally homogeneous brush-land type dominated by shrubs with thick, stiff, heavily cutinized evergreen leaves. Shrub height and crown cover vary considerably with age since last burn, precipitation regime, aspect, and soil type. At maturity, Mixed Chaparral typically is a dense nearly impenetrable thicket with greater than 80 percent absolute shrub cover. Canopy height ranges from 1 to 4 meters (3.3 to 13.1 feet), occasionally to 6 meters (19.6 feet). Mixed chaparral is a floristically rich type including interior live oak, chaparral oak and several species of ceanothus and manzanita (Mayer and Laudenslayer Jr. eds. 1988). This plant community is a complex of widely varying communities characterized by wedgeleaf ceanothus and interior live oak in combination with a complex mix of shrub species. Interior live oak and wedgeleaf ceanothus are usually well represented in the stand, but may not always be dominant. It is typical that none of the shrub species dominate. Common associates are California buckeye, chamise, Mariposa manzanita, deer brush, buck brush, Brewer oak, flannel bush, mountain-mahogany, and poison oak.

Between the years 1750 to 1850 the chaparral zone was probably similar in overall character to that seen today, although possibly species diversity was higher under pre-suppression fire regimes (which are assumed to have had shorter fire intervals). The upper limit of this zone was at a lower elevation at this time, before intensive logging and fire-suppression, which has allowed extensive fields of mariposa manzanita dominated chaparral to replace areas formerly occupied by ponderosa pine forest.

The chaparral of eastern Madera is extremely diverse with many subtypes. Dominant species typically seen on south slopes are mariposa manzanita (Arctostaphylos viscida ssp. mariposa), buckbrush (Ceanothus cuneatus), chaparral whitethorn (C. leucodermis) yerba santa (Eriodictyon californicum), interior live oak (Quercus wislizenii), and, mountain mahogany (Cercocarpus betuloides). Common species on north slopes are canyon live oak (Q. chrysolepis), interior live oak, deerbrush (Ceanothus integerrimus), poison oak (Toxicodendron diversiloba) redbud (Cercis occidentalis), and scattered California buckeye (Aesculus californica. The chaparral north of the Fresno River is dominated by chamise (Adenostoma fasciculatum), with varying proportions of buckbrush, mariposa manzanita, bush poppy (Dendromecon rigida), and yerba santa.

The herbaceous component of the chaparral throughout the Forest would have been largely visible after fires, as is the case today. Much of the species diversity in the chaparral derives from the herbaceous component largely existing as a seed bank between fires. After fire, typical annual fire-following species are golden eardrops (Dicentra chrysantha), whispering bells (Emmenanthe penduliflora), Venus' looking glass (Triodanis spp.), to name but a few. The most notable difference in the plant community during this time would have been the lack of introduced annual grasses and forbs.

Disturbance by fire was the most important agent in the chaparral, and dominant shrub species exhibit adaptations that can be interpreted as evolutionary responses to fire

(Keeley and Keeley 1994). The vegetation has evolved two main strategies for surviving burning: many species exhibit vigorous sprouting following fire; others have seedcoats that are altered by fire to favor germination (Kilgore 1981).

The natural fire regime was variable with respect to frequency and intensity depending upon the species composition and slope aspect. Natural fire cycles may have been as short as 20-25 years or as long as 50-100 years (Kilgore 1978). Keeley and Zedler (1978) suggest that with the shorter cycle there were fewer dead shrubs before the fire resulting in less intensity, lower fire-caused mortality of sprouting shrubs, and smaller openings for seedlings. This regime favored sprouting shrubs over those reproducing entirely from seed. The longer cycle resulted in more dead shrubs which produced higher fire intensity and larger openings with more fire-caused mortality of sprouting shrubs and fewer potential re-sprouts.

From 1850 to 1960 fire suppression went into full effect. The fire regime and pattern of fire changed in the chaparral after the decline of the Native American seasonal burning and the influx of settlers and stockmen after 1850. The Mission Period introduced cattle and highly flammable annual grasses which burned frequently and had disastrous effects on regenerating chaparral (Dunn 1994). The mosaic of varying age-classes created by Native American spot burning gave way to large expanses of even-aged brush.

Today age class mosaics and openings created by Native American burning are almost non-existent. Species mix has changed as obligate seeders such as ceanothus are dying out, increasing the proportion of dead material. The upper limit of this zone may have increased in elevation, aggravated by increasing plant density and drought, leading to bark beetle attacks on ponderosa pine, which have allowed extensive fields of mariposa manzanita dominated chaparral and replace areas formerly occupied by ponderosa pine forest.

Hardwood-Conifer Structure Group This structural type contains both broad-leaved and coniferous species. Total tree cover exceeds 10 percent of the landscape. Of the tree cover, at least half is in broad-leaved trees like oak species. Conifer cover is no less than 25 percent of the tree cover.

Montane hardwood-conifer habitat includes both conifers and hardwoods often as a closed canopy. The community often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees. Conifers reach 65 meters (200 feet) in height in the upper canopy and broadleaved trees 10 to 30 meters (30 to 100 feet) in height comprise the lower canopy. Most of the broadleaved trees are sclerophyllous evergreen, but winter deciduous species also occur. Common associated in this type are ponderosa pine, incense-cedar, California black oak, canyon live oak, sugar pine, and interior live oak (Mayer and Laudenslayer Jr. eds. 1988).

Conifer Structure Group - Tree canopy greater than 10 percent cover. Hardwood cover is less than 50 percent of total tree cover.

Tree spacing in ponderosa pine stands varies from open patchy to extremely close. On high quality sites, virgin stands may be 46 to 55 meters tall (150-180 feet). Typical overstory coverage of all layers may exceed 100%. The ponderosa pine habitat includes pure stands of ponderosa pine as well as stands of mixed species in which at least 50 percent of the canopy area is ponderosa pine. Associated species vary depending on location in the state and site conditions. Typical tree associates include white fir, incense-cedar, sugar pine, canyon live oak, interior live oak, and California black oak (Mayer and Laudenslayer Jr. eds. 1988).

a.) Ponderosa pine plant community: Ponderosa pine is the sole dominant or important tree with black oak or incense-cedar in the canopy. Associated species are canyon live oak, interior live oak, sugar pine and/or white fir. Trees are less than 70 meters tall, canopy is intermittent or open, and shrubs are infrequent or common. The Ground layer is sparse to abundant and may be grassy (Sawyer and Keeler-Wolfe 1995).

b.) Ponderosa pine/live oak plant community: This plant community is a two tiered stand with ponderosa pine the dominant overstory species and live oak dominant as an understory species. Ponderosa pine tree cover is generally scattered and less than 15 percent in late seral stands while oak cover is generally higher than 20 percent. Associated shrub species include Mariposa manzanita and wedgeleaf ceanothus.

From 1750 to 1850 ponderosa pine zone occurred between 2,500 and 4,500 feet. It was predominantly ponderosa pine with varying mixtures of incense cedar and hardwoods. The latter occurred as scattered individuals or in small stands, particularly when favored by Native American burning.

The horizontal and vertical diversity resulted from periodic disturbance, coupled with the fact that ponderosa pine grows taller than both California black oak and canyon live oak and the dominant tall brush species in the zone is non-sprouting manzanita. So, as McDonald and Tappeiner say in the SNEP Report (1996), "Fire is both a blessing and a curse for . . . hardwood species. On one hand, fire creates the necessary disturbance by killing the conifers. The hardwoods often are killed as well, but only aboveground. Below ground, they retain the capability to sprout and grow rapidly. On the other hand, the thin, poorly insulated bark provides little protection from heat. Just a little fire kills hardwood trees to groundline." The same can be said for non-sprouting manzanita except after fire it proliferates from abundant seed stored in the soil, often for decades. Stand structure was a mosaic of even-age groups, most of which were conifers but some of which were brush.

During the period before significant Euro-American influence, the ponderosa pine type experienced frequent, low-intensity fires with return intervals ranging from 5 to 10 years (Martin 1982). Although there is disagreement on the relative "openness" of the forest during this time period it is agreed that fire played a significant if not dominant role in shaping the vegetation pattern (SNEP 1996). It is believed much of this type had a park-like appearance with mosaics of small, singled-aged groups, with all ages represented (Toth, et al 1993).

The impacts of logging and fires, which often were related to sheep grazing, created more suitable open habitat. There was a strong edge effect for species assemblages, as the black oak and ponderosa pine formed a transition zone between the valley and Sierran forests. Also, the mosaic pattern on the landscape leads to greater habitat diversity.

Levels of mortality of conifers, the agents, and their relative importance is largely speculative in the early period.

During the period 1850 to 1960 logging began to provide lumber for settlements in the foothills and Central Valley in the 1850's. The largest pines, particularly sugar pine, were the main source of lumber. Extensive rail and flume systems were developed to move logs from the ponderosa pine zone to the Valley. Large areas of the zone, particularly around Fish Camp, Sugar Pine, were denuded. (Toth et al 1994).

The over utilization of ponderosa pine and uncontrolled fires during the late 1800's and early 1900's greatly reduced the proportion of ponderosa pine. Native American burning was virtually eliminated by the 1870's; and the suppression of wildfire after World War II led to massive fuel buildups, the development of fuel ladders that could carry fire into the crowns of trees and a change to a more severe fire regime (Toth, et al 1993).

This period saw an increase in the relative percentage of hardwoods, including denser canopies and a higher proportion of smaller trees, white fir and incense cedar, at the expense of ponderosa pine. The more fire resistant late-successional ponderosa pine was greatly reduced, as was the proportion of sugar pine. An increase in timber production at the end of the period resulted in extensive plantations with more highly stocked growing conditions than would have occurred under the natural fire regime. Patch size increased due to the occurrence of large fires and because of extractive forest management practices.

Fire and logging significantly reduced late-successional vegetation, converting it to early seral stages. Montane chaparral increased dramatically, as forest was converted from tree cover to shrubs, following logging and repeated fires.

The relative importance of four mortality agent groups in the western United States, historical pre-1952 trends included insects (70%), disease (10%), fires (10%), and other (10%) (Steed and Wagner 2002, PSW-GTR-181). The "other" mortality agent group was primarily due to suppression by other trees. Excluding fire and "other" causes, the relative importance of insects and disease groups can be broken out to bark beetles (65%), "other" insects (15%), "other" pathogens (15%), and nominal for defoliating insects, root disease, and stem and heart rot. Deed tree densities were probably light over the landscape because of the weeding effect of light intensity fire, and the tendency to support fewer larger trees. Dead trees were mostly scattered in nature, except in small pockets where bark beetles had a tendency to kill groups of trees.

Since 1960 the ponderosa pine zone has become characterized as having "a higher ratio of hardwoods to softwoods than occurred in the past, general absence of pine old growth,

strong "people pressure", and too much forest fuel" (Toth, et al 1994). At the beginning of this period, even-aged management using the clearcut harvesting method was adopted as the preferred method on the Forest. Many highly successful ponderosa pine plantations were established in the first decade. Public concern about the appearance of clearcuts and possible effects on the long term productivity of the ecosystem led to a shift to partial cutting during the second decade. Mostly the larger pines were harvested resulting in localized declines in their genetic diversity and in small openings with conditions favorable for brush and hardwood invasion. Beginning about 1980 the Forest recognized many ponderosa pine stands had become understocked with pine so the clearcut harvesting method was once again adopted resulting in many more pine plantations being successfully established.

According to McDonald and Tappeiner (SNEP, 1994), old-growth hardwoods stands are decadent and dying and there is little regeneration present to replace them. Artificial regeneration techniques are ineffective. Where younger stands or groups occur, tree density is too high resulting in very poor growth. The Forest has not had a management strategy for the major hardwood species. It has rather emphasized, until recently, their conversion to groups of pine. However, these hardwoods have great worth when their contribution to the total ecosystem is recognized.

The lower limit of the ponderosa pine zone has migrated to about 3000' as a result of drought induced pine mortality, fire control, and salvage logging. Although many pine plantations have been established, outside of clearcuts reforestation has been marginally successful. Often small openings were planted but could not be found again for care and maintenance. The historic ponderosa pine forest is now a combination of oak woodland, brushfields, plantations and typical ponderosa pine.

South slopes are still quite open, but trees are smaller and the understory of brush is older and denser with less forbs and grasses. Ponderosa pines occur more frequently on north slopes and riparian areas where they mix with large black oak. However, the increased density and age-class of whiteleaf manzanita and invasion of incense cedar in the understory has reduced the size of black oak crowns, availability of water and nutrients, and increased fire intensity and size.

By 1978-1997 there was a shift in the relative importance of conifer mortality agents: disease (20-65% root disease and dwarf mistletoe), fire (10%), and insects (5%).

Mixed Conifer Structural Group: Tree canopy greater than 10 percent cover. Hardwood cover less than 50 percent of total tree cover.

The Sierran mixed conifer habitat is an assemblage of conifer and hardwood species that forms a multilayered forest. Forested stands form closed, multilayered canopies with nearly 100 percent overlapping cover. When openings occur shrubs are common in the understory. At maturity, the dominant conifers range form 30 to 60 meters (100 to 200 feet) tall. Five conifers and one hardwood typify the mixed conifer forest; white fir, Douglas fir, ponderosa pine, sugar pine, incense-cedar, and black oak. White fir tends to

be the most ubiquitous species. Giant sequoia is a striking associate of the mixed conifer type (Mayer and Laudenslayer Jr. eds. 1988).

a) Sierra Mixed conifer plant community: Three or more equally important coniferous trees in canopy; typical species are black oak, incense-cedar, Jeffrey pine, ponderosa pine, sugar pine, and/or white fir may be present. Trees less than 70 meters tall, canopy intermittent, shrubs infrequent to common. (Sawyer and Keeler-Wolfe 1995).

b) Giant Sequoia plant community: Giant sequoia sole, dominant or important tree in canopy: black oak, Douglas-fir, incense-cedar, Jeffrey pine, ponderosa pin, sugar pine and or white fir may be present. Trees are less than 95 meters tall, the canopy continuous or intermittent. Shrubs are infrequent or common. (Sawyer and Keeler-Wolfe 1995).

c) Mixed Pine plant community: A co-dominance of Sugar pine and either Ponderosa or Jeffery pine. These species are also the primary regenerating species and each has greater than 10 percent cover in late seral stands.

The mixed conifer zone, during the 1750 to 1850 period, occurred between 4,500 and 6,000 feet. It contained various mixtures of ponderosa pine, sugar pine, white fir, and incense cedar. Various species of hardwoods occurred as scattered individuals or small stands. Black oak occurred on more productive sites, particularly when favored by Native American burning.

The horizontal and vertical diversity resulted from periodic disturbance, coupled with localized insects, diseases, blow-downs, and other disturbances to form a general upland forest landscape mosaic with a "fine-grained" pattern of single-storied, even-aged, and uniformly-sized stands, with scattered, small, even-aged openings that shifted in time across the landscape. Because of the general big tree character, age class distinctions would blur at the landscape level. From a distance, the forest would generally look homogeneous. "Courser-grained" landscape patters would occur in places as a result of large, more severe fires. The stands which colonized following the large, severe fires were also uniform in nature, and initially formed a more "coarse-grained" mosaic, until both age and localized disturbance events blended these areas into the overall "fine-grained" pattern. (Toth el al. 1993).

Native Americans practiced fall burning for a variety of cultural purposes as well as spring and early summer burning to reduce fire hazards around villages and encampments. Some fires probably spread beyond site specific target areas burning a larger area of the landscape. These Native American burning practices resulted in mixed conifer forests that were more open, black oak more predominant, and meadow systems larger and more extensive than today (Heady and Zinke 1978).

Fires were not widely stand replacing, yet some areas "probably escaped burning for much longer periods and built up sufficient fuel loads to burn with high intensity" (SNEP 1996) under favorable weather conditions resulting in small areas of stand-replacing fires

which created openings where patches of regeneration became established. Unburned patches were also present throughout low intensity burns where the fuel profile was discontinuous (Toth, et al 1994). Heady and Zinke (1978) characterized the result as a forest that was more open, black oak more predominant and meadow systems larger and more extensive than today.

The combination of vegetation and fire regime resulted in wildlife habitat that can be described by Wildlife Habitat Relationship types: Sierran mixed conifer, white fir, and ponderosa pine. WHR indicates that 161 species occur in the mixed conifer type. Riparian vegetation was more continuous and interconnected with other watershed ecosystems and habitats of a similar structure. It was dominated by larger, older trees in a less fragmented, more homogeneous pattern, with an overstory canopy closure generally greater than today. These areas were probably more complex in structure with denser overstory canopies than existed on surrounding upslope forest lands. The riparian areas were lush, wet, and shaded. Here, the overstory continued to be prevalent but understory shrubs, forbs, and low shade increased in amount and complexity, due to increased moisture availability.

The character and nature of fire disturbance in mixed conifer changed during the 1850 to 1960 period. There appears to have been a general change in the periodicity and seasonality of human-caused fires from that found prior to Euro-American settlement. Native American ignitions showed a steady decline.

Logging patch sizes were large, having the appearance of patches created by stand-replacing fires. At the beginning of the period, there was a "pulse" of conifer regeneration due to a combination of factors, including the loss of the grass-forb understory, reduced grazing pressures, reduced incidence of fire, periodic increase in precipitation, and the ability of white fir and incense-cedar to persist under closed canopy conditions.

By about 1945, the imposition of fire suppression policy, expansion of transportation networks, and logging in the mixed conifer created a change in the characteristic landscape. Broad cutting and large slash fires created patch clumpiness and even-aged stands over a much increased land base. The process of low-intensity fires which had created the historic "fine grained" character of the mixed conifer forest was lost. There was a gradual shift away from frequent, low-intensity fires toward conditions that increased the risk of more frequent high-intensity fires and resulting larger patch sizes on the landscape.

Though the forests appeared intact, their composition changed. Forests were becoming both shorter and denser. Selective logging practices reduced the abundance of the once dominant large trees and their contribution to the overstory tree canopy. Conversely, understory trees became commonplace, causing both an increase in overall tree density and canopy closure. There was a continuation of the trend from the "fine grained" open pre-Euro-American settlement forest, toward a patchy "coarse grained" landscape and a more closed canopied forest. Patches, when created, were generally even-aged with fewer trees species and less structural diversity. They were also larger than the existing, more

natural patches. Whereas prior to Euro-American settlement it was difficult to differentiate between age groups and patches, it became easy to identify young, even-aged patches on the landscape.

Many of the oldest trees in our stands were established before 1850, while the younger trees (second-growth) were established after that date. These second growth-stands are a result of Euro-American influences that included a great demand for timber, fuel wood and meat. They are a result of human activities beginning with the gold rush of 1849, where heavy cuttings were made in stands near mines. During seasons of heavy precipitation, such as the winter of 1861 to 62 the establishment of seedlings was good, the majority of second growth dates from the decade 1861-1870. Logging occurred over extensive portions of the zone beginning in the 1880's. Selective cutting of the most valuable species occurred until about 1900 when the advent of heavier logging machinery resulted in extensive removal of large pine so second-growth even-aged stands become more irregular in age and weighted with fir, cedar and smaller pines. After World War II the demand for lumber for housing resulted in a dramatic increase in road building and harvest.

In 1933 Dunning and Reineke wrote, "... the conditions favoring the establishment of larger areas of even-aged second-growth have largely ceased to exist. The pure ponderosa pine-sugar pine types will be cut out first because of high value and accessibility. The comparatively small area of sugar pine-fir type will be culled for sugar pine rather early. Types with a heavier proportion of true firs will probably not be cut extensively until the available pine was exhausted. The treatment of remaining virgin timber will determine the future of second-growth. So long as virgin timber is available, little cutting of second-growth is to be expected." Now some 60 years later our virgin timber has been logged or is preserved in our National Parks, and second-growth stands make up our National Forest resource base.

Management practices over the last 100 years have created fire-prone, closed-canopied, multi-storied stands. These have replaced relatively open, large-tree stands as the dominant landscape feature. The once continuous open grass/forb understory has largely been replaced by relatively dense groups of shrubs and smaller trees. Single tree harvest and fire exclusion have caused a continued shift away from shade intolerant species toward shade tolerant white fir and incense-cedar. Mature black oaks have also been impacted, both in the loss of crown size and actual mortality.

No large severe fires have occurred to date in the Fresno River mixed conifer. Across the Sierra, the fire regime in the mixed conifer forest has shifted from low-intensity; frequent fires to high intensity stand-replacing fires. Based on fire history data, fire return intervals in mixed conifer have been reduced to only 3 percent of what they were during the pre-settlement period (SNEP 1996). Dense tree stands are more conducive to severe, crown fires and other massive disturbance events. The ecological support team for the California spotted owl identified excessive woody fuel buildup, overstocked stands, and the resulting increased risks of stand-replacing fires as the number one threat to mixed

conifer forest stability. They determined that all other issues are of secondary importance (Toth, et al 1993).

A significant effect of controlling fire has been for the mixed conifer zone to creep downward in elevation taking over some of the ponderosa pine zone. In addition there has been a distinct shift towards the more tolerant tree species such as white fir and incense cedar and brush species such as deerbrush and chinquapin (Castanopsis sempervirens).

There was a continuation of the trend from the "fine-grained" open forest toward a patchy "coarse-grained" landscape and a more closed canopied forest. (Toth et al 1993). During the decade of the 1960's and 1980's stands of even-aged mostly ponderosa pine were created in the clearcuts which were the dominant cutting method of these periods. The structure of the forest both horizontally and vertically became less diverse and more fragmented.

2. Plant Species

Indicator: a. Floristic Diversity

Distribution and abundance of Sensitive plant species

Rawson's flaming trumpet. There is no evidence that populations of flaming trumpet were more numerous in the 1800s, although it may have been more abundant prior to logging and fire suppression. This riparian-dependent herb is considered to be a relict species which became increasingly restricted in range as aridity increased after the Pliocene (Grant, 1959). Taylor et. al. (1987) observed that the pattern of endemism for Rawson's flaming trumpet is similar to that observed in giant sequoias (*Sequoiadendron giganteum)*. By 1850, this species probably existed in about the same locations as it does today. Habitat conditions at the Nelder Creek site were probably more suitable than today because the site is degraded from excessive vehicle and foot traffic (see existing condition section).

Mountain lady's slipper orchid. There is no evidence that mountain lady's slipper orchids were more abundant in the central Sierra Nevada prior to European contact. However, since 1980, four of the 11 occurrences of this rare orchid known at that time may have disappeared (Sierra NF files, 2004). A new population was found in 2000, bringing the current known number of occurrences to 12. Historical logging and fire suppression (described elsewhere in this document) have brought about drastic changes in the structure of the mixed conifer forest around Nelder Grove, and this has probably affected the vigor of the lady's slipper populations.

Distribution and abundance of invasive non-native plants

Prior to European contact, there were no invasive non-native plants in the watershed.

3. Soil Erosion and Productivity

The indicators below were selected to measure soil properties and conditions that influence long term soil productivity and soil hydrologic function. A complete description of soil quality standards is given in FSH 2509.18 , R5 Supplement No. 2509.18-95-1 (Soil Management Handbook).

Indicators: a. Soil Cover
b. Soil Porosity
c. Down Logs

Soil cover can consist of living vegetation, non-living organic material, and coarse rock fragments on the soil surface. The level of soil cover indicates several things related to long term productivity and the hydrologic function of soil. First, the percentage of effective soil cover is a significant factor determining the erosion hazard potential. The higher the level of soil cover the lower the potential for raindrop impact and destruction of surface soil structure. Soil cover enables more water to enter (infiltrate) the soil rather than run over the surface and cause erosion.
The amount (mass) of soil cover in the form of living and non-living organic materials is an indication of amount of food sources for soil organisms. Soil organisms decompose and transform organic materials in the soil and in close contact with the soil surface. Their activities result in nutrient mineralization as well as the formation of very stable forms of soil carbon, such as humus.
Soil cover is measured using randomly located transects across the activity areas. Generally undisturbed forested areas have 100% soil cover. It is a Sierra NF LMP Standard and Guideline that at least 50% well distributed soil cover be maintained during management activities. This should be considered a minimum. The level of soil cover generally will increase with time and natural revegetation.
The thickness of the litter and duff layers generally increase with increasing elevation due to cooler average air and soil temperatures and reduced microbial activity. The thickness of the litter and duff layer is also dependent upon the soil productivity and vegetation type at various sites as well.

Soil porosity is an indication of soil structure. It determines how well air diffuses into the soil for root and microorganism respiration. It also affects how easily roots can physically penetrate the soil and access nutrients and water for growth. Reductions in soil porosity can occur when heavy ground based equipment is operated on the soil, especially when the soil is wet to moist. The decrease in soil porosity (or densification) is often referred to as compaction. A compacted soil has a lower level of pore spaces (especially macropores) so water and air cannot move or diffuse as easily compared to an undisturbed soil with higher porosity. Also soil porosity directly affects the hydrologic function of soil. Soil with low porosity has low infiltration and permeability rates and precipitation as rainfall or snowmelt can concentrate on the soil surface and runoff causing erosion.
A qualitative method to evaluate soil porosity is to conduct randomly located transects and determine the relative resistance to penetration into the top of the soil with a tile

spade. Resistance to penetration in areas that are undisturbed are compared to spots along the transect. Other indications of previous disturbance, such as skid trails, are also noted. A more quantitative approach is to gather soil core samples at intervals along the randomly located transects. The core samples can be used to collaborate tile spade observations. The R-5 Soil Quality Standards (FSH 2509.18, R5 Supplement No. 2509.18-95-1) provide for allowable changes in bulk density which would result in a 10 percent reduction in soil porosity. The allowable changes are presented in Exhibit 01 in the standards.

Down logs and large woody material, in some ecosystems, on the soil surface can provide important sites for microbial activity and nutrient availability. The R-5 Soil Quality Standards call for leaving 5 well distributed logs per acre representing the range of decomposition classes. Desired logs are at least 20 inches in diameter and 10 feet long. This differs slightly from the size of logs desired for wildlife but wildlife logs would generally fit the desired quality and size for soil quality. Some ecosystems are not capable of producing the number of logs or the natural fire return interval would preclude the persistence of large woody material long enough to reach the higher decomposition classes. Previous monitoring on the Sierra NF has indicated that the number and range of decomposition classes called for under the R-5 soil quality standards probably can only be reached in true fir stands. At lower elevations in the Mixed Conifer and Ponderosa pine stands the natural fire return interval would probably only permit the occurrence of Class I to III logs. This indicator needs to be evaluated further for the Fresno Watershed using available fuel loading surveys.

4. Fire

Fire history for the chaparral is lacking because the dendro-chronological evidence is largely destroyed due to the severe nature of fires in this type. Historical information is limited to fire records and anecdotal accounts. Disturbance by fire was the most important agent in the chaparral, and dominant shrub species exhibit adaptations that can be interpreted as evolutionary responses to fire (Keeley 1994). The vegetation has evolved two main strategies for surviving burning: Many species exhibit vigorous sprouting following fire; others have seed coats that are altered by fire to favor germination (Kilgore1981). Although species diversity in the chaparral zone has probably been altered from what existed with the historic fire regime, its overall character is likely similar.

The ponderosa pine/hardwood zone (PPH) occurs above the chaparral and below the mixed conifer zone. The largest concentration of hardwoods tends to be at lower elevations where live oak forms dense, closed canopies with a scattered over story of pine. This zone is adapted to high summer temperatures and low soil moistures. The density of ponderosa pine increases with elevation within the zone, and the live oak hardwood is replaced by a lower volume understory of shrubs and bearclover. The fire regime is variable in the zone as it transitions from chaparral to mixed conifer. Fire Return Rate and Severity Periodic disturbance by fire was a historically important influence within this zone. During the period before significant Euro-American

influence, the PPH zone dominated by ponderosa pine experienced frequent, low-intensity fires with return intervals ranging from 5 to 10 years (Martin 1982). The hardwood-dominated areas at lower elevations within PPH likely experienced less frequent (perhaps averaging every 20 years), but higher intensity crown fires that moved upslope from the chaparral. Such fires likely moved through the chaparral and into the live oak as crowning fires, dropping to the ground with breaks in stand continuity. The intermixed larger ponderosa pine likely survived such intrusions from the chaparral because of tree size and characteristics (thick bark, high crowns). The hardwood portion within PPH was undoubtedly influenced as well by lower intensity, backing fires, which moved from the pine-dominated area above it and kept it more open than today.

The mixed conifer zone occurs above the ponderosa pine and below the true fir zone. There exist only anecdotal accounts of landscape patterns for most of the area prior to the 1900's, and those accounts vary (open, thick, dense) with little data to describe or quantify the descriptive terms. Available know ledge of fire history, fire effects and fire behavior was used in conjunction with anecdotal accounts by the SNEP team to "surmise that the landscape patterns in the mixed conifer zone were of a relatively fine scale (e.g., Bonnicksen and Stone 1982; Stephenson et al. 1991)".

There is a great deal of vegetative variety in the mixed conifer zone generally associated with elevation, site quality and topographic moisture effects (Rundel et al. 1977). In some areas, ponderosa pine dominates, in others white fire, with varying concentrations of sugar pine. In the Fresno River Watershed, an important component of the mixed conifer is the Nelder giant sequoia grove.

Fire played a major role with other disturbance factors such as insects, diseases and blow downs in shaping the vegetation composition and landscape patterns in this zone; creating a "fine grained" pattern of single-storied, even-aged, and uniformly sized stands, with scattered, small, even-aged openings that shifted in time across the landscape. The Ecological Support Team for the spotted owl indicated that because of this general big tree character, age class distinctions blurred at the landscape level making the forest look generally homogeneous from a distance (Toth et al. 1993).

Indicators: a. Fire Return Rate and Severity
b. Fire Seasonality
c. Fire Size and Distribution

The chaparral natural fire regime was variable with respect to return interval (frequency) and intensity depending upon the species composition and slope aspect. Natural fire cycles may have been as short as 20-50 years or as long as100 years (Keeley 1982; Kilgore 1987; Barro and Conard 1991). This regime favored sprouting shrubs over those reproducing entirely from seed. The longer cycle resulted in more dead shrubs, which produced higher fire intensity and larger openings with more fire-caused mortality of sprouting shrubs, and fewer potential resprouts.

Ponderosa generally has a low level of fuel on the forest floor controlled fire intensities. Fires in PPH were predominantly of low to moderate severity. High-severity portions sufficiently intense to kill most large trees were most often restricted to localized areas. The virtual elimination of Native American burning by the 1870's and the suppression of wildfire after World War II led to massive fuel buildups, development of fuel ladders that could carry fire into the crowns of trees and a change to a more severe fire regime (Toth, et al. 1993).

Mix conifer fire regime can vary considerably in both frequency and pattern of severity by topographic position, site quality, vegetation, and other local factors (SNEP 1996). Although fire disturbance regimes varied within the mixed conifer forest, fire scar analysis indicates these forests were subject to rather frequent low- to moderate-severity fires. Lightning and, in many areas, Native Americans provided the ignition source (Weatherspoon, Husari and van Wagtendonk1992). The average fire frequency for most sites was between 6 and 15 years (Show and Kotok 1925; Wagener 1961).

Although these fires were not widely stand-replacing, some areas "probably burn with high intensity" (SNEP 1996). Under favorable weather conditions, small areas of stand-replacing fires did occur which created openings where patches of regeneration became established. Unburned patches also occurred with low intensity fires where the fuel profile was discontinuous (Toth, et al.1993).

In the chaparral seasonality of lightning fires, which occurred in the late summer and early, fall was not only intensified but, also, seasonally modified by Native Americans. Ethnographic data indicates the Indians practiced spot burning of the brush as well as spring burning to create openings and manage wildlife and plant species (Lewis, 1973). Indian burning in the foothills below the chaparral most certainly moved into this zone to add to the age class mosaic and was an important component of the fire regime.

Ponderosa pine fires were generally lightning ignited in this zone; however, ignitions by Native Americans for cultural purposes may have occurred as soon as fuels would burn in the spring or during drier winter periods. Lightning ignited fires occurred mostly in the late summer or fall when grasses had cured and needle cast and dead fuels had dried sufficiently to carry fire. In the lower elevations of this zone, where hardwood dominates with a scattered overstory of pine, it is reasonable to assume fires did not occur until late in the summer when live fuel moistures of the live oak were sufficiently low to sustain the crowning nature of fire intruding from the chaparral.

In the mixed conifer the majority of fires recorded by fire scars occurred in the late summer or early fall when lightning occurrence was most frequent and fuel moistures lowest (Vankat, 1985). Native Americans also practiced fall burning for a variety of cultural purposes and used spring and early summer burning to reduce fire hazards around village encampments. Between the late 1860's and early1900's, sheep herders annually set fire to the higher elevation pasturage in the late fall to remove obstacles to movement (large, down logs) and in wetter sites to increase forage. Some fires probably spread beyond site-specific target areas burning a larger area of the landscape.

These burning practices resulted in mixed conifer forests that were more open, black oak more predominant and meadow systems larger and more extensive than today (Heady and Zinke, 1978).

Fire size and distribution declined in the chaparral after Native American Burning ceased. Although naturally ignited fires undoubtedly burned over large areas periodically, the patchiness or age-class mosaics created by Native American burning practices affected both fire size and distribution. There were likely many more age-classes represented and much more patchiness in the chaparral than seen today. The Mission Period introduced cattle and highly flammable annual grasses, which burned frequently and had disastrous effects on regenerating chaparral (Dunn, 1994). The influx of settlers and stockmen after 1850 combined with the reduction in Native American burning reduced patchiness and probably resulted in larger high severity fires in this type.

Fire history for the Sierra National Forest shows the most acreage burned during the period of 1900-1960 than any time since. Large wildfires, burning mostly in the foothill grassland and chaparral belt below the conifer forest consumed thousands of acres, mostly between 1920-1940. The mosaic of varying age-classes created by Indian spot burning gave way to large expanses of even-aged brush.

Almost without exception, every large fire (300+ acres) that has burned on the Sierra National Forest since record keeping began in 1911 originated in the chaparral. Prior to the 1994 Big Creek Fire (Pine Ridge RD), well over 95 percent of those fires were successfully suppressed before burning into the mixed conifer forest. Many of the largest fires started on private land outside and down slope from the National Forest.

Although in the ponderosa pine there is disagreement on the relative "openness" of the forest historically, it is agreed that the fire regime played a significant if not dominant role in shaping the vegetation pattern (SNEP 1996). Fires were dominated by areas of low to moderate severity with high-severity portions (fires sufficiently intense to kill most large trees) most often restricted to localized areas, often a fraction of an acre to several acres--or occasionally several hundred acres--in size. Predominately high severity fires larger than a few thousand acres almost certainly occurred but were probably less common than they are today (SNEP 1996). It is believed much of this type had a park-like appearance with mosaics of small, singled-aged groups, with all ages represented (Toth, et al 1993).

The total amount of acres burned in the Sierra Nevada mixed conifer by lightning or Native American burning varied but was considered substantial. The generally low to moderate intensity fires occasionally burned under high intensity conditions (pockets of down fuel, hot afternoons, etc.) and created openings in the stand.

Within these openings or gaps, patches of regeneration were established and, in the largest openings, the less shade tolerant species were dominant (SNEP1996). Sugar pine and giant sequoia are known to require these patches of stand-replacing fires and resulting canopy gaps to allow recruitment into the intact canopy of the mixed conifer

forest (Parsons et al. 1989). Unburned patches were also present throughout low intensity fires.

As a result, each patch represented a distinct aggregation of trees that developed successionally as an independent entity. This created a complex mosaic of aggregations with patch sizes typically one-half to five acres (Bonnicksen and Stone, 1982; McBride and Sugihara, 1990). This burning pattern contributed to the complex mosaic of multi-aged patches throughout the mixed conifer. Similar fire patterns are currently found in the mixed conifer forests of the Sierra San Pedro de Martir National Park, Baja Norte, Mexico where traditional fire patterns still exist (Minnich et al, 1994a and 1994b).

5. Wildlife Species

Indicator:	a. Spotted Owls	c. Deer
	b. Furbearers	d. Goshawks

Pre-Euro-American Settlement 1600 to 1800: This time period reflects the high point of native population numbers, native population influence and is the date of origin for many of the older trees currently found here. Native Americans influenced the "natural" vegetation by setting fires and harvesting vegetation and wildlife. It is generally thought that even though their activities may have altered the natural ecosystem condition, it did not degrade it so as to result in habitat loss or stress upon wildlife populations. The forest generally had a high proportion of large diameter trees spaced fairly widely, with a rather open understory. Non fire-resistant trees were more concentrated along moist, cool riparian areas and north-facing slopes. Annual and perennial grasses and forbs were abundant. Areas taken up by villages, trails, agriculture, etc. were small and scattered. Wildlife populations generally were stable within the variability brought about by climate and natural disturbances.

