South Fork American-Chili Bar and Lower Middle Fork American River Watersheds

Landscape and Roads Analysis

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Introduction

The *Sierra Nevada Forest Plan Amendment* (SNFP) institutes a management requirement for landscape analysis, subject to available funding, to provide an information baseline for evaluating the existing conditions in terms of the desired conditions. (ROD, pg.13). This landscape analysis is not a decision document; rather it provides information on existing condition; its purpose is to enable identification and prioritization of appropriate project opportunities that would enhance, maintain, or improve the landscape conditions in order to achieve or move toward the desired conditions of the land allocations given by the SNFP. Further direction is provided by the National Fire Plan and the Healthy Forest Restoration Act of December 2003.

The SNFP Record of Decision (ROD) outlines some elements of a landscape analysis on pages A-18 through A-21, summarized here:

- Delineates 5th Field watershed or portion thereof, scale between 13,000 and 130,000 acres.
- Determines key forest characteristics related to wildlife habitat, fire and fuels management, aquatic and riparian restoration priorities, and road management priorities.
- Compares existing and desired conditions to identify opportunities for moving landscapes toward desired conditions.
- Lists sources for data/information to use in project analysis (e.g.: GIS coverage, HCA reports, wildlife survey reports, INFRA database).
- Reviews existing uses or activities, including recreational trails, developed and dispersed recreation sites or areas, maintenance level 1 and 2 roads and unclassified roads, to identify compatibility of the use with TES species, and to determine if any corrective actions are needed to bring the use into consistency with riparian conservation objectives.
- Includes the Forest Service's Watershed-scale Roads Analysis (RA), which identifies a full range of road system management options, including road improvements, reclassification for use as a trail, decommissioning, seasonal, or multi-year road closures, and new road construction. Road management is to be based on social effects, environmental effects, and administrative needs such as fire access.

Table 1 below illustrates how, in general, the landscape analysis (LA) and roads analysis (RA) processes are similar. The concept is to provide information regarding the existing

condition of the landscape watershed as well as the impact of past, current, and future management activities. Roads Analysis is specifically directed at the interaction of the road system with the overall watershed system. The combination of landscape and roads analysis includes interaction of land, water, vegetation, management activities, and social factors needed to define existing and desired condition. The following table provides a comparison of the steps described for these analyses.

Table 1. Comparison between Landscape Analysis and Roads Analysis

Step	Landscape Analysis	Roads Analysis
1	Characterization of Watershed	Setting Up the Analysis
2	Identification of Issues and Key Questions	Describing the Situation
3	Description of Land Use History	Describing the Situation
4	Description of Current Conditions	Identifying Issues
5	Analysis of Existing Conditions relative to Reference and Desired Conditions	Assessing Benefits, Problems and Risk
6	Synthesis and Interpretation of Information	Describing Opportunities and Setting Priorities
7	Recommendations	Reporting

The roads analysis for this landscape-scale analysis process is designed to be compatible with the Forest-wide Roads Analysis and to carry that process to the Landscape or Watershed scale. Arterial and collector roads have already been analyzed at the Forest scale, as is appropriate because the arterial and collector system is a Forest-wide system, providing the connections for the transportation system across the Forest. This Landscape Analysis focuses on the local road system contained within the Landscape Analysis area. To further refine the local road system for analysis, it considered the maintenance level 1 and 2 local roads in the Forest roads database (see Maps 34 and 35). These were further refined to include mostly those roads that were identified as "high risk" from a hydrological standpoint. It was a two-step, integrated approach that considered issues, data, and information to systematically address all pertinent roads in this analysis. The following factors were considered to provide ratings for the tables:

- Fire suppression and fuels management needs
- Road location (miles of road and roads that crossed two or more Ranger Districts)
- Annual and deferred maintenance costs
- Recreation use values
- Resource management values, including needs for grazing management and vegetation management
- Watershed effects and the magnitude of those effects
- Wildlife effects and the magnitude of those effects
- Aquatic and riparian effects and the magnitude of those effects
- Access needs for special uses
- Commodity access needs for grazing management and vegetation management

Step 1: Characterization of the Watershed

General Landscape Description

This landscape analysis includes two HUC 5th field watershed landscapes (Map 1): Lower Middle Fork (LMF) American River (62,172 acres), and South Fork (SF) American River-Chili Bar, previously called Slab-Chili Bar (95,860 acres), which includes both Slab Creek and Rock Creek. In both landscapes, National Forest ownership is the minority; SF American River-Chili Bar is composed of 43% (41,205 acres) and LMF is composed of 24% (14,969 acres) of National Forest lands (Map 2).

Land ownership both within the Forest boundary and outside the Forest Boundary in the SF American River-Chili Bar Landscape is complex. The Georgetown Ranger District is heavily influenced by the historic granting of every other section of land to railroad companies in the 1800's. The result of this is a distinct "checkerboard" effect of ownership. With additional land exchanges, purchases, disposal, and remnants from mining claims, greater complexity is added to Forest Service managed lands by many parcels that are comprised of sections, ½ sections, or smaller parcels intermixed with private land. Even the larger portions of Forest Service managed lands often have private in-holdings within them. The eastern portion of private lands within the Forest boundary and within the SF American River-Chili Bar watershed analysis area are owned primarily by private timber companies and are being managed for commercial timber. Consequently there are few residences within them.

The private lands within the Forest boundary, and generally in the west and south areas, are owned primarily by private citizens and are generally subdivided into 1- to 80-acre parcels. This has produced a relatively large number of private residences (approximately 600), outside of incorporated areas, within the Forest boundary. This pattern of ownership extends to the private land outside of and adjacent to the Forest boundary. In addition to private residences within the Forest boundary there are numerous commercial enterprises (restaurants, commercial camping facilities, mobile home parks, stores, etc.); these are generally located along Wentworth Springs Road, which bisects the analysis area. In addition, the communities of Pollock Pines and Camino lie just south and southwest in the SF American River-Chili Bar landscape area, with Apple Hill and other agricultural areas and a portion of the Highway 50 corridor within the landscape area outside the Forest boundary.

The Lower Middle Fork American River landscape displays a complex ownership pattern (Map 1). Both the Eldorado (ENF) and Tahoe National Forests have lands within the upper river canyon portion of this landscape. In the western portion of the landscape are other Federal agencies (Bureau of Reclamation and Bureau of Land Management), state, and private lands. Much of the lower elevation land is agricultural, and the community of Foresthill is on the north edge of the landscape.

The SF American River-Chili Bar watershed ranges in elevation from 1000 feet at Chili Bar to 5,165 feet along a ridge to the north of the Kings Meadow Area. The SF (SF) American River flows through the area along with two fairly large tributary streams (Rock Creek and Slab Creek). Stream channels are oriented in a well-defined dendritic pattern with a very high drainage density in the headwater tributaries. The relatively low gradient (2-4%) main stem flows in an east to west direction. The primary tributaries coming in from the north have low gradient origins but are typically steep (4-10+ %) near the confluence with the main stem. See Map 26 for a display of stream gradient patterns within these landscapes. There are 6 reservoirs greater than 5 acres located within the watershed: Brush Creek, Slab Creek, Chili Bar, Forebay, Blakely, and Finnon (Map 29) as well as over 100 small ponds (<5 acres) located on private lands. Precipitation averages about 45 inches per year and is dominated by winter rain storms with some rain on snow at the higher elevations. Temperatures typically range from 43 to 71 degrees Fahrenheit with an average maximum temperature in July of 88 degrees at the lower elevations. The LMF American River watershed ranges in elevation from approximately 500 feet below Michigan Bar to roughly 4,570 feet along the Foresthill divide to the north. Mean annual precipitation averages about 45 inches per year and is dominated by winter rain storms. Stream channels are oriented primarily in a linear pattern with 3 fairly well developed tributaries: Volcano Canyon coming in from the Tahoe National Forest to the north; Otter Creek and Canyon Creek originating from the south and flowing in a westerly direction with many unnamed small steep tributaries draining into the main stem of the MF American River. The relatively low gradient (2-4%) main stem flows from northeast to southwest.

Within both landscapes highly dissected watersheds result in a greater proportion of ephemeral streams, with 65-75% of total stream mileage. By contrast, perennial streams range from 12-20% of total stream miles, and seasonal streams make up approximately 14% of total stream mileage.

Slopes in these highly dissected watersheds present some limitations on management options. Inner gorges and very steep slopes (56% and above) occur on approximately 15% of these landscapes, and they present the greatest limitations for management activities. These areas occur along the slopes adjacent to the main streams. Approximately 65% of the SF American River-Chili Bar and 70% of LMF American River landscape analysis areas have fairly gentle slopes (0-35% slopes). Map 58 displays the distribution of slopes across these landscapes.

Soils within both the SF American River-Chili Bar and LMF American River watersheds are derived from metamorphic sedimentary, intrusive and extrusive igneous and ultrabasic rock formations. Soil erosion hazard ratings have been mapped for all of SF American River-Chili Bar watershed, with approximately 84% rated at high to very high erosion hazard. In LMF American River erosion hazard rating has been mapped for the 41% of the landscape within the ENF boundary. Of these 25,610 acres 84% are rated as high to very high erosion hazard. Approximately 85% of the soils within the two watersheds are rated as having a high to very high erosion hazard (Map 60).

Vegetation across these landscapes is transitional between the valley/foothill oak woodlands at the lower elevations and the montane true fir forest of the higher elevation

Sierra Nevada. Vegetation types within both landscape analysis areas include barren, grasslands, meadow, chaparral/shrublands, montane hardwood and oak woodlands, and conifer forests. The conifer forests include Douglas-fir, ponderosa pine, and mixed conifer. Within the mixed conifer forest, ponderosa pine, and Douglas fir are major species components. Variation in precipitation, slope, aspect, and soils create great diversity within all vegetation types. Within the ENF, this creates a greater component of tanoak and live oak species for these landscapes than found in other landscapes on the Forest. There is also a greater elevational band for these vegetation types as aspect varies. Shrub and hardwood stands are found at mixed conifer elevations on south to west facing slopes, and mixed conifer stands are found at lower elevations on north to east facing slopes. Species composition and density have shifted over time due to fire suppression activities. Shade-tolerant species, such as fir and incense cedar, have increased as a percentage component, especially within the pine-dominant mixed conifer forest types

Land Management Allocations.

Land allocations have been established for National Forest lands in the Eldorado and Tahoe Forests' Land and Resource Management Plans (LRMPs), as amended by the Sierra Nevada Forest Plan Amendment (2001) and its Supplemental EIS (2003). A number of land allocations overlap one another, often resulting in the application of standards and guidelines (S&Gs) associated with several allocations that are applicable to a particular area. The SNFP management prescriptions are described in Appendix A. Map 3 displays the SNFP land allocations found in the landscape area, showing the most constraining allocation overlaying allocations with lesser constraints. Urban interface defense and threat zones are shown on private lands as they would be designated if they were National Forest lands. The purpose for the display of private lands with urban zones is to illustrate the effects of intermingled ownership, and the need for cooperative action with private landowners in order to attain effective fuels treatments in these landscapes.

Table 1-1 displays the Sierra Nevada Forest Plan Amendment management direction to determine which allocation receives precedence in cases where allocations overlap.

Table 1-1. Management direction for each land allocation to assign S&Gs for overlapping areas

	Urban Wildland Intermix: Defense Zone	Urban Wildland Intermix: Threat Zone	Old Forest Emphasis Area	General Forest
All PACs, CA spotted owl, Northern goshawk,	Apply special management direction for PACs that overlap Defense Zones	Direction for PACs takes precedence within Threat Zones	Direction for PACs takes precedence within Old Forest Emphasis Areas	Direction for PACs takes precedence within General Forest
California Spotted Owl Home Range Core Areas	Home Range Core area standards and guidelines do not apply, use Defense Zone S&Gs	Home Range Core area standards and guidelines do not apply, use Threat Zone S&Gs	Standards & guidelines are identical for Old Forest Emphasis Areas and Home Range Core Areas	Direction for Home Range Core areas takes precedence within General Forest
Riparian Conservation Areas and Critical Aquatic Refuges	Apply direction for both allocations, to meet riparian conservation objectives where RCAs overlap Defense Zones.	Apply direction for both allocations, to meet riparian conservation objectives where RCAs overlap Threat Zones.	Apply direction for both allocations, to meet riparian conservation objectives where RCAs overlap Old Forest Emphasis Areas.	Apply direction for both allocations, to meet riparian conservation objectives where RCAs overlap General Forest.

(As found in the SNFP ROD page A-24)

Table 1-2 displays the acreages of these land allocations, with overlapping allocation acreage assigned to the allocation of highest priority in the second column. The third column illustrates the amount of overlap with allocations of lower priority. The last column gives the total acres within each allocation, including overlaps within a higher priority allocation. Because of these allocation overlaps only the first column of acreages is additive.

Mapping of LRMP land allocations within the SF American River-Chili Bar and LMF American River analysis area is found within the GIS files at: /gis/projects/sncf/framework/enffinal).

Table 1-2. Acres in each land allocation, with overlapping acreage assigned to the allocation of highest priority

	Allocation acres in hierarchical order	Additional allocations that overlap the higher priority allocation		Total acres by allocation (all overlapping acreage included)
SF American River-Chili Bar				
Urban Wildland Intermix: Defense Zone	3558	3 PACs OFE HRCA RCA	325 1,129 822 2,505	3,558
PACs: Owls & Goshawks	4162	Threat Zone OFE HRCA RCA	2,322 1,528 4,115 2,534	4,487
Urban Wildland Intermix: Threat Zone	20,227	OFE HRCA RCA	5,951 6,708 14,848	22,549
Old Forest Emphasis Area	2,072	HRCA RCA	973 1,494	10,679
Home Range Core Areas	2,863	RCA	1,737	15,481
Riparian Conservation Areas	4,418			27,536
General Forest	3,905			3,905
Total National Forest	41,205			
Private lands in Defense Zone	15,321			
Private lands in Threat Zone	25,328			
Private lands outside urban interface	14,006			
Total private lands	54,655			
Total for the landscape area	95,860			
Lower Middle Fork American River				
Urban Wildland Intermix: Defense Zone	1,541	6 PACs OFE HRCA RCA	142 1 494 766	1,541
PACs: Owls & Goshawks	1,833	Threat Zone OFE HRCA RCA	1,433 0 1,666 1,539	1,975
Urban Wildland Intermix: Threat Zone	8,783	OFE HRCA RCA	2,127 1,903 7,547	10,216
Old Forest Emphasis Area	0	HRCA RCA	0 0	(all in Defense & Threat Zones) 2,128
Home Range Core Areas	944	RCA	670	5,007
Riparian Conservation Areas	1,297			11,1819
General Forest	571			569

Total National Forest	14,969		
Private lands in Defense Zone	4,685		
Private lands in Threat Zone	6,805		
Private lands outside urban interface	35,713		
Total private lands	47,203		
Total for the landscape area	62,172		

Columns 3 and 4 are for comparison of overlapping allocation areas; therefore acreage totals are not additive.

In addition to the land allocations arising from the Sierra Nevada Forest Plan Amendment (SNFPA), some land allocations remain from the 1989 Eldorado and 1990 Tahoe National Forest Land and Resource Management Plans (LRMPs). Existing allocations include recreation opportunity designations and visual quality objective designations (Map 4). One grazing allotment (Map 5) and two special interest areas (Map 6) are found within the SF American River-Chili Bar analysis area. Developed recreation areas and existing special use permits remain unchanged by the amendment as well. Designations of routes and uses contained within the Rock Creek Recreational Trails EIS conforms with the SNFP direction to establish designated routes and areas for OHV uses, and remains the site-specific direction for that area. There are no Inventoried Roadless Areas, Wilderness, or Wild and Scenic River allocations in either SF American River-Chili Bar or LMF American River landscape analysis areas.

Botanical Special Interest Areas

Within the SF American River-Chili Bar Watershed there are two Botanical Special Interests Areas (SIAs): Traverse Creek and Rock Creek. Both are located a few miles south of Georgetown.