Post-Euro-American Settlement (1800 to 1900): This era is characterized by a general change in periodicity and seasonality of human caused fires from that found prior to Euro-American settlement. While Native American-set fires decreased, fires set by settlers and sheep herders, and accidental fires, increased. This also marked the start of widespread resource exploitation: logging, mining, market hunting, and grazing. By the late 1800s, railroad logging and grazing had affected wildlife habitat to a great degree. The largest size classes of trees were logged, and large areas (even high elevation meadows) were heavily grazed by cattle and sheep. Hunting increased with the human population, and the eradication of large predators (wolves, cougar, and grizzly bears) was established. Market hunting of such wildlife as turtles, deer, and game birds was heavy and unregulated.

This period saw increasing regulation on both a State and National level of the uses of natural resources. By this time, both the timber wolf and grizzly bear had been extirpated from California. Cougar populations were diminished. Fire suppression had allowed increased growth of brush, and as a result of more forage and less predation, deer herds began to increase dramatically. Logging accelerated with the increased demand for wood

products brought about by WW II, increasing the proportion of early-seral stage forests. Human populations near forested areas began to grow.

Also during this period, fuel buildup and understory tree growth from fire suppression started to change the stand structure and fire behavior from pre-European norms. "The combination of logging slash buildup and understory tree growth created fuel ladders between the ground and overstory trees, a stand structure conducive to severe stand-replacing fires. As a result, the first large-scale, wide-spread crown fires began to appear." These types of wildfires are more destructive to habitat than the pre-European ground fire. Soil can be sterilized, and a previously forested stand may grow back to brush.

The heavy amount of railroad logging occurring within the Fresno River watershed during this period (especially the late 1800's to early 1900's) would have had a severe negative impact on the quantity and quality of old-forest habitat available to spotted owls, goshawks, and furbearers. Logging practices at that time generally did not take environmental consequences into consideration. In addition, fur trapping was having a detrimental effect on furbearer populations. This period probably marked the most severe human-caused impacts to wildlife populations in the known history of the watershed.

Post War Years (1945 to 1990): This period has seen dramatic shifts in the use of the forest and wildlife resources. Logging accelerated during the post-war "baby boom" years, reached a peak, and then fell over the last decade due, in large part, to increased environmental awareness and regulation. Deer populations reached a peak in the early 1960s, and have been falling ever since. The Oakhurst herd is estimated to be at less than 10% of its 1961 population level (Peabody, 1984). Human development of foothill areas and land adjacent to the forest boundary (the urban interface) has increased and continues to grow. Deer winter range has declined in quality and quantity, mostly due to human encroachment. A moratorium on the hunting of mountain lions has allowed their population to increase substantially over the last decade. Most of the non-wilderness areas of the forest are heavily roaded, allowing access by growing numbers of recreationists, woodcutters, and other forest visitors.

As logging decreased in the area and the railroad logging era came to a close, second-growth conifer forests began to recover. With increased fire exclusion, these forests had a different character than the pre-European forests. The overall effects on the ponderosa pine and mixed conifer forest types have been a decrease in the average tree diameter, an increase in the number of trees per acre (up to a factor of 10 by some estimates), and an increase in brush and non-fire resistant tree species (such as cedar and white fir). Several years of drought had stressed the densely packed trees to the point that insect infestations caused a great deal of epidemic mortality in the early 1980's and again in the early 1990's. A series of very wet winters have generally ended drought related mortality since 1994. Continuing salvage efforts have mitigated some of the potential fuel buildups, but not enough to improve overall forest health or decrease the risk of stand-replacing wildfire except in very small, localized areas.

The current population of spotted owls has recovered to the point that surveys from the late 1980s to date have located owls in suitable habitat at population densities probably equal to pre-European forests. Within suitable habitat, spotted owl territories (home ranges) are adjacent to each other, indicating that the available habitat is filled to carrying capacity. Surveys over the last decade indicate generally stable site occupancy. Some owl activity centers discovered in 1990 were found to be occupied in 2002, often within the same nest stand. Goshawk populations are less well known, mainly due to the facts that this species has not been surveyed to the extent that spotted owls have, and they are more difficult to detect during surveys. However, limited surveys within the watershed and ongoing incidental sightings indicate that goshawks are present and persistent within suitable habitat over the last couple of decades.

Furbearer populations did not recover to the extent that owls and goshawks have. This is probably due to the fact that they not only suffered from past habitat loss, but also from hunting and trapping pressure. While the trapping and hunting of furbearers is no longer occurring in or near the analysis area, habitat loss and disruption of habitat connectivity within the Sierra Nevada range north of Yosemite National Park has resulted in an isolated sub-population of fishers. This subpopulation extends from the Sequoia-Kings Canyon National Parks in the south to Yosemite National Park, with the Sierra National Forest as the population core. The Fresno River watershed includes suitable fisher habitat, and surveys in 2002 and 2003 confirmed their presence there. While population numbers are not known, it is assumed that they are below carrying capacity and careful habitat management is needed to assist the continued recovery of the species on the Sierra. A long-range, broad-scale recovery plan is needed to restore habitat connectivity with fisher populations far to the north to restore genetic interchange for population diversity and resiliency.

Beginning the new millennium, weather has become somewhat more unstable and drought conditions have become more frequent and lasting. Endemic bark beetle infestation has increased in recent years and tussock moth activity in the fir has also increased. Southern California has experienced similar weather and drought trends, and mortality in some areas has increased to 80 percent of the timbered stands.

Expanded fuels reduction programs have cleared many acres in the front country chaparral and ponderosa pine types and it appears that deer herd populations may be on the increase. Untested yet, it appears that a change in deer behavior and opportunities have increased the number of resident deer compared to the traditional migratory animals.

6. Water Quality

Indicators: a. Turbidity

Water quality objectives are displayed in the Water Quality Control Plan (Basin Plan) for the Central Valley Regional Water Quality Control Board. These are as follows:

- If natural turbidity is between 0 and 50 NTU's there should not be an increase more that 20% of background.
- If natural turbidity is between 50 and 100 NTU's, increases should not exceed 10 NTU's.
- If natural turbidity is greater than 100 NTU's, increases should not exceed 10% of background.

Table 1 Natural Turbidity by watershed

Stream	Natural Variability (NTU)	State Allowable Variability (NTU)
Miami	1.29 – 75.3	1.55 – 85.3
Lewis	0.26 – 12.5	0.31 – 15.0
Nelder	0.94 – 5.04	1.13 – 6.05
Fine gold	12 - 40	14 - 48

The turbidity of the entire watershed should not exceed 85.3 NTU, so the variability ranges from 0.26 to 85.3 NTU.

7. Water Yield

Indicators: a. Stream Flow

Table 2 Stream Flow. Maximum and Minimum (From the three USGS gaging stations).

Stream	Maximum	Minimum
Miami	443	0
Fine Gold	3920	0
Fresno River (133sq.mile)	4290	0

The natural variability is from no flow to 4290 cfs.

8. Element: Watershed Condition

Indicators: a. CWE Methodology/Equivalent Roaded Acres (ERA's)

The CWE methodology, described in Forest Service Handbook 2509.22, calls for comparison of the %ERAs resulting from past land management activities to a threshold of concern (TOC). TOCs are also measured in %ERAs. The threshold of concern is established by relating the natural sensitivity of a subwatershed to the %ERAs associated with no impact, potential CWE impact, and actual CWE impact. In this way, the TOC representing the level where a potential or actual CWE response might occur can be identified.

It is important to remember that TOCs only represent a cautionary point where the potential for a CWE response increases rather than being a specific level that should not be exceeded. In many respects, this approach is like the fire danger rating system. Just as various physical measures establish whether fire danger is low, moderate, high, very high, or extreme, the TOCs define similar levels of increasing likelihood of a CWE response to additional land disturbing activity. Neither the fire danger rating system or CWE assessment can predict whether a response will occur. Even with a high fire danger, an ignition source will be necessary to a have a wildfire. Likewise, a CWE response will not occur in an over-threshold subwatershed without a triggering runoff event. Both systems provide an indication of the level of caution that should be exercised due to conditions present.

From this discussion of the Threshold of Concern (TOCs) concept, it seems apparent that the reference variability for cumulative watershed effects is between the lower bound and upper bound thresholds of concern.

9. Channel Morphology

Indicator: a. Sediment Delivery Rate/Residual Pool Depth

No reference variability has been documented.

10. Riparian/Aquatics

Indicator: a. Macro Invertebrates Community
b. Vertebrates

Observed/Expected ratio of 0.55 - 1.45
The RV represents the variability derived from reference sites (2001-2) used to develop the RIVPAC model. The reference variability of the macroinvertebrate community in the Fresno River and Fine Gold Creek watersheds is unknown. Aquatic habitat has likely been altered as a result of past timber harvesting; roading; exotic species; and grazing. These activities may result in a community that is within RV due to historic affects from stand replacing fires. The effect from management activities has been increased levels of sedimentation, which would also occur subsequent to a stand-replacing fire. As habitats have changed, species best able to adapt to the change may dominate. The community adjusts in response to water temperate, substrate, input of organic debris, introductions of exotic species. An aquatic community considered to be in good condition would be expected to be occupied by high percentage of pollution intolerant families from the orders plecoptera (stoneflies), tricoptera (caddisflies), ephemeroptera (mayflies); or elmidae (riffle beetles) and have a Observed/Expected ratio close to 1.

11. Riparian Vegetation

Indicator: a. Canopy Cover
b. Large Woody Debris

15 to 100 percent canopy cover
The range of variability is derived from surveys within the watershed and the projected results from stand destroying fires. Fires that decrease stream shading may also affect water temperature, levels of dissolved oxygen, bank erosion, and levels of sedimentation. Water temperatures vary greatly by water year type. During "Wet" and "Above Normal" water year types, heavy snowpacks result in prolonged duration of runoff and increased magnitude of streamflows. The net effect is that water temperatures remain "cold", providing that canopy cover is sufficient. This situation is contrasted with "Critically Dry" and "Dry" water years that result in a light snowpack and reductions in magnitude of flow and duration of runoff. Water temperatures below 3000 feet elevation may exceed 20° C during these years, especially if canopy cover has been altered. Contrasting the extremes in canopy variability cover (15-100%) would provide approximate daily mean stream temperatures ranging from 1°– 24° C.

See discussion on Large Woody Debris in Existing Condition section.

(Cultural/Social Hierarchy)

The team discussed at length how to incorporate the cultural/social key elements into the analysis. Ecosystem models based on biological and physical elements often disregard the complex interaction between humans and the environment. The team felt that many of the elements addressing the human dimension of the analysis were best displayed in a written history of the analysis area. Indicators were difficult to define and measure due to the complexities in evaluating cultural and social trends on this relatively small land base. The effects of human activity on the landscape are best measured by natural resource indicators.

The following section describes the history of the cultural and social events that shaped the analysis area. Existing conditions, desired conditions, and opportunities are described in detail in their respective chapters.

Cultural History

Since humans first inhabited the Fresno River watershed, they have been tied to the land and environment. Daily activities of the past have been similar to today as they also worked to provide food, shelter, clothing and amenities that could make life easier and more enjoyable.

Native Americans have inhabited the area the longest, for at least 5,000 years. At the time of contact with Euro-Americans, in the late 1700s and early 1800s, the Fresno River was the boundary between the Southern Sierra Miwok to the north and west, and the

Chukchansi Yokuts to the south and east. The Western Mono occupied the area around what is now Bass Lake. The boundaries between the groups were ambiguous, with a lot of overlap in this area between the Miwok, Yokuts, and Mono, each group using the natural vegetation and environment to sustain their populations. The area was abundant in food and basketry materials, with plenty of resources for temporary and more permanent shelters.

When the first Euro-Americans arrived in 1769 there were over 200,000 native peoples living in California. Starting in 1849, the gold rush brought 100,000 more Euro-Americans. Between 1848 and 1859, 75 percent (150,000) of the California Indians had died, mostly from diseases brought by the new immigrants. By 1900, only five percent (10,000) survived and were relegated to 87 reservations and rancherias.

As the forest-foothill management changed hands to the Euro-Americans and their descendants, their attitudes, beliefs and values were imposed. Rules and regulations were made for those with the largest economic, political, social, and cultural voice. Native American ties to the land became more restricted and sometimes non-existent as land was taken away. Their previously easy and abundant access to forest products was restricted and superceded by other economic or political uses.

The earliest Europeans and Euro-Americans in the Fresno River area were probably explorers, trappers and traders. Although the Spanish explored the foothills, there is no official record of them ever reaching this area. The first recorded expedition into this area was conducted by the Mariposa Battalion following existing aboriginal trails. This was a punitive expedition against the Native Americans during the Indian War of 1851.

Prospectors looked for gold, but the area was not as productive as the northern Sierra, so the Gold Rush did not result in extensive settlement in the Fresno River area. The town at Fresno Flats began in 1850 as placer mining camps were established along the Fresno River. Well-established camps were also at Coarse Gold Gulch and Fine Gold Creek in 1851, both within the Fresno River watershed boundary. In the 1860s, placer mining ceased being a major source of employment.

The Chinese numbered in the several thousands in the area during the mining heydays (about 2,000 in the Coarsegold Creek area). At the invitation of President John Tyler in 1841, they came as laborers to help develop the west coast. During the gold rush, the Chinese re-worked the mines that the Euro-Americans had abandoned, and barely made a living. They also panned for gold. They were used to help build roads, the flume from Sugar Pine to Madera, and later railroads, and they were depended on heavily to fight forest fires, as were most laborers of the time. Cedar Valley used to be the Chew Ranch, named after Chinaman Chew who farmed corn in the area.

Nelder Grove of Giant Sequoias is a 1500 acre special area, unique in its resources and history compared to other areas in the watershed. Within Nelder Grove are giant sequoias, other sensitive plants, archeological and historical sites of Native American inhabitants, remnants of early century logging, and recreational campgrounds and trails.

The Southern Sierra Miwok and Western Mono were the first to live amongst the giant trees and several pre-historic archeological sites are in the grove. The first Euro-Americans were probably from the Mariposa Battalion. According to the diary of Robert Eccleston, the battalion saw an area that fits the grove's description in April of 1851. Galen Clark of Yosemite first saw the grove in the spring of 1858, having been shown by the local Indians. He named it Fresno Grove as it was then in Fresno County. World renowned conservationist John Muir also walked and wrote of the grove. John Muir writes of meeting John Nelder in the grove in August of 1875, calling the new log cabin "handsome", finding an "old weary-eyed speculative, gray haired man on a bark stool by the door, reading a book" (Muir, 1901). John A. Nelder, for whom the grove is named, born in New Orleans 1817, headed for California gold in early 1850. After many unsuccessful attempts at mining he retreated to the grove where he made a homestead claim. He supported himself by making shakes, souvenirs of sequoia bark, and extracting red dye from the sequoia seeds. In 1889, cattlemen looking for stray cattle in the grove found Nelder dead, his cabin having burned several days earlier. Nelder's son Claudius inherited the estate apprised at $1,630 and in 1892, deeded the property to Madera Flume & Trading Company. The Forest Service legally acquired the grove in 1928.

Logging of all species occurred in and around the grove since the Euro-American's arrived. Two mills operated within the present Nelder Grove boundary (one sawmill and one shingle mill) with other mills located near the grove, within the Fresno River watershed.

The population increased in California as homesteaders, ranchers and lumbermen began to move into the area. The remains of several homesteads (Sivils Ranch, Board Ranch and John Nelder's cabin) are within the watershed. From the beginning, sheep and cattle ranchers maintained the attitude that forage available in the forest was there for their animals. Their primary concerns involved getting the animals safely up to the forest during the summer, back to the foothill ranches in the fall, and on to the market place. During the early 1900s, fires were deliberately set by the ranchers to provide good forage for their livestock the following year. Many of these fires set in the Fresno River watershed required suppression efforts as recorded by the Forest Service and account for most of the large fires recorded for this time period. Historical records indicate that ranchers continued the practice of burning rangeland well into the 1950's.

The first mill in the area was John Harms Mill, built in 1852. It was water and oxen powered. Operations were limited because of the need for water and pasture for the animals. In the aftermath of the Civil War, families moved to the area and began raising stock. The timber demand grew, as did the logging operations. As more animals were used, the demand for hay increased, bringing more farmers and other service oriented businesses to the area. The Southern Pacific Railroad Company arrived in the San Joaquin Valley in 1872. A flume was built in 1874 to get timber to the railroad and a mini construction boom ensued, bringing more men and families to the area.

During the settlement period, watershed resources continued to be the main draw to the area. Railroads, lumber mills, flumes, villages, work sites, cabins, corrals, holding pens, water systems, roads, phone lines, agriculture, etc. were built with the intent to get to the resources and get them to their respective markets. As more and more people came, some began to bring their families with them. In the mid-1860s, families began to settle in the Fresno Flats area. One of the first families was that of Robert Nichols in 1864.

Lumber companies followed close behind the miners and brought in workers and all that goes with housing and supporting large numbers of people. The Forest Service arrived in 1905, replacing the old Government Land Office and began to establish regulations and policies to bring forest use under management. In the 1930s, the CCCs built firebreaks, roads, and campground improvements. Recreation resorts and cabins were built and given special use permits.

U.S. Forest Service fire history and law enforcement records from the early 1900's reflect the value that was attached to timber. The Forest Service strongly supported the logging efforts with a very clear fire suppression mission directly related to the timber values. Logging companies diligently supported fire suppression efforts, dispatching crews as soon as needed to help in fire suppression. Regardless of the size of the fire, a timber cruise was demanded from the highest government levels, to assess the dollar damage to the timber. Investigations as to fire starts were aggressive and often resulted in fines, arrests and, in one instance, the guilty party being asked to leave the country.

Villages quickly sprang up: Fresno Flats, Coarse Gold Gulch, Sugar Pine and more modern conveniences followed. As villages grew, so did the impacts on the resources. Buildings for stores, churches, schools, hospitals, and government offices began to appear. Utilities such as electricity and phone service became important and needed communications tools. As populations continued to grow and more people found this an inviting place to live additional facilities to serve their needs arrived with them. Families of workers needed homes, schools, churches and groceries. People brought vehicles which needed better roads and service facilities, so gas stations and repair shops were built.

With settlement came more human caused fires and threats to the valuable timber and rangeland. During the 1930's the Forest Service began to aggressively suppress all wildland fires. This policy changed the nature of fire as a natural process within the forest.

As time passed, most of the mining, logging and ranching gave way to communities of retirees and families, professional and technical workers (many commute to the valley for their work) and an increasing emphasis on tourism. The construction of Highway 41 began as early as 1928. This route is the single-most important regional north-south traffic link through the area and is essential for access to Yosemite National Park and other Sierra National Forest recreation areas to the north. As the transportation systems and vehicles improved, more people began to visit the forest and use forest resources. Hotels and motels have become a staple in the area, with the most elaborate, Tenaya

Lodge, located just north of the watershed. As forest visitors increase, the need for education of the natural resources becomes greater.

In the late 1970s the Oakhurst mill, the main industry of the community, ceased operation, and lumber gave way to tourism. The service industries have taken the place of resource product oriented businesses. The largest employers are the large grocery chain stores, utility companies and medical services.

Today's values and attitudes have turned away from harvesting natural resources to expanding services for community members and tourists traveling to Yosemite National Park. Natural resources in the National Forest are only now being seen as a valuable tourist draw. Concerns for protection from catastrophic wildfire, maintenance of some commodity production, and more urbanized values are beginning to dominate the social and economic needs within the analysis area.

12. Transportation

Indicators: a. Infrastructure, Roads.

Vehicle access for this area began in the 1880s and increased significantly in the 1920s with the introduction of railroad logging. Many of these railroad grades provided the first roadbeds. Since this period, roads have been added through timber harvest activities for log haul to lumber mills located in Oakhurst, Southfork, and the San Joaquin Valley. Much of the arterial road system was reconstructed to improve timber haul and provide for passenger car traffic. Most areas have been accessed by permanent road systems to support management activities such as timber harvest, recreation, special uses and hydro-electric projects. The existing transportation system provides access for activities including developed and dispersed recreation; dispersed camping; hunting and fishing; and private in-holdings

<u>1850 to 1900.</u> Logging was first started in the Fresno drainage in 1849. This early logging was performed with oxen and the lumber was primarily used for building materials and lumber for the mines further north. Erosion from roads was not a problem since there were very few roads during this period. The few trails and stagecoach road did not contribute large amounts of sediment to the stream systems.

<u>1900 to 1960.</u> Access for this area increased significantly by the early 1900s with the introduction of railroad logging. Many of these railroad grades later provided the first roadbeds. These roads were not very steep and erosion was not excessive. The construction of Highway 41 took place from 1928-1930, from Westfall Ranger Station to Sky Ranch. This route is the single-most important regional north-south traffic link through the area. This route is essential for access to Yosemite National Park and other Sierra National Forest recreation areas to the north. State Highway 49 is the second most important regional traffic link from Highway 41.

In 1953 off highway vehicle use became popular as government surplus jeeps became available. Miami basin developed into a popular motorcycle riding and 4WD area and is often available year round. This activity increased bank disturbance and was a source of sediment into the Miami Basin.

Since this period, roads have been added through timber harvest activities for log haul to lumber mills located in Oakhurst, South Fork, and the San Joaquin Valley.

1960- present. Much of the arterial road system was reconstructed since 1960 to improve timber haul and provide for passenger car traffic. Most areas have been accessed by permanent road systems to support management activities such as timber harvest, recreation, and special uses. The existing transportation system provides access for activities including developed and dispersed recreation; dispersed camping; hunting and fishing; and private in-holdings.

Measurement of indicator is number of miles of National Forest System Roads, by functional class, which meet current operational maintenance standards. It is estimated that 55% of the road system fails to meet current road maintenance standards. At minimum, National Forest System Roads (NFSR) will be maintained to standards established in the 7709.58 Handbook.

Erosion problems are eliminated as roads are reconstructed for timber sales and other projects. Maintenance of roads includes surface rocking and drainage structure repair. Sidecasting of materials are prohibited. Reduced funding and road maintenance activities by timber sales have limited opportunities to maintain the road system to proper maintenance standards

13. Recreation

Indicators: None

The concept of reference variability is not applicable for the element of Recreation.

14. Contemporary Native American Use

Indicators: None

The concept of reference variability is not applicable for the element of Contemporary Native American use. Throughout the known history of human occupation, the use of the land has ranged from small populations living directly off the natural resources and not having very much impact; to increasingly larger populations, still living directly off the natural resources, but also manipulating the resources, and having some impact on the land; to the current large populations, directly using the natural resources to a greater extent, and also using the land for recreational activities, and having an increasing impact on the land. Choosing a range of variability between the extreme ends of

Historical use and impact may not provide a reliable *reference variability* or define acceptable use and impact.

Currently, there is not a very high demand for contemporary Native American use of resources because the population is less than it was in the late 1800s, and fewer Native Americans follow the traditional lifeways. However, for those who do hunt, fish, and gather food, basketry and medicine plants, the areas of those resources are becoming scarcer and more heavily impacted by modern uses of the areas.

15. Economics

Indicators: **N**one

The concept of reference variability is not applicable for the element of Economics.

16. Special Uses and Adjacent Land Uses

Indicators: **N**one

The concept of reference variability is not applicable for the element of Special Uses and Adjacent Land Uses.

17. Atmospheric Particulates

Indicator: **PM10**

It is commonly believed that fire has been an important component of chaparral communities for at least 2 million years; however, the true nature of the "fire cycle" has been subject to interpretation. It is believed that 10 times as much chaparral burned pre-settlement and 60 times as much in red fir. (McKelvey, SNEP 1988)

There are numerous accounts of smoke filling the great San Joaquin Valley and the Sierra Nevada Mountains prior to Europe settlement. Historic writings by Spanish explorers speak of the numerous fires that burn on a yearly basis.

“Smoke filled the Sierra Nevada’s”, accounts of early land surveyors (1899) state that “travel through a large part of the territory was difficult on account of dense smoke” (Sudworth, 1900). There is disagreement about the impacts and severity of the fires in the old days, but there is "strong consensus," that smoky skies were more of a fact of life back then — and that we’re heading that direction again (Arno 1989).

In fact, fire ecologists say that far more land burned each year during the 1800s and earlier, than in recent years. In the pre-industrial era, from 1500 to 1800, an average of 145 million acres burned every year nationwide — about 10 times more than the nation’s

recent annual burns. In the West, there are estimates that 18 to 25 million acres burned each year, as recently as the 1800s lightning being a contributing factor (Arno 1988).

A survey of 11 western states shows an annual average lightning occurrence of 5125 fires. (Vale, 2000). Lightning strikes ignited some fires, while others were started by accident. Native Americans did not relie solely upon natural fires (Keeley, 1988), Indians and settlers set many fires deliberately, to drive game, make room for their homes, stimulate their crops, or fight enemy tribes.

Chapter 4 Existing Conditions

1. Vegetation Mosaic

Indicator: a. Vegetation Species Composition
b. Vertical Diversity
c. Horizontal Diversity

The vegetation map for the Sierra NF 4-1997, was typed and printed for both the California Wildlife Habitat Relationship (CWHR) vegetation model and the R5 Timber Strata model. Fresno River and Finegold watersheds were both included. The area totals 43,247 acres, and the coverage has the area segmented into 2954 stands for vegetation or habitat type delineation. Portions of the landscape were field verified in the spring of 2003. In producing the map the ponderosa pine (PP) and mixed conifer (MP – heavy pine representation) types were subdivided based on a 60% canopy closure (cc).

The major CWHR types are represented on the landscape as follows:

Table 3 Major CWHR types

CWHR Type	CWHR Title	Stands	Acres
MCH	Mixed Chaparral	23	453
MCP	Montane Chaparral	15	199
MHW	Montane Hardwood	820	10509
MHC	Montane Hardwood Conifer	515	5157
PPN	Ponderosa pine	1115	15878
SMC	Mixed Conifer	454	10960
Total		2942	43156

Chaparral A great expanse of Chaparral (MCH and MCP and some MHW) lies south and west of the Fresno River landscape, immediately outside the National Forest boundary, between the Forest and the Communities of Oakhurst and Awahanee. Most of typed chaparral stands are located near this Forest Boundary. There is some intermix in the ponderosa pine belt higher in elevation on the slope. The inclusion of shrub and chaparral type vegetation (NHW and MHC) in the ponderosa pine belt is under-represented by the satellite imagery, as typed for both WHR and timber strata**.** This is particularly true for understory development.

As noted in Chapter 2, the chaparral zone was probably similar in overall character to that seen today, although, possibly, species diversity was higher historically. In addition, the condition of the vegetation typed as chaparral is taller, denser, and has greater amounts of dead wood. Patches of vegetation are large and tend to be of similar composition and age across the entire patch. Openings in the vegetation are few and passage is difficult.

The current homeogeneity and condition of the chaparral cover is probable derived from the large intense fire activity experienced in the area prior to the 1970's. "Contrary to

popular opinion, most chaparral species are not adapted to frequent low-intensity fires. Bark measurements show that nearly all chaparral species have very thin bark making them very susceptible to cambium damage and topkill by low-intensity fires burning on the surface (Chaparral Soils and Fire Vegetation Interactions, Marvin Dodge, 1977).

The reliability of satellite imagery and derived data is somewhat questionable concerning relative species composition. This is of importance, especially when considering treatments for fuels and fire concerns. Sprouting species of brush will more aggressively reoccupy the site sooner than species requiring seed regeneration. Sometimes the canopy height, and/or height potential, may come into question. Species composition and canopy development will be of great concern in determining importance of vegetation structure for wildlife habitat use.

Field review has indicated that stands mapped (satellite) as QC (Canyon live oak) south of Cedarbrook should be more appropriately labeled as CC (ceanothus chaparral) or CX (montane chaparral.) Stands west of Cedarbrook should be labeled QK (California black oak) instead of QC and PP.

Ponderosa Pine The ponderosa pine belt has probably been the most altered vegetation type located in the Fresno River landscape. This vegetation type contains the locations of the dominant "at-risk" vegetation communities in terms of fuels and fire threat in the study area. In the upper reaches, the vegetation type is experiencing white fir and incense cedar incursions in the understories. This may be caused, in part, by logging and fire exclusion policies of the past.

Much of the landscape is now devoted exclusively to shrub and chaparral species, and/or often in direct competition with pine trees within the stands. On the lower slopes, incursions of shrub and chaparral vegetation may be caused by larger "front-country" fires carrying further into the pine belt displacing pine stands.

Because most chaparral species have thin bark, which makes them susceptible to fire, they are not adapted to frequent low-intensity fires (Dodge 1975.) Fire suppression policies of the last 70 years have resulted in most low-intensity fire of appreciable size haveing been eliminated (California Division of Forestry, 1972.) As a result, invading chaparral species have been permitted to survive and spread. When low intensity fires occur on lands with grass or forest litter, with short intervals of 2 to 3 years, chaparral species are almost totally eliminated. The consequences of the invasion and survival of chaparral species in the pine belt, include the effect that a low intensity fire regime has been replaced by a high-intensity fire regime, which will put larger formerly fire resistant species, such as ponderosa pine, at risk.

Ponderosa pine is very density sensitive. Fire exclusion may have contributed to denser vegetation development, both from invasion of chaparral species, generally lower on the slopes, and from invasion of white fir and incense cedar higher on the slopes. This predisposes ponderosa pine not only to fire, but also to increased drought and beetle mortality. As opposed to fire caused mortality, which primarily affects small trees,

beetles tend to cause large tree and large tree group mortality. Snag, or dead tree, populations are currently increasing in the watershed partly due to the social and political inability to conduct salvage operations and the high numbers of snags required by the Sierra Nevada Forest Plan Amendment (generally 4 snags per acre?????).

The predicted relative importance of the major conifer mortality agents includes bark beetles (55%), root disease (25%), and dwarf mistletoe (15%). Fire was not included in this preliminary model (Steed 2002). Defoliators, "other" insects, and "other" pathogens are nominal in importance. Bark beetles have remained high in importance concerning mortality. There has been a shift from historical conditions where "other" insects (15%) and "other" pathogens (15%) were high in relative importance to current conditions favor more root disease and mistletoe. Bark beetle, root disease, and dwarf mistletoe are all agents directly related to stocking or population density.

Evidence of this effect may be most notable in the catastrophic beetle mortality recently being experienced in Arizona near Prescott and Flagstaff, and in Southern California, on the San Bernardino National Forest, near Lakes Arrowhead and Big Bear. More locally evidence of this phenomenon has been presented in the bark beetle insect epidemics experienced in this area during and following the droughts of the late 1970's and 1980's.

Logging practices of the 1980's have created a large number of sizable pine plantations within the pine belt of the Fresno River watershed. The pine plantations do not represent a "normal" condition in the landscape, in comparison to the landscape existing prior to 1960. Pine regeneration and seral stage development had existed in smaller groups dispersed throughout the landscape. The most affected area in the watershed is the Miami Creek drainage.

Mixed Conifer The apparent natural transition from ponderosa pine type to mixed conifer is about 4800 feet elevation. This zone is mapped most reliably by present technology, which seems better suited to sensing attributes (species composition, size, and vegetation density) of the conifers as opposed to shrubs and hardwoods. Above 4800 feet, stands typed as PP, >60% cc, included enough other species to be considered as MP (mixed conifer-pine). An exception to this would be the area northeast of Sugar Pine, where the pine component is dominant enough to remain PP. In stands above 4800 feet typed as MP >60% cc, the pine is dominant in the overstory and the white fir/incense cedar is more plentiful in the understory. MP extends downward in elevation to 4600 in sheltered drainages such as Camp Redwood. On Speckerman Mountain north of Nelder Grove of Giant Sequoias, the mixed conifer is dominated by white fir (MF – mixed conifer-fir). Mapped overlay of potential natural vegetation from Ecological Unit inventories indicates the possibility that white fir and incense cedar have increased their representation in the mixed conifer as well as the ponderosa pine types in this area.

As noted in Chapter 2, logging in the late 1800's and early 1990's focused on ponderosa pine and sugar pine extraction. The imposition of fire suppression strategies removed low intensity fire from the ecosystem which had the effect of suppressing fire tolerant species regeneration in the understory. Large salvage timber sales, of the late 1970's and

early 1990's, concentrated on drought and beetle tree mortality in ponderosa and sugar pine.

The trend towards increasing white fir and incense cedar representation is documented on a very intensive local basis in the Nelder Giant Sequoia Grove Inventory, (Price, 2000.) White fir and incense cedar account for 85-95% of the number of trees, and 75% to 92% of the basal area. Ponderosa pine is a shade intolerant species. In mixed conifer stands it tends to be found in the dominant and codominant crown positions because, given opportunity it grows fairly rapidly. It enjoys unobstructed sunlight. However it does not perform well in shade or partial shade. There is a disproportional high mortality in the 21-40" DBH classes for ponderosa pine in Nelder Grove. High mortality of ponderosa pine trees in the understory would normally be expected from tree suppression. Mortality in the larger DBH classes may be the result of an interrelationship between Dendroctonus bark beetles and ponderosa pine (Oliver, William 1995, Cochran, P.H. 1994.) Black oak is likewise an intolerant species and thus is underrepresented in Nelder Grove. It is a slow growing species with limited height capabilities. Over the long term, with no intervention to remove faster growing, taller conifers it will succumb to being "shaded out" of the stand.

Nelder Grove is significantly "over-stocked" with trees As is much of the range of mixed conifer Fresno River landscape but not to the extent found in Nelder Grove. Considerable thinning of trees, especially white fir and incence cedar has occurred in the General Forest and Old Forest Allocations in the recent past to alleviate density aggravated tree stress.

The trend towards increasing white fir and incense cedar representation has implications for fuels and fire management. Tolerant trees growing in the understory may provide a "fuel ladder" to wildfire, allowing torching of the overstory crowns. In addition, overstocked stands may predispose stands to a less than desirable representation of the most fire resistant tree species ponderosa pine. Overstocking of a stand extends to all vegetation competing for local site resources including understory shrub and brush species.

There is some fragmenting of mixed conifer stands still in evidence from the clear cutting and shelterwood harvest systems employed in the 1970's, but not to the extent in the Fresno River Landscape mixed conifer as is presented in the ponderosa pine type. Canopy closure above 4800 feet is predominately greater than 60%.

Duff development is commonly 2-3 inches in depth. Compared to more open stands, or those recently having experienced commercial thinning operations, or those having experienced understory burning, this is probably deeper than that commonly occurring previous to fire suppression policies being enacted. This may have a positive effect on mushroom and truffle development. It may have a detrimental effect under wildfire conditions or in considering prescribed understory burning. A deeper duff often relates to longer resident burn times and transmission of heat thru bark to damage cambial tissue and tree mortality.

2. Plant Species

Indicators: c. Floristic Diversity

Distribution and abundance of Sensitive plant species

Rawson's flaming trumpet: Rawson's flaming trumpet is a perennial herb that spreads both by seed and via underground stems (rhizomes). The tubular flowers are bright orange red, pollinated by hummingbirds and several species of bee (Hevron, 1989). The entire distributional range of this relict species is confined to a 15 by 10 mile area between 2500 and 7000 feet elevation. All occurrences are within Madera County, and most are on the Bass Lake Ranger District. Populations occur along streams and around meadows within about 12 major drainages. Each major drainage may have over 5 linear miles of occupied habitat. Estimates of population size are usually given as number of stems, but a single genetic individual may comprise many stems (Wilson, Clines, and Hipkins, in press).

There is one occurrence of flaming trumpet in the Fresno River analysis area, at Nelder Creek. This is notable because all other occurrences of this rare plant are found in the San Joaquin River drainage. Initial field observations in 1989 (J. Clines field notes) documented that that this site has extensive soil compaction from Sky Ranch Road down to the stream (at Gooseberry Flat), and receives frequent use by the public. There are user-defined trails through the flaming trumpet colonies on both sides of Nelder Creek. Plants have been observed to wilt in the afternoon sun, possibly because the riparian forest along this section of Nelder Creek provides less canopy cover because conditions are not optimal for riparian trees and shrubs (J. Clines, field observations). Rawson's flaming trumpet thrives in areas of moderate sunlight near the stream or where subsurface water is present (Liskey, 1994). Plants do not grow where soil is compacted or in areas of frequent trampling. A study of the genetic variability within the species included samples from Nelder Creek, and revealed that flaming trumpet has relatively high genetic variability for a rare plant, that variability exists both within and among patches, and that sexual reproduction is the primary method of reproduction for this species (Wilson, Clines, and Hipkins, in press).