Traverse Creek SIA:

Traverse Creek Botanical Area lies only three miles south of the town of Georgetown and is easily accessible by road. It was designated a Special Interest Area (SIA) in 1988 in recognition of the area's unique plant communities due to its serpentine geology and its cultural remains. It was recognized as a Special Interest Area in the 1989 ENF LRMP and accompanying Record of Decision in 1990 and is the only SIA on serpentine in the Sierra Nevada. It is situated across 220 acres of moderately sloped hills at elevations between 2,200 and 2,500 feet. Two nearly year-round creeks, Traverse and Rock Canyon Creeks, bisect it. About 3 miles of trails have been created through the SIA, one of which is accessible to the physically challenged. A poorly designed and located parking lot is leading to impacts to aquatic and botanical resources in the area.

Portions of the area were previously held under mining claims. The area was mined extensively during the early portion of the gold rush (1849-50) and later reworked by the Chinese in the 1860-1870's. Near the turn of the century the southern portion of the SIA was claimed by Byrl Stifle for the mining of gems and minerals. The Stifle Claim was deeded over to the El Dorado Mineral and Gem Society in 1954. Since the Society is primarily an educational group, very little disturbance has occurred as a result of the Society's activities.

The area also has historic and prehistoric sites that require management protection. Known sites include bedrock mortars, mine tailings and diggings, and the Stifle home site.

Rock Creek SIA:

In the mid 1970's G. Ledyard Stebbins, Professor Emeritus U.C. Davis, urged the ENF to set aside a portion of the relatively pristine Rock Creek watershed. Professor Stebbins saw this lush, low elevation forest, much of it less than 2,000 feet in elevation, as an educational site that would provide year-round access for students of ecology, botany, and forestry. Donald L. Smith, a local elder of the California Native Plant Society, also championed the creation of the Rock Creek Botanical Area and it was eventually recognized as a Special Interest Area in the 1989 ENF LRMP and accompanying Record of Decision in 1990.

Located about 6 miles south of Georgetown, this low-elevation portion of the steep Rock Creek canyon contains a unique assemblage of plants that are commonly associated with the more moist/humid climate of the Pacific Coast. The vegetation types of the Rock Creek Botanical SIA are quite diverse with tall stands of mixed conifer forest, open woodlands of ponderosa pine and black oak, dense patches of chaparral dominated by manzanita and deer brush, and steep hillsides with canyon live oaks and sword ferns. Along Rock Creek and its tributaries one can find relict species such as California nutmeg and Pacific yew that were once more common before the climatic changes that accompanied and followed the ice ages. Here, also, are nine species of fern, phantom orchids, western azalea, American ginseng, and Indian rhubarb. Over 150 species of plants are documented along two transects across the SIA. Streamside vegetation is rich in diversity and lends a high aesthetic appeal to the area.

No vehicular routes are currently maintained within this SIA. It is accessed by Trail Gulch and the One-Eye Trail, which makes a 2½ mile traverse across the SIA.

Step 2: Issues and Key Questions

The Sierra Nevada Forest Plan Amendment (January, 2001) considered information provided in the Sierra Nevada Ecosystem Project (a scientific review of the status of the Sierra Nevada completed in 1996), and the Sierra Nevada Science Review (a synthesis of new information of range wide urgency to the National Forests of the Sierra Nevada completed in 1998). From these scientific reports and reviews, the Sierra Nevada Forest Plan Amendment determined the need to address five major problem areas:

- Conservation of old-forest ecosystems
- Conservation of aquatic, riparian, and meadow ecosystems
- Increased risk of fire and fuels buildup
- Introduction of noxious weeds
- Sustaining hardwood forests

In December of 2003, the Healthy Forest Restoration Act (HFRA) became law. These Landscape Analyses are consistent with this legislation. The objectives from the SNFPA are compatible with the HFRA, including:

- To promote Forest health and public safety
- To promote fire-resistant stands
- To protect communities, watersheds, and other at-risk lands from catastrophic wildfire
- To contribute towards the restoration of forest conditions that typify pre-fire suppression conditions

The SF American River-Chili Bar and LMF American River landscape analyses address issues and key questions developed for these five problem areas and relevant to the anticipated management actions within the watershed. Three objectives were developed to help identify and prioritize management actions in these watersheds:

Conservation of terrestrial ecosystems and species;
Conservation of aquatic, riparian, and meadow ecosystems and species; and
Addressing the increased risk of fire and fuels.

The information needed to address these objectives is identified in the key analysis questions listed below each objective and described in Steps 3 through 5 of this analysis. Step 6, Synthesis and Interpretation, specifically addresses each of the key analysis questions enumerated in the following three pages. Step 7 displays recommendations for key issues and for transportation. Also included are recommendations for recreation and heritage resources because they are affected by and affect implementation of projects designed to address the key issues.

1. Conservation of terrestrial ecosystems and species

What management actions are needed to increase the amount, quality, and connectivity of old forest habitat?

- How much old forest habitat occurs within this landscape?
- Where are linkages between watersheds providing habitat connectivity?
- Where and how much natural disturbance and management activity has occurred in these landscapes?

What management actions are needed to move existing forest vegetation types to desired conditions?

- How and where is existing vegetation outside the range of natural variability?
- What actions are needed to increase forest health and promote resistance to drought, insects, and disease?
- Do hardwood ecosystems occur within the range of natural variability for these vegetative communities in the landscape area?

What management actions are needed to achieve desired conditions within hardwood habitats?

What management actions are needed to increase the amount, quality, and connectivity of oak woodland habitat?

What actions are necessary to prevent and control the spread of noxious weeds within the landscape area?

- Where do noxious weeds occur within the landscape area?

Where does the existing road and trail system have the greatest impact upon habitat values for terrestrial species?

- Where are level 1 and 2 roads and unclassified (non-system) roads located?
- Where does habitat occur for the focal species associated with this landscape?

Where do existing uses potentially reduce habitat values for terrestrial species associated with this landscape area?

- What are existing uses of the area and how do they overlay with species' habitats?

Where are fuels treatments reducing or likely to reduce habitat values for terrestrial species associated with this landscape area?

- Where are fuels treatments likely to be emphasized?
- Where are Strategically Placed Area Treatments (SPLATs) and how do they overlap with species' habitats?

Where are fuels treatments improving or likely to increase habitat values for terrestrial species associated with this landscape area?

2. Conservation of aquatic, riparian, and meadow ecosystems and species

What are the existing hydrologic conditions of greatest concern?

- What are the hydrologic conditions of the HUC 5 watersheds and HUC 7 sub-watersheds?
- What are the primary drivers influencing conditions in these watersheds?
- What are the beneficial uses of water within these watersheds?
- Are beneficial uses of water at risk or impacted?
- Which HUC 7 sub-watersheds are most sensitive to disturbance?

What management actions are needed to achieve desired conditions within riparian habitats?

- What is the current condition of riparian habitats and how do current conditions differ from desired conditions?
- What factors are affecting the condition of riparian habitats?

What management actions are needed to achieve desired conditions within meadow habitats?

Where does the existing road and trail system have the greatest impact upon hydrologic conditions or habitat values for aquatic species?

- Where are level 1 and 2 roads and unclassified (non-system) roads located?

Where do existing uses impact hydrologic conditions or aquatic habitat values?

- What are the existing uses of the area?
- What is the condition of existing water holes?
- Where does habitat occur for the focal species associated with this landscape?

Where are fuels treatments most likely to impact hydrologic conditions or aquatic habitat values?

- Where are fuels treatments likely to be emphasized?
- Where are SPLATs and how do they overlay with terrestrial species habitats?
- To what extent do SPLATs overlay RCAs?

3. Risk of fire and fuels buildup

Where should Strategically Placed Landscape Area Treatments (SPLATs) be located and prioritized to meet fuels objectives in this landscape area?

- Where should the wildland urban intermix defense and threat zones be located?
- What are the values and communities at risk?