Mountain lady's slipper orchid: The mountain lady's lipper orchid is a perennial, rhizomatous herb that ranges in height from 10 inches to about 2 feet. The large leaves are pleated, oval-shaped, and arranged in an alternate arrangement on the stem. Each stem has from one to three showy flowers up to 5 cm in length (Hickman, 1993). Photos are available at www.calphotos.org. These typical orchid flowers are white, yellow and purple, and are very showy with a large sac-like lower lip ("slipper").

Flowering is generally in June in the central Sierra. Pollination is by a wasp, fruits are capsules containing thousands of tiny seeds, which are wind-dispersed (Cramer and Kaye, 2003). Seeds require a fungal symbiont to germinate. Mycorrhizal fungi are probably important for the entire life of a plant (Cramer and Kaye, 2003). One mountain lady's slipper orchid plant can live at least 30 years and possibly many more. Plants may

not emerge above-ground every year, making accurate assessment of population dynamics difficult (Cramer and Kaye, 2003). The habitat components required for maintenance of long-term viability of lady's slipper orchids are not well understood, but maintenance of at least 60% canopy cover appears important, as well as adequate soil moisture and maintenance of sufficient organic matter in the form of downed wood so that myccorhizal fungi are sustained (Cramer and Kaye, 2003).

Habitat for the mountain lady's slipper orchid across its range includes Douglas-fir, white fir, giant sequoia, and mixed conifer forests in the mid-late seral stages, as well as oak woodlands and riparian areas. More than 70% of known occurrences are found in mixed conifer forest (Cramer and Kaye, 2003). Cramer and Kaye (2003) identified that a majority of the known sites occur between 1,625 and 5,850 feet, but in the central Sierra Nevada (Sierra National Forest and environs), the lower limit seems to be about 4,400 feet (Sierra National Forest files, 2004). Slope aspect is primarily northerly; slope steepness is usually between 25 and 50%; canopy closure is generally between 60 and 80% (Cramer and Kaye, 2003). Soils do not appear to be limiting, mountain lady's slipper populations have been found on many soil types, including ultramafic and limestone (Cramer and Kaye, 2003).

The Sierra National Forest has the southernmost occurrences of this species in the Sierra Nevada, 12 occurrences are found in or near Nelder Grove of Giant Sequoias (11 known since 1980, 1 discovered in 2000). Four of the original 11 populations found in 1980 have not been seen in recent years, despite searches in 2000 and 2003. This may be due to the fact that lady's slipper orchids do not emerge every year, especially if habitat conditions are not optimal; or it may be that these populations are extirpated.

Distribution and abundance of invasive non-native plants

The pattern of distribution of noxious weeds in the Fresno River L.A. area appears to be related to the road system, although noxious weeds are very opportunistic and can spread via wind, water, hikers, bikes, wildlife, etc. Noxious weeds are known to spread along roadsides, partly because the habitat is generally more disturbed and favors invasive, weedy plant species, and also because wheeled vehicles can transport noxious weed seeds. The presence of noxious weeds in the Sierra decreases with increasing elevation, but because some weed species can grow up to high elevations, the higher elevations are still at risk.

Road maintenance activities on the Forest and associated ground disturbance can increase the spread of noxious weeds. The Fresno River watershed is heavily used by the public, and often vehicles are driven through weed-infested areas such as Oakhurst where their wheels can pick up weed seeds, then to the analysis area. These seeds are then sometimes deposited along roadsides in the Forest. The area is also heavily used by people from other geographic areas, some of which are source areas for additional weed species that are not yet found in Madera or Mariposa counties.

The forest has been conducting inventories for noxious weeds in the Fresno River watershed since about 1998, as well as manually controlling infestations of klamathweed, yellow starthistle, scotch broom, bull thistle, and medusahead. The entire area has not been surveyed, but we do have a general idea of which species are present and where they are concentrated. The primary weed species present in the watershed are shown on the attached map. The weeds known to occur in the analysis area are:

Yellow starthistle: There are known infestations known to occur in the watershed: Examples are along Sky Ranch Road (almost eradicated after 5 years of hand pulling), some small patches along 6S10 and its spurs, 6S11 just east of Sivils, Miami Basin, Cedar Valley, Thornberry Mountain along Road 7S33, Hwy 41 near Cedar Valley.

Medusahead: There are at least 2 infestations on National Forest System lands: one in Cedar Valley and one at Sivils Meadow. There is also an infestation on private land near the national forest next to 6S12YA just south of the Forest boundary, north of the Episcopal Conference Center at Oakhurst (ECCO).

Scotch broom / Spanish broom: There area two known infestations on National Forest System lands: one in a landing at end of 6S10Y (A spur), and one at Fish Camp just south of Tenaya Lodge along 6S07 on private land but probably spreading onto NFS lands. There are probably scattered plants on private lands throughout the watershed, because people buy broom plants at nurseries and plant them in their gardens. For example, there is a Spanish broom plant in Cedar Valley.

Klamathweed: There are known infestations in the analysis area. Infestations are scattered along roads in Miami Basin, Cedar Valley, Highway 41 corridor. This species fades out at higher elevations. There is an especially dense infestation that is continuing to spread in the vicinity of Lone Sequoia Staging Area (6S41) in Miami Basin.

Himalaya blackberry: It is not known how many infestations occur in the analysis area. They are concentrated in riparian areas, often near road crossings, e.g. along Lewis Fork and Miami Creek.

Bull thistle: There are known locations of bull thistle in the watershed. Plants are found scattered along roads and disturbed sites throughout watershed (e.g. Miami basin, Nelder Grove). This weed is found at higher elevations than most other noxious weeds, and tends to spread in meadows more than the other species listed.

3. Soil Erosion and Productivity

Indicators: a. Soil Cover
b. Soil Porosity
c. Down Logs

Soil cover is measured using randomly located transects across the activity areas. Generally undisturbed forested areas have nearly 100% soil cover.

A comprehensive soil monitoring project was conducted in Miami Watershed in 1991. Randomly located transects were completed and soil cover at that time was found to average 88 % throughout the Miami watershed. Areas that lacked soil cover were generally roads, trails or campsites which were intercepted during the transects.
No other soil cover data is available for other parts of the Fresno Landscape Analysis area.

Porosity. During the 1991 soil monitoring project in Miami Watershed it was found that 16% of the watershed was compacted. The majority of this compaction was due to road building and timber management activites. No other soil porosity data is available for other parts of the Fresno Landscape Analysis area. The Fresno Landscape Analysis Area is composed of a large portion of Holland soils.
Soil bulk density samples were taken as part of a monitoring project in Holland soil in Unit 16 of the Foster Timber Sale area, which is also on the Bass Lake Ranger District. The samples were gathered from the very surface of undisturbed soil with a soil core sampler. The average bulk density for 20 samples was found to be 0.79 g/cm^3. The bulk density in areas disturbed by heavy equipment operation can be expected to be higher.

Down Logs During the 1991 soil monitoring project in Miami Watershed it was found that there was an average of 7.7 downed logs per acre. The distribution is only fair, however. Only 41% of the 440 1/10 acre plots had 1 downed log or more.
No other large woody materail data is available for other parts of the Fresno Landscape Analysis area. Data from any fuels surveys could be interpreted to determine what materials may qualify for soil quality standards.

Snags were also measured during this project and it was found that there are an average of 4 snags per acre present. These snags are not well distributed. Only 24% of the 440 1/10 acre plots had 1 or more snags.

4. Fire

Indicators a. Fire Return Rate and Severity
b. Fire Seasonality
c. Fire Size and Distribution

Chaparral The Ecological Support Team Proceedings have found that this area is heavily used by people as a place to live, hunt, fish, work, and recreate. During this century, portions of this habitat type have been inundated or altered by water developments (such as nearby Bass Lake). Fire suppression efforts have been very active in this area because of the amount of property and homes which have built up over the years. Records show only one fire in the Class E (300-999 acre) size class near the Nelder Creek drainage since 1920. This shows that large areas of chaparral habitat are at least 75 years old (Blankenship, 1996). As a result, a great proportion of the remaining chaparral is in a decadent condition. With the advent of development and corresponding fire suppression policy, vegetative composition has shifted from *Ceanothus*/shrub to one dominated by live oak and manzanita species. In reviewing the front country landscape a

general observation was made that overall there now appears to be less front country habitat than historically. This loss in habitat is a result of development and agriculture.

Disruption of the historic fire regime in the chaparral zone has reduced the incidence of disturbance by fire. The result has been an increased proportion of dead material within the stand, a more homogenous cover and reduced species diversity. Species mix has changed as shorter-lived obligate seeders, such as ceanothus, are dying out. Age class mosaics and openings created by Native American burning are almost non-existent.

The forest structure above the chaparral and the values at risk intermingled throughout it changed dramatically during this century. The rapid growths of the wildland-urban intermix where human lives, homes and businesses are intermingled with wildland fuels continue to intensify wildfire effects, endanger the values at risk and compromise public and firefighter safety.

Fire history records indicate that most large fires in the chaparral in and around the Fresno River Watershed occurred before 1940. The current age ranges from 50 to 100+ years. At least one, and probably two or more fire return intervals have been missed due to aggressive fire suppression. The most influential change in the chaparral zone is a reduction in mosaic and age class diversity. Stands are more decadent, even-aged, have fewer openings and a higher dead to live ratio than historical levels. The severity of fires burning in chaparral in this condition is high. Fire suppression in old stands is more difficult and line building is slower since there is more material to cut and remove and stems are large. Increased fire intensity leads to more spotting and high resistance to control.

The flammability of chaparral is directly correlated to moisture in the living plants and the amount of dead material and surface fuel. Current chaparral stands lack openings between individual plants and have little grass or litter on the ground; but contain a proportion of dead material that is approaching 50percent. Although the natural pattern of lightning ignitions does not occur until late summer and early fall, current stand conditions extend the available burning season earlier in the summer and later in the winter if the ignition source exists (now highly probable due to the urban/wildland interface) in combination with severe weather.

Consequently, the few fires escaping control under the most extreme weather conditions (high winds, low temperatures and humilities) have the potential to turn into enormous, high intensity fires which create even more spatially continuous landscapes in the chaparral (Minnich 1983, 1987, 1989).

Ponderosa Pine / Hardwood The interruption of the natural fire interval, coupled with selective harvesting of the larger pines has produced shorter, denser forest conditions. Increases in stand density are concentrated mainly in small and medium size shade-tolerant and fire-sensitive tree species. A large increase in the amount and continuity of live vegetation near the forest floor provides a link between surface fuels and upper

canopy layers. A lack of fire has caused dead fuels on the forest floor to accumulate in excess of historical levels (SNEP 1996).

South slopes are still quite open, but trees are smaller and the under story of brush is older and denser with less forbs and grasses. The density of ponderosa pine increases on north slopes where it mixes with large black oak. However, the increased density of brush, and invasion of incense cedar in the understory has reduced the size of black oak crowns, reduced availability of water and nutrients, and increased potential fire intensity and size. A buildup of pine needles and small branches create a fuelbed with characteristics that make it highly reactive to weather conditions. The climate in the area, with periods of drought and wind, and its location above the highly flammable chaparral ultimately lead to large, periodic fire events, which can have severe impacts on the ecosystem in its current condition.

The current fire return interval of 152 years in the ponderosa pine/hardwoods indicates that 8 to 17 fire events have been missed since post-European settlement (Husari 1994). Private lands have steadily become urbanized, and significant population concentrations have developed. Fire ignitions from human sources have increased, and fire suppression policies are increasingly centered on structure protection rather than protection of public lands in the urban/rural/wildland interface.

Attempts to control fire disturbance through aggressive fire suppression efforts has altered the fire interval, creating flammable forest conditions conducive to large fires. In turn, when suppression efforts fail, the magnitude of fire's impact increases.

Lightning during the summer months is the most influential ignition source in the PPH. Native American ignitions were eliminated after 1870, and the proportion of acres burned by human-caused fires (also predominantly in the summer months) has decreased in recent decades (McKelvey and Busse 1996;Weatherspoon and Skinner 1996). The need to reintroduce fire into PPH through management-ignited prescribed fire has forced expanding the seasonality of fire. This has not yet occurred within the study area, but may be necessary for one to two entries to reduce fire hazard.

Climate, including weather patterns, evaporation and transpiration, and moisture stress governs the extent of PPH. It influences mortality, fire risk and species composition (Toth et al 1993). Excessive vegetation and tree density in the PPH zone have undoubtedly affected the evapotranspiration ratemaking the vegetation more flammable for longer periods throughout the season.
The size of lightning fires has increased in the past three decades, particularly in the late 1980's and early 1990's (SNEP 1996). This change in size can be explained by the increased flammability of the vegetation within this zone and the fact that lightning-caused ignitions often occur simultaneously during thunderstorms, overwhelming suppression resources. Patch size has increased due to the occurrence of large fires, mortality from insect infestations and because of extractive forest management practices (SNEP 1996).

Mixed Conifer Management practices over the last 100 years have created fire-prone, closed-canopied, multi-storied stands. These have replaced relatively open, large-tree stands as the dominant landscape feature. The once continuous open grass/forb understory has largely been replaced by relatively dense groups of shrubs and smaller trees. Singletree harvest and fire exclusion have caused a continued shift away from shade intolerant species toward shade tolerant white fir and incense cedar. Mature black oaks have also been impacted, more in the loss of crown size than actual mortality.

The Ecological Support Team for the California spotted owl identified excessive woody fuel buildup, overstocked stands, and the resulting increased risks of stand-replacing fires as the number one threat to mixed conifer forest stability. They determined that all other issues are of secondary importance (Toth et al. 1993).

Based on fire history data, fire return intervals in mixed conifer have been reduced to only 3 percent of what they were during the pre-settlement period (SNEP 1996). The current fire return interval of 379 years from 5 to 50 years indicates that 4 to 10 fire events have been missed since post-European settlement (Husari, 1994).

The fire regime in the mixed conifer forest has shifted from low-intensity, frequent fires to high intensity stand-replacing fires. Increased levels of slash from logging activities of the settlement period have combined with dense tree stands resulting from fire exclusion to create forest conditions which are more conducive to severe, crown fires and other massive disturbance events.

The biggest change in seasonality of fires within the mixed conifer zone results from the excessive fuel buildups both horizontally and vertically. This change allows fires to burn almost year round if weather conditions are such that ignitions can be sustained. Because of these highly flammable conditions, management-ignited restoration of fire in this zone is often done in the winter or early spring to moderate fire behavior and facilitate control. Generally, the initial one to two prescribed burns need to be done during these cooler seasons to restore fire as an ecological process.

A characteristic of fires occurring in the mixed conifer today is that they generally only occur under severe conditions that exceed the capability of suppression forces. Under most weather conditions, the closed, multi-layered stands are really less flammable than they were historically because the dense canopies maintain higher relative humilities within the stands and reduce heating and drying of surface fuels by solar radiation and wind (Weather spoon, Hussar and van Wagtendonk 1992). The wind velocity of these closed stands is also reduced. When burning conditions are moderate, therefore, fires are quickly contained.

Under severe weather conditions, or when multiple ignitions from thunderstorms exceed the capability of suppression forces, fires are increasingly likely to become large and damaging. The result is a larger and more uniform spatial pattern within the burned area and a more coarse grain to the landscape mosaicas a whole (SNEP 1996).

5. Wildlife Species

Indicators: a. Spotted Owls
b. Furbearers
c. Deer
d. Goshawks

For analysis purposes habitats within the watershed have been mapped based upon existing forest inventory data and field review of these areas. The mapping results are shown in Appendix C. Also shown in Appendix C is a map which depicts the known wildlife uses within the analysis area.

Within the Fresno River analysis area, these are the primary areas of wildlife habitat management emphasis:

A) Southern Sierra Fisher Conservation Area (SSFCA): an area whose management will emphasize maintaining habitats favorable for the Pacific fisher, a sensitive forest carnivore. This management area includes forested habitats above 3,500' elevation and encompasses 26,055 acres within the Fresno River analysis area, though not all acres within the SSFCA contain suitable habitat.

B) Spotted Owl Protected Activity Centers (PACs) and associated Home Range Core Areas (HRCAs): these areas emphasize maintaining suitable habitat for the sensitive California spotted owl. A total of 11 300-acre PACs and their 300-acre HRCAs occur within the analysis area, with portions of 6 more PACs and HRCAs overlapping the analysis area boundary for a total of 8,283 acres. In addition, 4 spotted owl activity centers occur within ¼ mile of the analysis area boundary.

C) Goshawk PACs: areas that emphasize providing suitable habitat for the sensitive Northern goshawk. The analysis area contains 3 PACs (roughly 175 acres each) for a total of 528 acres.

D) Mule Deer Areas: The Fresno River analysis area contains a variety of mule deer habitats. Portions of the Miami Mountain and Taylor Mountain mule deer winter range which occur within the analysis area provide winter cover and forage for mule deer herds in the vicinity of Oakhurst. These areas lie mostly within the front country/ponderosa pine zones and encompass 3,982 acres within the analysis area. Management within mule deer winter range should focus on maintaining or increasing thermal and hiding cover, providing forage opportunities, and decreasing sources of disturbance to wintering mule deer. A 487-acre portion of the White Chief summer population center also lies within the mixed-conifer vegetation zone within the analysis area. Management in deer population centers should focus on maintaining adequate forage, protecting fawning habitats, and minimizing disturbance. Other areas are classified as mule deer migration routes. Within the analysis area, Thornberry Mountain, Chepo Saddle, the Hwy 41 Corridor, and the Miami Creek basin are all deer migration routes. Ideally, migration routes should provide hiding cover and forage opportunities, and minimize sources of deer mortality such as vehicle collisions, poaching, and harassment by dogs.

Management objectives for the wildlife area listed above can be found in the Sierra National Forest Land and Resource Management Plan Environmental Impact Statement (LRMP-EIS), as amended by the Sierra Nevada Framework (USDA FS, Region 5, Jan, 2001); the "California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment (CASPOW)" (United States Department of Agriculture, Forest Service, Pacific Southwest Region, January 1993); and the "California Spotted Owl: A Technical Assessment of its Current Status" (United States Department of Agriculture, Forest Service, Pacific Southwest Research Station, General Technical Report PSW-GTR-113). In addition, General habitat conditions are also provided by "A Guide to Wildlife Habitats of California" (WHR), K. Mayer and W. Laudenslayer, editors, California Department of Forestry with USDA Forest Service, California Dept of Fish and Game, and Pacific Gas and Electric Company, October 1988. Included below are those portions of these documents that relate to wildlife habitat.

Front Country: The Front Country area defined in the Sierra National Forest's LRMP-EIS generally refers to chaparral habitats. The chaparral component of the forest vegetation includes a variety of brush and hardwood tree types (including oak). It includes variations called chaparral, chamise-chaparral, and timberland-chaparral.

Chaparral is a floristically rich vegetation type that supports up to 240 species of woody plants (WHR). This vegetation type was an important component of mule deer winter range throughout the Oakhurst area. No threatened, endangered, or sensitive (TE&S) species occurring in or near the project area is dependent on chaparral. Since chaparral normally experiences fire on a regular basis, wildlife species are adapted to this condition and reach peak population levels "in the first two or three decades, frequently 1 to 15 years, after a fire" (WHR). Generally, from 30 to 60 years of age, chaparral stands begin to decline in habitat value as brush becomes extremely dense and decadent, dead material builds up, and there is a lack of grasses and forbs in the understory. Chaparral stands are normally a mosaic of openings and age classes due to the effects of fire, with a relatively small proportion in a decadent condition. Fire-created openings will have good grass and forb growth for 1 to 3 years. These areas lack cover (though unburned brush is seldom far away), but provide good forage. Fire also enables decadent brush to resprout and is necessary for many fire-adapted plant species to reproduce. Within the analysis area, about 1,845 acres are within a chaparral vegetation type.

Due to described in the previous section (4. Fire), factors, traditional wildlife uses of this area have been altered dramatically. Most notably is the effect on mule deer populations. The LMP states: "CDFG data suggests deer population in the Forest, like many west-slope herds, has declined from a peak of approximately 35,000 to 40,000 in the mid-1950's to a current estimated low of 6,000 to 7,000 deer. Although the reasons for decline are not completely understood, predation, habitat degradation and loss, poaching, antlerless harvests, and drought are thought to have influenced herd size." The Oakhurst Deer Herd Management Plan (Peabody, 1984), a joint CDFG and USFS document, states: "The primary limiting factor on the winter range is the excessive loss of traditional winter range habitat to urban developments and associated hazards such as roads, dogs,

fences, and loss of forage and cover. This winter range is mostly private property (69%) and this will in all probability eventually be developed."

During a field review of the vegetative habitats some general observations of the habitat conditions were made. The front country area comprised of chaparral/oak vegetation is, on average, quite overgrown and in a decadent condition. Favored deer forage species (Ceanothus) make up a small percentage of the available forage, as does black oak, which provides quality acorn forage. Manzanita and live oak are predominant.

Private Lands The predominant vegetation type on private lands within the Fresno River analysis area is front country chaparral/gray pine/oak. The corridors for Highways 41 and 49 are largely developed. Suburban and rural housing developments occur in varying densities throughout the private lands.
Potter Ridge (Deadwood Peak) and the lands south of Thornberry Ridge are largely undeveloped. The Harlow fire burned much of Fresno Flats and Potter Ridge area in 1961, but since then there has been little fire activity to remove decadent brush. Private lands support a variety of wildlife such as foxes, bobcats, ring-tailed cats, raccoons, resident mule deer, great horned and barn owls, California quail, and cougar. Wildlife conflicts with humans such as road kill, harassment, poaching, consuming garbage, preying on pets and livestock, and property damage are fairly common and expected to increase as more acres of habitat are developed.

Ponderosa Pine, Hardwood Vegetation Type Fire exclusion, logging, and development are the three primary factors affecting the habitat quality of ponderosa pine stands currently. Ponderosa pine stands generally occur above the chaparral vegetative type and blend into the mixed conifer stands up slope. This vegetation type can also be used for deer winter range. The majority of the analysis area (26,170 acres) is of this vegetation type. More mature stands with heavy canopy cover can provide suitable habitat for some TE&S species: goshawks, spotted owls, and some furbearers (marten and fisher) are known to occur in ponderosa pine, though it is not optimal. Historically, fire played an important role in this vegetation type. Frequent ground fires created an open, large-tree condition with a grass and forb understory and few small trees. Average tree diameters were much larger and stand densities less than currently. Non fire-resistant tree species made up a small portion of a stand, and these were generally confined to drainages and north-facing slopes. Brush cover was generally less dense than current densities.

Development includes agriculture, buildings, campgrounds, fences, and roads. Road densities directly affect habitat quality for many species of wildlife. Areas of intense timber management or areas next to housing developments typically have very high road densities. This can lead to erosion, increased human presence, trash, poaching, and road kill of all manner of wildlife.

With the fuel buildup brought about by years of effective fire suppression, fires are generally more destructive to wildlife habitat and soil than natural fires during pre-European times. Fire engines, aircraft, and fire crews are being used to save structures

instead of forest vegetation, resulting in the potential of loosing large areas of habitat. "Conditions of wildlands as a result of fire exclusion, past management practices, and drought will only produce additional losses in the future."

"Snags are important for many animals and birds. Snags provide for future recruitment for stream and soil nutrients and structural elements. However, snags are potentially dangerous to people moving through the forest, and especially to firefighters during prescribed burns and fire suppression activities. Levels of snags are increasing because of the greater mortality caused by recent, severe fires and because of the mortality from insects and stressed pine ecosystems due to fire exclusion." A balance must be found that will provide for cavity-dependent species habitat and the safety of humans who work or recreate in the forest.

In the ponderosa pine type, the generally small tree diameter and dense stand character, with a thick understory of cedar and fur, were noted. There is continuing insect mortality. In many areas the quantities of ground fuels are very high. In addition, these areas have developed a significant ladder of pole sized trees that allow for movement of fire into tree crowns.

Riparian: Riparian areas can occur in all three vegetation types within the analysis area. Though they make up a small portion of the analysis areas' total acreage, they provide a habitat component that is of unequalled importance for wildlife on a per-acre basis. Vegetative and wildlife diversity is highest in riparian areas. Cover and forage is normally available in good quantities, and they provide travel routes and connectivity between fragmented habitat areas. These areas are critical for a large number of water-dependent wildlife species such as amphibians, reptiles, snakes, insects, crustaceans, mollusks, fish, and several species of birds and mammals. Due to their damp, cool micro climate, perennial riparian areas generally only burn in severe fire conditions, usually of a stand-replacing fire type. The presence of water and generally good soil promotes quick post-fire regrowth of vegetation. Riparian areas also attract the most use by humans on a per-acre basis, so impacts can be severe. Riparian areas, for the purposes of this analysis, include wet and moist meadow areas, of which there are very few within the analysis area.

A large portion of the Fresno River channel has been altered as a result of development, generally channelization and simplification of the stream course resulting in a loss of habitat diversity and quality. Riparian areas attract as much attention from humans as they do from wildlife. Campsites, OHV and foot trails, and roads compact soil near streams and contribute to sediment input. Logging has reduced the amount of Large Organic Debris (LOD) that historically played an important role in the healthy functioning of the stream ecosystem. The introduction of bullfrogs and non-native fish species for sport fishing purposes has had severe impacts on native amphibians (especially frogs). In some areas, development has disrupted the natural function of the flood plain, causing flood events to be more destructive and erosive. Nearly all stream courses within the analysis area have been impacted to some degree by one or more of the activities mentioned above

Mixed Conifer The existing condition for mixed conifer vegetation types is similar to that of the ponderosa pine types. The mixed conifer vegetation type is the most diverse of the three types considered here. This type can provide suitable habitat characteristics for several TE&S species including California spotted owl, northern goshawk, great gray owl, marten, fisher, and western pond turtle. This vegetation type supports some 355 species of animals (WHR). Fire also played a role historically in this type, though somewhat less than in chaparral and ponderosa pine. The general forest condition was more open, with much fewer trees per acre on average, and of larger average diameter than currently. Fire resistant trees generally made up a greater proportion of the stand than currently, with less white fir and cedar. The Nelder sequoia grove occurs within this vegetation type. Nelder Grove has a high incidence of sightings of spotted owls and goshawks. About 9,620 acres within the analysis area are classified as mixed conifer.

Nelder Grove, a management area for giant sequoias, lies within the mixed conifer vegetation type within the analysis area. This 1,448-acre area is a "hotbed" for mature-forest dependent wildlife, with numerous sightings of goshawks and spotted owls over the years. The Southern Sierra Fisher Management Area (SSFMA), a goshawk PAC, and portions of 3 spotted owl PACs and HRCAs all overlap within the grove. There has not been any significant vegetation management within the grove since 1900. It was set aside as a botanical preserve in 1928 (J. Hoover, pers. comm. 8/12/97). Much of the grove displays a mature, multi-storied vegetative condition with numerous large trees, downed logs, and snags. However, the density of many stands has resulted in an excessive buildup of ground and ladder fuels. This has created a high fire risk within the grove, and a high rate of mortality in the suppressed understory. Many hazard trees have had to be felled to protect the forest-using public.

6. Water Quality

Indicators: a. Turbidity

Water Quality Monitoring in Fresno River and Big Sandy-Fine Gold Watersheds - Water samples were collected from Miami and Lewis Creeks from 1982 to 1984. Fine Gold Creek was sampled from 1981 to 1983. Dissolved Oxygen, pH, conductance and turbidity were analyzed in the field. Dissolved Oxygen was analyzed using a modified Winkler-Azide Titration method (HACH). Turbidity was analyzed using the HACH Model 16800 Turbidimeter. A YSI pH meter was used to determine pH. Conductance was determined using a Myron-L conductivity meter. The remainder of the samples was analyzed using a HACH DR-EL/4 Portable Laboratory that used modified Standard Methods of analysis.

Sampling was designed to be made at high and low flow periods. This was not always possible. Therefore this data is for general reference only. It is not consistent in all cases. It does, however, provide a baseline for that period of time.

Water was sampled at locations at the lowest reach of the creek just before it flowed off the Forest. Sampling locations are: Miami Creek- T6S, R21E, Sec27; Lewis Creek- T6S, R21E, Sec36; and Fine Gold Creek- T8S, R22E, Sec3.

Turbidity was chosen as the indicator. From the following information, natural variability of turbidity ranged from 3 to 50 NTU. This is mainly dependent on season of flow. The lowest turbidity occurred in the winter months prior to runoff. The highest occurred during spring and storm runoff and summer low flows.

Table 4 Seasonal Turbity

Creek	High NTU	Month Year	Low	Month Year
Lewis	50	June 1983	3	Nov. 1983
Miami	45	April 1984	19	Oct. 1982
Fine Gold	40	Nov. 1981	12	July 1983

Fine Gold Creek this is a lower elevation watershed and is not influenced by spring runoff, as are the other watersheds. Fall rains are a determining factor for high turbidity.

Nelder Creek was not sampled during this period but should be similar to Miami and Lewis creeks.

Table 5 Summary of 1980's turbidity data:

Creek	**Average NTU**
Miami	35
Lewis fork	26
Fine Gold	47

The following charts summarize the results from the analysis of all the samples collected during that period.

Table 6 Stream water content parameters.

Stream Name	**Fine Gold**	**Fine Gold**	**Fine Gold**	**Analysis**
Date,	11/24/81	4/18/1982	7/7/1983	
Air Temp Degrees C	14	15	24	
Water Temp	12	11	16	
Alkalinity, NO	3.5	4	7	HACH
Carbon Dioxide	8.4	3.5	3.5	HACH
Chloride	0.4		2	HACH
Hardness Ca	14	9.6	8	HACH
Hardness Tot	16	24	10	HACH
Iron	0.07	<1	0.01	HACH
Manganese	0.01	<1	0.01	HACH
Dissolved Oxygen	9.6	9.5	10	HACH
pH	7.8	7.2	9.8	YSI
Sulfate	<1		4	HACH
Conductance	20	90	18	MYRON-L
Turbidity	*40*	*30*	*12*	*HACH*
Calcium				HACH
Nitrate	<1		1	HACH
Phosphate ORTHO	0.01		<1	HACH
Phosphate Poly				HACH

Table 7 Stream water Quality Parameters

Stream Name	**Miami**	**Miami**	**Miami**	**Miami**	**Lewis**	**Lewis**	**Lewis**	**Lewis**	**Analysis Method**
Date	10/5/1982	6/22/1983	4/18/1984	11/14/84	10/5/1982	6/23/1983	11/14/1983	11/12/1984	
Air Temp Degrees C	9	13	10	15	9	15	8		
Water Temp	14	10	8	10	14	11	3		
Alkalinity, NO	80		26	2	80	2.5	16	3.5	HACH
Carbon Dioxide	3	2.5		2.5	3	3	3	2	HACH
Chloride	10	1		2.5	10	1	3	2	HACH
Hardness Ca		10	5.6	14		10	15	3	HACH
Hardness Tot	40.8	10	14	14	40.8	14	14	3	HACH
Iron		0.15		0.01		12	0.003	0.1	HACH
Manganese		0.5		0.5		0.5	<1	<1	HACH
Dissolved Oxygen	8	10.3	8.6	9.8		9.2	10.55	8.9	HACH
pH	8.83	9.8	7.5	9.45		9.8	8.2	8	YSI
Sulfate		0.4		0.3		0.1	2	0.1	HACH

Conductance	50	20	50	12		4	3.5	12	MYRON-L
Turbidity	***19***	***40***	***45***	***20***		***50***	***3***	***8***	***HACH***
Calcium	6	4		3.5	6	4	4.4	3.5	HACH
Nitrate	0.04	0.02		0.02	0.04	0.02	0.01	0.03	HACH
Phosphate ORTHO				0.02			0.06		HACH
Phosphate Poly									HACH

In 1993 the District Hydrologist started a water quality sampling program and collected turbidity data from 1993 to 2000. Monthly samples were collected on Miami, Lewis and Nelder Creeks

Table 8 Turbidity Data

Creek	Maximum	Minimum	Average	Sampling Period
Miami	75.3	1.29	22.52	1993-2000 Monthly
Lewis	12.5	.26	3.85	1993-2000 Monthly
Nelder	5.04	.94	2.32	Aug. 1, 1994 – May 30, 1997

This data varies greatly with the previous information from the 1980's. Miami results are similar, but Lewis Creek has a much lower turbidity. Similar turbidimeters were used in the analysis. Both sets of results for Miami Creek are similar so methodology is probably not the problem. Lewis Creek is considerably less turbid in the 1990's sampling. Since it is consistently lower during the second sampling period and was sampled monthly instead of bi-annually, this newer data is probably more accurate.

7. Water Yield

Indicators: a. Stream Flow

Stream flow is an important aspect in analyzing a watershed. Although water yield depends mostly on climatic precipitation and soil depth, vegetative cover is the one variable that can be influenced by management. Deep-rooted vegetation uses large amounts of water through evapotranspiration (ET). This water would otherwise be available for stream channel flow. High ET vegetation consists of conifers, brush and broad leaf riparian species. Low ET species are grasses and forbs. It is possible to increase water yield by converting high ET vegetation to low ET vegetation ie; converting trees and brush to grass.

Increasing water yields are most often connected to brush conversions to trees and by the removal of trees by fire or harvest (commercial timber sales or fuel reduction). This increase in water is only available until the vegetation; trees or brush, grows back. Brush returns in 3 to 5 years. Tree plantations can take up to 50 years to return to pre-removal ET levels.

Table 9 Maximum, Minimum and Average flow for each of the three gauging stations within the Fresno River watershed.

Station Name (Num)	Years	Max	Min	Average
Miami Crk (11-2571)	8	443 cfs	0	7.23 cfs
Fresno River (11-2575)	56	4290 cfs	0	77.89 cfs
Fine Gold Crk61 (11-2480)	21	3920 cfs	0	39.2 cfs*

Table 10 USGS records for the years shown below:

Miami:	1961-1968	(10.6 sq-mi)	(.64 cfs / sq-mi)
Fresno River:	1912-1968	(133 sq-mi)	(.59 cfs / sq-mi)
Fine Gold:	1938-1958	(92.6 sq-mi)	(.42 cfs / sq-mi)

Upper Fresno River: (on Forest) = 43.26 cfs** (.78 cfs / sq-mi)

** Calculated average annual flow using regression equations for all sub-watersheds within the Upper Fresno watershed used 55.3 square miles of watershed area. Fresno River gaging station used 133 square miles of watershed.

Table 11 Calculated water yield as stream flow for each of the sub watersheds within the Fresno River/Coarse Gold study area.

Subwatershed 503	Area (SqMiles)	Mean Annual Flow (Cfs)	Mean Annual Flow (ac/ft)
Miami Creek	10.6	1.88	6432.72
0004	4.27	3.42	2476.13
0010	2.43	1.89	1369.97
0009	3.13	2.47	1787.08
3001	2.16	1.67	1210.60
3002	3.86	3.08	2227.10
0011	1.01	0.75	544.96
0008	1.47	0.75	544.96
0003	0.52	0.37	271.42
0054	3.78	3.01	2178.66
0055	4.0	3.19	2311.99
0051	1.44	1.09	790.87
0052	3.58	2.84	2057.79
0002	3.86	3.08	2227.10
0007	0.61	0.44	320.94
0006	0.48	0.34	249.53
3051	2.31	1.79	1299.02
0056	1.89	1.45	1052.22
0001	1.33	1.00	272.56

0053	2.5	1.95	1411.43
0005	0.93	0.69	499.72
0007	1.95	1.50	1087.33
0008	1.09	0.81	590.37
0059	1.0	0.74	539.29
0060	4.07	3.25	2354.49
0061	2.15	1.66	1204.72
Total	55.82	43.28	31335.24

8. Watershed Condition

Indicators: a. CWE Methodology/ Equivalent Roaded Acres
A total of 31 subwatersheds ranging from 305 acres to 2,731 acres in size are present within the Fresno River Landscape analysis area (Figure 1). Table 12 displays the size and natural sensitivity for the 31 subwatersheds in the Fresno River Ecosystem Management project area. The percent of sensitive lands present in the subwatersheds was extracted from the geographic information system through a comparison of subwatershed boundaries and sensitive lands defined from the soils resource inventory. The size of the subwatersheds was also extracted from the geographic information system.
In the Fresno River ecosystem management area, the physical characteristics of the subwatersheds tend to have higher natural sensitivity levels. Nearly half of the subwatersheds are rated as having a high natural sensitivity (Table 12). With the exception of one subwatershed with a low natural sensitivity, the remaining half of the subwatersheds has a moderate natural sensitivity rating.