- What is the historic fire regime within the landscape area, and how has this regime been altered?
- What is the fire risk and hazard for various portions of the watersheds?
- Where are existing fuels treatments located; can they be effectively incorporated into SPLAT strategy?
- Where is existing vegetation more vulnerable to destructive wildfire?

To what extent can effective fuels management be achieved to modify fire behavior within the analysis areas?

- How do private lands influence the ability to conduct fuels treatments?
- What do fuel models show about the potential effectiveness of SPLATs in these watersheds?

How and where is the ability to achieve desired fuels conditions limited within the landscape area?

- Where does fuels modeling indicate treatments may be less effective?
- To what extent do PACs overlap SPLATs?
- To what extent do SPLATs overlay RCAs?

Analysis Elements Not Addressed

The Record of Decision for the Sierra Nevada Forest Plan Amendment identifies several specific analysis elements and data collection steps that will not occur as part of this landscape analysis. The following elements are not addressed in this landscape analysis for the reasons stated:

- **Locations of mining claims or areas open to mineral extraction.** These data are not readily available and were not consolidated for this landscape analysis. Mining activity is generally independent of other management activities in identifying and prioritizing management actions in the analysis area.
- **Determination of whether existing uses or activities, including dispersed recreation use, are compatible with local species and consistent with riparian conservation objectives.** This determination is best made at the project level. Site-specific analysis is required to analyze each existing use in relation to riparian conservation objectives; it would be inappropriate to attempt to make such determinations from data available at this watershed scale.
- **Update and refine vegetation strata labels and polygons.** A complete photo reinterpretation was not considered necessary for the purpose of identifying and prioritizing management actions in the landscape area. The existing vegetation data has been updated for both natural disturbance and management activities.
- **Transfer of information on the location of high hazard and risk areas for insect and disease from the regional database.** These data have not been transferred; the landscape assessments should be supplemented with this information in the future.

Step 3: Land Use History

Heritage

Prehistory

Archaeological evidence indicates that humans have occupied the north-central Sierra Nevada for more than 10,000 years (Moratto 1984). During that time people have served as active agents in the modification of the natural landscape.

Contrary to their romantic depiction as passive inhabitants, treading lightly upon the landscape, local Native Americans actively managed their natural resources. Natives made use of the SF American River-Chili Bar and LMF American River area for a variety of social and economic activities. Chief among activities carried out in the project area were hunting, gathering, raw material procurement, permanent settlements, seasonal/ephemeral camps, travel, and seasonal aggregation. As the original land managers, natives used fire, pruning, tilling, selective harvesting, and other techniques in order to create more favorable conditions for plants and animals of economic importance.

Prior to the mass influx of immigrants during the Gold Rush, the Georgetown Divide and surrounding areas were occupied by the Hill Nisenan. The Nisenan were hunter-gatherers who established permanent villages in the Sierra foothills below 4,000 feet in elevation (Beals 1933, Wilson and Towne 1978). Their seasonal round brought them to the higher elevations during the warm months where they established base camps, from which they exploited plant, animal, and mineral resources within a limited radius (Matson 1972). Of great importance to the Nisenan was the acorn, their staple food (Kroeber 1925). In addition to acorn, they collected various grass seeds, nuts, roots, bulbs, berries, fruit, and insects as they became available through the seasons (Wilson 1972). Skilled hunters preyed upon a variety of large and small game with the use of bow and arrow, snags, traps, and deadfalls. Nisenan also took fish, particularly salmon, on occasion. Locally available tool stone was quarried at places such as Wallace Canyon, to be fashioned into a variety of utilitarian forms (Jackson et al. 1994).

In addition to using the uplands of the Sierra for resource acquisition, Nisenan families would venture into the higher elevations for seasonal aggregations (Littlejohn 1929). Generally occurring in the late summer or early fall, large groups of Nisenan would gather to socialize, share information, trade, and exchange marriage partners. At times they would also trade and socialize with their neighbors to the east, the Washoe.

Anthropogenic fire was the primary means by which Native Americans managed their resources throughout the Sierra Nevada, including the landscape area (Anderson and Moratto 1996, Hansbearry 1972). Ethnographic informants have confirmed that fire was a management technique used annually by the Nisenan in the area (Beals 1933). It was used to preserve meadows and grasslands, enhance forage for deer, keep conifers from encroaching on oak woodlands, improve production of plant species used in basket

making and cordage production, as well as to prevent large, catastrophic fires (which had the potential to bankrupt traditional grounds).

History

Despite the early presence of Spanish and Mexican governments in Alta California, no attempts were made to explore the Sierra Nevada, with the exception of Gabriel Moraga who reached the present site of Auburn in 1808 (Supernowicz 1983). During the period from 1820 to 1848 trappers, traders, explorers, and pioneers began to trickle into the Sierra Nevada and surrounding regions. Although their numbers were few, the impact of their arrival on the native population was immense. The introduction of foreign pathogens decimated local Native American populations (Jackson et al. 1994; Wilson n.d.). It is likely that the reduction in local native populations resulted in less intense landscape modification. Other changes in the environment during this period included the introduction of livestock grazing in the Sierra, collection of firewood, and very limited timber production for use in local construction (Hansbearry 1972).

Within the last 150 years, Sierran ecosystems have undergone dramatic changes as aboriginal management techniques have been supplanted by modern land use practices. The period from 1848 to WWII ushered in drastically different land use practices in the landscape area, the effects of which are still being felt today. The Gold Rush of 1849 brought a wave of new immigrants to the region. The surge in population and accompanying economic growth rapidly displaced the local Nisenan and brought to a halt the traditional land use practices that had been in place for millennia (Hansbearry 1972).

Mining for gold was a major economic pursuit in the analysis area between 1849 and America's entrance into World War II. During that period mining claims used a variety of techniques to recover the precious metal. Early claims focused on surficial and shallowly buried placer deposits found in stream and river channels, as well as exposed cut-banks. An immediate result of this type of mining was extensive disturbance of stream channels and adjacent riparian vegetation. Initially, tools used in this simple type of placer mining included picks, shovels, pans, and cradles or rockers. As water became more widely available throughout the Divide, many small-scale "dry diggins" were replaced by larger operations that were more technologically sophisticated. With the development of extensive ditch and flume systems throughout the Georgetown Divide, the method of washing large amounts of auriferous gravels into large sluices with the use of high pressure nozzles, known as hydraulicking, became widespread. Most hydraulic mining claims stopped operating in the Sierra following a successful lawsuit filed by farmers and other valley residents who grew tired of widespread flooding and environmental havoc wreaked by the enormous amounts of debris washed into Sierra streams and rivers from hydraulicking.

Lode mining was also extensively practiced on the Georgetown Divide and beyond. Also known as hardrock or quartz mining, lode mining involved the digging of deep tunnels along quartz veins. The mined ore was then transferred to a stamp mill on the surface where it was crushed to a fine consistency and washed with water to free the gold. This type of mining continued in the region, albeit less frequently and with smaller profit

margins, until October 1942 when the War Productions Board deemed gold a non-essential resource and shut down all gold mines in the United States (Clark 1980).

In addition to gold, several other metals and minerals were mined within the analysis area. Semi-precious metals such as copper, chromite, manganese, and tungsten were all mined at various points of time. Mineral resources that were also sought in the area include limestone, slate, and serpentine.

Prior to the Gold Rush, timber was harvested in extremely small quantities for firewood, homesteads, and to blaze trails (Hunt 1986). With the rapid growth of Sierra communities following the discovery of gold at Coloma, the demand for timber products throughout the goldfields and beyond grew exponentially. Initially, the vast timber resources on the Georgetown Divide were harvested with primitive and highly inefficient methods. Incremental advances in technology were made in the latter part of the 19th century including the development of cross-cut saws, double-bitted axes, invention of the steam donkey and band saws. These innovations all greatly contributed to the growth and economic viability of the timber industry on the Divide.

As stands of timber on the lower western slopes were rapidly diminished, insatiable demand necessitated the development of a system of narrow gauge railroads that could economically transport logs from the rugged high country. The American Land and Lumber Company, which later became the Michigan-California Lumber Company, operated the Pino Grande Railroad on the Divide between 1892 and 1951 (Polkinghorn, 1966).

Other land use activities that occurred in the landscape analysis area include cattle and sheep ranching, as well as limited agricultural production. Subsequent to the banning of hydraulic mining in the region, water supplied by the extensive ditch and flume systems was laterally cycled to other uses such as irrigation for crops on the Divide.

The abrupt changes in land use ushered in by the Historic Era resulted in biotic "dis-equilibrium," that has initiated a radical change in character and distribution of vegetative resources in the analysis area. Furthermore, the intense land use practices of the Historic Era, particularly mining, produced a lasting legacy of negative environmental impacts.

Fire History

Table 3-1 and Map 40 display the available information on fire history within the portion of the landscape area within the ENF and Tahoe National Forest boundary.

Table 3-1. GIS data available for fuels and utilized in analysis of the landscape area

Data in Coverage	Type of Data	Results	Acres burned by decade
Fire history on both Federal and private lands within the Eldorado & Tahoe National Forest boundary (data for private lands is limited to fires greater than 300 acres in size)	Polygons.	Total acres burned = 28,155 on 130 fires # of fires 5 acres or less = 224 # of fires greater than 5 acres = 130	1910-1919 = 6,311 1920-1929 = 5,740 1930-1939 = 780 1940-1949 = 4,443 1950-1959 = 7,828 1960-1969 = 2,129 1970-1979 = 837 1980-1989 = 5 1990-1999 = 81 2000-present = 40 average acres per decade (1910-2000) = 3,128 acres/decade
Fire ignitions within the ENF boundary	Polygon and Point	168 human caused ignitions 115 lightning caused ignitions 71 unknown caused ignitions	

Vegetation Management History

Timber Harvest History from 1960 to the Present

Prior to mid-1980, some mixed conifer stands were treated with overstory removal cuts, seed tree cuts, or shelterwood seed cuts. These methods allowed natural regeneration of stands. Fuels resulting from the harvesting were not generally treated. It is unknown how many acres of this harvest treatment occurred in the analysis area on National Forest lands. The majority of these stands became natural plantations, some of which are shown on Map 12 and included in the plantation acres from Table 3-2 below.

Tables 3-2 and 3-3 are derived from available GIS data on vegetation management history within the landscape area (primarily on ENF). This information, also shown on Maps 12, 46, and 47 includes information available from district files and GIS mapping exercises. Fuel treatment areas may overlap the plantation and California Spotted Owl (CASPO) thinning unit polygons. (See discussion on following page.)

Table 3-2. GIS data on vegetation treatments within the landscape area

Data in Coverage	Type of Data	SFAR-Chili Bar (acres)	LMFAR (acres)	Total (acres)
All plantations	Treatment area polygons	5,718	642	6,360
Timber sale units receiving CASPO thinning treatments.	Treatment area polygons	1,485	588	2,073
Underburns since 1980 (see Map 47)	Treatment area polygons	1,282	205	1,487
Fuel break	Treatment area polygons	1,230	0	1,230
All other treatment (Crushed Veg, Hand Pile, Mastication, Timber Harvest, Development)	Treatment area polygons	2,304	292	2,596

Even-aged timber harvest in the landscape area (since the 1960's) has resulted in approximately 7,360 acres of young and middle-aged plantations (Map 12). The vast majority of plantations were created in the 1980's.

Table 3-3. Plantation acres by decade

Decade	SFAR-Chili Bar	LMFAR	Total
1950 - 1969	3,232	138	3,370
1970 - 1979	27	28	55
1980 - 1989	1,548	179	2,727
1990 - 1999	637	270	907
Year unknown	274	27	301

Pre-commercial thinning is the silviculture treatment of choice for managing plantations for growth. Fuel treatments in these plantations have been primarily the lop and scatter of the boles and branches with some hand piling and burning for roadside hazard reduction. Mastication has been implemented on a very limited basis, primarily due to the higher costs associated with the use of the equipment. Drought related tree mortality from 1989 through 1992 resulted in extensive salvage timber harvest during these years, with limited follow-up fuel treatments due to the scattered nature of the mortality.

Implemented in 1993, the *California Spotted Owl Sierran Province Interim Guidelines* (CASPO) developed standards and guidelines for timber and fuels treatments for the region. Stands identified in a site-specific project were categorized by timber strata. Timber and fuels prescriptions for harvest and post sale treatments followed the guidelines for each type of strata. Trees greater than 30" dbh (diameter at breast height =

4.5 feet) were not harvested. Generally, trees to be harvested were in the 10" to 24" dbh range, which is known as "thinning from below". CASPO timber sales in the landscape areas resulted in approximately 2,073 total acres being harvested across both watersheds (Map 12) on National Forest lands. Defensive Fuel Profile Zones (DFPZs) were created or enhanced under most of the CASPO timber sales, to help complete a district-wide DFPZ program. Fuels treatments in harvest units and/or DFPZs included prescribed fire, stand cleaning, and dozer piling. The landscape area has had numerous salvage sales that treated insect and disease outbreaks, drought related mortality areas, fire areas, transmission/canal lines, and roadside areas. Public safety was a key component for many of the salvage sales. Some salvage areas have been treated several times due to continuing problems with insects, disease, and dead or dying single trees. It is difficult to pinpoint the areas that have had salvage treatment but the majority of the acres in the landscape area have been affected.

Fuels Treatment History

Fuels treatments have typically followed timber sale harvesting. Types of harvesting in the portion of the analysis area within the ENF boundary have varied and fuels treatments have varied accordingly. In the 1980's, there was an emphasis on treating clear-cut units with broadcast burning to reduce activity-generated fuels and make tree planting possible. Understory-type burning was implemented primarily in fuelbreaks. Most understory burns occurred in the 1990's as a result of increase in hazardous fuels reduction funding.

When timber harvest prescriptions changed in the early 1990's, fuels treatment prescriptions also changed and were designed to treat not only activity-generated fuels, but also ladder and surface fuels, and to create or enhance DFPZs. There was a shift to mechanical methods, as fuel treatments, for CASPO sales. Timber sales generally had smaller average diameter material removed, allowing greater use of mechanized harvest equipment. Whole trees, or at least the treetops with the last log still attached, were generally yarded to landings for delimbing and slash piling. Stand cleaning, which included cutting and removing small diameter (< 9.9" dbh) material, hand or machine piling slash, and burning the piles, was carried out as the predominant fuels treatment for the CASPO sales. Understory burning was also proposed on areas to improve wildlife habitats that were outside CASPO units, but within sale area boundaries. Biomass removal was used but with limited success. Roadside hand piling of activity-generated slash often occurred along a 50-foot corridor for non-paved roads and within 100 to 200 feet along surfaced roads and highways, and on high-use roads.

Noxious Weeds History

Scotch broom (Cytisus scoparius) is a long-standing problem in the region. The following account (Hoshousky 1986) illustrates a long-standing concern of the USDA over the proliferation of scotch broom. It should be emphasized that this is hardly a scientific census and possibly misleading, but it is the only statewide survey indicating the rate of spread of broom. Note that El Dorado County has led the state in acres of scotch broom infestation for at least 40 years.

> *In 1965 and 1982 the USDA Biological Control Laboratory in Albany, California sent letters to all of the county agricultural commissioners*

throughout the state requesting information on the extent of broom infestation. Responses were varied and occasionally vague. Of interest are the changes in the following counties (the 1965 approximations are followed by the 1982 acreage counts which are in parentheses): El Dorado 25,400 acres (760,000 acres); Glenn 0 acres (710 acres); Nevada 15,100 acres (76,800 acres); San Francisco 0 acres (20 acres); Shasta 3 acres (10,850 acres); Yuba 50 acres (35,200 acres).

Yellow starthistle (*Centaurea solstitialis*) and skeletonweed (*Chondrilla juncea*) are of more recent concern. Yellow starthistle was introduced into California in the mid-1800's as a contaminant in imported alfalfa seed. It now infests 15 to 20 million acres in the state. It has been steadily moving into the foothills east and west of the Central Valley for the past two decades, and is a common weed of roadsides and disturbed fields throughout western El Dorado County. Skeletonweed is less common but this perennial exotic is making a steady advance into foothill communities and lower elevation forests. Both these noxious weeds made their initial advances along roadways, then into fields and pastures. Often seed is transported to new areas by heavy equipment.