On the Sierra National Forest, the dominant geomorphic processes lead to basing natural sensitivity on the key physical characteristics of: 1) percent sensitive land and 2) bifurcation ratio of the stream network. Sensitive land addresses the likelihood of slopes where land use activities occur to react through soil erosion, landslide activity, or other erosional effects. The bifurcation ratio is an indication of how peak flows occur in the stream network under an individual storm event. This measurement is usually based on the ratio of second to third-order streams.

The Treshhold of ConcernTOC varies depending on the natural sensitivity of the subwatershed. The more sensitive a subwatershed is to land-disturbing activity, the lower the TOC. There are three levels of natural sensitivity identified for subwatersheds: low, moderate, and high. These represent the lower bound below which a CWE response is unlikely. When the %ERAs exceeds the lower bound TOC, a potential for incurring a CWE response exists.
The TOCs for low, moderate, and high natural sensitivity subwatersheds are 6.0, 5.0, and 4.0 ERA, percent respectively. Field evaluation of this potential is necessary to ensure that a CWE response is avoided. The ERA percentvalues currently used for the TOCs are empirical values based on comparison of fisheries and channel conditions in areas where

the ERA percent from land disturbance were known. Because it is empirically derived, it may be subject to re-evaluation in the future.

Table 12 Subwatersheds, Size, and Natural Sensitivity

Subwatershed	Size (acres)	Natural Sensitivity
503.0001	854	High
503.0002	407	High
503.0003	331	Moderate
503.0004	2,731	High
503.0005	597	High
503.0006	305	High
503.0007	388	High
503.0008	943	Moderate
503.0009	2,003	Moderate
503.0010	1,553	High
503.0011	644	High
503.0051	919	High
503.0052	2,288	High
503.0053	1,601	High
503.0054	2,418	Moderate
503.0055	2,560	Moderate
503.0056	1.209	High
503.0057	1,250	Low
503.0058	697	Moderate
503.0059	638	High
503.0060	2,605	Moderate
503.0061	1,377	High
503.3001	1,380	Moderate
503.3002	2,471	Moderate
503.3051	1,480	Moderate
524.0001	536	Moderate
524.0002	505	Moderate
524.0051	1,283	Moderate
524.1001	482	Moderate
524.1051	2,423	High
524.2051	909	High

Experience has shown that an upper bound TOC exists on the Sierra National Forest. This is a ERA percent value above which a CWE response is likely should a triggering event occur. This is based on review of subwatersheds where the fisheries habitat and/or channel hydrology was concluded show or be about to show a cumulative watershed effect. The empirical value for the upper bound Threshold of Concern is 14 ERA.percent

There are thirty-one subwatersheds in the Fresno River Landscape Analysis area. Ten subwatersheds exceed their respective lower bound Threshold of Concern (TOC) in the

year 2003). One subwatershed, 503.0003 is at the upper bound TOC of 14% ERAs in the year 2003. Table 13 illustrates that the natural recovery decreases the level of disturbance over time. By the year 2007, only seven subwatersheds exceed their lower bound Threshold of Concern. Only four subwatersheds have disturbance greater than their respective lower bound TOC by the year 2013.

Table 13 Comparison of the Threshold of Concern (TOC) and Disturbance Present in the Year 2003 and Projected Over the Next Ten years.

Subwatershed	TOC	2003	2005	2007	2009	2011	2013
503.0001	4	3.1	2.9	2.8	2.6	2.4	2.2
503.0002	**4**	**6.3**	**5.6**	**5.0**	**4.6**	3.8	3.5
503.0003	**5**	**14.5**	**12.9**	**11.6**	**10.7**	**9.2**	**8.2**
503.0004	4	2.3	2.2	2.1	2.0	1.9	1.8
503.0005	4	3.4	3.3	3.1	3.0	2.4	2.4
503.0006	**4**	**8.6**	**8.0**	**7.2**	**6.7**	**6.2**	**5.8**
503.0007	4	0.8	0.7	0.6	0.6	0.5	0.5
503.0008	5	0.7	0.7	0.7	0.7	0.7	0.7
503.0009	5	2.4	2.0	1.8	1.6	1.3	1.1
503.0010	4	1.6	1.6	1.6	1.6	1.6	1.6
503.0011	4	3.8	2.9	2.9	2.8	2.7	2.7
503.0051	4	0.5	0.5	0.5	0.5	0.5	0.5
503.0052	**4**	**4.1**	3.6	3.4	3.1	2.7	2.3
503.0053	**4**	**4.1**	3.7	3.2	2.9	2.5	2.1
503.0054	**5**	**5.5**	4.9	4.5	4.2	3.7	3.2
503.0055	**5**	**6.6**	**6.1**	**5.7**	**5.2**	4.7	4.3
503.0056	**4**	**8.4**	**7.7**	**7.1**	**6.2**	**5.6**	**5.0**
503.0057	6	1.7	1.6	1.5	1.4	1.4	1.3
503.0058	5	2.8	2.5	2.4	2.2	2.0	2.0
503.0059	4	1.6	1.6	1.6	1.6	1.6	1.6
503.0060	5	2.1	2.1	2.0	2.0	1.9	1.9
503.0061	**4**	**5.2**	**4.8**	**4.5**	**4.2**	3.8	3.4
503.3001	5	1.8	1.6	1.2	1.0	0.8	0.8
503.3002	5	1.3	1.3	1.3	1.3	1.2	1.2
503.3051	5	4.0	3.3	2.9	0.0	0.0	0.0
524.0001	5	3.1	3.0	2.8	2.6	2.5	2.3
524.0002	5	0.6	0.6	0.6	0.5	0.5	0.4
524.0051	5	2.1	2.1	2.0	1.9	1.9	1.8
524.1001	**5**	**9.9**	**9.5**	**9.0**	**8.1**	**7.7**	**7.2**
524.1051	4	1.9	1.9	1.9	1.8	1.8	1.7
524.2051	4	1.5	1.4	1.4	1.3	1.3	1.2

Subwatersheds exceeding a TOC are shown in bold print

9. Channel Morphology

Indicators: a. Sediment Delivery Rate/Residual Pool Depth

Approximately, 15.79 miles of channel have been surveyed for Rosgen channel types and Pfankuch channel stability ratings in the Fresno WA area. This data was collected in Lewis Fork, Miami Creek and Nelder Creek between 1989 and 1992 (see Table 14). VSTAR data has been collected only in Miami Creek. The following is a summary of available data for Lewis Fork, Miami Creek and Nelder Creek.

Lewis Creek: Approximately .85 miles of Lewis Fork have been surveyed for Rosgen stream types and Pfankuck channel stability (see Table 14). Analysis of this data indicates that Lewis Fork is mostly an A/B Rosgen stream type. These reaches are steep (1.5 and 4%), entrenched to moderately entrenched with cascading step pools and riffle dominated channels. There are 2 Aa stream type reaches that have channel gradients of 24% and 35%, respectively. These two reaches are bedrock controlled, confined with low width/depth ratios and have bedforms that are typically step/pool with chutes and waterfalls. Two reaches are C stream types. These C stream type reaches represent 21% of the total of Lewis Creek that was inventoried. These C stream types are depositional reaches, with well developed floodplains and channel gradients of 1%.

Table 14 Lewis Creek Summary of Rosgen Channel Data

STREAM_NAME	LLEWIS FORK	
CHANTYPE	**Data**	**Total**
A1A	Sum of REACHLEN (m)	150
	Percent %	3.33%
A2	Sum of REACHLEN (m)	365
	Percent %	8.11%
A2A	Sum of REACHLEN (m)	485
	Percent %	10.78%
A3	Sum of REACHLEN (m)	100
	Percent %	2.22%
B4	Sum of REACHLEN (m)	1736
	Percent %	38.57%
B6	Sum of REACHLEN (m)	700
	Percent %	15.55%
C3	Sum of REACHLEN (m)	795
	Percent %	17.66%
C6	Sum of REACHLEN (m)	170
	Percent %	3.78%
Total Sum of REACHLEN (m)		4501
Total Percent %		100.00%

Review of the Pfankuch channel stability rating indicates that Lewis Creek has poor channel stability. Adams, 1997 concluded that "the Pfankuch channel stability rating is

good with a low to moderate width/depth ratio and is considered to be hydrologically stable." Strand, 2003 described Lewis Fork to have a fair to good channel stability rating based on observations that were made in some reaches of Lewis Fork (personal communication, 2003).

VSTAR data for Lewis Fork has not been collected and at least two VSTAR reaches should be established to determine existing conditions and to compare future VSTAR measurements of Lewis Fork.

Miami Creek: Ten VSTAR monitoring plots have been established in Miami Creek as part of the water quality monitoring plan for the Miami Creek Watershed (Adams, 1996). VSTAR plots are located approximately .5 miles upstream of lower Bridge on Miami Creek. VSTAR data has been collected in 1993, 1994 and 1996 (see Table 15). The results of this data shows that fine sediment varies from 17.3 to 78.9 and has an overall decreasing trend from 1993 to 1996.

Table 15 Miami Creek Summary of VSTAR Data

Pool #	*1993*	*1994*	*1996*
1	16.6	41.6	27.7
2	59.3	48.1	51.6
3	70.8	47.3	44.8
4	73.5	11.1	35.9
5	73.0	24.8	38.6
6	38.7	29.9	45.3
7	13.1	43.5	36.5
8	48.4	50.7	78.9
9	37.1	41.6	40.9
10	28.3	51.3	17.3
Average	**45.88**	**38.99**	**41.75**

Approximately, 15,587 m of channel has been surveyed for Rosgen stream types and 1214 m of channel has been surveyed for Pfankuch channel stability in Miami Creek. The extent of this data includes the upper, mid and lower reaches of Miami Creek. Analysis of this data indicates that Miami Creek has 40% A channel types, 22% B channel types, and 38% C channel types (see Table 16). Gravel and boulders dominate the A channel types, cobbles dominate the B channel types and gravel and silt-clay dominate the C channel types. The A channel types have channel gradients between 4 and 10%, the B channel types have channel gradients between 1.5% and 3%, and the C channel types have channel gradients between .1% and 1.5%. The C channel types are the most sensitive to sedimentation and have been impacted the most from disturbances in the upper watersheds.

Stream surveys conducted during 1996 , indicate that the main stem of Miami Creek is found to be in fair to poor condition (Adams, 1996). Pfankuch channel stability ratings vary from poor to fair with poor being the dominant rating. The channel bed substrate is predominantly composed of fine material, gravel and cobble with little to no gravel visible.

Table 16 Miami Creek Summary of Rosgen Channel Data

STREAM_NAME	MIAMI CREEK	
CHANTYPE	**Data**	**Total**
A1	Sum of REACHLEN (m)	578
	Percent (%)	3.71%
A2	Sum of REACHLEN (m)	1882
	Percent (%)	12.07%
A2A	Sum of REACHLEN (m)	75
	Percent (%)	0.48%
A3	Sum of REACHLEN (m)	320
	Percent (%)	2.05%
A4	Sum of REACHLEN (m)	3230
	Percent (%)	20.72%
B2	Sum of REACHLEN (m)	144
	Percent (%)	0.92%
B3	Sum of REACHLEN (m)	2692
	Percent (%)	17.27%
B4	Sum of REACHLEN (m)	597
	Percent (%)	3.83%
C1	Sum of REACHLEN (m)	163
	Percent (%)	1.05%
C3	Sum of REACHLEN (m)	379
	Percent (%)	2.43%
C4	Sum of REACHLEN (m)	2408
	Percent (%)	15.45%
C5	Sum of REACHLEN (m)	284
	Percent (%)	1.82%
C6	Sum of REACHLEN (m)	2835
	Percent (%)	18.19%
Total Sum of REACHLEN (m)		15587
Total Percent (%)		100.00%

Nelder Creek: Nelder Creek, including California Creek is a Class I tributary to the Fresno River. Stream surveys conducted during 1992, indicate that Nelder Creek was found to be in good condition. Approximately 5315 m of channel has been survey for Rosgen stream types and Pfankuch channel stability. Analysis of this data indicates that 62% of Nelder Creek are A type channels that vary from A1A to A5A types and 38% of Nelder Creek are B type channels (see Table 17). Pfankuch channel stability is good in the A type channels and poor in the B type channels. A type channels have channel gradients that range from 4 to 10% and stream flows at bank full stage are typically described as step/pools with attendant plunge or scour pools (Rosgen, 1994). Nelder

Creek has channel gradients that range from 4 to 15%. The bed of Nelder Creek is well armored and the channel substrate material is composed of bedrock, boulder, cobble, gravel and fines. California Creek has localized disturbances to meadows that are major sediment sources to lower reaches of Nelder Creek.

VSTAR data for Nelder Creek has not been collected and at least two VSTAR reaches should be established to determine existing conditions and to compare future VSTAR measurements of Nelder Creek.

Table 17 Nelder Creek Summary of Rosgen Channel Data

STREAM_NAME	NELDER CREEK	
ROSGEN CHANTYPE	Data	Total
A1A	Sum of REACHLEN (m)	729
	Percent (%)	13.72%
A2	Sum of REACHLEN (m)	250
	Percent (%)	4.70%
A3	Sum of REACHLEN (m)	1191
	Percent (%)	22.41%
A3A	Sum of REACHLEN (m)	117
	Percent (%)	2.20%
A4	Sum of REACHLEN (m)	345
	Percent (%)	6.49%
A5	Sum of REACHLEN (m)	425
	Percent (%)	8.00%
A5A	Sum of REACHLEN (m)	220
	Percent (%)	4.14%
B3	Sum of REACHLEN (m)	2038
	Percent (%)	38.34%
Total Sum of REACHLEN (m)		5315
Total Percent (%)		100.00%

10. Riparian/ Aquatics

Indicators:

a. Macro Invertebrates Community
b. vertebrates

Macro invertebrate sampling within the Fresno River watershed has been conducted in 1993 (Miami and Lewis Creeks) and 2001 (Miami and Nelder Creeks). The sampling conducted in the watershed during 2001 was part of the data set collected for development of the Forest Service's RIVPAC model and will provide a baseline for Miami and Nelder Creeks when the model is completed. Macroinvertebrate sampling from Nelder Creek has an O/E ratio of 1.09, which indicates the stream is not biologically impaired upstream from the sampling site. The Observed/Expected ratio of Macro-invertrebrates is approximately 1.09.

Sampling conducted on Miami and Lewis Creeks in 1992 was part of a paired basin analysis using some of the metrics from the Environmental Protection Agency's Rapid Bioassessment Protocol. The abundance of mayflies (order Ephemeroptera (E)), stoneflies(order Plecoptera (P)), and caddisflies (order Trichoptera(T)) is commonly evaluated as EPT. Metrics evaluated included density; taxa richness; EPT Index; % EPT; EPT/Chironomid; Family Biotic Index; percent contribution of dominant taxa; percent scrappers to total; and percent shredders to total. Statistically significant differences were indicated in density; taxa richness; EPT Index and Family Biotic Index. These differences suggest that Lewis Creek was in better aquatic condition

Vertbrates: The Fresno River Landscape Analysis includes drainage to both the Fresno and San Joaquin Rivers. The Fresno River watershed is comprised of Miami, Lewis, and Nelder Creek drainages.

Fishery: These creeks within the Fresno River watershed are generally part of the "rainbow trout fish assemblage" denoted by Moyle (2002). This assemblage as described by Moyle occurs in permanent waters, at higher elevations, with water temperatures that seldom exceed 21° C.

The fish community is dominated by rainbow trout (*Oncorhynchus mykiss*), but also includes riffle sculpin (*Cottus gulosus*), Sacramento sucker (*Catostomus occidentalis*), and speckled dace (*Rhinichthys osculus*). Moyle notes that this assemblage has been extended by humans to areas that were historically fishless.

It is not known whether rainbow trout are native to the Fresno River watershed within the Forest boundaries. Yoshiyama et al. (1996) do not include the Fresno River in their discussion on the historical distribution of Chinook salmon (*Oncorhynchus tshawytshya*). They do note that "*Native Americans belonging to the Northern Foothill Yokuts groups, including the Chukchansi people from Coarse Gold Creek and the Fresno River, fished for salmon in the San Joaquin River near the area of Friant (Gayton 1948b)"*. If Chinook salmon did not occur in the upper Fresno River, it is also unlikely that anadromous steelhead trout migrated to the upper watershed. Additionally, the absence of non-game fish associates such as hardhead minnow (*Mylopharodon conocephalus)*, Sacramento sucker, Sacramento pikeminnow (*Ptyochochelis grandis*), or sculpin and migration barriers (such as Crystal Falls on Lewis Creek and below Road 6S17 on Miami Creek) would also suggest that anadromous salmonids did not migrate to waters within the Forest boundaries.
Other portions of the analysis area drain to the San Joaquin River via Fine Gold Creek Yoshiyama et. al. (1996) note that "*Spring and fall runs of salmon formerly existed in the upper San Joaquin River, and there may also have been a late-fall run present, but all salmon runs in the San Joaquin River above the confluence of the Merced River were extirpated by the late-1940s. The spring run historically ascended the river past the present site of Kerckhoff Power House in the Sierra foothills to spawning grounds in the higher reaches (CDFG 1921). Based on the absence of natural barriers, it is likely that salmon entered two tributaries of the upper San Joaquin River near Millerton Reservoir— Fine Gold Creek, possibly "as far upstream [~6 mi] as opposite Hildreth*

Mtn", and Cottonwood Creek, which they probably ascended as least 2 mi. The construction and operation of Kerckhoff Dam (ca. 1920) for power generation blocked the spring-run salmon from their spawning areas upstream and seasonally dried up ~14 mi of stream, below the dam, where there were pools in which the fish would have held over the summer (CDFG 1921) ". Construction of Friant Dam eliminated the possibility of anadromous fishes reaching the Fine Gold Creek drainage. In addition to Chinook salmon, it is probable that steelhead trout may have accessed Fine Gold Creek. This would have resulted in at least the lower reaches of the creek being occupied by the rainbow trout assemblage previously discussed under the Fresno River watershed. Portions of the Fine Gold Creek drainage within the landscape analysis boundary comprise the headwaters for the drainage and it is unlikely that fish are native to these upper stream reaches.

The Fresno River and Fine Gold Creek drainages beyond the Forest boundary represent the "pikeminnow-hardhead-sucker assemblage" described by Moyle (2002) as occurring within Sierra Nevada foothill streams ranging in elevations between 27 and 450 m. Water temperatures within this transitional area may exceed 21° C during the summer, especially during "dry and critically dry" water years. Trout species may persist within these areas, but water temperatures may limit the populations. Introduced centrachids (sunfish family) are better adapted to these habitat conditions.

Stream surveys have occurred along Miami Creek (1978, 1989, 1993), Lewis Creek (1991), Nelder Creek (1978, 1992), and Rainier Creek (1991). As part of these inventories, stream channel conditions and aquatic habitat observations were completed, along with the identification of Watershed Improvement Needs (WIN) sites. Stream channels were defined by "reach" type based on information collected regarding channel gradient, width/depth ratios, amount of channel meander, substrate material, channel stability (Pfankuch 1975), riparian zone. Channel reach types (Rosgen 1996) were determined based on channel attributes such as channel morphology, along with sediment and transport characteristics. Channel types are considered in terms of sensitivity to disturbance as presented by Rosgen (1996), which varies by channel gradient and size of substrate.

Approximately 3.5 km of Miami Creek had mesohabitat typing (McCain et. al 1991) during 1989, in addition to snorkel surveys to evaluate the fishery. Habitat typing indicates a 2.5:1 pool:riffle ratio, although the majority of the stream (56%) was either glides or runs (shallow, slow areas). Fish surveys indicate self-sustaining populations of brown trout (*Salmo trutta*) and rainbow trout within Fresno River watershed streams. Brown trout are not native to North America and have been introduced by unknown persons (Bartholomew per com 2003). Snorkel surveys indicate that brown trout dominate the Miami Creek fishery, with observations of fish to 46 cm. Water temperature preferences for brown trout are similar to rainbow trout, but the species prefers pools to riffles and are fall spawners. Lower gradient segments of Miami Creek are pool dominated and provide better habitat for brown trout. Pools are the primary holding area for fish. Stream channel surveys conducted in 1978 estimated pools filled with an estimated 20% fine material, and streambank stabilities rated at fair:good.

Stream surveys in the mid- 1990s determined pools to be filled by more than 40% fine material and streambank stabilities of fair:poor. Accumulations of fine sediment within pools has limited habitat for aquatic species within Miami Creek, which in combination with loss of spawning gravels (also due to fines) are limiting factors in the population. Fish observations indicate the populations are low.

Lewis and Nelder Creeks are higher gradient, thus have more riffle and step-pool habitats. Electro-shocking conducted along Lewis Creek in 1984 estimated trout populations at 56/100 m, with brown trout slightly outnumbering rainbow trout (Parkinson 1984). The California Department of Fish and Game annually stocks rainbow trout in Lewis Creek. Stream channel surveys (1992) along Lewis Creek indicate channels are generally stable and provide better aquatic habitat than Miami Creek. Stream surveys of Nelder Creek in 1978, noted excessive bank erosion associated with logging in upper parts of the watershed. Surveys along Nelder Creek in 1992 indicate that bank stabilities are now generally stable. Fish observations indicate sparse distribution within Nelder Creek.

Herpetofauna**:** Migration barriers that might have restricted upstream migration of fishes have not excluded herpetofauna. Historically, the watersheds were known to be occupied by California red-legged frog (*Rana aurora draytonii*), Pacific tree frog (*Hyla regilla*), western toad (*Bufo boreas*), black bellied slender salamander (*Batrachoseps nigriventris*), California newt (*Taricha torosa*), ensatina (*Ensatina eschscholtzi*), western aquatic garter snake (*Thamnophis couchi*), common garter snake (*T. sirtalis*), western rattlesnake (*Crotalus viridis*), and western pond turtle (*Clemmys marmorata*). Foothill yellow-legged frog (*R. boylii*) has been collected at several sites within the Fine Gold Creek drainage and likely occurred within the Fresno River drainage as well. Mountain yellow-legged frog (*R. muscosa*) also likely occurred within the upper elevations (> 1700 m) of the Fresno River watershed. Bullfrog (*R. catesbeiana*) has been introduced to both watersheds and is now the dominant frog at sites below 1500 m elevation (particularly where ponds or large pools are maintained).

Of the herpetofauna species identified above, the California red-legged frog is listed as "threatened" by the U.S. Fish and Wildlife Service, while foothill yellow-legged frog, mountain yellow-legged frog and western pond turtle are Forest Service "sensitive" species. California red-legged frog was last sited within the two watersheds at Miami Creek in 1963 (below the Forest boundary) and at the San Joaquin Experimental Range (drains to Fine Gold Creek) in the mid-1950s. The California Natural Diversity Database includes records for foothill yellow-legged frog from China Creek (Fresno River drainage)(1991) and Little Fine Gold Lake (1972). Observations or collection of western pond turtle are recorded near Oakhurst (1988), Raymond (1988), Fine Gold Creek (1988), and Willow Creek (O'Neals: 1988) Forest service crews have surveyed 34 km of stream within the Fresno River watershed for herpetofauna since 1993 and have not detected any special interest species. Additional surveys have been conducted by the California Academy of Science (1999-2000) also have not detected these species.

11. Riparian Vegetation

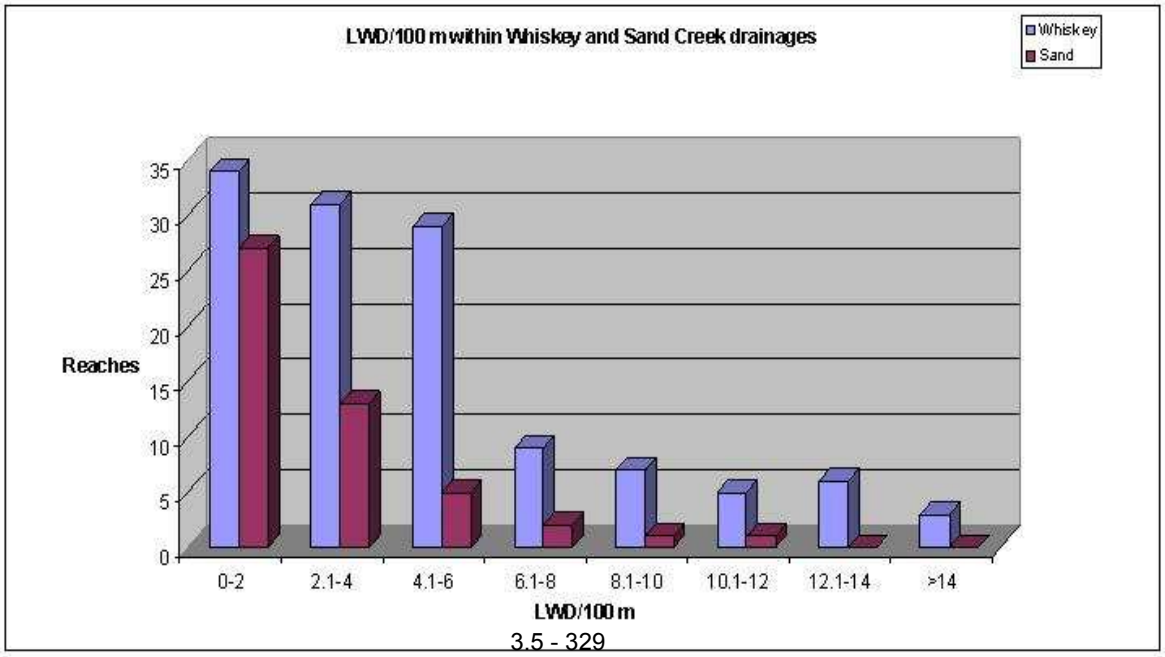
Indicators:	a. Canopy Cover	70-80 percent canopy cover
	b. Large Woody Debris	0-40 pieces LWD/100 m

Canopy: Stream surveys indicate canopy cover within Fresno River watershed streams is currently between 70-80%. No canopy cover data is available for the upper Fine Gold Creek. In general, water temperatures are within the range identified for cold water species. During "dry" water years, daily mean water temperatures may exceed 21° C below 900 m elevation in August.

Large Woody Debris: Information on reference variability and existing levels of Large Woody Debris (LWD) within most of the Fresno River and Fine Gold Creek watersheds is unknown. The Forest has been collecting LWD data since 1993 and surveys completed along portions of Miami Creek indicate 27 LWD/100 m and 11 LWD/100 m along Lewis Creek (Meyers 1993). Variability would be linked to the fire recurrence interval and related to stand density and intensity of fire. Subsequent to stand destroying events, LWD would be limited until trees reoccupying the site are of sufficient size to contribute to LWD recruitment.

Lacking information of historic reference variability for most of the two watersheds, Whiskey Creek is considered as a surrogate source for variability. Whiskey Creek is of similar stream order and headwater elevation with both Miami and Lewis Creeks. The amount of LWD present is a legacy of past activities. Intermittent tributaries in the Whiskey Creek drainage were railroad logged in the 1920's, but steeper portions along the main channel were not harvested. LWD distribution within the Whiskey Creek drainage was collected between 1995-98 representing 118 stream reaches (totaling 43 km) and shows a variability of 0-20 LWD/100 m and an average of 4.4 LWD/100 m (median 3.7). This is consistent with results from Ruediger and Ward (1996), which measured 4.5 Stable LWD/100 m for unharvested areas on the Stanislaus National Forest.

Figure 1 Large Woody Derbis in the Willow Creek Watershed



The results from Whiskey Creek can be contrasted with the Sand Creek drainage (displayed above). Both Whiskey and Sand Creeks are part of the Willow Creek drainage. Sand Creek is of similar stream order and headwater elevation with Whiskey, Miami and Lewis Creeks. However, several large fires burned through the Sand Creek drainage in the 1930s. These fires were followed by salvage harvesting and the two events effectively eliminated the riparian zones. Within the past decade, trees adjacent to Sand Creek are reaching sufficient size to contribute LWD for habitat complexity and diversity. Data collected from the Sand Creek basin in 1997 (48 reaches; 16.6 stream km) indicate 2.2 LWD/100 m (1.6 median). Some 60 years after the fires, levels of LWD are not yet half that of a less disturbed system.

12. Transportation

Infrastructure, Roads.

The existing transportation system for the Fresno River Analysis area consists of approximately 133.1 miles of National Forest System roads and 22.6 miles of State and County roads. The transportation system for the Fresno River watershed area is nearly complete. Roads needed to manage long term forest activities are included in the Forest Transportation Plan and identified as a National Forest System Road (NFSR).

Most system roads are in fair condition but may be experiencing isolated erosion problems due to wet weather use and erosive soils. Many of the local roads have received little to no maintenance over the years and will require heavy maintenance or reconstruction to eliminate resource damage and meet acceptable standards. Many roads do not currently meet maintenance standards established in the 7709.58 Handbook.

Approximately 38.8 miles of NFSR roadway are surfaced with aggregate or asphalt concrete for erosion protection and user comfort. There are 94.3 miles of NFSR native surfaced roads within the study area. These roads are not suited for wet weather use due to high potential for road damage, and degradation of water quality.

Madera and Mariposa County's maintain 14.0 miles of roadway. The State of California maintains 8.6 miles of roadway. These roads are maintained for passenger car travel and provide access to local communities as well as access to Yosemite National Park.

The road system is open seasonally to the public during the summer months. During winter conditions, segments of the road system are inaccessible by snow or are physically closed by gates or barriers to protect soft road surfaces.

Off-Highway Vehicle use is allowed on maintenance level 1 and 2 roads throughout the study area unless this use is prohibited. The Miami Motorcycle area offers an OHV recreational experience by providing designated trails for motorcycles and quads.

Some existing Forest, State, County and private roads, crossing National Forests lands and private lands do not meet current easement standards as defined in the Forest service Handbook.

Road maintenance responsibilities of NFSRs are borne by the Forest Service. Maintenance levels are dictated by the degree of maintenance expected, intended traffic and type of vehicles used.

Maintenance level 1 roads (10.7 miles) may be native or rock surfaced that provides specific project access. These roads are only maintained during project use and are generally closed upon completion of project activities.

Maintenance level 2 roads (108.6 miles) may be native or rock or asphalt surface that provide general access to the area. Level 2 roads may be open for public travel and are maintained for high clearance vehicles such as pickups. These roads may be used by "Green Sticker" OHV vehicles.

Maintenance level 3 through 5 roads (13.8 miles) may be native, rock, or asphalt surfaced. They provide general access which facilitates passenger car use to campgrounds and heavy traffic patterns. Maintenance level 3 through 5 roads fall under the National Highway Safety Act and require registered vehicles and licensed drivers.

Table 18 Roads within the Fresno River LA.

Miles by Maintenance Level, Surface Type, and Jurisdiction.

	Maintenance Level					County	State
Surface Type	1	2	3	4	5		
Native	10.7	80.8	2.8	0		4.6	0
Aggregate	0	26.1	0	2.1		2.2	0
Asphalt	0	1.7	2.4	6.5		5.6	8.6
Total	10.7	108.6	5.2	8.6		12.4	8.6

Table 19 Existing transportation system providing access to the study area.

Miles by Functional Class and Maintenance Level.:

	Functional Class		
Mtc. Level	Local	Collector	Arterial
1	10.7		
2	96.0	12.6	
3	3.5	1.7	
4	1.4		7.2
5			
Total	111.6	14.3	7.2

A field condition survey for unclassified routes within the Fresno River watershed area was completed in 2002. This survey identified 12.8 miles of unclassified routes (greater than 50 inches) including temporary roads, skid trails and use-defined roads. These routes are not included in the current transportation plan.

Table 20 Existing transportation system providing access to the study area.

Miles by Functional Class and Maintenance Level.:

Mtc. Level	Functional Class Local	Collector	Arterial
1	8.7		
2	80.9		
2		12.6	
3	3.5		
3		1.7	
4	1.4		
4			7.2

The following roads were identified as native surfaced roads located in High Erosion risk soils within sub-watersheds that are currently exceeding the cumulative watershed effects threshold.

Table 21 High priority roads for treatment, due to High Erosion Hazard.

4S04	5S12B	5S62	5S66A	6S09	6S10YA
6S10YB	6S13	6S13D	6S13G	6S13X	6S14
6S14A	6S14B	6S15B	6S15E	6S15X	6S17
6S24A	6S24B	6S39	6S63	MPA 126	

Table 22 Native surfaced roads located in High Erosion risk soils including the Holland, Chaix and Auberry family.

4S04	5S12	5S12B	5S17	5S17C	5S17D
5S17X	5S18	5S18X	5S62	5S66	5S66A
6S09	6S09A	6S09B	6S10B	6S10YA	6S10YB
6S11B	6S11D	6S11E	6S12YA	6S12YB	6S12ZA
6S13	6S13D	6S13F	6S13G	6S13H	6S13X
6S14	6S14A	6S14B	6S14C	6S14E	6S15
6S15B	6S15C	6S15D	6S15E	6S15X	6S16XA
6S17	6S17A	6S17B	6S17BA	6S24	6S24A
6S24B	6S24C	6S39	6S39A	6S41D	6S49
6S63	6S90	6S90D	6S90E	7S16	7S21B
7S23	7S23D	7S33	7S33B	7S33D	MPA 126
MPA 127					

Key transportation features within the Fresno River LA area include the following:

NFSR 6S10, Sky Ranch road. This road is an Arterial maintenance level 4 road that provides general public access to the eastern part of the study area. Road 6S10 is a two-lane paved and rocked surface road that provides access to recreational trailheads, campgrounds, Nelder Grove, special-use summer camps, and private in-holdings. This road is part of the Sierra Vista National Scenic Byway.

NFSR 6S47Y, California Creek road.
NFSR 6S90, Sugar Pine road. These are collector maintenance level 2 and 3 roads that provide primary access to the Nelder Grove Historic Area. These roads are single-lane with some spot rock surfacing.

NFSR 6S41, Kamook Road.
NFSR 6S24, Hugh Ryan road.
NFSR 6S15, China Wells road
NFSR 6S17, Ponderosa Fireline road. These are collector and local maintenance level 2 and 3 roads that provide primary access to the western part of the study area. They are single-lane with some rocked surfaces. They provide access to the Miami motorcycle area.

State Route 41. This two-lane paved road bisects the study area. Route 41 provides primary access to rural communities including Oakhurst, Bass Lake, Fish Camp, and is access to the southern entrance to Yosemite National Park.

County Road 632.
County Road CV08.

County Road 630. These two-lane paved roads provide primary access to private property and rural communities. They also provide secondary access to National Forests lands.

County Road 126. This single-lane native surface road provides access to the western portion of the study area. Road 126 provides access to private in-holdings and is seasonally maintained by the County.

County Road 223.
County Road 426. These two-lane paved roads provide primary access to private property and rural communities including Bass Lake. They also provide secondary access to National Forests lands.

Front Country The transportation system for the Front Country includes 0.1 miles of road maintenance level 1 roads, 13.0 miles of road maintenance level 2 roads and 1.5 miles of road maintenance level 4 roads. These roads are in poor to fair condition and are showing signs of resource damage due to use during wet weather conditions in high erosive soils and lack of road maintenance.

The Recreational Opportunity Spectrum for this analysis area is rural where as facilities for intensified motorized vehicle use and parking are available.

Road 7S13 is closed seasonally to all motor vehicles for protection of the road surface during wet conditions. However, hiking, biking and horse back riding are allowed. Gates provide closure compliance.

The following standards and guidelines provide additional guidance for transportation management direction for the Front Country management area: S&G #326 and 327.

General Forest The transportation system for the General Forest includes 10.6 miles of road maintenance level 1 roads, 101.6 miles of road maintenance level 2 roads, 5.2 miles of road maintenance level 3 roads and 7.1 miles of road maintenance level 4 roads. These roads are in fair condition but are showing some signs of resource damage due to use during wet weather conditions in high erosive soils and lack of road maintenance.

The Recreational Opportunity Spectrum for this analysis area is roaded natural where as conventional vehicle use is provided in construction standards and design of facilities.

Roads 5S17, 5S17X, 6S17 and 5S19 are closed seasonally to all motor vehicles for protection of the road surface during wet conditions. However, hiking, biking and horse back riding are allowed. Gates provide closure compliance.

Road 6S17 is closed seasonally to all motor vehicles greater than 1000 lbs. for protection of the road surface during wet conditions. However, Motorcycles and quads, hiking, biking and horse back riding are allowed. Gates provide closure compliance.

Roads 7S23, 7S23A, 7S23B and 7S23D are closed year round to all motor vehicles for protection of fire closure area and to provide a non-motorized recreational experience. However, hiking, biking and horse back riding are allowed. Gates provide closure compliance.