In California, the removal of periodic fire has dramatically changed the composition of rangelands. For noxious annual grasses such as barbed goatgrass and medusahead, fire suppression can lead to their dominance in grasslands and oak woodlands. Medusahead (*Taienatherum asperum*) and goatgrass (*Aegilops triuncialis*) are two extremely invasive annual grasses that are aggressively moving into the low- to mid-elevations of the Sierra Nevada including the ENF. They are both are on the California Department of Food and Agriculture List of Noxious Weeds and the ENF Weed List A (most invasive species). Invasion of medusahead and barbed goatgrass, along with star thistle have been identified as significant problems facing the Sierra Nevada and foothill rangelands (John Stumbos, pers com.).

Medusahead was introduced into the United States from the Mediterranean region of Eurasia in the late 1800's. It grows in dense stands, forming a mat of new and old stems (thatch) 2 to 5 inches thick. The high silica content this thatch layer inhibits its decomposition. Evidence indicates that the dense litter cover, once established prohibits the reestablishment of native or other desirable plant species. Medusahead's litter also is an extreme fire hazard by mid-summer and ties up nutrients otherwise available for plant growth. An example of Medusahead's extreme competiveness is shown in its ability to invade cheatgrass dominated sites. On sites with favorable soil conditions, a high clay content and relatively well-developed profiles, medusahead replacement of cheatgrass is surprisingly complete and can occur on a landscape scale.

Barbed goatgrass, introduced from the Mediterranean region of southern Europe, reduces the abundance of native perennial bunchgrasses and competes with more desirable introduced annuals, as well as native forbs. Barbed goatgrass has long barbed awns, which can cause severe mechanical injury to livestock and other grazing animals including wildlife. The barbed awns are also easily transported on hair, fur, wool, shoes or clothes.

Unlike many other introduced annual grasses found in California, barbed goatgrass appears to do well on serpentine soils that are generally resistant to the spread of annual grasses and therefore are thought of as refugia for native plants. See Map 10 for areas of noxious weeds located within the ENF boundary.

Grazing History

Part of one grazing allotment, Old Pino, occurs within the SF American River-Chili Bar landscape area (Table 4-23); it has been active for the past 30 years under the same permittee. Portions of this allotment have been grazed since 1910 (Management Plan for Old Pino Allotment, Georgetown Ranger District, ENF, 1965).

A small part of the Volcano allotment occurs within the LMF American River landscape area and is administered by the Tahoe National Forest. See map 5 for the locations of these 2 allotments..

Hydropower History

There are a number of existing operating hydropower facilities in this landscape area and they are discussed below under the two watersheds. Historically the entire length of the American River (161 miles) was available to chinook salmon; presently only 28 miles are accessible (all below Folsom Dam), an 83% reduction due to building of dams (SNEP 1996). The construction of Folsom Dam eliminated the anadromous runs of fish up the South and Middle Forks of the American River. Moyle and Williams (1990) identified dams and diversions as the single biggest cause of fish declines in California overall. The greatest impacts of dams occur immediately after they are built with declining anadromous runs of fish, such as steelhead, chinook salmon, and lamprey. For locations of existing hydropower facilities see Map 29.

SF American River-Chili Bar Watershed

The Upper American River Project (FERC Project No. 2101) is operated by Sacramento Municipal Utility District and began the re-licensing process in 2001, to be completed in 2007. Facilities consist of two dams, two reservoirs, and two powerhouses: Water is released from the Slab Creek Reservoir into a 4.9-mile long tunnel and a 0.3 miles long penstock leading to the White Rock powerhouse. Slab Creek Dam and Reservoir were built in 1967, Slab Creek Powerhouse in 1983, White Rock Powerhouse and facilities in 1968, and Brush Creek Dam and Powerhouse tunnel in 1970.

On the SF American River, the Chili Bar Project (FERC Project No. 2155), operated by Pacific Gas and Electric, is on the same re-licensing schedule as the Upper American River Project. Their facilities within this landscape assessment include Chili Bar Dam and Reservoir and Chili Bar Powerhouse for which commercial operation began in 1964.

The majority of the El Dorado Project (FERC Project No. 184) operated by El Dorado Irrigation District lies upstream of Slab Creek Reservoir, starting at their facility, the Akins Powerhouse. Facilities within the landscape area include Forebay Reservoir, the El Dorado Canal, Penstock Tunnel and 14 Mile Tunnel. The re-licensing process settlement agreement was signed in April, 2003.

Rock Creek Hydroelectric Project is a small hydropower development at the mouth of Rock Creek. It was built around 1985 and has a 15-foot weir for water diversion.

Lower Middle Fork American River Watershed

Ralston Dam constructed in 1966, along with Ralston Afterbay Reservoir and Oxbow and Ralston Powerhouses are components of the American River Hydroelectric Project (FERC Project No. 2079) on the MF American River, with facilities managed by Placer County Water Agency (PLACWA). There is also a transmission line owned and operated by Pacific Gas and Electric Company that crosses through the LMF American River watershed (FERC Project 2479). This transmission line connects to the Oxbow and Ralston powerhouses.

Ralston Afterbay has required sediment removal to maintain powerhouse function. Much of the spoil material has been placed below Oxbow however spoil sites have also been designated on Ralston Ridge which resulted in time consuming costly operations. The most recent sediment disposal plan allows placement in the floodplain downstream where the material can be transported downstream in large storm events to restore a more natural sediment transport regime.

In March of 1986 Hell Hole Dam located the Upper Middle Fork American River was breached with a flow exceeding 10,700 cfs. This breaching resulted in deposition of large rock and boulders in the upper watershed above typical flood prone areas as well as significant scour to bedrock streambed and banks in the lower portions of the Rubicon, much of this material is likely still being transported through the MF American River.

Step 4: Current Conditions

Vegetation Conditions

Map 8 displays existing vegetation by species and life form groups and Map 9 displays density and size class groups. Table 4-1 displays existing vegetation information for these landscape areas. The data are displayed by various groupings to provide information that is useful for designing future management proposals. The first part of Table 4-1 shows existing vegetation types in these landscape areas from the Forest's Existing Vegetation layer developed from interpretation of satellite imagery. The second part of the table uses the California Wildlife Habitat Relationships classification system (CWHR) to display the size class and density relationships that are needed to design

Table 4-1. GIS data describing existing vegetation conditions

Data in Coverage	Type of Data	Vegetation			
		Non-forest	**SFAR-Chili Bar**	**LMFAR**	**Total**
		Chaparral, Brush	6,899	4,029	10,928
		Grassland, Meadows	1,891	1,165	3,056
		Lava cap, Barren	433	398	831
		Water	558	90	648
		Urban, Agriculture	1,209	262	1,471
		Forest			
Existing vegetation from 1997 satellite	Vegetation Polygons derived from remote sensing	Douglas Fir/pine	29,282	20,312	49,594
		Ponderosa pine	35,414	18,108	53,522
		Mixed Conifer	13,202	647	13,849
		Gray pine/Knobcone Pine	153	2,089	2,242
		Total Conifer Forest	78,051	41,156	119,207
		Montane Hardwood & Oak woodlands	6,656	11,872	18,528
		CWHR			
		6, 5D, 5M	9,232	4,186	13,418
		4D	19,285	13,665	32,950
		4M	34,039	17,252	51,291
		4P/S	3,505	2,972	6,477
		Plantation or size class 1, 2, or 3	19,486	14,354	33,840
SNEP mapping					
SNEP mapping of late-successional/	Vegetation polygons mapped from	Rank 5	0	0	0
		Rank 4	5,164	24	5,188

old growth conditions	aerial PI using criteria described in SNEP, Vol. II	Rank 3	12,986	2,530	15,516
		Rank 0-2	46,969	18,033	65,002

vegetation management options under the SNFPA. The third part of the table displays the late-seral/old growth (LSOG) mapping for these landscapes done during the Sierra Nevada Ecosystem Project (SNEP) analysis. SNEP mapping covers only National Forest lands and the portion of private lands for the landscape areas within the approximate outer boundary of the National Forest. The use of all of these groupings of data provides a basis for designing options to achieve desired conditions for the various eco-types within these landscape areas. As is the case for any large-scale vegetation mapping effort, different degrees of error apply to various elements of the map. The error assessment is described in Appendix B.