Roads 7S33 and 7S21B are closed year round to all motor vehicles for protection of fire closure area. However, hiking, biking and horse back riding are allowed. Gates provide closure compliance.

Roads 7S16, 7S16A and 7S16B are closed year round to all use including foot traffic for public safety and protection of County sewer spray fields. Gates provide closure compliance.

The following standards and guidelines provide additional guidance for transportation management direction for the General Forest management area: S&G #314, 315, and 316.

13. Recreation

Indicators: None

The Fresno River watershed contains several significant recreation facilities that are described below. These along with easy access from State Highway 41 and the Sky Ranch Road make the analysis area a major recreation resource on the Bass Lake Ranger District. Highway 41 is the most traveled route into Yosemite National Park. Consequently, literally millions of tourists pass through the Fresno River watershed annually. While many do not stop and only enjoy the scenery as they pass through, there are many attractions within the area that draw people to visit in relatively large numbers.

The area is heavily used by the rapidly growing populations of the foothill communities in eastern Madera County. The area also draws a significant amount of visitors from the San Joaquin Valley.

In addition to the key features listed below there is a significant amount of dispersed recreation that occurs within the analysis area. Dispersed camping is popular at Gooseberry Flat and along California Creek on the road to Nelder Grove (6S47Y).

Key Recreation Features

Lewis Creek National Recreation Trail Approximately four mile long trail open to hiking and mountain biking that travels along Lewis Creek parallel to State Highway 41. This is very popular hike for locals, and tourists on their way to Yosemite National Park. The main trailhead is on Highway 41 approximately four miles north of Oakhurst. This trailhead accesses Corlieu Falls and is the most popular. The north end of the trail is accessed at Sugar Pine, and the south end at Cedar Valley. It is not uncommon to see 10-20 vehicles on a summer weekend at the Lewis Creek Trailhead.

Westfall Day Use Area Westfall is a small, six tables, rest stop along Highway 41 approximately 4 miles south of Yosemite National Park. It is a popular lunch spot for Yosemite bound tourists. The operation and maintenance is currently under concessionaire permit to California Land Management (CLM). The toilets at the picnic area are in very bad condition and need replacement. The parking area is experiencing a lot of erosion and needs to be graded and surfaced. Otherwise the tables and grills have been recently replaced by CLM. The site does not even come close to meeting accessibility standards. Overall this facility presents a very poor impression on the large number of visitors heading for Yosemite. This may by their only contact with the National Forest before entering the Park.

Miami Motorcycle Trails Area (MMTA) The MMTA offers 19 miles of single track off road motorcycle and ATV trails. Within the area are two staging areas, Kamook and Lone Sequioia. This area is extremely popular with locals and residents of the central San Joaquin Valley as it provides a unique experience. Most of the maintenance work on the trails has been supported by State of California Off Highway Vehicle Funds. The identified trails are currently not designated as part of the Forest's trail system, however they are managed in the same manner that system trails would be. Some of these identified trails are in an unacceptable condition and need to be rerouted to improve soil erosion management. There are some continuing soil erosion problems that need attention on routes that have been used in the past but are now closed. The parking area at the Kamook Staging Area is in poor condition and needs to be graded for proper drainage.

Sierra Vista National Scenic Byway (SVNSB) The byway travels along the Sky Ranch Road (FR 10) through the analysis area. This is the northern terminus of the 100 mile route that begins in the community of North Fork.

Nelder Grove Historic Area The Nelder Grove of Sequoia's is the cornerstone of this designated 1,434 acre historic area. The area was set aside as a Historic Area in 1972. There are 106 mature giant Sequoias within the Historic Area boundaries. There are several recreational and interpretive facilities within the Historic Area including:

- Nelder Grove Campground – 10 overnight sites
- Sierra Beauty Day Use Site – 1 picnic site
- Bull Buck Trail
- Chimney Tree Trail
- Shadow-of-the-Giants National Recreation Trail
- Graveyard-of-the-Giants Trail
- Nelder Grove Interpretive Site – including 2 restored cabins, and several exhibits.

Nelder Grove provides a very appealing environment to experience the majesty of the giant sequoias, in contrast to the crowed groves within Yosemite National Park. Most of the visitors are day users, hiking the various short trails in the area. The campground however does have a strong following of visitors that annually enjoy the quiet, off-the-

beaten-path surrounding along the creek. Mountain biking especially along the Graveyard-of-the-Giants trail (an old fire road closed to vehicles) has been increasing lately. It is a popular destination for visitors staying at Tenaya Lodge in Fish Camp.

A recreation development plan was completed for Nelder Grove in 1981. However, little if any of the plan has been implemented, primarily due to lack of funding. The trails are generally in acceptable condition thanks to the work of many volunteer groups. However, the three small foot bridges on trails within Nelder Grove all need replacement. The Chimney Tree Trail which was closed for many years was recently re-opened due to the volunteer efforts of the Mariposa Rotary Club. The campground facilities are currently sub-standard and need replacement. None of the facilities at Nelder Grove are accessible.

14. Element: Contemporary Native American Use

Indicator: None

Native Americans are given special consideration in this landscape analysis because they are descendents of the original occupants of the area of the Fresno River and Fine Gold Creek watersheds, and because they have special legal status under federal law.

The Native American groups and tribes that traditionally called the Fresno River watershed their territory are the North Fork Mono, the Chukchansi, and the Southern Sierra Miwok. Federally recognized tribes in the Fresno River landscape are the North Fork Mono Rancheria and the Picayune Rancheria of the Chukchansi Indians. The North Fork Mono Tribe and the Southern Sierra Miwok are not yet federally recognized, but organized and active in the Fresno Area Landscape area. Other Native American organizations or groups in the area are the Mono Nation, the Sierra Mono Museum, the Wassama Roundhouse, and the California Indian Basket Weavers Association.

Contemporary use by local Native Americans includes but is not limited to traditional uses of plant gathering for basket making materials, food, medicine, and ceremonial purposes; hunting, fishing; and occupying the land for ceremonial, ritual, and social events.

Hundreds of plant species are gathered for basket weaving, food, medicine, or ceremonial uses. These plants are listed in an ethno-botanical list compiled by Ron Goode, entitled *Cultural Traditions Endangered* (1992), and in PG&E's operation plan for *Integrated Pest Management* (1999).

On Lewis Creek, there is one known site of spiritual importance to the Chukchansi.

The request/demand from the Native American communities for protection and enhancement of traditional plant gathering locations, and for access to Forest areas for other traditional uses is increasing.

The Forest policy on Native American plant gathering is to allow traditional gathering without special use authorization or fee (letter on Native American Gathering Policy, 1993). To protect specific plant species and populations of plants, protection clauses are included in our road maintenance plans, fuels reduction projects, timber sales, burn plans, and operating plans for Lands permits. Enhancement of specific populations of plants by periodic pruning or burning is encouraged and implemented in some areas.

Arch Sites Heritage resource sites are of three types – archeological remains of prehistoric human occupation, the remains of historic human activity, and areas of contemporary Native American use. (The topic of contemporary Native American use is discussed further in Chapter 4, Cultural/Social Hierarchy, Element #14.) The element titled archeological sites includes prehistoric and historic sites.

Prehistoric sites include food processing sites (bedrock mortars), food storage sites (granaries), tool making sites (lithic scatters), trash dumps (midden soil), ceremonial sites (rock art), large get-together areas or village sites and small, single or short-term activity sites. Prehistoric sites represent human occupation in the time period of perhaps 5,000 years ago (or more) to about 1900 AD.

Historic sites include mining claims, remains of old homesteads, carved aspen trees, sheep and cow camps, Forest Service administrative structures (cabins, fire lookouts, tool caches, etc.), tin can dumps, saw mills, railroad logging, water diversion, old trails and roads. Historic sites represent a time period of human occupation from about 1849 to 1950.

Approximately 75% of National Forest managed lands within the Fresno River and Fine Gold Creek watersheds has been surveyed for archeological sites. The two main areas that are not surveyed are have inadequate survey are the lower sections of Miami Creek and the steep areas north and west of Nelder Grove.
There are 153 sites recorded. Of these, 94 are prehistoric sites, 42 are historic sites and 17 have both prehistoric and historic components. Of the 111 sites with prehistoric components, 74 are milling sites with lithic scatters, 8 have only milling features, and 26 are lithic scatters only. There is one petroglyph (rock art) site, and 2 sites have unknown components (recorded as “suspected Indian campsites). Sixty historic sites represent the logging periods of each of the three logging companies in the area (Company California Lumber Company 1873 to 1878, Madera Flume and Trading Company 1878 to1899, and Madera Sugar Pine 1899 to 1929), and homesteads, graves, trash dumps, and other historic sites or activities.

Currently these sites are managed by the “flag and avoid” technique under the *Programmatic Agreement Among the USDA Forest Service, Pacific Southwest Region, California State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Identification, Evaluation and Treatment of Historic properties Managed by the National Forests of the Sierra Nevada, California*, and benign neglect. Unless a specific project is proposed, little is done to manage heritage resources

due to budget and personnel constraints. When a ground-disturbing project is slated to take place all sites are “flagged and avoided” by project activities.

A preliminary check of the location of recorded sites and specified roads, shows 37 road/site conflicts in the Fresno River Landscape area. Some of these road/site conflicts are of minimal concern, and present no opportunities for protection, mitigation, or interpretation. However, a preliminary review of the site records show 24 sites where the roads running through the sites are causing an impact that could be eliminated or mitigated.

Table 23 Roads having the serious road/site conflicts are:

Forest Service		County
5S18	6S14A	126
5S19	6S13	127
5S79	6S24	CV04
6S09B	6S41	CV08
6S11	6S41C	
6S11A	6S70	
6S12YA	7S21B	
6S12Z		

The Sierra National Forest has not investigated all of the historic road systems in the Fresno landscape, so the full impact of road management on historic roads is not known. However, there are several old wagon and stagecoach roads in this area, old Yosemite Stage Road (Road 5S66), Miami Stagecoach Road, and a historic road associated with the Worman Mill. Also, the community of Sugar Pine was once the location of a large sawmill supplied with timber by an extensive railroad system (Madera Sugar Pine Railroad). Some of the forest roads within the Fresno River Landscape are railroad grades converted to roads. There are extensive lengths of existing forest road that were built on previously constructed Madera Sugar Pine railroad grades.

Table 24 Roads constructed on Madera Sugar Pine railroad Grades

4S04 6S13 and 6S13E	5S17 6S14B
5S18 6S90	5S19B Highway 41
6S11	

The Madera Flume and Trading Company’s logging system has been evaluated for eligibility to the National Register of Historic Places. The entire system of logging mills, logging camps, railroad grades, wagon roads, chutes, and the flume have been found eligible as a historic district. Seven of the twelve sites within the system have been found to be contributing elements to the significance of the historic district, and five are not contributing.

There is on going damage to archeological or historical sites in several areas. Off-Highway Vehicle (OHV) trails and user defined routes run through six known archeological sites in the Miami Creek basin. Approximately 2,000 acres in the Miami Creek area have not received adequate archeological survey.

The historic Westfall Ranger Station is deteriorating and there is little money to keep it up despite its probable eligibility to the National Register of Historic Places.

Several sites are being looted (a site near Cedar Valley is a good example) despite attempts to protect the sites.

The campground at Nelder Grove and several of the trails are located on historic and archeological sites.

Many dispersed camping areas are on archeological sites.

Nelder Grove is a 1,500 acre preserve of 106 giant sequoia specimen trees with a campground, picnic area, and interpretive signs describing historic logging techniques. There is opportunity here for greater interpretation.

The Lewis Creek Trail passes several historic and prehistoric archeological sites, and provides a great opportunity to interpret the local history to Forest visitors. Any public interpretation should be created with Native American consultation and respectful attention to the sacred site on Lewis Creek.

15. Element: Economic

Indicator: None

Commercial Recreation on National Forest System Lands: Yosemite Trails Pack Station has operated on a site at the head of this watershed analysis area for over 50 years. The pack station provides hourly, two hour, and day rides from this site. They teach horsemanship classes to organized groups, provide overnight pack services, and winter sleigh rides. Yosemite Trails Pack Station operates summer fall and winter seasons. The business is closely associated with the adjacent Tenaya Lodge Resort. In 2002 the business grossed approximately $340,000.Their gross earnings has been relatively stable for 1999-2001.

Yosemite Sugar Pine Rail Road has operated on the Sierra National Forest for over thirty years. The railroad offers rides using historic steam locomotives on a mile long track of old logging railroad grade. Historic interpretation is provided and light food service is available. The site also offers a gift shop/bookstore and museum. In recent years marketing has been successful in attracting tour bus companies to make a stop at the railroad. In 2002 this business grossed approximately $900,000. Gross earnings have been trending upward for the past three years.

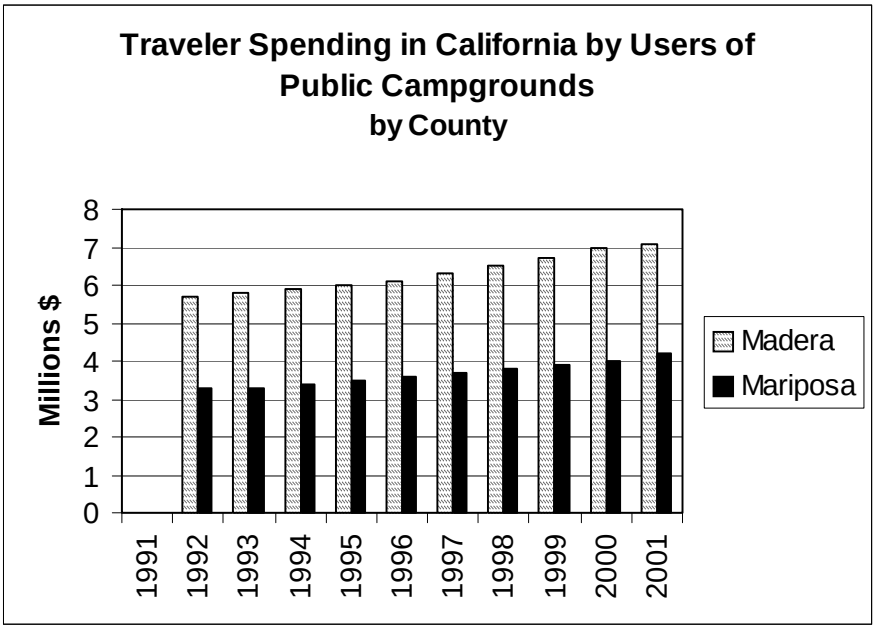
Organized Recreation on National Forest System Lands: Camp Redwood is a private camp permitted on NFS lands within Madera County. The thirty-one sites with tent platform structures are occupied ~ 50% of the weekends June-August. Families utilizing the camp purchase supplies and may utilize entertainment and restaurants in the Oakhurst area. At $93/group/per day (Campers in CA, 2000 pg 39), income to the Oakhurst area would be in the range of $35,600/year. (372 occupied days @ $93/day = $35,600)

Camp Adahi is an organized camp permitted on NFS lands within Madera County. For one week per summer it provides a summer camp experience for 3900 service days. It is expected that this use would not contribute significantly to the economic gain or loss for Madera County due to the short duration of use.

Table 25 National Forest Developed Sites

Campgrounds/Picnic	# sites	Cost/site
Westfall Picnic	6	0
Nelder Grove Campground	10	0

Figure 2 Expenditures by Users of Public Campgrounds in Mariposa and Madera Counties



This information was obtained from a study of campers in California conducted by Dean Runyan Associates.

Definitions

Public Campground: Spending by campers using public campgrounds is estimated from visitor counts at national and state parks, national forests, and state and federally managed recreation areas, and then multiplying the visitation by daily spending estimates from the visitor survey.

Traveler: A person traveling in California. A traveler may be a California resident or a resident of another state. The terms traveler and visitor have the same meaning in this report.

Average Daily Spending: Spending by campers using public campgrounds per party (not including travel to and from campsite/residence) is **$93/day**.

Dispersed Recreation on National Forest System Lands Though there is little data to determine financial contributions of visitors to the Miami Motorcycle area, visitors to this National Forest attraction would fall into three categories: 1) campers on site (using the staging areas), 2) hotel/motel clients, and 3) day users. Day users and Campers likely spent $93/day per party. Hotel/motel clients likely spend $150/day/person.

In addition, off highway vehicle recreationists spend a great deal in urban centers (not within the analysis area) on purchasing this specialized equipment and the vehicles (trucks/trailers) to transport this equipment.

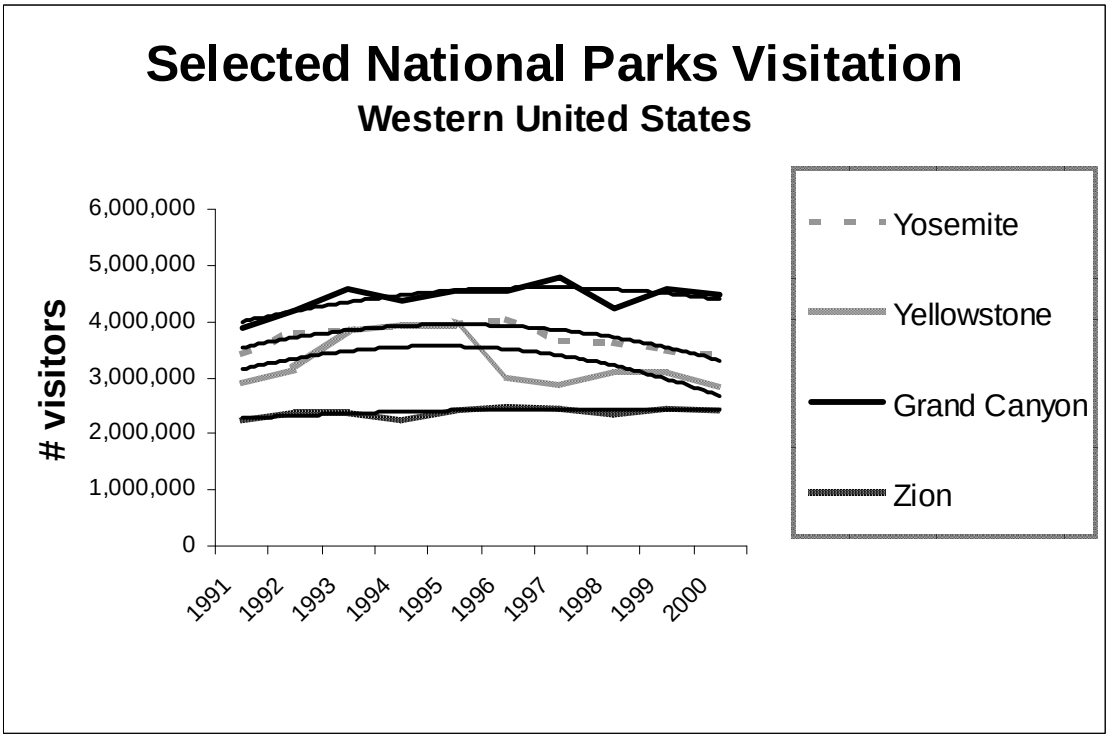
Table 26 Miami OHV area

Staging Areas	# sites	Cost/site
Kamook	2	$0
Lone Sequoia	2	$0

The Sierra Vista Scenic Byway (Sky Ranch Road) runs south-west to north-east through the analysis area. Current marketing for the Byway is to encourage local residents to bring out of town visitors with them for a days outing. There is no estimate of financial contribution of the Byway to the local economy.

Yosemite National Park Visitation: Yosemite NP visitation was 3.4 million in the year 2000 (www.nps.gov). This is down from a 10 year high of 4 million in 1996. In comparison, other major national parks in the western United States (Yellowstone, Zion, Grand Canyon) have decreased in visitation, with their 10-year highs falling in the mid 1990's.

Figure 3 National Park Visitation: western United States



Tourism On Private Lands: The following destinations are located on private lands both within and adjacent to the analysis area. The estimated economic benefits to Mariposa and Madera counties for visitation to the following destinations is included in the traveler expenditures and Transient Occupancy Tax discussions in this section. (Dean Runyon Associates: http://dra.uia.net**)**

Mariposa County: Tenaya Lodge is a 244-room resort hotel on 35 acres of private land at the head of the analysis area. It is open year round. Occupancy rate and income is unknown.

Narrow Gauge Inn is a 26-unit inn and restaurant. The motel is open year round. The restaurant offers fine dining and is open in the summer/fall season. Occupancy rate and income is unknown.

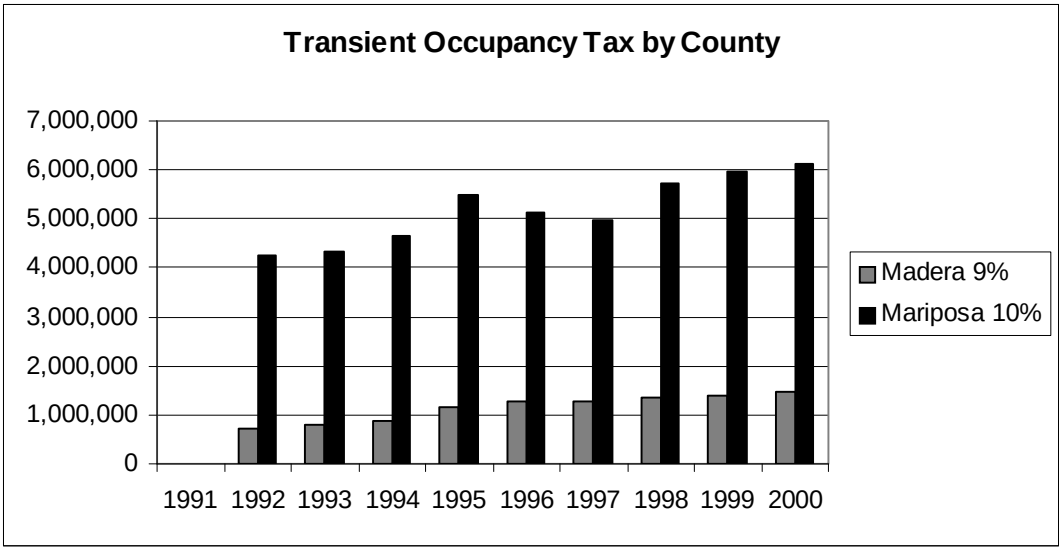
Apple Tree Inn is year round 53-unit inn on 7 acres of private land within the analysis area. Occupancy rate and income is unknown.

Madera County: Sierra Sky Ranch is a 25-room historic style resort and restaurant on 25 acres of private land within the analysis area. Occupancy rate and income is unknown.

Calvin Crest is a youth camp and adult conference center located on private land within the analysis area. Food service is provided onsite. The Conference Center is open year round. Occupancy rate and income is unknown.

Figure 4 Transient Occupancy Tax

Spending by hotel and motel guests in other business categories, such as food and transportation, is estimated to be $150/day/person (personal communication with Dan Carter, Executive Director Sierra-Yosemite Visitors Bureau).



Direct County Income from Travel and Tourism
The Transient Occupancy Tax (TOT) is a local tax charged on lodging (also referred to as room tax, transient lodging tax, hotel tax or bed tax). The tax rate is defined locally. In Madera County the rate is 9%. In Mariposa County the rate is 10%. The TOT is commonly referred to as an indicator of the health of the tourist economy. It is unknown what percentage of the TOT is derived from economic contributors to the analysis area.

Industry
Mining: there is no mining industry in the analysis area.
Logging: Logging industry is mostly on private lands adjacent to the analysis area (Mariposa County). Economic contributions from this industry is unknown.
Film: The film industry utilizes the analysis area 2-3 year. The Miami Motorcycle has become popular with the manufacturers of off highway vehicles. Crews for film productions range in size from 10-40 people. Most recent productions utilized the analysis area for 2-4 days. Estimated spending is $150/person/day.

Ranching: A portion of the Soquel Grazing Allotment (44,785 acres) falls within the Fresno River LA area. From June 1- October 15, 235 cow/calf pairs are permitted to graze in the Soquel Allotment. Approximately 80 pairs (one third of the permitted numbers of cattle for the allotment) graze within the watershed (including Nelder Grove area) from June 1- October 15. The permittee is Michael J. Knapp of the Lazy K Ranch. Sheep are no longer grazed on the Sierra NF, and cattle grazing is at a very low level compared to past grazing use (J. Lorenzana, pers. comm.).

Employment by County

Table 27 Madera County and Oakhurst: **Population and Employment.**

Madera County	**1990**	**2000**	**% Change**
Total Population	88,090	123,109	+40%
Civilian Labor Force (CLF) Employed persons	33,263	42,166	+21%
CLF percent unemployed	11.9	7.1	-40%
Percent employed in ag, forestry, fisheries	16.4	14	-15%
Percent employed in Entertainment & Rec Services	1.6	7.7	+79%
Percent employed in mining	>1	N/A	N/A
Per capita income	$10,856	$14,682	+26%
Oakhurst (Zip Code 93466)			
CLF Employed persons	3,502	7,239	+52%
CLF percent unemployed	2.8	2.9	+3%
Percent employed in ag, forestry, fisheries	5.0	2.5	-56%
Percent employed in mining	>1	N/A	N/A
Percent employed in Entertainment & Rec Services	1.6	20.3	+92%
Per capita income	$14,186	$20,152	+30%

Table 28 Mariposa County: **Population and Employment.**

Mariposa County	**1990**	**2000**	**% Change**
Total Population	14,302	17,200	+20%
CLF Employed persons	5908	7958	+26%
CLF percent unemployed	6.7	8.2	+18%
Percent employed in ag, forestry, fisheries	3.8	2.7	-29%
Percent employed in Entertainment & Rec Services	4.9	23.0	+79%
Percent employed in mining	>1	N/A	N/A
Per capita income	$13,074	$18,190	+28%

Timber Harvest and Fuels Reduction: Timber harvesting has shifted from commodity production to thinning for watershed improvement and fuels reduction opportunities.

There is heightened interest in the community for economic opportunities that may be capitalized upon when implementing fuels reduction products.

The local North Fork Community Development Council (CDC) has initiated several studies involving the utilization of brush and small timber products which may be

produced through the fuels program. The CDC has been successful in obtaining grants for these studies and has produced several reports exploring economic uses, opportunities, and challenges associated with small biomass products. Some of these challenges involve the amount, size, species and location of woods product generation, collection and transport technology, material value, processing cost, and capital requirements.

The local fuels, physical and biological environment, and political environment point to a heavier than average reliance on mechanical fuels treatments compared to less costly burn treatments. This puts communities and the Forest at a disadvantage when competing for appropriated fuels program funds at a regional or state-wide level. Northern Forests have better air quality, more diverse and established markets for similar material, and can accomplish more work efficiently than the southern Forests.

16. Special Uses and Adjacent Land Uses

Indicators: None

Yosemite Mountain Sugar Pine Railroad (YMSPRR): The YMSPRR is a major tourist attraction located on Highway 41 approximately 3 miles south of Yosemite National Park. It has operated on the Sierra National Forest for over thirty years. YMSPRR offers steam train rides on a mile of old logging railroad grade in the summer season. They also offer food service and souvenirs, along with entertainment and special events. Most of the operation is on NF lands and is under a Special Use Permit. Some of base area maintenance shops are on private land.

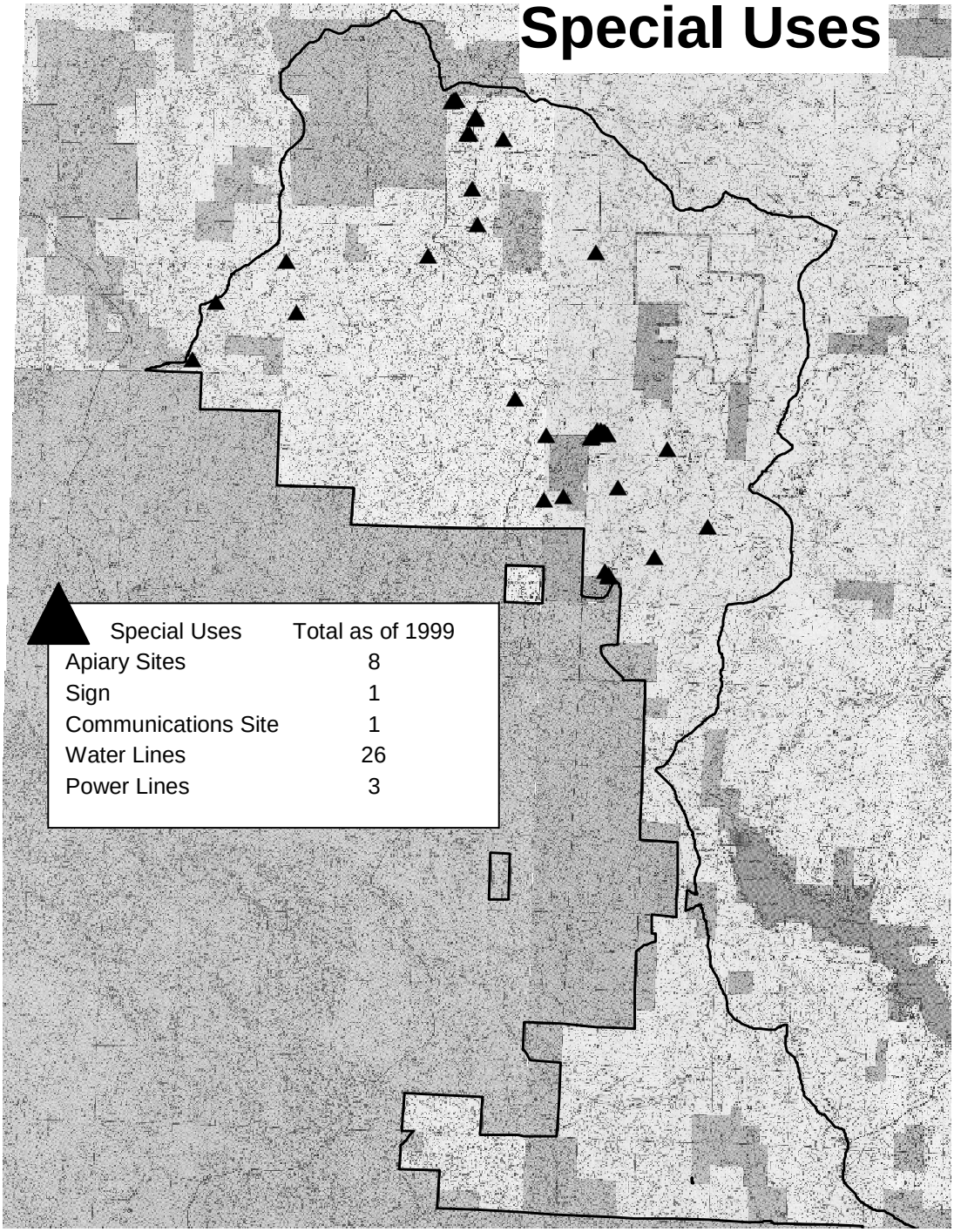
Camp Redwood: Camp Redwood is a private camp operated under Special Use Permit. The Camp is located on the Sky Ranch Road (FR10) at California Creek, approximately 3 miles from Highway 41. There are thirty-one sites with semi-permanent improvements such as tent platforms.

Camp Adahi: Camp Adahi is an organized camp operated under a Special Use Permit by Campfire Inc. (formerly the Campfire Girls). It is located just off the Sky Ranch Road (FR10) approximately 3 miles from Highway 41. It provides a traditional summer camp experience for both boys and girls. On the average use is about 3900 service days per year.

Adjacent Land Uses: There are twenty-one tracts of private land, ranging in size from 10 acres to a portion of the ~3000 acre Yosemite Mountain Ranch. Most tracts are from 200-500 acres in size. The main tracts from north to south in the analysis area are:

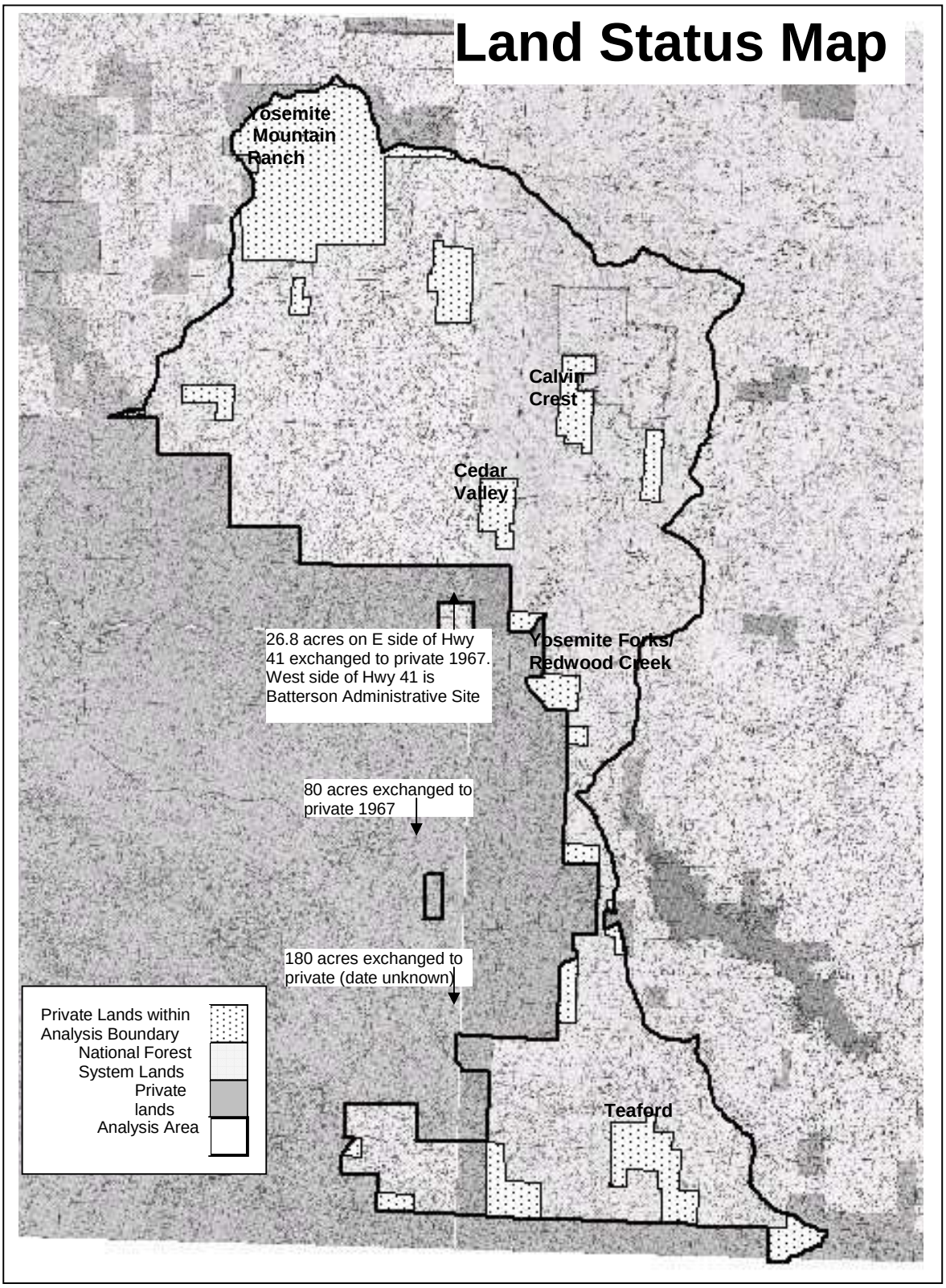
Yosemite Mountain Ranch:	1 parcel
Sugar Pine:	1 parcel
Calvin Crest:	6 parcels
Cedar Valley:	184 parcels
Yosemite Forks/Redwood Creek:	185 parcels
Teaford:	266 parcels

Figure 5 Location of special use sites located within the Fresno River Watershed. Special Uses on National Forest Lands include; apiary sites, advertising sign locations, communication sites, and water and power lines.



Trespass: Due to urbanization and multiple private lands in-holdings within the analysis area, trespass of private uses and occupancy onto National Forest System lands is evident and ongoing. Some data has been collected and is housed in the land survey files at the Forest Supervisor's office.

Figure 6


Land Status Map
Yosemite Mountain Ranch
Calvin Crest
Cedar Valley
26.8 acres on E side of Hwy 41 exchanged to private 1967. West side of Hwy 41 is Batterson Administrative Site
Yosemite Forks/ Redwood Creek
80 acres exchanged to private 1967
180 acres exchanged to private (date unknown)
Teaford
Private Lands within Analysis Boundary
National Forest System Lands
Private lands
Analysis Area

17. Atmospheric Particulates

Indicator: PM10

The analysis area is located in Madera County, California. The analysis area is contained within the San Joaquin Valley Air Basin.