Coniferous Forest Conditions

The existing coniferous forest acreage within the landscape assessment areas is approximately 119,000 acres or 75% of the area. Major vegetation types in the assessment areas include mixed conifer, ponderosa pine and Douglas fir/pine depending on aspect, elevation, and soils. With the exclusion of fire many stands within the landscape areas are continuing to develop uncharacteristically high stocking levels. The ingrowth of shade tolerant species (incense cedar and fir) has led to increased competition and stress. One measure of the level of competition or density is called Stand Density Index (SDI). This index represents a theoretical level that is considered healthy for a particular stand, based on tree sizes and mix of species. As SDI increases above the healthy range (55% of maximum SDI) for a stand, the trees within the stand become more susceptible to all risk factors, including drought, insects, and disease. Stand examinations done recently for project work in the landscape areas show 79% of 96 sampled stands were at or above the desired level of 55% of maximum SDI. Increased competition, insect activity and disease all contribute to increased mortality and accumulating fuel loads within the landscapes.

Hardwood Forest Conditions

Mapping done from 1997 satellite photography (Map 8) identifies about 18,528 acres of montane hardwood and montane hardwood conifer forest across both landscapes. This represents 7% of the SF American River-Chili Bar landscape and 19% of the LMF American River landscape. The hardwood component within both landscapes displays considerable diversity, as reflected in the numerous hardwood species present. These landscapes contain a wide range of options for future management of hardwoods on significant acreage. The SF American River-Chili Bar landscape also contains the greatest portion of lower elevation oak hardwoods and tanoaks to be found on the Forest.

Old Forest Conditions

The ENF does not have a definitive mapping of "old growth" tied to specific, measurable stand elements. The Sierra Nevada Ecosystem Project (SNEP 1996) mapped from aerial photography and ranked lands according to the degree to which late-successional or old

growth (LS/OG) conditions occurred (from 0 to 5, least to greatest). Polygons ranked 3 were considered to provide moderate quality late-successional conditions and those ranked 4 and 5 were considered to provide relatively high-quality late-successional conditions. Mapping was done at a coarse scale, attempting to represent the degree to which relatively large areas (thousands of acres) contained old forest conditions. The mapping provides landscape-level information rather than stand-level information, and specific boundaries might be adjusted based on more refined mapping efforts. See Map 15 for ranked lands within the ENF boundary.

This mapping effort generated a relatively small amount of moderate to high-quality late-successional conditions, probably due to extensive high-intensity wildfire history in these watersheds. Both of these watersheds contain extensive amounts of private lands leading from the Forest boundary down in elevation into oak woodlands and valley grasslands with ranching and farming land uses. To estimate percentages of Old Forest Conditions for the total watersheds would be misleading. Use of the forested acreage with late-successional potential would give a more accurate representation of the ability of these landscapes to produce old forest conditions. Within the Forest, approximately 65,000 acres are mapped as LSOG rank 0 through 2 occurring at the western boundary with the lowest elevations and a portion on private timber lands in the eastern part of the watershed. These areas are predominately oak woodlands, tanoak, and chaparral mixed into gray pine, which lack the potential to produce SNEP LSOG ranks 4 and 5. Many of these stands are already at their potential natural community types.

A significant amount of the Rank 3 mid-seral vegetation is currently present in both watersheds. Approximately 15,000 acres provide moderate quality late-successional conditions. These areas contain inclusions of older seral patches that were too small to be mapped. These inclusions provide an indication that these Rank 3 areas have the potential to provide late-successional conditions, and in fact appear to be moving toward late-seral conditions.

Meadow Conditions

The SF American River-Chili Bar landscape area has 25 polygons ranging from less than 1 acre to 50 acres (143 acres total) identified as having vegetation characteristic of meadows; Kings Meadow on private land is the largest of these. The LMF American River landscape area has 5 polygons ranging in size from less than 1 acre to 11 acres (17 acres total). Most of these areas are somewhat linear features along drainages with riparian vegetation but are not indicative of more typical grass and forb dominated Sierran meadows that generally occur at higher elevations (Map 11). There is an active grazing allotment in the SF American River-Chili Bar landscape area.

Unique Chaparral Habitat Conditions

There are about 1,000 acres of chaparral/woodland habitat within the analysis area. Here the shale bedrock is either exposed or overlaid with a few inches of soil. This unique edaphic condition severely restricts the growth of forest-type stands of conifer and oak and has allowed a chaparral/woodland ecosystem to evolve here. This chaparral/woodland community is found mainly in the vicinity of Slate Mountain and

Poho Ridge where the substrate is weathered slate or shale derived from a slight metamorphism of sedimentary rocks. Analyses of soils in the Slate Mountain area (Knight 1966) show them to be highly acidic in nature (pH 4.0-4.5). Additional chaparral areas are located in the vicinity of Volcanoville, Little Bald Mountain, and along the Volcano Canyon drainage on the Tahoe National Forest which may be associated with serpentine areas..

Vegetation on these shale slopes appear to be monotypic stands of white-leaf manzanita (*Arctostaphylos viscida*), but actually consists of many species including Sonoma sage (Salvia sonomensis), pussy paws (*Calyptridium umbellatum*), yerba santa (*Eriodictyon californicum*), knobcone pine (*Pinus attenuata*), Douglas fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), black oak (*Quercus kelloggii*), canyon live oak (*Q. chrysolepis*), buckbrush (*Ceanothus cuneatus*), and woolly-leaf ceanothus (*C. tomentosus*). This community provides valuable habitat for deer, birds, and other wildlife species, including the ringtail (*Bassariscus astutus*), which dwell almost exclusively in rocky, chaparral habitat (Sevilleta LTER, 1998).

Another important member of this community is the El Dorado manzanita (*Arctostaphylos nissenana*), which is an ENF sensitive plant species. See Map 10 for locations. This low-growing manzanita grows in pure stands in areas referred to as "domes" where shale is most dense. These domes are ringed by the taller white-leaf manzanita. While the 'domes' are not fire proof, only the hottest and strongest wind-blown fire could sweep through its rocky habitat. Annual rings of individual plants at one Slate Mountain occurrence were counted in 1965. Many plants were about 60 years old at that time (Knight 1966). Records of fire history show no fires at this occurrence since that time, which would make these plants about 100 years old today.

The dominant species in this community are white-leaf manzanita and scattered populations of the El Dorado manzanita. Both species are seed obligates, which means that stands reproduce only from seed. While seeds of white-leaf manzanita will germinate after ground disturbance that removes mature plants from a site, seedling recruitment is (generally) restricted to the first season after fire (Keeley 1992). On the ENF manzanita is commonly thought of as an early-seral species that eventually is replaced by a conifer forest. In true chaparral communities such as this one, white-leaf manzanita comes early and stays late. It is the "climax" species here. Demographic studies of old age (56-120 years) California chaparral communities found no significant seedling populations present within the stands. The 1992 Keeley study also showed that century old chaparral is dominated by vigorous shrub populations, not obviously senile or senescent (decadent). No decline in community richness was noted and the richest community in the study was 118 years of age.

Local anecdotal evidence on the flammability of large manzanita stands indicates that it is difficult to carry a fire through it, at least when environmental conditions are in prescription for prescribed burning. The age of the chaparral communities in the aforementioned study would seem to indicate that burn intervals of up to 100 years are neither uncommon nor unnatural.

Conditions Related to Noxious Weeds

Scotch broom (Cytisus scoparius):

Portions of the analysis area have significant populations of scotch broom. Current status of the inventory is incomplete and does not give an accurate depiction of the problem (Map 10). As projects are proposed and analyses are developed, additional data will be compiled. The watersheds analyzed in this document likely contain a major proportion of the scotch broom infestation that occurs on the ENF.