There are several areas surrounding the analysis area that are classified as "Smoke Sensitive", defined as population centers where forest activities (mainly prescribed fire activities) could potentially have negative impacts to air quality and human health if not monitored properly. These include but are not limited to the towns of Oakhurst, Awahanee, and Ponderosa Basin.

The San Joaquin Valley Air Basin has been designated as in serious non-attainment for the national one-hour and 24-hour PM10 standards set by the Environmental Protection Agency and as in non-attainment for the California state standards for PM10. Particulate matter (i.e. PM10) is considered a criteria pollutant because of the impacts it can have on human health and visibility. Particulate matter of 10 microns or smaller can be produced by both prescribed burning activities and from dust.

At present, burn projects are designed to meet the national ambient air quality standard of 70 tons/year of PM10 production per project. In addition, all projects are modeled to predict the contribution of fugitive road dust emissions for projects to meet the national guidelines.

At present there are no set rules or regulations regarding PM2.5 emissions (those sized particles within dust), but these sized emissions are addressed during project planning and measures are implemented for reducing them.

Because of the non-attainment status of the San Joaquin Valley Air Basin more stringent rules and regulations have been implemented within the Air Basin. When utilizing prescribed fire for fuels treatment, all plans are reviewed and approval by the San Joaquin Valley Unified Air Pollution District. For prescribed fires and burns, anticipated to produce more than 1 ton of particulate matter or for multi-day burns, these rules and regulations have been adopted by the Air District Board as a means of addressing how to meet national ambient air quality standard of 70 tons/year of PM10 per project emissions within serious non-attainment air basins.

Chapter 5 Desired Condition

A. Definition of Desired Condition
Desired future condition is a statement describing a common vision for a specific land area. These statements are made it the present tense indicating a condition that management will be designed to maintain or move towards, in each land allocation. Statements of desired condition take into account the natural range of variability typical for the Fresno River landscape, the uncertainty of natural disturbances, effects of past management, and the unique features or opportunities that the Fresno River area offers. This section describes desired conditions for the management indicators.

B. Delineating Management Zones
Current Management Zones have been delineated by the Sierra National Forest Land and Resource Management Plan, as amended by the Sierra Nevada Framework 2003.

C. Desired Condition
Fresno River

1. Vegetation Mosaic/Fire/Wildlife

Indicators: a. Vegetation Species Composition

Indicators: a. Fire Return Rate and Severity
b. Fire Seasonality
c. Fire Size and Distribution

Indicators: a. Spotted Owls
b. Furbearers
c. Deer
d. Goshawks

The Desired Conditions for Vegetation, Fire, and Wildlife will be addressed together in this section by major vegetation zones for ease of discussion and clarity of intent.

Vegetation conditions are somewhat prescribed by the Sierra Nevada FEIS and ROD (Framework), for several land allocations and prescription zones. Certain allocations such as PACs for California spotted owl (SO), northern goshawk (AG), and great gray owl (SN), have stringent standards and guidelines assigned: habitat area (SO-300ac) (AG&SN-50ac); Limited Operating Periods (LOPs); mechanical equipment restrictions; etc.

In a similar fashion, standards and guidelines for riparian areas are restricted to treatments that must have an identified positive effect on the riparian or aquatic resources themselves.

Deer winter range has been identified and would be managed according to LRMP standards and guidelines which favor manipulation of the vegetation to favor deer habitat,

generally developing a vegetation mosaic which includes small patches of brush or hardwoods in generally one or two layers.

Defense Zones around communities would consist largely of single storied stands with fuels conditions allowing efficient fire suppression.

Existing stands would be managed to obtain old growth characteristics as quickly as possible, but would be managed slightly differently according to their location within or outside of the Defense Zone (WUI) or Strategically Placed Area Treatments (SPLATS). Plantations and thinned stands would be developed for single storied stands within the Defense Zone and SPLATs, and for 2-3 layered canopies outside these areas.

The extent and locations of PACs, SMZs, Nelder Grove, and deer winter range are defined and identified by current inventories of the land base. The extent of Defense and Threat Zones mandated by the Framework is determined by the land use and locations of existing communities.

Table 29 Desired Vegetative Diversity by Area Allocation

HORIZONTAL DIVERSITY	VERTICAL DIVERSITY
Nelder Grove	2-3 canopy layers
PACs	2-3 canopy layers
SMZs	2-3 canopy layers
Deer winter range	1 canopy layer, patchy oak over brush
Defense Zone	1 canopy layer
Threat Zone	1 canopy layer
Stands - Plantations outside SPLATS - Thinned stands outside SPLATS	2-3 canopy layers 2-3 canopy layers
Stands - Plantations within SPLATS - Thinned stands within SPLATS	1 canopy layer 1 canopy layer

A general discussion of desired conditions for the major vegetation zones, regardless of formal land allocation status follows:

Chaparral: The LRMP-EIS describes fuels reduction activities as being most beneficial in the chaparral areas, which lie below the timber belt. "There are opportunities to use prescribed fire on steep and rocky areas and mechanical clearing and herbicide treatment on areas with deep soils with less than 30% slopes. These treatments will change the present condition of chaparral areas to conditions resembling the 1850's. The resulting conditions will make fire control easier and increase range forage, wildlife browse, and available water for site users."

The current condition of the Chaparral Zone is moderately altered from its historic condition. Several ecologists believe that fire is necessary to preserve chaparral and chaparral species.

In the chaparral, a mosaic of varying aged vegetation in patches of 100+ acres is most desirable. Plant density would be reduced to clumps averaging 200 stems/acre, favoring more ceanothus and mountain mahogany and less manzanita. Younger bush is more palatable for wildlife and less flammable. Smaller, less intense fires would occur with a frequency of approximately 25-30 years, to encourage a greater variety of annuals and short-lived small plants, which support increased biodiversity.

Chaparral stands maintain their fire resistance until 15 or 20 years of age. By that time enough litter has accumulated to carry a fire during extreme fire weather conditions. Fire normally occurs in chaparral stands at intervals from 30 to 50 years, most becoming large high-intensity fires, because small low intensity fires are immediately suppressed. Low intensity fire can occur in these stands under moderate weather conditions such as late spring and early summer (Dodge 1977).

Fuel treatments are desired so natural or prescribed fires could be allowed to burn at more frequent intervals. Fuel treatment will likely be a combination of mechanical manipulation and prescribed burning. Prescribed fire is the primary managerial tool where mechanical methods cannot be used; mechanical crushing would be used where topography and soils permit as a pre-treatment to widen the prescribed burn window and as an aid to creating mosaics across the landscape.

It is desirable to develop stands which may be safely and easily burned almost every 20 years. This would develop stands which could produce the greatest stand plant diversity and increase heterogeneity spatially, both vertically and laterally. Much of the chaparral has developed large homogeneous stands of older decadent brush across the landscape, replacing the earlier mosaic of smaller patches of vegetation. The desired condition favoring plant diversity is to recreate a more heterogeneous state of smaller patches of varying age, density, and species. Many chaparral species require fire for their reproduction and survival, whether reproduction is by seed or sprouting. Young chaparral plants are fire resistant and incapable of carrying fire (Dodge 1977). Once a treatment regime is established deadwood accumulation could be kept somewhat in check to limit fire intensity and provide for increased public and firefighter safety.

Once a more natural mosaic of age classes and community types has been restored, age class boundaries would then function, along with topographic features, as natural fuelbreaks for limiting the size of future fires and maintaining the desired mosaic. Wildland fires can be managed using the appropriate management response to implement protection and/or fire use objectives.

Under high fire weather conditions, wildland fire behavior in treated areas is characterized as follows: (1) flame lengths at the head of the fire are less than four feet, (2) the rate of spread at the head of the fire is reduced to at least 50 present of pre-treatment levels for a minimum of five ears, (3) hazards to firefighters are reduced by keeping snag levels to two per acre, and (4) production rates for fire line construction are doubled from pre-treatment levels.

Prescribed fire will have benefits of promoting new growth of forage species for deer, reduce the proportion of decadent brush, and provide fire protection to adjacent wildlife habitats such as spotted owl and goshawk PACs.

It would be desirable to increase Ceanothus species to 20-30% of the brush stand for deer forage. Masication would help reduce the non-sprouting white-leaf manzanita and promote sprouting of *Ceanothus*. Seeding and planting are also possibilities.

The desired condition of chaparral stands is to maintain or increase blue and black oak where possible and appropriate. Black oak develops an acorn that is a preferred mast for deer. Black oak trees also grow large trunks and limbs, which are desirable for cavity using species, more so than live oaks which can tend to be bushy in form. Increasing the proportion of black oak to 30-40% of the oak canopy by cultivating young trees, pruning stumps and reducing live oak will increase the quality of available mast for deer and other WL forage.

An impediment to burning these stands is their location on the landscape, being closest to foothill residences. Experience has shown difficulties in obtaining minimum air quality standards during burn operations. Mechanical or hand treatment means would not be as effective in obtaining the desirable conditions for plant diversity maintenance and proper functioning soil conditions.

Other future condition goals would be to reduce road densities by utilizing seasonal closures and obliterating unnecessary roads and user-defined trails, reduce the current fuels profiles, and to provide protection to existing property and resources from fire.

Ponderosa Pine: As noted in Chapter four, the ponderosa pine belt is the most altered vegetation type in the Fresno River watershed. Conifer mortality causes have shifted from the reference period previous to 1952 to current conditions where mortality agents are more associated with stand density issues. These include bark beetles, fire, root disease, and dwarf mistletoe.

The desired condition for ponderosa pine areas is to simulate open and park like conditions described under “Potential”. The number of trees per acre should be reduced by 30 to 75% depending on stand condition, and the average tree diameter should be increased to 18 - 24" DBH. Ridge tops and upper slopes should be managed for a mature, open-stand character. This will provide habitat for deer, and reduce the spread of fire. Mid-slope and lower could be managed for a more closed-canopy, multi-storied stands of various seral stages to provide habitat for old-growth dependent species (furbearers and spotted owls). A mix of habitat types that would provide for a variety of wildlife could be: 40% mature (half open canopy, half closed), 20% large sawlog, 20% pole/small sawlog, and 20% sapling/open.

The desired condition for the ponderosa pine belt is a stand structure composed of large well spaced trees and a more finely defined vegetative structure of smaller patches of varying age, density, and species composition within the larger stand. The objective is to

create a mosaic of vegetation patterns of early and mid seral stages. This will provide forage and hiding cover to wildlife. It is desirable to increase the variation of patches within the stand as compared to the current variation between the stands. Density control is important in minimizing undesirable levels of tree mortality. This density control extends to the brush layer as well as tree-to-tree competition for the life of the stand.

Within the Defense Zone and SPLATS, single layered canopies should be maintained to provide vertical space devoid of fuels to carry ground fire into the upper canopy. Forest canopies should remain open enough to allow efficient use of aerially applied fire suppression chemicals to reach the forest floor. This should be accomplished over larger patches than would be otherwise normal. However, the long term goal would be to work the area into smaller patch structures, which would retain the maximum resistance to "torching" of smaller patches damaging the larger stand upper canopies.

In most areas outside of the Defense Zone (WUI) and SPLATS, vertical diversity should be maintained in 2-3 layers of canopy, for wildlife purposes as well as returning the pine stands to more normal conditions. Multiple layered canopies have been mandated by the Sierra LRMP, amended by the Sierra Nevada Forest Plan Amendment ROD (Framework), in PACs and Streamside Management Zones (SMZ). Nelder Grove should also be maintained in a multiple layered canopy condition in its own right, in addition to much of the grove being designated as PAC. The "multiple" canopy layers developed in the ponderosa pine should not be construed to extend to each acre. Instead it should be developed on a patch basis, each patch being a single layer with a mixed of patches in various stages of development. The goal would be to increase heterogeneity within the stand and increase the homogeneity between the stands at a larger scale.

In the threat zone and general forest, identifying and treating high fire hazard areas and improving plantation fire resistance is the principal objective. Treatment would be to establish SPLATS in compliance with the amended land management plan. These SPLATS would create defensible areas to aid in fire suppression and provide for greater firefighter safety.

Chaparral vegetation incursion into the pine belt should be reduced as soon as practical; the chaparral stands having been developing for more than 50 years. These stands would easily lend themselves to large intense fire upon ignition, which could lead to total landscape replacement on large areas. Stand replacement on areas smaller than approximately 10 acres may be desirable in the development of a patchier condition. In addition, small patches of dead wood would tend to maintain or increase habitat diversity. This would mimic the reference stands in terms of mortality conditions arising from the dominate bark beetle and fire activity previously experienced.

Chaparral stand incursions should also be eliminated from the standpoint of maintaining soils productivity. Forest and grasslands are quite efficient in intercepting and recycling nutrients percolating downward through the soil profile (Dodge 1977). Soils under chaparral species are often exposed and erode readily, leading to loss of nutrients, and

development of shallow, course-textured soils with low water holding capacity and low fertility. Chaparral species typically have deep root systems, relatively few lateral fibrous roots to hold surface soil particles, and provide little litter or organic matter to the soil.

In a similar fashion, it is desirable to remove invasive tolerant species such as white fir and incense cedar at the higher elevations of the ponderosa pine belt. Along with any brush regenerated at stand initiation, these trees, having seeded in under the dominant canopy, develop "fuel-ladders" which may carry ground fire into the crowns of the dominant trees. These same trees cause several density related issues related to inter-tree competition for moisture, sunlight, nutrients, and growing space, in addition to increased susceptibility to bark beetles, root disease and fire.

Black oak in the ponderosa pine ecotype may be managed as described under the desired condition for Chaparral.

Timing of activities described under "chaparral" apply here. Initial activities should be concentrated in those areas where property and resources need protection from fire. In addition, shaded fuel breaks within the ponderosa pine areas should be established to prevent fire from traveling to adjacent sub-watersheds and to protect property and resources.

The density of open roads per square mile should be reduced as much as possible with seasonal closures and obliteration of unneeded and unauthorized roads and trails. In areas adjacent to roads and established recreation sites, vegetative screening should be established to provide cover for wildlife. Encourage growth of forbs, grass, and small shrubs in the understory, emphasizing deer forage species where possible (Ceanothus, for example).

Activities which would provide for the desired condition would include ladder fuel removals including brush, sanitation harvests of diseased trees, and thinning from below to promote growth of dominant and co-dominant trees, concentrating on removing fir and cedar species. Fire, where feasible, could be used as a tool in removing ladders and in propagating ponderosa pine stands. Achieving the desired condition will probably take decades. The current condition shows an absence of mature, large sized trees which could contribute to open, park like stands, and provide large, long-lasting snag and downed log habitat.

Wildland fires will be managed using the appropriate management response combined with prescribed fire to encourage return to a fire regime which will allow protection of intermingled private lands in the urban interface while meeting fire use objectives.

Mixed Conifer

The density of understory vegetation has been dramatically reduced in this zone and single storied stands of larger diameter trees dominate the landscape. The continuity of

the stands breaks depending upon aspect. North slopes are more uniform and accommodate more snags, while south slopes have numerous openings. In the openings, a more open understory consisting of forbes, grasses and scattered brush dominates and high intensity crown fires which threatened to cause large openings in the mixed conifer have been eliminated.

Much of this vegetation type has become rather dense with ladder fuels and large quantities of snags and ground fuels. Thinning from below should be done to reduce current tree densities, improve stand health, and increase the growth rate of the remaining trees. Maintain vegetative diversity. Reduce current levels of fuel loading and fuel ladders to reduce risk of loss to wildfire. Road densities should be reduced as described previously. The main goal is to increase average tree diameter and reduce tree density, but achieving an open, park-like stand is not necessary. These types of conditions promote old growth characteristics and would benefit those species dependent on mature habitats. A desired condition for these habitats would be to ensure linkages between fur-bearer areas, goshawk habitat, and suitable spotted owl habitat, such that any habitat area managed for mature characteristics could be used by any mature-forest adapted species. Areas currently deficient in these characteristics should be managed to achieve them over time. These managed habitats could substitute for current PACs if and when the habitat in those protected areas becomes degraded or lost to events such as fire or insect mortality.

Furbearer Habitat/PACs/HRCA, SPLATS and WUI Zones would provide significant course-grain horizontal diversity. The horizontal diversity of the SPLATS and WUI treatments of single story stands would contrast markedly from the Furbearer, PAC, HRCA, and Riparian multistory stands.

SPLAT placement up the Lewis Creek drainage have already been located, this is to address the tendency of fire occurring in that drainage to inflect great resource damage. However the most desirable locations for SLATS will probably be in conflict with PAC and Riparian areas. Appendix D shows a map of the proposed SPLAT's within the north half of the project.

Wildland fires are managed with the appropriate management response to implement protection and/or fire use objectives. Prescribed fire is a tool used along with fire surrogates (mechanical methods, timber/biomass harvesting) to modify vegetation in this zone.

Riparian

Riparian habitat condition would be improved by maintaining adequate riparian management areas (RMAs) where no vehicles are allowed and timber harvest is limited to that necessary to maintain stand health. Sediment sources would be reduced by moving roads, trails, and campsites away from the stream channel. Stream crossings and culverts are designed for the least impact to the stream channel. Impacts from range cattle are controlled by managing grazing to Forest Plan standards. By working with

California Department of Fish and Game, "put and take" fisheries are de-emphasized in favor of sustaining native populations, while non-native fish are removed from stream areas where recreational use is low and potential sensitive or proposed anuran habitat exists. Sensitive stream or meadow areas are identified and fenced to exclude cattle and reduce human use. Meadows are maintained or restored by conifer eradication (in areas where conifer encroachment is taking place), erosion control, prevention and repair of damage caused by vehicle trespass, and other management methods as necessary. Vegetative cover is maintained to provide travel corridors for wildlife. Man-made stream diversions or dams are reduced to the minimum required to meet current special uses. Aspen and willow plantings may be used to stabilize eroded areas, provide cover or nesting habitat, and provide forage.

2. Plant Species

Indicators: a. Vertical Diversity
b. Horizontal Diversity
c. Floristic Diversity

Distribution and abundance of Sensitive plant species Forest Plan management direction for sensitive species is to develop and implement management practices to ensure sensitive species do not become threatened or endangered because of Forest Service actions. Under Forest Plan *Management Standards and Guidelines,* the forest is to a) develop sensitive plant species management guides to identify population goals and compatible management activities that will maintain viability (S&G 67) and b) manage sensitive plant species to avoid future listing as threatened and endangered. Standard and Guideline 68 directs the Forest to ensure maintenance of genetic and geographic diversity and viable populations. The Forest Plan also states that the Forest will conduct sensitive plant surveys and field investigations prior to any ground-disturbing activity in areas that sensitive plants are known or suspected to occur. Avoidance or mitigation measures are to be included in project plans and Environmental Assessments (USDA FS 1992). The relevant Forest Wide Goals and Objectives identified in the Forest Plan for threatened, endangered, and sensitive species are: Manage plant habitats to maintain viable populations of all resident (native) plant species, emphasize habitat improvement for sensitive, threatened, endangered and harvest species, and manage habitat for Forest Service sensitive plant species in a manner that prevents any species from becoming a candidate for threatened or endangered status. Botanical resources are to be managed to maintain present diversity of species.

For the Fresno River Watershed, this translates to maintaining the existing known populations of Rawson’s flaming trumpet and mountain lady’s slipper orchid, and improving habitat conditions for both species.

Distribution and abundance of invasive non-native plants (noxious weeds) The desired condition for invasive non-native plants derives from the Forest Service Manual (FSM 2080, USDA, 1990) and the Forest Plan (1992, 2001). Specific goals for the

Fresno River watershed based on the principles of the FSM and LRMP direction are as follows:

- Current infestations of yellow starthistle, medusahead, tocalote, and klamathweed on National Forest System lands are gone within 5 years.
- Bull thistle and himalaya blackberry are being controlled and their impact on native plant and animal communities are minimal.
- An ongoing education and prevention program has successfully minimized the number of new introductions, and when noxious weeds do get introduced, they are promptly controlled before they have a chance to spread.
- Native plant communities are diverse, vigorous, and resilient to the effects of disturbance, including invasion by non-native plants.
- No new species of noxious weeds have been allowed to become established (an aggressive early detection and rapid response program is in place).

3. Soil Erosion and Productivity

Indicators: a. Soil Cover
b. Soil Porosity
c. Down Logs

The desired condition of soils in the watershed is to maintain productivity and reduce induced soil movement. The Sierra LRMP applies appropriate "Best Management Practices" and mitigation and utilizes the regional cumulative wartershed effects methodology for each project. Ground based tractor logging on highly erosive soils on slopes above 35% is avoided except for very short pitches. No regeneration is allowed on highly erosive slopes exceeding 65%. Appropriate erosion control measures for ground disturbing operations are installed prior to fall storms (October 1). On ground disturbing projects, protective ground cover will be retained or established covering 50% of the affected area in 1to 100-hour fuel sizes, with some 1000-hour fuels up to 10 inches in diameter. Retain the largest 3 down logs per acre exceeding 20 ft by 20 inches diameter.

4. Fire

Indicators: a. Fire Return Rate and Severity
b. Fire Seasonality
c. Fire Size and Distribution

Although not specifically discussed in the current Sierra LRMP, desired conditions related to fire and fuels management have been subsequently identified in other landscape-level analyses completed for the Forest and will be defined here since they are consistent with revised Forest Service policy for sustaining ecosystems. They display the vegetative conditions, which seem most sustainable based upon historic fire regimes and current management practices. These include a light density of large, old trees with an increased continuity and distribution of old forest across the landscape. The amount of forest with late-success ional characteristics (for example diverse species composition,

higher canopy cover, multi-layered canopy, higher density diameter trees, snags and coarse woody material) would also increase.

A strategic approach for locating fuel treatments across broad landscapes has been adopted. The treatments would be linked to support one another on the landscape so that wildland fire behavior spread and intensity are reduced. Strategically placed area treatments (SPLATS) are blocks of land, ranging anywhere from 50 to over 1,000 acres, where the vegetation has been treated to reduce fuel loading. Fuels treatment in the defense zone will be the most intense, design to prevent the loss of life and property by creating defensible space. In general forest and the threat (outer) zone of the urban wildland intermix, fuel treatments will support establishment and maintenance of strategically located fuel treatment areas.

Managers consider historic fire regimes and the potential fire and the potential for severe wildfire (based on fuel loading, prevailing wind direction, and terrain features) in deciding where to place area treatments. The SPLAT strategy treats a relatively large proportion of the landscape, and this strategy facilitates fire reintroduction (Sierra Nevada Forest Plan Amendment).

The forest consists of several ecological zones ranging from chaparral at the lower elevations to sub-alpine fir in the higher elevations. Desired conditions for Fresno River vary from zone to zone in the following broad categories Chaparral, Ponderosa Pine, and Mixed Conifer as discussed in the previous section Vegetation Mosaic/Fire/Wildlife.

5. Wildlife Species

Indicators:

a. Spotted Owls
b. Furbearers
c. Deer
d. Goshawks

The discussion regarding *potential*, *current*, and *desired* wildlife habitat focuses on the major vegetation zones within the Fresno River analysis area. These include front-country chaparral, ponderosa pine, and mixed conifer. Sequoia groves are found within the mixed-conifer type. In addition, riparian habitats can be found in all three of the major vegetation types. Specific discussions concerning wildlife by vegetation zone are found in the Vegetation Mosaic/Fire/Wildlife section. The desired conditions described in that narrative provide a basic need of maintaining or improving wildlife habitat. Designed fuel breaks should reduce the risk of large stand replacing fires which could destroy old growth habitat, PACs and furbearer habitat. In addition, thinning and removal of ladder fuels should assist in the protection and maintenance of these areas. Also, through the use of prescribed fire, key deer winter range can be enhanced.

6. Water Quality

Indicators: a. Turbidity

As described previously turbidity is used as an indicator of water quality. The more turbid or muddy the water is the lower the quality depending on the specific beneficial use of the water. If it is for potable use the clearer (less turbidity) the better since bacteria uses the suspended particles as substrate for movement and for a place to multiply. This is standard is not to exceed 5 NTU.

Other beneficial uses such as boiler water have a limit of 20 NTU. Cold-water fish should have less than 250 NTU. Grazing animals can tolerate fairly high turbidity. A specific limit was not available and probably depends on the individual animals tolerance for the taste of muddy water. Irrigation water can be very turbid and causes no specific problems other than silting pipes, ditches and reservoirs.

A desired condition for Turbidity in the Upper Fresno River drainage should be somewhere between the lowest measurement of 0.26 NTU and the highest measurement of 75.3 NTU. A median number for an annual average turbidity would be 37.8 NTU.

7. Water Yield

Indicators: a. Stream Flow

Since stream flow depends on weather, it is difficult to be specific for a desired flow. Miami Creek averaged 72.26 cfs from 1961 to 1968, Fine Gold Creek averaged 39.2 cfs from 1938 to 1958 and the entire watershed on-Forest averaged a calculated 43.26 cfs. This varies with rain, snowfall and the amount of brush and trees on the watershed. The less trees and brush the more water will be yielded. The more trees and brush the less water yields.

A desired annual water yield actually depends on the desired vegetation cover. Considering the need for water by the surrounding communities, valley agriculture and urban areas, more water is desired. In that light, annual water yield should not drop below the calculated average of 43.26 cfs from On-Forest Land. Total water yield should not drop below its present average annual flow of 77.89 cfs.

8. Sediment

Indicators: a. Sediment Delivery Rate (SDR)
b. Equivalent Roaded acres
c. CWE Methodology

The desired future condition for cumulative watershed effects is to avoid its occurrence within the watersheds. In other words, desired future condition is to have no adverse impacts to beneficial uses downstream from the primary areas of management activity in the subwatersheds. This is desirable because it conforms to the legal requirements of the Clean Water Act as implemented in California. As a consequence of this desired future condition, the recommended management variability is to stay near the lower bound TOC value in each subwatershed and to not exceed the upper bound TOC value. This is

sustainable because natural recovery would tend to lower the %ERAs present in a subwatershed in the absence of additional land disturbing activity.

Subwatersheds 503.0003, 503.0006, 503.0056, and 524.1001, have limited management options during the next ten years due to the impact of past land management activities. The potential for a CWE response is acute for these subwatersheds both from the level of disturbance and its persistence over time, which increases the chance of a triggering event occurring during this period of vulnerability. There is no real opportunity to manage these subwatersheds within acceptable management variability beyond actions that do not include ground-disturbing activities. This is especially true for subwatershed 503.0003 because of the disturbance level nearing the upper bound Threshold of Concern.

Under our current understanding of watersheds and assessment procedures for cumulative watershed effects (CWE), keeping subwatersheds at %ERAs within the management variability is best accomplished through scheduling. This may take the form of deferring work in subwatersheds with higher %ERAs to future periods when natural recovery has lowered the existing levels. It may also take the form of scheduling projects for subwatersheds that have lower %ERAs instead of subwatersheds that are at higher levels. It should be noted that project-level CWE assessment will require field evaluation of channel and fisheries habitat conditions at the time of project planning if the %ERAs projected exceed the lower bound TOC.

9. Channel Morphology

Indicators: a. Residual Pool Depth

10. Riparian/Aquatic

Indicators: a. Micro Invertebrates
b. Macro Invertebrate Community

DC - Observed/Expected ratio 0.63-1.39
Aquatic macroinvertebrates are a primary food source for many aquatic and terrestrial species. The diversity and condition of biological communities reflect overall ecological integrity (i.e., chemical, physical, and biological integrity). As the level of fines in pools decreases, it is expected that the macroinvertebrate community will adjust in-kind. Improvement might be noted through increases in taxa richness; higher percentages of EPT; and an increase in % of “intolerant” taxa. The desired condition is that the macroinvertebrate community be within two standard deviations of the RIVPAC predicted community. Providing the desired Observed/Expected ratio would directly meet Aquatic Management Strategy goal related to water quality, species viability, and plant and animal community diversity.

11. Riparian vegetation

Indicators: **a. Canopy Cover** 70 to 80 percent canopy cover

The reduction or removal of riparian vegetation increases solar radiation. Increased solar radiation affects stream temperature and primary productivity. As noted previously, summer water temperatures vary by water year type. During "dry" water years, canopy cover is more important in maintaining water temperatures. Maintaining the riparian vegetation in this range (where possible) will provide for optimal functioning of riparian canopy dependant processes. Special interest herpetofauna such as foothill yellow-legged frog and western pond turtle are basking species that prefer some sunlight. Providing the desired canopy cover would directly meet Aquatic Management Strategy goal related to water quality. The desired condition would indirectly assist Aquatic Management Strategy goals relating to plant and animal community diversity; watershed connectivity; watershed condition; and streambanks and shorelines. These conditions would also contribute to the Forest LRMP goal to manage habitat for sensitive species in a manner that prevents any species from becoming a candidate for threatened or endangered status.

b. Large Woody Debris DC – 3 -15 pieces LWD/100 m

Maintaining a sufficient amount of LWD is essential to a properly functioning aquatic/riparian system. Distribution should be in form of accumulations (log jams) and individual pieces in order to provide all the benefits derived from its presence. Providing 3 -15 LWD/100 m would provide habitat diversity and complexity, along with nutrient input into the aquatic system. The objective is to provide the desired level of LWD in streams across the watersheds, not at the reach level. Providing the level of LWD would directly meet Aquatic Management Strategy goal related to species viability, and plant and animal community diversity. These conditions would also contribute toward Forest LRMP goals to manage habitat to maintain viable populations of resident fish and to manage habitat for sensitive species in a manner that prevents any species from becoming a candidate for threatened or endangered status.

12. Transportation

Indicators: a. Infrastructure, Roads

At minimum, National Forest System Roads (NFSR) will be maintained to standards established in the 7709.58 Handbook. All road drainage structures shall be functional and maintained to prevent potential resource damage and degradation of water quality. Road maintenance criteria include:

1. Requirements for the protection of adjacent resources or improvements such as streams, lakes, vegetation, and facilities.
2. Smoothness required for the desired operating speed and for user comfort and convenience.
3. Acceptability or non-acceptability of dust.

4. Season of use and approximate volumes and types of traffic.
5. Current and future road maintenance strategies.

All permanent vehicle ways, are managed as elements of the National Forest Road System or the Forest Trail System. Few new permanent roads are expected to be required for future project access. Other non-inventoried and non-managed vehicle ways are prohibited and will be decommissioned as they are identified.

Road development is limited to minimize both the physical disturbances and the costs associated with the construction, operation, and maintenance of the road system. Project planning and road system development emphasizes this minimal roading approach. Roads are located and constructed to provide access to approved land management activities. Use of temporary roads is minimized.

Roads will be maintained to provide for the intended use. The condition of the road entrances will convey to casual travelers the type of intended use. Road surfaces are stabilized, where cost effective, to reduce sediment yield and extend the effective working season for essential activities.

All road segments requiring easements are documented using the proper instrument and recorded by the County.

All road safety and maintenance standards will be met. Forest Wide Standard and Guidelines relating to transportation will be followed, particularly: S&G #17, 43, 77, 78, 79, 124, 129, 173, 206, 209, 210, and 213.

13. Recreation

Indicators: None

LRMP Direction: The analysis area is within Management Area #4 (General Forest) with a small portion at the Forest boundary in Management Area #5 (Front Country). Within these areas lie Management Area #9 (Special Interest Area), and Analysis Area #70 (Nelder Grove)

VQO The Visual Quality Objectives for the analysis are primarily Type II-Retention and Type III-Partial Retention, and to a lesser degree Type IV-Modification. The most stringent classification, Type II, creates a corridor along Highway 41 approximately ¼ mile wide. Then Type III is prescribed outside that corridor for approximately 1 mile on either side of Highway 41 and includes Nelder Grove. The Type IV is generally west of Miami Creek.

ROS Most of the analysis area within the Recreation Opportunity Spectrum (ROS) class of *Roaded Natural* except for a corridor along Highway 41 which is classified as *Rural.*

Standards and Guidelines

Forest Wide Standard and Guidelines relating to the analysis area includes #2, #3, #5, #14, #15, #16, #17, #18, #20, #22, #23, #25, #26, #27, #28, #319, and #320.

Discussion Overall the direction in the LRMP plan and FS National policies as they relate to the analysis area can be summarized as follows:

- Provide a quality recreational experience through developed sites that are appropriate for the intended uses, are compliant with the ROS class, and are maintained to standard.
- Provide for universal accessibility in all developed opportunities.
- Meet prescribed VQOs for all projects.
- Manage OHV use through a designated system of managed trails.
- Highlight the special features in Nelder Grove and the Lewis Creek NRT.

These guidelines present a vision of the desired condition for the recreation facilities within the Fresno River watershed. Overall the variety, placement and capacity of the recreation features within the watershed are sufficient to serve the existing and foreseeable demands. However the current condition of the facilities on all accounts is lacking. For example, none of the facilities are fully accessible, and most of the toilets are in a deplorable condition. The desired condition is to correct these issues.

14. Element: Contemporary Native American Use

Indicators: None

LMP Standards and Guidelines 4.5.2.15 Cultural Resources - # 197 and 198 direct the Forest Service to "coordinate site identification, evaluation, and management with concerned local Native Americans", and to "coordinate Forest management practices to assure local Native Americans have access to and use of traditional food, medicinal and basketry resources." *Implementation Actions Items and Priorities* from the Sierra Nevada Plan Amendment, Record of Decision, 2001 (Frameworks) direct the Forest Service to improve our relationships with Native American communities.

The desired conditions for contemporary Native American Use are:
* Preservation of sacred and traditional use areas
* Reasonable access to plant and animals used for traditional lifeways
* Enhancement of plant populations in the Fresno River watershed

These desired conditions can be more clearly defined by consultation with the appropriate Native American tribes or groups, and achieved by creating projects with the preservation of specific plants, animals, and use areas in the initial design.

15. Economic

Indicators: None

Encourage appropriate uses of National Forest System lands that provide economic benefit to the local economy. (i.e. commercial filming in Miami motorcycle area.)

A key consideration for the implementation of biomass utilization economy is "right-sizing" an operation to local conditions. A primary challenge for this consideration is the ability of the Forest Service to provide a consistent and sustainable supply of material.

The County of Madera is interested in maintaining a resourced based economy, side-by-side with the recreation based economy, to achieve both economic advantage as well as public protection. The County is actively exploring alternative development options through committees such as RAC, Fire Safe Council, Noxious Weed Alliance, and the Resource Conservation and Development District.

16. Adjacent Land Uses

Indicators: None

Actions are taken to resolve encroachment and trespass onto National Forest System lands by adjacent private landowners

17. Atmospheric Particulates

Indicators: PM10

No increase in PM10 emission levels would be most desirable. However, during the flaming phase of a catastrophic wildfire, air quality degradation can exceed Federal and State standards for many days and even weeks. Based on inventories of existing dead material on site and emissions predicted using the emission calculation table developed by Yosemite National Park, a wildfire that consumed approximately 1000 acres would generate 478 tons of PM10 emissions.

Treatments proposed in the analysis could affect air quality locally in the form of prescribed burning hand piles and jackpot burning smoke emissions during fuel reduction activities (centered around reforestation efforts) and fugitive dust from roads and helicopter harvesting activities.

Following rules and regulation set forth by the San Joaquin Valley Unified Air Pollution Control District will ensure compliance with federally mandated annual threshold levels. Production of PM10 from prescribed burning would require the writing and approval of a Smoke Management Plan by the San Joaquin Valley Unified Air Pollution Control District to set meteorological conditions that would prevent impacts to smoke sensitive

areas during burning operations and to ensure that federal and state ambient air quality standards would not be exceeded.

Dust created by logging and hauling operations can affect PM10 concentrations. Log haul may produce PM 10 emissions. Dust abatement measures for hauling would be used to mitigate fugitive dust effects during implementation of the proposed action.

If a wildfire event does occur after project implementation of proposed actions, concentrations of smoke related emissions would be expected to be less than if no actions were taken, due to the reduced levels of fuel available.

Chapter 6 Management Opportunities

A. Fresno River Opportunities

Chapter 5 describes the desired condition for the Fresno River Landscape Area. This chapter defines the strategy, implementation, and opportunities that may be presented in moving the landscape towards the desired condition.

1. Direction

The basic strategy for treatment in the area is derived from several sources: Sierra National Forest Land and Resource Management Plan (LRMP), as amended by the Sierra Nevada Forest Plan Amendment Record of Decision 2001 (Framework), and the 2001 Federal Wildland Fire Management Policy, also known as the National Fire Plan (NFP).

The 2001 Federal Wildland Fire Management Policy or National Fire Plan (NFP) is a multi-agency policy effort to address recent, increasingly devastating wild-fire losses. It provides clarified guidance for Federal agencies with 9 Guiding Principles:

1. Firefighter and Public safety is the first priority in every fire management activity.

2. The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the planning process.

3. Fire management plans, programs, and activities support land and resource management plans and their implementation.

4. Sound risk management is a foundation for all fire management activities.

5. Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.

6. Fire management plans and activities are based upon the best available science.

7. Fire management plans and activities incorporate public health and environmental quality considerations.

8. Federal, State, tribal, local, interagency, and international coordination and cooperation are essential.

9. Standardization of policies and procedures among federal agencies is an ongoing objective.

2. Process

The net effect of these recent policy modifications is an emphasis on the inter-relatedness of the major functional program goals of the National Forest, and requiring a comprehensive approach to land management, balancing resource protection and productivity with land utilization, and requiring increased collaboration with local public entities.

The analysis for the Fresno River Landscape produced a desired condition for elements described. The strategy developed for anticipated treatments on a spatial basis must additionally be considered on a temporal basis for implementation, bounded by the various Standards and Guidelines and Guiding Principles. This section addresses the feasibility, economics, support, scheduling, opportunities, and risk considerations in the implementation of the landscape analysis recommendations.

This landscape was selected for analysis based on Framework analysis which identified the area as being substantially outside to natural range of variability for fuels and fire risk compared to values and communities at risk. More than 80% of the Fresno River analysis area is within the Wildland/Urban Intermix (WUI) zone.

Treatments and prescriptions allowed in the various land allocations are described in the Framework and the LRMP. Defense Zone treatments are a priority concern for many adjacent landowners. Threat Zone treatments and Strategically Placed Area Treatments (SPLATS) are largely similar in their Framework treatment standards and guidelines (S&Gs) descriptions. Treatments within the land allocations describe desired stand attributes following treatment, in terms of average live crown base height and anticipated fire behavior in terms of flame length, dependent upon tree canopy cover. Treatments are also limited in the ratio of treated verses untreated land when mechanical means are used, maximum tree sizes which can be removed, allowable tree canopy reductions, oak maintenance, large woody ground debris retention, and legacy snag retention.

SPLATS are (here, in this analysis) designated within the Threat Zone for strategy and scheduling purposes, with an emphasis on strategy. Although permissible treatments across the Threat Zone are similar, it is not financially, politically, or environmentally sound to attempt to treat the entire Threat Zone.

3. Analysis

The primary strategy and priority assessment for vegetation treatments follows:

Of particular concern are the “State Highway 41 Corridor” and the Nelder Giant Sequoia Grove areas. Because of the high concentration of human habitation and activity on the Highway 41 corridor, SPLATS in this area are high priority for implementation. Highway 41 is a major southern access route to Yosemite National Park and the Yosemite Valley. This area includes the communities of Cedar Valley, Sugar Pine, Fish Camp, and Calvin Crest. Large commercial investments in recreation and lodging have

been made along Hwy 41 including Yosemite Mountain Sugar Pine Railroad, Yosemite Trails Pack Station, Tenaya Lodge, Narrow Gauge Inn, and Apple Tree Inn, among other developments. Calvin Crest, a private educational facility at the crst of the ridge below Nelder Grove, presents special management considerations for wildfire management, because it serves up to 400 children at the camp during the height of fire season and has no capability for timely evacuation. Camp Sugar Pine, Camp Adahi, Green Meadows are education facilities with similar operations and conditions. Camp Redwood is a permitted special use community located below Calvin Crest along the Sky Ranch Road 6S10.

Prescribed broadcast understory management burns are already authorized under the NEPA process in the western portion of the corridor area in the up reaches of the Miami drainage. The District has experienced delays and difficulties in meeting conditions required to conduct the burns. A major consideration in this area is the Oakhurst airshed and smoke management difficulties.

The area receives a great number of transient visitors. Nelder Grove of Giant Sequoias has very high resource values and interests both locally and nationally, in addition to the unique value of the specimen trees and the stand itself. Nelder Grove contains portions of 3 Spotted Owl Activity Centers, a Goshawk Activity Center, a Furbearer Management Area for fisher and martin, and sensitive plant populations including Rawson's Flamming Trumpet (Collomia) and Lady Slippers orchid. Because of the greater threat and national fire suppression priorities, Calvin Crest must be given greater weight than the protection of Nelder Grove during a catastrophic wildfire event.

Road location and condition are critical resources when considering fire suppression strategy and tactics. Wild fire discovery, reporting, and location have improved with public access to the forest, especially with the increased use of radio and cell phone communications by the general public. Safe equipment and crew access is critical in both "initial attack" and in extended fire suppression campaigns. Roads are not only required for access to the fire but are also utilized in tactical suppression by providing natural fire barriers or pre-built fire line (which may be improved by "burning out" from, providing "safe anchor" points for fireline construction, and access to "safety Zones").

In the southern end of the analysis area in the Thornberry Ridge and Teaford Saddle areas, efforts at improving the Thornberry and Goat Mountain Fuel Breaks are ongoing and continuing. Mastication of brush in the Defense Zone (WUI) adjacent to the Teaford and Teaford Lakes Estates subdivisions are under contract in 2003. Mastication and pre-commercial thinning projects are under contract on the lower slope of Thornberry Ridge above the Sierra Lakes subdivision and the opportunity to create a SPLAT (China Creek) around this core of treatments may be considered. Cultural vegetation and fuels reduction treatments in the Teaford area would provide defensible space for local land owners.

4. Opportunities

Opportunities for other natural resource development, maintenance, and management abound in the area:

A number of plantations in the Miami Creek subwatersheds are being considered for thinning, mastication, or tractor piling and burning. Two SPLATS are proposed to interdict wildfire originating on the slopes north of Oakhurst, burning into the ponderosa pine zone on the National Forest. There is a concern for the cumulative watershed effects in the Miami Creek subwatersheds, so these SPLAT treatment priorities are lower than for those in the Highway 41 corridor.

Physically, or operationally, the removal of trees by thinning the smaller trees benefits fire suppression by increasing the effectiveness and penetration of aerially delivered fire retardant chemicals to the ground where the fire is carried.

Any thinning of vegetation improves the health of the retention vegetation improving its resiliency against disease and insect attack. Exposure to large scale catastrophic epidemics such as recently experienced in the San Bernardino Mountains of Southern California and in the vicinity of Flagstaff and Prescott, Arizona may be reduced or limited.

Commercial timber removal for fuel treatment considerations has the added value of extending the economic base for increasing the area or complexity of the fuel treatments by converting potential product asset value to cash for appropriated tax allocations for fuel and vegetation treatments. Recent experience has indicated a strong preference to reduce intended allocations for fire prevention and fuel treatment to supplant shortfalls in the annual fire suppression budget, as opposed to increasing or augmenting the allocation for the fire budget.

Road maintenance is a primary concern. Historically timber management and timber values have supported the construction of the transportation road system network that is available today. Timber product availability under the direction of the Framework is severely restricted in piece size, value, and volume available for harvest. Much of this value will be utilized in road maintenance. No increase appropriations from tax revenues are anticipated for road maintenance.

There are opportunities to close or permanently reduce road densities in areas where roads are no longer required for forest management. Priority roads for consideration of closures or decommissioning from a wildlife standpoint would be unneeded local roads within protected California spotted owl and goshawk activity centers (PACs), and furbearer management areas (which are mapped in the LRMP and Framework), and mule deer winter range (which is not well mapped in the LRMP). Reduction of road densities has additional benefits beyond maintenance cost reduction and wildlife habitat improvements. These include aquatic and riparian habitat improvements and reductions in management tendencies to approach adverse cumulative watershed effects.

Considerations for treatment applications by vegetation type:

Chaparral: Strategically placed areas of fuel treatments (SPLATS) may be created in this zone; however, the maintenance of fuels treatment may be intense and costly. There is very little market for products composed of chaparral materials to allow mechanical or hand manipulation of fuels, which is expensive in comparison to burning. Mechanical treatments do not provide the same ecological benefits provided by fire in this vegetation type. Mechanical means may temporarily remove existing vegetation, but it is likely that regenerating species composition and mix would not be optimal or desirable.

An impediment to burning these stands is their location on the landscape, being closest to foothill residences. Experience has shown difficulties in obtaining minimum air quality standards during burn operations. Mechanical or hand treatment means would not be as effective in obtaining the desirable conditions for plant diversity maintenance and proper functioning soil conditions.

Ponderosa pine: Conversion of chaparral incursions to ponderosa or oak stands could be effectively implemented using either, or a combination of, mechanical and fire means. Chaparral readily invades disturbed soils, particularly when plant competition is greatly reduced. It is important to reoccupy the site with desirable vegetation immediately following any site disturbance. Current technology favors conversion to pine stands over oak stand development from the simple fact that there has been more experience and success in planting pine.

If fire alone is utilized for conversion, burn intervals of low intensity fire every 2-3 years may be required for several cycles to eliminate chaparral seed and sprouting capability. It this scenario, establishment of desired vegetation would be delayed, because protecting young plants during the follow-up burns would be difficult or impossible. Mechanical treatments such as piling and burning would be effective in “rooting-out” established sprouting chaparral species. Chaparral seed reserves would remain in the soil for many years and may become a significant source of brush competition for trees that have been established. Prescribed understory burning or low intensity wildfire would activate this seed source. Mechanical treatment at a later date by mastication or piling and burning would become necessary, to control competition and fuels development.

Opportunities to improve the Distribution and abundance of rare plant species

Rawson’s flaming trumpet: rehabilitate the area along Nelder Creek at Gooseberry Flat by ripping the soil to lessen compaction and barricading the area to allow it to heal. Monitor to see whether flaming trumpet plants expand into the area. Remove non-native plant species.

Mountain lady’s slipper orchid: A draft Conservation Assessment was prepared for this orchid species across its range in the Sierra Nevada (Cramer and Kaye, 2003) as part of the Sierra Nevada Forest Plan Amendment (USDA, 2001, 2004). Draft recommendations for conservation include maintaining minimum canopy cover, minimizing ground

disturbance, maintaining native species biodiversity, and maintaining the conditions necessary for mycorrhizal fungi. Aspects of the final conservation recommendations will be considered for future projects, but in the meantime the following management opportunities exist:

(a) Continue annual monitoring; visit all 12 locations in case plants at the four sites that have not emerged since 2000 re-emerge.

(b) In cooperation with the Regional Office and Pacific Southwest Research Station, design fuels treatments in the vicinity of one or more lady's slipper populations as experiments to enhance habitat for the orchids.

(c) Minimize mechanical ground disturbance and foot traffic near existing populations.

(d) Maintain canopy cover between 50 and 75% in areas occupied by lady's slipper orchids and within 200 feet of these areas.

(e) Remove non-native invasive plants (noxious weeds) manually in the immediate vicinity of lady's slipper orchids, should they encroach upon the orchid plants.

(f) Collaborate with a researcher (possibly a graduate student) to investigate the genetic variability and population status of lady's slipper orchids in and near the Nelder Grove area, possibly compare with similar information obtained from Yosemite National Park.

(g) Coordinate with private landowners at Fish Camp if they are interested in conserving the orchids on their property (some of them have already contacted the Sierra National Forest to indicate interest). Provide technical advice and help them with monitoring if they so desire.

Distribution and abundance of invasive non-native plants:

(a) Continue to work with State, County, and other agencies and groups through the Sierra-San Joaquin Noxious Weed Alliance to inventory, map, and eliminate noxious weeds on and off National Forest System lands. Specifically, find grant funds to continue the Eastern Madera County Noxious Weed Management Project, currently funded with RAC dollars, to reduce the spread of noxious weeds from private lands to National Forest System lands.

(b) Continue active education of the public about noxious weeds in the area, aimed at curbing the spread of invasive weeds onto National Forest System lands in the Fresno River watershed (newspaper articles, posters at visitor contact points, field workshops, outreach to property owners near National Forest System lands.

(c) Continue to inventory for noxious weeds along roads, motorcycle trails, and trails frequently (every other year if possible) in order to detect newly introduced weeds soon

enough to eliminate them without the use of pesticides (early detection and rapid response).

(d) Annually, assess what progress is being made towards eliminating noxious weeds infestations to achieve desired conditions.

(e) Prepare a comprehensive list of all plant species in the watershed, especially focused on the proportion of total plant species in the watershed that are non-native, and assigning each non-native species to risk categories.

Opportunities to improve hydrological and riparian resources

Stream inventories conducted within the Fresno River watershed indicate that Miami Creek provides poor habitat for fish due to accumulations of sediment. Consistent with direction from the Forest LRMP and the Aquatic Management Strategy, actions should be identified to enhance habitat for resident fish and to improve habitat for sensitive species. Actions that could improve habitat should:

- Reduce sources of sedimentation from active headcuts; roads; and trails.
- Maintain or restore riparian vegetation to provide adequate summer and winter thermal regulation.
- Maintain or restore riparian vegetation to help reduce rates of surface erosion and bank erosion.
- Maintain or restore riparian vegetation to provide an amount and distribution of large woody debris. Leave LWD and snags within riparian zones where public safety is not at risk.

Replace culverts that restrict the ability of fish or herpetofauna to access upstream habitat.

Watershed Rehabilitation Opportunities

There have been 128 sites needing watershed improvement that were identified on the Sierra National Forest within the Upper Fresno River watershed. These are listed in the Watershed Improvement Needs (WIN) Inventory for the Sierra National Forest. Of these 128 sites, 57 have either been repaired or are being monitored for needed repair.

The primary area needing improvement is within the Miami basin. This is a heavily used OHV area. Through the years stream crossings have been armored to prevent OHV damage to the channels, gullies within trails have been repaired and OHV trails have been properly drained to reduce soil erosion into Miami Creek. This is a continuous process as the motorcycles and quad runners continue to use the area. WIN listing

below displays current problems within the entire watershed, including Miami, Lewis Creek, and Nelder Creeks.

Table 30 WIN Project Identified for Subwatersheds and Subwatershed Disturbance.

Subwatershed	ERA			**WIN#**				
	TOC	2003	2013					
503.0002	**4**	**6.3**	3.5	51002	51008	51009	51010	51016
				51034	51054	51064		
503.0003	**5**	**14.5**	**8.2**	51000				
503.0004	4	2.3	1.8	51058				
503.0006	**4**	**8.6**	**5.8**					
503.0052	**4**	**4.1**	2.3					
503.0053	**4**	**4.1**	2.1	51005	51006	51007	51023	51026
				51045	51047	51048	51049	51053
				51055	51056	51059	51060	51066
				51062				
503.0054	**5**	**5.5**	3.2	51001	51003	51004	51011	51012
				51013	51041	51042	51044	51051
				51052	51063			
503.0055	**5**	**6.6**	4.3					
503.0056	**4**	**8.4**	**5.0**	51017	51046	51050		
503.0057	6	1.7	1.3	51032	51039			
503.0061	**4**	**5.2**	3.4					
524.1001	**5**	**9.9**	**7.2**					

Subwatersheds exceeding a TOC are shown in bold print.

Transportation Opportunities

Identify and repair roads not meeting current maintenance standards, roads causing unacceptable resource conditions, and replace existing culverts not meeting 100 year storm design standards. The objective is to maintain all NFSRs to standards established in the 7709.58 Handbook. All road drainage structures shall be functional and maintained to prevent potential resource damage and degradation of water quality. (S&G #78, #79, #124, #206)

Treat roads located in sub-watersheds exceeding cumulative watershed thresholds and on High and Very High Soil Erosion ratings, by placing aggregate on existing native surface roads (S&G #129). Seek opportunities such as project proposals, annual maintenance plans, and the 10% Roads and Trails program to rock identified roads.

Work with Mariposa and Madera County road departments to rock or pave County native surface roads, CR 420 and 126, where are located on National Forest lands (S&G #129).

Reconstruct the aggregate segment of 6S10 (Sky Ranch Road) to a two-lane all-weather standard, sufficient for intended traffic and improve user safety. (S&G #206, #213).

Reconstruct 6S47Y, 6S90 and 5S19 to an all-weather standard to support recreational traffic to Nelder Grove Historical Area, for intended traffic and improve user safety. (S&G #206, #213)

Obtain permanent easements for Madera County road CV04, CV08, 222, 223, 426, 630, 632, 420; Mariposa County road 126; State route 41; and Forest roads 5S12, 5S12B, 5S17, 6S14B, 6S49, 6S90, 6S97 and 5S58X, within National Forest boundary (S&G #173).

Evaluate for decommissioning, 12.8 miles of identified unclassified roads within the study area, if not required for public use and consider for possible designation as OHV routes prior to closure. (S&G #314)

Provide a Quality Recreational Experience.

Rehabilitate Westfall Day Use Area. This project would include the grading and surfacing of the parking area, replacing barriers, installation of new accessible toilets, and signs. In addition at least one of the picnic sites should be meet assessable standards, requiring some sort of surface hardening.

Revise the Nelder Grove Management Plan or identify interim measures to improve the experience at this popular destination. The campground needs a major rehabilitation with the installation of accessible toilets and camping units. The trail system is currently adequate but all three of the foot bridges need replacement.

Rehabilitate Kamook Staging Area. This project would primarily consist of designing a parking area that incorporates proper drainage and surfacing along with traffic control.

Designate an OHV trail system and eliminate unclassified roads and trails, especially within the MMTA. Close and/or reroute routes that are currently identified that have unacceptable resource impacts. Close and obliterate all unclassified roads and trails that are not designated as a system road or trail. Incorporate appropriate design features into designated system to ensure that resource objectives are met. Continue to pursue funding sources such as State of California OHV Funds and “10%” funds to meet this objective.

Meet or exceed VQO’s as required by LRMP. Assess condition of VQO as described in the LRMP, Monitoring and Evaluation. Conditions should be assessed every two years as prescribed in the LRMP.

Contemporary Native American Use Opportunities

***** Consult with Native American communities to solicit their needs in the Fresno River area, and assistance in designing protection measures and enhancement projects for traditional use areas.

* Provide for protection of sacred area on Lewis Creek.
* Provide for protection of plant gathering areas.
* Encourage enhancement of plant gathering areas by pruning or burning.

Economic Opportunities

* Develop and implement streamlined commercial filming special use authorization procedures. Work closely with the Madera County Film Commission.

* Work closely with the Yosemite Sierra Visitors Bureau to identify possible tourism enhancement opportunities.

* Seek opportunities for partnerships with the local community and the Counties in developing a market for products which could be generated from the fuels program.

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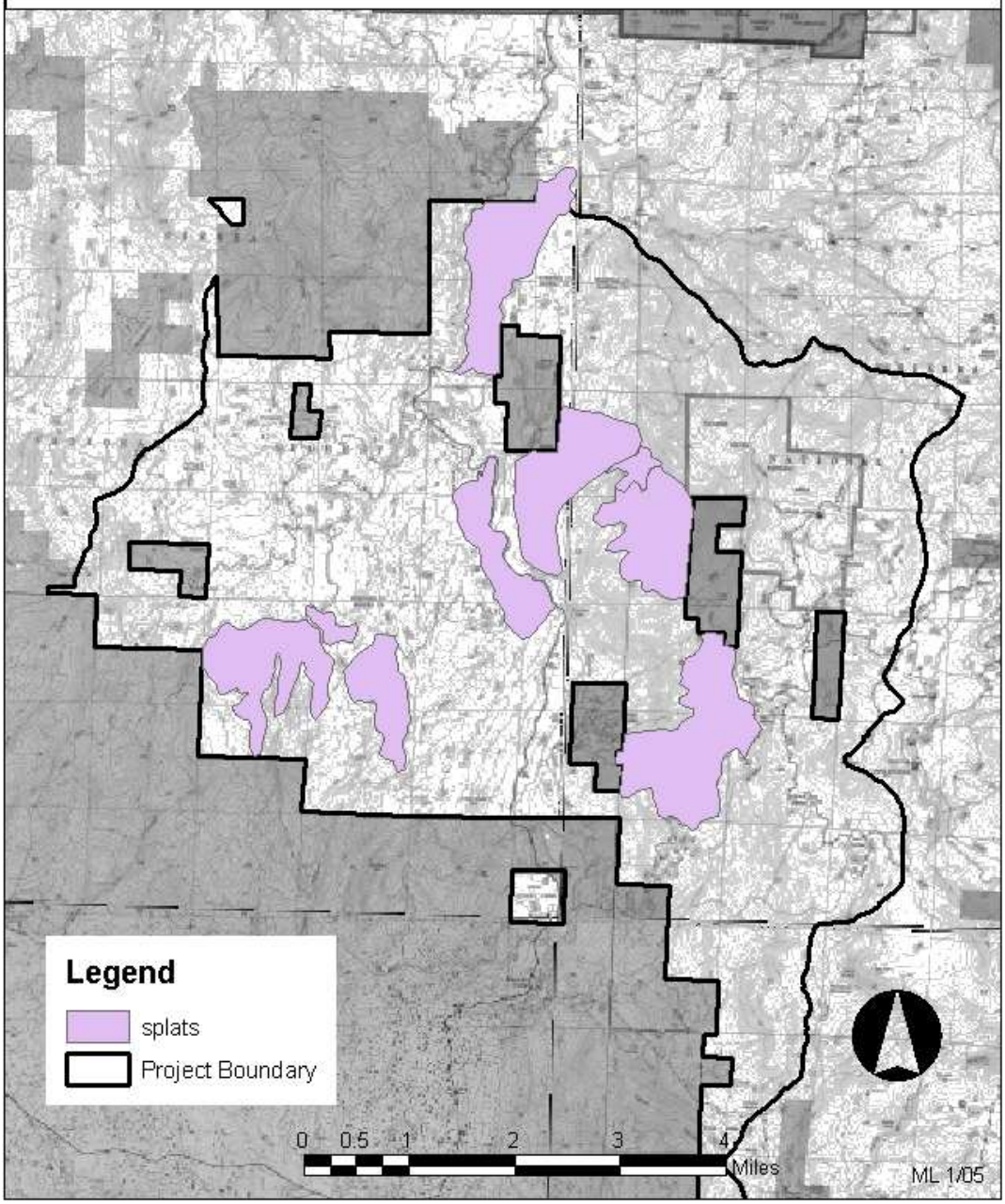
Appendices

APPENDIX D
Proposed SPLAT Map
Fresno River



Attachment 3.5, Mastication contracts

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SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS
OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30

1. REQUISITION NUMBER: 290275/290308

Page 1 of 19

2. CONTRACT NO.: AG-9A40-D-09-0022

3. AWARD/EFFECTIVE DATE: 7-9-09

4. ORDER NUMBER:

5. SOLICITATION NUMBER: AG-9A40-S-09-0022

6. SOLICITATION ISSUE DATE: June 24, 2009

7. FOR SOLICITATION INFORMATION CALL:

a. NAME: Patrick J. Gallegos

b. TELEPHONE NUMBER (No collect calls): 559-297-0706 x 4830

8. OFFER DUE DATE/ LOCAL TIME: July 8, 2009

9. ISSUED BY: CODE

USDA Forest Service, Southern Sierra Province
1600 Tollhouse Rd
Clovis, CA 93611

10. THIS ACQUISITION IS

☐ UNRESTRICTED OR ☒ SET ASIDE: 100 % FOR

☒ SMALL BUSINESS ☐ EMERGING SMALL BUSINESS

☐ HUBZONE SMALL BUSINESS

☐ SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS ☐ 8(A)

NAICS: 115310

SIZE STANDARD: $7 million

11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED
☐ SEE SCHEDULE

12. DISCOUNT TERMS

☐ 13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)

13b. RATING

14. METHOD OF SOLICITATION
☒ RFQ ☐ IFB ☐ RFP

15. DELIVER TO: CODE

16. ADMINISTERED BY: CODE
SOUTHERN SIERRA PROVINCE
1600 Tollhouse Rd
Clovis, CA 93611

17a. CONTRACTOR/ OFFEROR: CODE FACILITY CODE
WOOLERY TIMBER Mngt, Inc
P.O. BOX 1615
Tuolumne CA 95379
TELEPHONE NO. 209-928-1850

☐ 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER

18a. PAYMENT WILL BE MADE BY: CODE
USDA – National Finance Center
P. O. Box 60075
New Orleans, LA 70160

18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED
☐ SEE ADDENDUM

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	Mechanical Thinning and Fuel Reduction USDA Forest Service Sierra National Forest Bass Lake Ranger District Task Order #1 (Use Reverse and/or Attach Additional Sheets as Necessary)				

25. ACCOUNTING AND APPROPRIATION DATA

26. TOTAL AWARD AMOUNT (For Govt. Use Only): $374,810.00

☒ 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4, FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA ☒ ARE ☐ ARE NOT ATTACHED

☐ 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA ☐ ARE ☐ ARE NOT ATTACHED

28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 2 COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED

☐ 29. AWARD OF CONTRACT: REF. _____ OFFER DATED _____ YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS: _____

30a. SIGNATURE OF OFFEROR/CONTRACTOR
Charlotte Woolery

31a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER)
Patrick Gallegos

30b. NAME AND TITLE OF SIGNER (Type or print): Charlotte Woolery C.F.O.

30c. DATE SIGNED: 7-8-09

31b. NAME OF CONTRACTING OFFICER (Type or print): Patrick J. Gallegos

31c. DATE SIGNED: 7/9/2009

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION IS NOT USABLE

STANDARD FORM 1449 (REV.3/2005)
Prescribed by GSA - FAR (48 CFR) 53.212

SOL NO.AG-9A40-S-09-0022
Page 2 of 19
Bass Lake RD Task Order #1

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
01	Foster, Sonny Meadows,	340	Ac	$ 410.00	$ 139,400.00
02	Cedar Valley/Sky Ranch, Placer/Nehouse, Plumbar Creek Long	590	Ac	$ 399.00	$ 235,410.00
		930	Ac	TOTAL	$ 374,810.00
	For Site Information Contact: Francey Blaugrund – 559-877-2218 Ext. 3205				

32a. QUANTITY IN COLUMN 21 HAS BEEN

☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED: _____

32b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE | 32c. DATE | 32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE | 32f. TELPHONE NUMBER OF AUTHORZED GOVERNMENT REPRESENTATIVE | 32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE

33. SHIP NUMBER |PARTIAL | |FINAL | 34. VOUCHER NUMBER | 35. AMOUNT VERIFIED CORRECT FOR | 36. PAYMENT ☐ COMPLETE ☐ PARTIAL ☐ FINAL | 37. CHECK NUMBER

38. S/R ACCOUNT NUMBER | 39. S/R VOUCHER NUMBER | 40. PAID BY

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT | 42a. RECEIVED BY (Print)

41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER | 41c. DATE | 42b. RECEIVED AT (Location)

42c. DATE RECD (YY/MM/DD) | 42d. TOTAL CONTAINERS

STANDARD FORM 1449 (REV.3/2005) BACK

GENERAL NOTES

Bidders are encouraged to visit the work sites on their own or attend the show me trip scheduled for July 2, 2009. Bidder will meet at the Bass Lake Ranger District in North Fork, CA at 0730 Hr. To reach the District office from Fresno, take Highway 41 northeast to the O'Neals turnoff, which is Road 200, and turn right. Proceed to the town of North Fork and the district office is located at 57003 Road 225.

Attached are the specific driving directions to the project areas. For additional information contact Francey Blaugrund at (559) 877-2218 Ext. 3282 or Ext. 3205

Items #1, the contractor shall provide one (1) excavator/mastication machine that shall be used for the duration of the contract.

Item #2, the contractor shall provide two (2) excavator/mastication machines working concurrently for the duration of the contract.

If both Item #1 and Item #2 are awarded to one contractor, the Contracting Officer shall permit one mastication machine to work concurrently on both items until Item #1 has been completed.

The purpose of this task order is to reduce brush, release and thin conifers and prepare sites in stands by mechanically shredding/mulching/chipping live and dead brush, created and existing slash, small dead conifers and live conifers. Operating the equipment in a safe and practical manner on slopes up to 50% while protecting soil conditions while working in Conifer Plantations, Natural-Wild Stands and DFPZ Fuelbreaks. Work shall be done in a manner that does not damage residual trees or vegetation not specified to be treated including resource/protected sites and all leave trees. The Equipment Operator(s) and Contractor's Representative must be able to speak fluent English and understand the written English language.

Item #1:

- Foster Project Area = 120 acres
- Sonny Meadows Project Area = 220 acres
- Grand Total Acres = 340 acres
- Item #1 Performance Time = 217 days
- Estimated Start Work Date = July 28, 2009

Item #2:

- Cedar Valley/Sky Ranch Project Area = 165 acres
- Nehouse/Placer Project Area = 280 acres
- Plumbar Project Area = 145 acres
- Grand Total Acres = 590
- Item #2 Performance Time = 187* days (*Performance days for two excavators working concurrently)
- Estimated Start Work Date = July 28, 2009

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
01	Sweetwater Point Mastication	275	AC	$ 540.00	$ 148,500.00
				TOTAL	$ 148,500.00
	For Site Information Contact: Julie Roberts – 559-877-2218 Ext. 3159				
	THE BIDDER SHALL BID ALL ITEMS.				

32a. QUANTITY IN COLUMN 21 HAS BEEN

☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED:

32b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE	32c. DATE	32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE
32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE		32f. TELPHONE NUMBER OF AUTHORZED GOVERNMENT REPRESENTATIVE 32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE

33. SHIP NUMBER |PARTIAL | |FINAL	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR	36. PAYMENT ☐ COMPLETE ☐ PARTIAL ☐ FINAL	37. CHECK NUMBER
38. S/R ACCOUNT NUMBER	39. S/R VOUCHER NUMBER	40. PAID BY		

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		42a. RECEIVED BY (Print)
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER	41c. DATE	42b. RECEIVED AT (Location)
		42c. DATE RECD (YY/MM/DD) / 42d. TOTAL CONTAINERS

STANDARD FORM 1449 (REV.3/2005) BACK

PART I - THE SCHEDULE

SECTION B - SCHEDULE OF ITEMS

SUPPLIES OR SERVICES AND PRICE/COST

2010 Mechanical Thinning,
Bass Lake Ranger District, Sierra National Forest

ITEM No.	EST QTY	UNIT	UNIT PRICE	TOTAL
Item No. 1	300	Acres	$543.60	$ 163080.00

DESCRIPTION
Buffin/Long Meadow,
Sugar Pine North,
Sugar Pine South
Thin/Release/Site Prep/DFPZ Fuels

Prepare and submit a Work Plan Schedule with the bid price.

GENERAL NOTES

A pre-bid tour is not scheduled. Bidders are encouraged to visit the work sites on their own. Attached are the specific driving directions to the project areas. For additional information contact Francey Blaugrund at (559) 877-2218 Ext. 3282 or Ext. 3205

Item #1, the contractor shall provide two (2) excavator/mastication machines working concurrently for the duration of the contract.

The purpose of this task order is to reduce brush, release and thin conifers and prepare sites in stands by mechanically shredding/mulching/chipping live and dead brush, created and existing slash, small dead conifers and live conifers. Operating the equipment in a safe and practical manner on slopes up to 50% while protecting soil conditions while working in Conifer Plantations, Fuelbreak /DFPZ and Natural-Wild Stands. Work shall be done in a manner that does not damage residual trees or vegetation not specified to be treated including resource/protected sites and all leave trees. The Equipment Operator(s) and Contractor's Representative must be able to speak fluent English and understand the written English language.

C.7 ORDER OF WORK

The Contracting Officer may specify an order of work by item or sub-item (unit) within an item, without additional cost to the Government. Work may be performed at any time during the period of the contract, except as specified as followings:

a. In accordance with the attached fire plan.

b. When the Contracting Officer determines that adverse weather has made access or project production too dangerous or that continued vehicular travel would cause unacceptable road damage.

c. When the Contracting Officer has determined that weather conditions are unfavorable for mechanical thinning operations to continue due to increased risk of insect infestation.

d. Limited Operating Period's (LOP): A LOP for the protection of Spotted Owls and Great Gray Owls from March 1st through August 15th and for the protection of Goshawks from February 15th to August 31 when activities are prohibited in specific units in the following project areas; Bass Lake Annex RAC, Cedar Valley RAC, Fish Camp, Grizz-Long and Sonny Meadows.

e. When the Contracting Officer or COR has determined that soil conditions are too wet and unfavorable for mechanical thinning operations to continue due to the increased risk of soil compaction and /or resource damage. (Refer to C.10.F)

C.8 DEFINITION OF TERMS

1. Blister Rust Fungus: A disease occurring in white pines (sugar pine) that girdles branches and eventually kills the tree. Symptoms of this disease will be swelling in the branches and patches of dead needles.

2. Conifer: A cone-bearing tree with needles or leaf scales (e.g. pine, fir, cedar). Conifer Plantations are areas that have been planted with conifer seedlings.

3. Created Slash: Debris created from work during this contract, including all cut trees and shrubs such as tops, trunks and branches.

4. Crop Tree: A healthy looking, well formed, undamaged tree that will remain in the stand.

5. Cull (Down) Log: A non-utilized log over 18 inches in diameter on the small end, and 10 feet in length.

6. Cut Tree: Tree to be removed from the stand that is not needed to meet spacing and /or leave/crop trees per acre requirements.

7. Damaged Trees (Created): Any damage created by work under this contract which includes stripping or removing of branches, debarking the bole of a crop tree in excess of ¼ of the circumference.
   Damaged Trees (Existing): Includes any defect or deformity of a tree resulting from agents such as wind, snow, animals, insects, disease, and equipment. Indicators include dead or broken tops or branches, bark that has been removed extending more than ¼ of the circumference of the tree.

8. D.B.H. (diameter at breast height): The diameter of a tree measured outside the bark at 4 1/2 feet above the ground on the uphill side.

9. Debris: Woody plant material.

10. Dripline/Crown: The tip of the tree's branches where rain water will drip. The tip of the tree's branches also identifies the edge of the trees crown.

11. Down Log: all or part of the trunk of a felled tree in various stages of decomposition.

12. Dwarf Mistletoe: A leathery evergreen plant growing as a parasite on trees. Produces long yellowish shoots and causes swells and cankers in the trees stems.

13. Dominant and/or Codominant: A tree displaying greater height and diameter than its closest competitors. A mature dominant and /or Codominant tree is also considered as a mature overstory tree.

14. Existing Slash: Debris existing prior to work under this contract, that may, or may not, have been previously windrowed or piled.

15. Excess Trees: A tree other than a crop tree, that shall be removed during the shredding/masticating/mulching thinning process.

16. Fuel Break DFPZ: A wide strip or block of land on which the native vegetation has been or plans to be modified so that fires burning into it can be more readily extinguished.

17. Fuel ladders: An arrangement and volume of vegetation (brush and or trees) that grows beneath the drip line or whose bole/stem lies within 8 feet from the drip line of a residual overstory tree. This vegetation increases the threat of ignition and spread of fire into the canopy of trees it grows under.

18. Hardwood: A tree with broad leaves rather than needles (e.g. oak, madrone).

19. Machine/Equipment: Boom mounted rotary type mowers/shredders/masticators. (Refer to C.3.A., C.3.B., C.3.C.)

20. Major Damage: Includes any defect or deformity of a tree resulting from such agents as wind, snow, animals, insects, disease, and equipment, and evidenced by such things as dead or broken tops or trunks, large crooks, and barking extending more than 1/4 of the circumference of the tree.

21. Mapping Boundary: An artificial perimeter established by a series of connecting straight lines, which approximate an average of the irregularities of the unit boundary. The mapping boundary is used in the computation of the enclosed area for payment.

22. Minor Damage: Crooks in the trunk, which are, offset less than 3 inches from the long axis and within 13 feet of the ground, and barking of 1/4 or less the circumference of the tree.

23. Natural-Wild Stands: An area of land that consists of an array of natural vegetation such as trees, brush and grass. The condition and arrangement of these trees and brush are requiring a mechanical thinning treatment. These natural-wild stands have not been treated in the recent past years.

24. Noxious Weeds: Those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. The primary species of concern for the project area are: yellow starthistle, medusa head, Klamath weed, bull thistle and Italian thistle. Any plant species designated as noxious by the California Department of Agriculture would be of concern if found in the project area. This list can be viewed at www.cdfa.ca.gov/weedhome.

25. Multi-storied stands: A varying-aged forested area that consists of various types of trees that have different ages and heights. These trees are considered either dominate, co-dominate, intermediate, or suppressed.

26. Release: Removal of unwanted vegetation adjacent to a leave tree.

27. Residual: Pockets of trees containing crop trees, damaged and disease trees.

28. Shred/Masticate/Mulch: Created and existing slash which has been treated shall lie in close contact with the soil. Trees and brush shall be shredded, torn, and broken into narrow strips to 5 feet or less in length for Item #1 and 3 feet or less in length for Item #2.

29. Shrub/brush: A woody plant with no main stem, which may grow higher than 7 feet, commonly called brush. For example: ceanothus, manzanita, and chokecherry.

30. Site Preparation: The mulching/mastication of competing brush, damaged and/or poor vigor small residual conifers by shredding, cutting, and or chipping to prepare the site for tree planting, while preserving any thrifty crop/leave trees that may be present.

31. Spacing: The horizontal distance from the trunk of one crop tree to the trunk of the next nearest crop tree.

32. Stump Diameter: The diameter of a tree measured outside the bark at six inches above the ground on the uphill side.

33. Terrace: Any of a series of flat platforms of earth with sloping sides, raising one above the other, mechanically constructed on the contour, as on a hillside with slopes. (The terraces were planted with seedlings on the flat portion of the platforms.)

34. Thinning: The removal of trees in excess of those leave/crop trees to be left for future management.

35. Threatened, Endangered, or Sensitive Plants (TES Plants): Threatened or Endangered Plants are species officially listed by the US Fish and Wildlife Service. Sensitive plants are those plant species identified by the Regional Forester for which population viability is a concern. Please see the Biological Assessment/Biological Evaluation for TES plants for details (in the project file at the Bass Lake Ranger District Office in North Fork, CA).

36. Unit: A subdivision of a bid item with a closed perimeter.

37. Unit Boundary: The perimeter of the work unit as indicated by the Forest Service markings at various points along an irregular perimeter. In some instances, the perimeter of the work unit will be defined by roads, drainages, uncut timber stands, natural barriers such as rocks, washouts, or others. Some situations require the exercise of common sense, as it is only possible to mark points along the irregular line.

38. Windrow: Rows of pushed brush, trees, and debris. The rows are normally on the contour.

39. Work Areas: An area of forestland where the Forest Service has an established fuel break, plantation or natural-wild stands consisting of planted and /or natural conifers. These conifers may be surrounded by various brush species. Competing brush species may impede the conifers growth.

C.9 SALVAGE MATERIAL

If authorized by the Contracting Officer, salvage material shall be made available to the Contractor. Any such material created by this contract will become the property of the Contractor on a salvageable basis and may be removed from the project, provided project work is progressing as scheduled and removal is completed prior to completion of that sub-item. Rights to any material not removed from the project areas prior to expiration of the contract shall revert back to the Government. Salvage rights may be granted by the Contracting Officer if the Contractor requests such rights in writing. Permission to remove salvage material will be by letter and is not transferable. Land management direction guidelines for required down logs per acre, will be provided.

C.10 NON-WORK AREAS / RESOURCE PROTECTION

Within the general project area, the Contracting Officer will exclude non-work areas such as: rocky areas, wildlife areas, non operable portions of terraces, noxious weeds and sensitive plant areas, streamside protection zones, meadows, and/or areas with a dense oak canopy, Cultural Resources Protection areas and other special areas such as excessively steep slopes. The Contracting Officer will designate non-work areas. Such areas exceeding 1/2 acre in size will be excluded from payment. The attached maps are intended to show only the general size and location of work areas and are not intended to be accurate as to shape and dimensions. The position of cultural and topographical features also may be approximate.

A. Work areas have been strung, flagged, or otherwise designated on the ground.

B. The Contractor shall not operate and shall not refuel within Stream Management Zones (SMZ). Stream management zone boundaries will be identified with blue and white polka-dot flagging, or otherwise designated prior to commencing unit treatment.

C. Equipment shall not cross meadows, stream channels, and/or designated non-work areas except at locations designated by the Contracting Officer. Maintain a 25’ buffer along meadows.

D. Equipment shall not operate on areas steeper than 50%.

E. Leave all snags over 16 inches in diameter and over 20 feet in height. These snags shall not be pushed over, damaged, or disturbed.

F. Mechanical operations will be restricted to periods when surface soils in the operating area are drier than the "plastic limit", to a depth of 30 cm (12 inches). A test to determine the plastic limit can be measured by rolling soil with your hand on a flat surface that produces a wire of soil 1/8 inch in diameter. Equipment shall be operated only when soil moisture conditions prevents unacceptable compaction or soil displacement. Typically, soil moisture conditions are a concern between the months of November and April.

G. Protection of Land Survey Monuments. The Contractor shall protect all known survey monuments, witness corners, reference monuments, and bearing trees against avoidable destruction, obliteration, or damage during the Contractor's operations. Known corners are identified on the contract maps by black diamonds. It is the Contractor's responsibility to locate and protect them during operations.

If the Contractor causes damage as detailed in the above paragraph, the Contractor shall hire the appropriate registered land surveyor to establish or restore at the same location the monuments, corners, or accessories. Such surveyors shall use procedures in accordance with the "Bureau of Land Management Instructions for the Survey of the Public Lands of the United States" for the General Land Office surveys, and in accordance with the State law for others. The Contractor shall record such survey in the appropriate county records.

H. Protection of Improvements. Contractor shall protect improvements from damage and shall be responsible for their timely restoration if damaged by Contractor's Operations. Improvements include but not limited to; water tanks, fences, gates, pipeline, culverts, helispot, existing roads, water bars, under ground fiber optic cable, stock driveways, power lines, established land corners, established hiking and motorcycle trails and all private property.

I. Equipment shall not be walked between units on paved or chip-sealed roads. The walking of equipment between units shall be at the direction of the Contracting Officer or COR, to avoid the possibility of entering a Control Area or resource damage.

J. Exit and entry of units shall be confined to within unit boundaries unless otherwise stated by the Contracting Officer or COR. Entry and exit points to the unit shall be chosen in a manner as to reduce resource damage and soil erosion.

K. Prevention of Oil Spills. If the Contractor maintains storage facilities for oil or oil products on the project area, the Contractor shall take appropriate preventative measures to insure that any spill of oil or oil products does not enter the soil, any stream, or other waters.

If the total oil or oil storage exceeds 4996 liters (1320 gallons) or if any single

container exceeds a capacity of 2498 liters (660 gallons), the Contractor shall prepare a Spill Prevention Control and Countermeasures (SPCC) Plan. The proposed plan is to be approved by the Contracting Officer. Such plan shall meet applicable EPA requirements (40 CFR 112) including certification by a Registered Professional Engineer.

L. Protection of Cultural Resources: Location of known historic or prehistoric sites, buildings, objects, and properties related to American history, architecture, archaeology and culture, such as settler or Indian artifacts, protected by American Antiquities Act of 1906 (16 U.S.C. 431433), National Historic Preservation Act of 1966 (16 U.S.C. 470), and implementing regulations (36 CFR 800), the American Indian Religious Freedom Act, and the Archaeological Resources Protection Act of 1979 (PL 96-95 and 36 CFR 261.9(e)) will be identified on the ground by the Forest Service. The Forest Service may unilaterally modify or cancel all or portions of this contract to protect an area, object of antiquity, artifact, or similar object which is or may be entitled to protection under these Acts regardless of when the area, object or artifact is discovered or identified. Discovery of such areas or objects by either party shall be promptly reported to the other party.

The Contractor shall protect Controlled Areas (CA) shown on the Project Unit Maps, by AVOIDANCE, and shall protect all known and identified or discovered historic or prehistoric sites, buildings, objects, and properties related to American history, architecture, archaeology and culture against destruction, obliteration, removal or damage during the Contractor's operations. The Contractor shall immediately notify the Contract Officer or the COR if damage occurs to any cultural resources and immediately halt operations in the vicinity of the resource where damage occurred until the Contract Officer authorizes the Contractor to proceed. If such damage is negligently or willfully caused by the Contractor's operations, the Contractor shall bear costs of investigation and restoration in accordance with 36 CFR 296.14(c), provided that such payment shall not relieve the Contractor from civil or criminal remedies otherwise provided by law.

Wheeled or track-laying equipment shall not be operated within such areas except on roads, landings, tractor roads, or skid trails approved by the Contracting Officer. The Contractor may be required to restore disturbed areas where the Contracting Officer has approved incursion.

All known Controlled Areas are identified on the project map and on the ground with flagging. The sites may be reflagged immediately prior to operations.

M. Protection of Sensitive Plant Populations. No known populations of sensitive plants occur within or adjacent to the designated units. The Contracting Officer will designate any protected plants located within any of the units for protection. Elderberry bushes/tree shall not be damaged. To maintain stand diversity, trees and or brush providing homes to wildlife shall not be damaged or disturbed.

N. Control of Dust Near Sensitive Areas. The Contracting Officer may require the Contractor to cease operations when the wind speed is such that dust from operations will blow into sensitive areas. Sensitive areas are those occupied by the public including developed campgrounds and residences. Periods of shut down will not count against the Contractor's time.

O. The Contractor shall remove all trash from the work site.

P. The Contractor shall be responsible for determining the location of buried utilities and preventing damage to them.

Q. Areas with an excessive amount of rock or rock outcrop areas on the soil shall be avoided. These areas will be designated by the Contracting Officer.

R. Heavy equipment shall not work or leave the boundaries of the work areas without written permission from the Contracting Officer. This is intended to avoid the possibility of damage to sensitive or protected sites outside the work boundaries. The "walking" of equipment cross-country between work units is not allowed without the written permission of the Contracting Officer.

S. There may be terraces or portions of terraces that have existing non-treatment areas. These non-treatment areas may be due to one or more of the following conditions: angle of the slope, existing rock at the edge of the flat platform, width of terrace, height and angle of the cut bank, and/or the size of the tree's diameter.

C.11 WORK METHODS AND STANDARDS

For the duration of the contract and working concurrently, for Item #1, the Contractor will provide two track operating pieces of equipment with masticating/mulching/shredding type heads attached at the end of the equipments' boom. For Item #2, the Contractor will provide one track operating piece of equipment with a Fecon masticating head attached at the end of the equipments' boom.

A. Protection of residual trees shall be the highest priority in all operations. Excessive residual stand damage may result in contract shut down and/or contract termination. Excessive damage shall be defined as damage to 10% or greater of the residual trees.

B. The Contractor shall be responsible for avoiding identified buried utilities.

C. The Contractor shall not operate in areas within the units that exceed 50% slope, or in areas where the ground conditions may damage Contractor's equipment, such as excessively rocky sites. These areas will be excluded from

measurement for payment.

D. Water bars in skid trails, fire lines, culverts, draws and roads disturbed by the Contractor shall be restored to condition prior to damage at the Contractor's expense. Culverts, stream channels, draws and roads shall be free of all slash and debris.

E. The Contractor shall operate equipment in a manner that limits soil displacement.

F. Riparian vegetation shall not be shredded, cut or damaged.

G. Downed logs shall not be shredded or cut and shall be left in an undisturbed state to the greatest extent practical.

H. Equipment shall be kept free of debris accumulations that may result in fire starts.

I. The shredded/masticated/chipped material shall be evenly distributed over the treated areas so as to not leave large accumulations of slash. Concentrations of brush, slash, and small dead trees may need repeated treatment in order to satisfy desired work standards.

J. Dead and excess live trees and brush, and created and existing slash and/or existing slash piles shall be shredded. The shredded material shall not be pushed into leave trees. All cut material shall be shredded according to contract requirements.

K. Equipment will not be permitted to cross meadows, stream channels, or other non-work areas except at locations designated by the Contracting Officer or COR.

L. Soils in the operating area must be dry enough to prevent rutting and or compaction by a single pass of the equipment.

M. The Contractor shall not operate and shall not refuel within Stream Management Zones (SMZ). Stream management zones boundaries will be identified with white with blue polka-dot flagging or otherwise designated prior to commencing unit treatment.

N. Protect rock out crops that support islands of mature vegetation such as manzanita and protect Blue Elderberry Bushes.

O. The Contractor shall be required to work the edge of the project boundary along all private property and road side edges. To prevent unoffical access where the project area boundary meets the edge of a road, the Contracting Officer shall determine where to leave untreated existing vegetation along portions of some

roads.

C.12 WORK CONDITIONS

Shredding and clearing may be done at any time during the term of the contract, except under the following conditions:

A. Weather predictions indicate a hazardous fire condition warranting curtailment of operations, as specified elsewhere in this contract.

B. When ground conditions are such that machine operations could cause resource damage.

C. Between dusk and dawn.

D. Between December 1st and June 30th when shredded/cut/chipped material is larger than 3" diameter and consists of Pine species.

E. On Sundays unless otherwise agreed upon between the Contracting Officer and the Contractor.

F. Before 7:00 A.M. on weekdays or 8:00 A.M. on weekends when operating within ¼ mile of residences or campgrounds.

G. Limited Operating Period's (LOP): During Limited Operating Period from March 1st through August 15th, activities are prohibited for the protection of Owls in the following project areas: Bass Lake Annex RAC Unit 526-45, Fish Camp Units 706-101, 706-104, 706-117 and 716-110, Grizz-Long Unit 514-041 and Sonny Meadow Unit 770-6. For the protection of Goshawks a Limited Operating Period from February 15 to August 31 activities are prohibited in the Cedar Valley Project Area in Units 732-06, 732-11, 732-17 and 732-18.

C.13 SELECTION OF LEAVE TREES

Hardwood Trees:

Hardwood trees over 10 feet in height or 4 inches in diameter shall be considered potential crop trees.

Leave Trees/Conifers:

Leave trees shall generally be the tallest, most vigorous, healthy, largest crown, and straightest stems that are free of damage due to insects, diseases, physical or

mechanical causes. The Contractor shall select leave trees based on the following priorities:

A. Healthy undamaged trees at the required spacing intervals.
    1. Crown class - must be either vigorous dominant or co-dominant.
    2. Crown ratio - 30% or more of the total height must be live crown.
    3. Vigor - healthy and vigorous in appearance. Terminal growth must be equal to or greater than that of competitors.

B. If no healthy, undamaged tree exists within the spacing requirements, leave the best disease free tree available, including oaks, to meet the stocking requirements.

C. If no healthy tree with minor damage exists, leave a tree as defined below:
    1. A tree with minor mistletoe infection: Minor mistletoe infection is defined as a tree with 20 percent or less of the crown infected and with no mistletoe within one foot of the main bole.
    2. Trees with crown damage may be left providing there are no signs of rot and the tree has established a new leader (top) with a minimum of two years growth visible.

D. Within categories listed above, selection shall be made based on the following priority order:
    1. Ponderosa, Jeffrey pine and /or Giant Sequoia
    2. Sugar pine
    3. Incense cedar
    4. Fir
    5. Oak
    6. When no other priority leave tree is present, then a disease free Knob Cone Pine tree shall be left.

C.14 WORK DESCRIPTION AND SPACING

Thinning/Release/Plantations/DFPZ Fuel break Natural-Wild Stands and/or Conifer Plantations:
In multi-storied stands, remove fuel ladders from beneath and within 8 feet of the drip line of the residual overstory trees. Shred/masticate/mulch brush and excess trees less than 11" DBH, to achieve an average leave/crop tree spacing of 15' x 15’ (170-210 trees/acre) or 16’ x 16’ (155-190 trees/acre). (See data table for spacing requirements.) Spacing can be varied to take advantage of a better crop tree. If present shred/masticate/mulch all vegetation beneath the electrical power lines and watch for guy wires. Trees and/or brush providing homes for wildlife shall not be disturbed.

In openings within the stand, shred/masticate/mulch brush and excess trees that are less than 11" DBH, and greater than 8 ft. from the drip line of residual overstory trees to achieve an average leave/crop tree spacing of 15' x 15’ (170-210 trees/acre) or 16’ x

16’ (155-190 trees/acre) between boles/ tree stem. (See data table for spacing requirements.) If present shred/masticate/mulch all vegetation beneath the power lines and watch for guy wires. Trees and or brush providing homes for wildlife shall not be disturbed.

In conifer plantations where natural and or planted trees exist, shred/masticate/mulch excess trees less than 11" DBH, to achieve an average leave/crop tree spacing of 15' x 15’ (170-210 trees/acre) or 16’ x 16’ (155-190 trees/acre). (See data table for spacing requirements.) Spacing can be varied to take advantage of a better crop tree. If present shred/masticate/mulch all vegetation beneath the power lines and watch for guy wires. Trees and/or brush providing homes for wildlife shall not be disturbed.

DFPZ/Fuel break:

The work area is within a DFPZ and shaded fuel break located along forest open areas and road edges. Remove fuel ladders from beneath and within 8 feet of the drip line of the residual overstory trees. Shred/masticate/mulch brush and excess trees less than 11" DBH to achieve an average leave/crop tree spacing of 16’ x 16’ (155-190 trees/acre). The results shall produce a DFPZ/shaded fuel break of sound relatively large, thrifty, leave/crop trees with vertical and horizontal fuel discontinuity. Treat both individuals of paired trees the same. All competing vegetation shall be shredded/masticated/mulched. Trees and/or brush providing homes for wildlife shall not be disturbed.

Protection/Fuel Reduction Buffer Zone:

In addition to the contract specifications, a 10’ wide fire protection/fuel reduction buffer zone shall be masticated along portions of the boundary in specified plantations. The buffer zone shall begin where previous site prepared areas merge with untreated vegetation. Trees and/or brush providing homes for wildlife shall not be disturbed.

Site Prep:

Site preparation shall be completed in areas with less than 100 trees per acre. Within site prep areas, the Contractor shall shred/masticate/mulch brush and damaged, diseased or poor vigor residual conifers less than 11" DBH. This will be completed by shredding, cutting, and/or chipping to prepare the site for tree planting, while preserving any thrifty disease free crop/leave trees that may be present. Shred/masticate/mulch all vegetation beneath the power lines and watch for guy wires. Trees and or brush providing homes for wildlife shall not be disturbed.

2008 DATA AND SPACING TABLE
Mechanical Thinning Bass Lake RD
ITEM #1

Units		Estimated Treatment Acres	Average Thinning Spacing	Year Planted	Elevation
Item #1 Plantations, Wild Stands Thin/Release/Site Prep/DFPZ					
Bass Lake Annex RAC Project Area: *++ F !! PP FB {95 acres}					
526-44	Bass Lake Annex RAC	15	15 x 15	Nat Regen	3,400’
526-45	Bass Lake Annex RAC*	55	15 x 15	Nat Regen	3,200’
526-46	Bass Lake Annex RAC	25	15 x 15	Nat Regen	3,300’
Cedar Valley TS Project Area :**++ PP TS {200 acres}					
726-01	Granddad Fuelbreak TS PP	12	16 x 16	Nat Regen	5,200’
732-06	Granddad Fuelbreak**TS	38	16 x 16	Nat Regen	4,600’
732-09	Granddad Fuelbreak	17	16 x 16	Nat Regen	3,800’
732-11	Granddad Fuelbreak**TS	67	16 x 16	Nat Regen	4,800’
732-13	Granddad Fuelbreak TS PP	14	16 x 16	Nat Regen	5,000’
732-17	Granddad Fuelbreak**	4	16 x 16	Nat Regen	4,600’
732-18	Grabddad Fuelbreak**	4	16 x 16	Nat Regen	4,600’
740-02	Sky Ranch PP	34	16 x 16	Nat Regen	3,400’
740-04	Granddad Fuelbreak	10	16 x 16	Nat Regen	3,600’
Fish Camp Project Area: *++TS {205 acres}					
706-101	Little RainTS#1*TS	6	15 x 15	1991/1996	6,800’
706-103	Little Rain TS#3 TS	7	15 x 15	1991/1994	6,500’
706-104	Little Rain TS#4*TS	18	15 x 15	1991	6,700’
706-117	Little Rain TS#17*TS	7	15 x 15	1991	6,300’
706-501	Buffin Mdw++TS	56	15 x 15	1983/1984	5,600’
706-502	Long Mdw BrushTS	7	15 x 15	1991	6,400’
706-506	Long Mdw++TS	18	15 x 15	1968	6,400’
706-508	Long Mdw++ TS	19	15 x 15	1976	6,700’
706-511	Long Mdw++TS	14	15 x 15	1967	6,200’
706-514	Long MdwTS	5	15 x 15	1959	6,200’
716-110	Little Rain TS#10*TS	8	15 x 15	1991/1997	6,300’
716-114	Little Rain TS #14TS	9	15 x 15	1991	6,400’
716-516	Long Mdw++TS	31	15 x 15	1969	6,800’

2008 DATA AND SPACING TABLE
Mechanical Thinning Bass Lake RD
ITEM #1

Units	Estimated Treatment Acres	Average Thinning Spacing	Year Planted	Elevation
Item #1 Plantations Wild stands Thin/Release/Site Prep/DFPZ				
Grizz-Long Project Area: *++{82 acres}				
514-09 Grizz-Long #1	16	15 x 15	1994/1998	5,100'
514-12 Grizz-Long #4	16	15 x 15	1994	5,200'
514-39 Grizz-Long #42	19	15 x 15	1993/94	5,200'
514-40 Grizz-Long #43	16	15 x 15	Nat Regen	5,200'
514-41 Grizz-Long #44*	15	15 x 15	1994	5,100'
Sonny Meadows Project Area *T, ++: {105 Total Acres}				
710-200 Hogan TS++	4	15 x 15	Nat Regen	4,800'
710-501 O'Neals Mdw++	12	15 x 15	1982	4,800'
730-503 Pilot Peak++ T	2	15 x 15	1962/Nat Regen	4,000'
770-01 Sonny Mdws++T	9	15 x 15	1962/Nat Regen	4,000'
770-02 Sonny Mdws++T	3	15 x 15	1962/Nat Regen	4,000'
770-04 Sonny Mdws++T	12	15 x 15	1962/Nat Regen	4,000'
770-05 Sonny Mdws++T	7	15 x 15	1962/Nat Regen	4,400'
770-06 Sonny Mdws*++T	23	15 x 15	1962/Nat Regen	4,400'
770-07 Sonny Mdws++T	11	15 x 15	1962/Nat Regen	4,400'
770-08 Sonny Mdws++T	22	15 x 15	1962/Nat Regen	4,400'
Item #1 Grand Total	687 acres			

!! =Overhead Power Lines
T = Plantations with Terraces in the Sonny Meadow project area
MC = Motor Cycle Trails
PP = Project area is adjacent to Private Property
TS = Project area is adjacent to a flagged Timber Sale
F = Flume with running water
FB = Foot Bridge
*Limited Operating Period (LOP) - all or part of treatment area (March1st to August 15th)
** Limited Operating Period (LOP) - all or part of treatment area (February 15th to August 31st)
++ Equipment shall be capable of severing, and reducing to a maximum length of five feet, shrubs and trees less than eleven inches D.B.H.

2008 DATA AND SPACING TABLE
Mechanical Thinning Bass Lake RD
ITEM #2

Units	Estimated Treatment Acres	Average Thinning Spacing	Year Planted	Elevation
Item #2 Plantations Wildstands Thin/Release/Site Prep/DFPZ				
Cedar Valley RAC Project Area !! ++MC PP TS: {145 acres}				
732-20 Cedar Valley RAC PP	5	15 x 15	Nat Regen	3,500’
732-21 Cedar Valley RAC PP	18	15 x 15	Nat Regen	3,500’
732-22 Cedar Valley RAC PP	122	15 x 15	Nat Regen	3,500’
Item #2 Total	145 acres			

!! =Overhead Power Lines
MC = Motor Cycle Trails
PP = Project area is adjacent to Private Property
TS = Project area is adjacent to a flagged Timber Sale
++ Equipment shall be capable of severing, and reducing to a maximum length of five feet, shrubs and trees less than eleven inches D.B.H.

C.15 STUMP HEIGHTS

All project created stumps, including those of shrubs, shall be less than 6 inches high as measured from the uphill side. Scattered stump heights up to 8 inches will be tolerated on up to 10 percent of the area. 90% of the live limbs or stems of trees and brush will be severed from the stump.

C.16 SLASH, BRUSH AND TREE TREATMENT

1. All brush within the designated units shall be shredded except brush growing so close to adjacent leave trees that attempted brush removal would cause damage to the leave tree generally 15.2 cm (6 in.) or closer to residual tree.

2. Created and existing slash shall be shredded/mulched/masticated and shall lie in close contact with the soil no higher than 9 inches off the ground nor exceed five feet in length in Item #1 and three feet in length for item #2. Created and/or existing windrows and piles shall be considered as existing slash unless otherwise indicated.

3. Brush shall be severed from its main stem no more than 6 inches (15.2 cm) for Item #1 and 3 inches for Item #2 from the ground on level surfaces, and no more than 8 in. (20.3 cm) from any natural obstacles such as rocks or downed logs.

4. All cut trees and brush shall be shredded/mulched/masticated within the work areas. Any cut material not masticated that encroaches upon protected sites, roads, telephone/power lines, established trails, stock driveways, fence lines, established land corners, stream zones, outside of the unit boundaries and other improvements not listed, shall be removed if possible. Any resulting damage shall be immediately reported to the Contracting Officer. All cut trees and brush shall be masticated. Any vegetation cut and not masticated shall be reworked. Any cut vegetation lying on the top or against untreated vegetation shall be reworked to pass inspections.

5. No dead conifers (snags) greater than 10 inches+- DBH shall be cut with the exception of roadside hazard trees or others designated by the Contracting Officer.

C.17 DAMAGE PREVENTION

Leave trees shall not be damaged.

Hand Thinning

C.10 ORDER OF WORK

Cutting operations shall progress in an orderly and systematic manner. Prior to the start and/or during the period of the contract, the Contracting Officer may specify a priority area to be done within project boundaries. The Contracting Officer may specify an order of work by item, area, unit, or sub-unit.

C.11 WORK AREAS

The maps in Section J. are intended to show only the general size and location of work areas and are not intended to be accurate as to shape and dimensions. The position of cultural and topographical features when shown may also be approximate.

Within the general work area, the Contracting Officer may exclude additional nonworker areas which equal or exceed one-half (1/2) acre such as: rock areas, groups of trees, excessively steep slopes etc. Nonwork areas will be strung, flagged, or otherwise designated by the Contracting Officer prior to work on that segment of the general work area. Such areas will be excluded from the contract by modification with an adjustment to the payment.

C.12 DEFINITIONS

Blister Rust - A disease occurring on sugar pine that girdles branches and eventually kills the tree. Indicators are swellings on the branches or trunk with cracked bark exuding pitch and sometimes showing yellow powdery spores, and patches of dead needles.

Bole - The trunk or stem of a tree.

Brush - A woody plant with no main stems. Species include manzanita, deerbrush, buck brush, ceanothus, and white thorn.

Bucking - Cutting the boles of the trees into specified lengths.

Buffered area - An area that shall be protected and/or has specific working guide lines, such as but not limited to, drainages, meadows, and roads.

Dominant or Codominant tree - Tree displaying greater height and diameter than its closest competitor.

Conifer - A cone-bearing tree with needles or leaf scales. Species found in

project area may include: ponderosa pine, sugar pine, white fir, red fir, incense cedar, and lodgepole pine.

Created Slash - Debris created from work during this contract, including all cut trees and brush, such as tops, trunks and branches.

Crop Tree - Trees to be left in the stand. Also referred to as a Leave Tree (see definition).

Cut Tree - Trees selected by the Contractor to be removed from the stand.

Damaged Tree (created) - Any damage created by work under this contract. Includes debarking of the stem or bole of a crop tree, in excess of 25% of the circumference and longer than 10 inches, root springing, or stripping and/or removing of branches resulting in less than 30% crown cover..

Damaged Tree (Existing) - Major damage - includes any defect or deformity of a tree resulting from agents such as wind, snow, animals, insects, disease, and equipment. Indicators include dead or broken tops, trunks or branches, large crooks, deep scars, or irregular growths on the bole or branches, or debarking extending more than 1/4 of the circumference of the tree.

Damaged Tree (Existing) - Minor damage - Includes crooks in the trunk which are offset less than 3 inches from the long axis and within the lower 1/3 of the tree, and barking of 1/4 or less the circumference of the tree.

DBH - Diameter Breast Height. The diameter of a tree measured 4.5 feet above the ground level on the uphill side of the tree.

Diseased Tree - Tree with one or more of the following symptoms:

- visible mistletoe infection on any part of the live crown or stem.

- off-color foliage, weak root system, or exhibiting an unhealthy appearance.

- signs of insect infestation or displaying conks, or other disease indicators.

- Sugar pine showing branch flagging or cankers due to blister rust either on, or within two feet of the bole.

Excess Trees - Uncut trees not needed to meet spacing or trees per acre specifications.

Existing Logs - Down logs existing prior to work under this contract that may

have been previously jackstrawed, criss-crossed, windrowed or piled.

Hang-up Tree - Any cut tree suspended more than 18 inches off the ground.

Hardwood - A tree with broad leaves rather than needles. Species includes black oak, live oak, alder, and big leaf maple.

Hydrological or Topographic Depression - A depression or swell that is usually at or near the top of drainage.

Intermediate - Trees shorter than the those in the dominant and co-dominant classes, but with crowns either below or extending into the stand canopy.

Leave Tree - A tree that has the best phenotypic appearance (tallest, most crown, best color, etc.) of surrounding trees and a least 2/3 of the height of surrounding trees.

Limb and Scatter - Cutting off the limbs from the bole of the cut tree, and spreading the limbs, pieces, and boles throughout the treatment area to keep the level of slash at or below the specified level.

Mistletoe or Dwarf Mistletoe - A leathery evergreen plant growing as a parasite on trees. Produces long yellowish shoots and causes swells and cankers in the trees stems and branches.

Oversize tree - Any conifer 10" or greater diameter at breast height and any hardwood 8" or greater diameter at breast height is considered an oversize tree and is not to be cut unless it qualifies as a sanitation tree (see definition).

Release - The cutting of brush species that are overtopping or are adjacent to leave trees.

Sanitation Tree - A tree 12 inches DBH or less which will not become a crop tree due to major damage, disease, or a fork in the bole.

Slash/Residue - All down material resulting from the thinning and release operation of this contract, including the stems, limbs, and tops of trees and brush.

Snag - A dead tree 20 feet or more in height and greater than 16 inches in DBH.

Spacing - The horizontal distance from the bole of one leave tree to the bole of the next nearest leave tree.

Thinning - The cutting of trees in excess of those to be left for future management.

Unit - A subdivision of a bid item with a closed perimeter.

Unit Boundary - The perimeter of the work unit as indicated by Forest Service markings at various points along an irregular perimeter. In some instances, the perimeter of the work unit will be defined by roads, drainages, uncut timber stands, natural barriers such as rocks, washouts, or others. Some situations require the exercise of common sense, as it is only possible to mark points along the irregular line.

Wasted leave tree - Those cut trees that should have been left to maintain leave tree or trees per acre specifications.

Windrow - Rows of pushed, pulled, or stacked brush, trees, and debris.

Work Area - An area of forest land where the Forest Service has established a plantation of planted and/or "natural" conifers. These may be surrounded by various brush and herbaceous species that impede the growth of the conifers.

C.13 TECHNICAL SPECIFICATIONS

A. THINNING STANDARDS

Units are planted natural regeneration pine stands.

1. Damage Control: The Contractor shall exercise care in thinning operations. He/she shall prevent damage to crop trees or brush from improper felling methods. If a suitable crop tree is cut or damaged during thinning operations, a suitable substitute tree shall be reserved as a crop tree.

2. Stocking Density and Spacing: The desired stocking density after thinning shall have an overall average of 200 trees per acre. An average spacing of 15 foot by 15 foot equates to190 - 200 trees per acre. This equates to **5 trees** per 1/40th acre plot (33' x 33' square plot), except in Sonny Meadows #730-001 the spacing will be 16x16. This equates to **4 trees** per 1/40th acre plot.

Spacing may be varied up to 25 percent to select the most desirable leave tree. The number of trees per acre shall not be materially increased or decreased.

For spacing purposes all healthy conifers **10" DBH and larger** are considered leave trees and shall be spaced off of, until the DBH becomes larger then 20'' DBH And these trees will be ignored.

3. Leave Tree Selection: Leave trees shall generally be those of the tallest height, largest crown, straightest bole, and are free from insect, disease, physical, and mechanical damage. Leave Trees shall be selected by the Contractor based on the following guidelines:

4. Priority: Precedence for leave tree selection among trees of equal size and vigor are:
1) ponderosa or Jeffery pine, 2) sugar pine, 3) incense cedar, 4) white fir, 5) hardwoods 6" DBH and under. An occasional damage free tree of equal size and vigor of the following species shall be left instead of a ponderosa/Jeffrey pine to mix up species composition: sugar pine, incense cedar, or white fir.

Leave trees shall be based on the following criteria:

a. Dominance - Trees are taller than others of the same age class and live crown ratio greater than 30 percent.

b. Health - Shall be vigorous and healthy in appearance with a full compliment of green foliage.

c. Growth - Leader length shall be equal to or greater than that on trees of the same size and crown class.

d. Bole - Straight with no bends, sweep, crooks, or scars.

e. Quality - Trees have good form, with no forks, no vertical branching, no spiral grain.

f. Damage - free from physical or mechanical damage.

g. Disease - free from mistletoe or blister rust infections.

In stands lacking sufficient dominant leave trees, select the best codominant, intermediate, or younger trees that meet the above criteria. If no healthy undamaged tree exists within the spacing requirements, then leave the best tree available, including any tree with minor mistletoe or oak under 8" DBH, to meet stocking requirements.

B. CUTTING CRITERIA

The Contractor shall cut all excess trees meeting the following criteria; conifers **less than 10 inches DBH** that are at least **2 feet in height**, and **all sanitation trees at 12 inches DBH.** Do not cut maple or dog wood trees.

1. Felling:
   a) Cut Trees shall be felled in a parallel manner, not jackstrawed or criss-crossed.
   b) Cut trees shall be felled away from drainage channels or other ephemeral hydrological or topographical depressions, buffered areas, meadows, unit boundaries, property boundaries, established land corners, roads, established trails (not including skid trails), fire lines,

fence lines, Control Areas, or other improvements. Any trees falling in or on such areas shall be removed.

2. Protection of Land Survey Monuments. The Contractor shall protect all known survey monuments, witness corners, reference monuments, and bearing trees against avoidable destruction, obliteration, or damage during the Contractor's operations. Known corners are identified on the contract maps by black diamonds. It is the Contractor's responsibility to locate and protect them during operations.

   If the Contractor causes such damage, the Contractor shall hire the appropriate registered land surveyor to establish or restore at the same location the monuments, corners, or accessories. Such surveyors shall use procedures in accordance with the "Bureau of Land Management Instructions for the Survey of the Public Lands of the United States" for the General Land Office surveys, and in accordance with the State law for others. The Contractor shall record such survey in the appropriate county records.

3. No felled material shall lean against or be suspended by a leave tree or brush.

4. All thinning slash shall be placed on or near the ground surface.

4. Stump Height: All stumps, including those of brush, **shall not exceed eight inches above ground level, or 4 inches above natural obstacles.** The tree bole and any remaining green branches shall be completely severed from stump. All cut vegetation shall be completely severed from the stump or uprooted.

5. Slash Treatment:

a) Bucking - All felled trees and brush shall be bucked into lengths not to **exceed 8 feet**, except in Boggy #12 511-054 the lengths will not **exceed 6 feet**. Any trees felled, which are criss-crossed, shall be bucked at the joint. Created slash shall be bucked as felled in a systematic method approved by the Contracting Officer.

b) Limbing - In areas requiring limbing, (see below) limbs shall be cut from the bole of the felled trees, and from brush, to achieve a slash depth not greater than **18 inches.**

c) Scattering - In areas requiring scattering (see below) created slash shall be scattered to achieve a slash depth not greater than 18 inches.

d) Pull back - In areas requiring pull back (see below), created slash shall be pulled back and then scattered so as not to create windrows.

e) Limbing, Scattering, and Pull back areas (also see unit maps):

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e. Slash shall be limbed and scattered on **slopes 30%** and greater and in areas unpilable due to rocks, drainages or other hydrological or topographical depressions, and inaccessibility. .

f. Slash shall be pulled back to the top of all road cut banks and out of all road buffers.

g. All thinning slash shall be placed on or near the ground surface.

h. All thinning slash in ephemerals, drainages, or other hydrological or topographical depressions shall be cleared from the channel.

i. Slash shall be pulled out of buffer strips and scattered.

6. Brush Removal:

a) All brush, dead or alive, within a 5 foot radius of the boles of crop trees shall be cut to within 7 inches of the ground or below the lowest live limb, whichever is lower.

7. Pruning: Pruning is required of dwarf mistletoe in leave trees within 6 feet the ground. Branches shall be pruned between 1/2 inch and 1 inch from the bole