Yellow starthistle (Centaurea solstitialis):

There are 29 infestations of yellow starthistle documented within these two watersheds (Map 10). In total these infestations comprise less than 10 acres in the analysis area with a majority of the infestations located in two discrete locations. One is near the Traverse Creek Special Interest Area along Bear Creek Road on the Georgetown Ranger District and the other is in the Independence Point area on the Placerville Ranger District. A control project focusing on yellow starthistle is ongoing and these infestations are in some stage of control after two seasons of treatments.

Skeletonweed (Chondrilla juncea):

There are 18 skeletonweed sites documented in the analysis area (Map 10). Infestations are mainly concentrated in two vicinities. About half the sites are adjacent to the Swansboro residential development on Georgetown District and the other half along Forebay Road on Placerville District.

Skeleton weed is a perennial species in the sunflower family (Asteraceae). It spreads by seed, shoots from rhizomes and by regeneration following rootstock fragmentation. Plants can produce up to 15,000 seeds annually but the life of the seed is comparatively short, up to 18 months.

Manual control of mature plants is difficult due to a deep tap root that can resprout from lateral roots and the main taproot (from a 3-foot depth). Hand pulling 2 to 3 times per year for 6 to 10 years can successfully remove skeletonweed (Cuthberson 1972). Low intensity burning can open up niches that may increase skeletonweed densities. Burning followed by herbicide treatment will kill seedling growth stimulated by the fire. Seeding with native grasses is not an effective control because bunchgrasses do not compete directly for water with the deep taprooted skeletonweed.

Medusahead (Taienatherum asperum) and Goatgrass (Aegilops triuncialis):

To the extent of our present knowledge there are seven infestations of medusahead and one infestation of goatgrass in the Slab and Chili Bar watersheds. Together these infestations total less than an acre. All seven infestations were likely vectored into the ENF on motor vehicles from Darling Ridge Road (12N80). The largest infestation (1/4 acre) is on a small piece of private land surrounded by the ENF where a small dam and pond were constructed by the landowner. Medusahead totally covers the dam face. Another infestation is located on a water barred section of the One-eye Trail; all others are on roadside or landings. The infestation of most concern is on landing off 12N81 within the Grey Eagle Fuels Project. This landing contains infestations of medusahead,

goatgrass and yellow starthistle. These infestations were noted in 2002 and 2003; in all probability they existed prior to that but went unnoticed. It is likely that other small infestations of medusahead and goatgrass exist in these watersheds. These sites will be mapped as they are encountered.

Conditions Related to Sensitive Botanical Species

Table 4-2. GIS data available for sensitive plant species within the landscape area

Data in Coverage	Type of Data	Results
Sensitive plant occurrences	Point detections.	Eldorado manzanita 4 occurrences Tripod buckwheat 1 occurrence Layne's butterweed 3 occurrences Yellow bur Navarretia 8 occurrences Parry's horkelia 3 occurrences Mtn. Lady's Slipper (habitat only)

El Dorado manzanita (Arctostaphylos nissenana):

Thirteen locations of El Dorado manzanita are known. Of the 7 occurrences located on Forest System lands, 4 are within the analysis area (see Map 10). The disjunct occurrence is located near Sonora in Tuolumne County.

El Dorado manzanita grows in almost pure colonies on 'hard' shale. Many occurrences are tightly ringed by the taller white leaf manzanita (Arctostaphylos viscida). ENF occurrences are part of and surrounded by an edaphically unique chaparral/woodland habitat. In this habitat the hard shale substrate effectively restricts tree growth to small stands of conifers and oaks growing on islands of more loosely packed, weathered shale.

*Tripod buckwheat (***Eriogonum tripodum***):*

All occurrences of Tripod buckwheat are found on alluvial serpentine soils in foothill and cismontane woodlands, both along the west slope of the Sierra and in the coast mountain ranges. It is documented from Amador, Mariposa, Tuolumne, El Dorado, Placer counties in the Sierra foothills and Tehama, Colusa, Lake and Napa counties in the coast range.

One occurrence of this species is found on the ENF. This occurrence is entirely within the Traverse Creek Special Interest Area on the Georgetown District where there are approximately 150 to 300 individuals distributed in three distinct areas of the SIA. Another El Dorado County occurrence, south of Placerville on private land, is estimated to contain 50 individuals (see Map 10).

*Layne's butterweed (***Senecio layneae***):*

This Federally listed plant species occurs on gabbro and serpentine soils in western El Dorado County, the Red Hills in Tuolumne County, and in Yuba County near Brownsville. This rare species occurs in 3 locations on the ENF and 1 location on private land adjacent to the Forest. These four occurrences are disjunct from the main population in the Pine Hill Preserve in the Cameron Park area. Within the SF American River-Chili Bar landscape area two occurrences are found in the Traverse Creek SIA (see Map 6).

Another small occurrence (10-20 plants) is located on private land near the Traverse Creek SIA. A fourth occurrence is located at Little Bald Mountain on the Georgetown District in the LMF American River watershed (see Map 10).

Yellow bur Navarretia (*Navarretia prolifera *ssp.* lutea*):

This highly localized subspecies is restricted to a narrow east-west band 18 miles long and 8 miles wide centered over Pollock Pines, El Dorado County. All known occurrences are found within ten miles of Pollock Pines. Eight occurrences are located within the analysis area, all within 2 miles of the Badger Hill Arboretum on the Placerville Ranger District (see Map 10).

Parry's horkelia (Horkelia parryi):

Parry's horkelia is known to occur in Mariposa, Calaveras, Amador and Eldorado Counties. It is known to occur on the Stanislaus, Mendocino and Eldorado NF's, private, and BLM lands. It grows in old tropical soils that are slightly acidic in plant communities that usually resemble Ione Chaparral (Holland 1986) or Ione Manzanita series (Sawyer, Keeler-wolf 1995). In El Dorado County it has been found to grow on soils formed on the Valley Springs formation and other shallow or otherwise unproductive soils.

Mountain Lady's slipper orchid (*Cypripedium montanum*):

Potential habitat for Mountain lady's slipper occurs in scattered locations within the SF American River-Chili Bar watershed. Within California it occurs in 15 counties, reaching as far south as Santa Cruz County along the coast, and down into Madera County in the Sierra Nevada but is not continuous within this range. The species has yet to be documented on the National Forest System lands on the Eldorado and Tahoe National Forests. Only one occurrence is known from the ENF. It has been found on Sierra Pacific Industry land within the Amador Ranger district. This occurrence contains two sites, each containing 3 to 6 individual clumps.

Mountain lady's slipper has adapted to multiple habitats, growing in both moist and dry conditions at elevations between 600 and 6,700 feet, although it is less common above 4,800 feet. The typical moist condition favored by this plant is near a stream or sometimes near the edge of a small seep. Mountain lady's slipper also grows in relatively dry conditions on north-facing hillsides in mixed conifer forests.

Focal Species

Focal species for this analysis were identified as:

1. Species listed or designated as threatened, endangered or on the Regional Forester's sensitive species list (TES species).

2. Management Indicator Species (MIS) identified in the ENF LRMP.

3. Migratory birds on the Partners in Flight Watch List, or those receiving a "high vulnerability" ranking in the Sierra Nevada Forest Plan Amendment.

The TES species and MIS potentially found on the ENF are identified in Appendix E. Appendix E also describes the criteria used to determine whether, for each TES or MIS species, habitat is likely to occur within the SF American River-Chili Bar and LMF American River landscape areas. Table 4-3 identifies the status and relevant management issues associated with both plant and animal focal species likely to occur in the SF American River-Chili Bar and LMF American River landscape areas.

Table 4-3. Focal species for this landscape analysis

Species	Status	Relevant Issues
Valley elderberry longhorn beetle	Threatened	Fuels treatments
California red-legged frog	Threatened	Fuels treatments, conservation of aquatic ecosystems
California spotted owl	Sensitive	Fuels treatments, conservation of old forest
Northern goshawk	Sensitive	Fuels treatments, conservation of old forest
Pacific fisher	Sensitive	Fuels treatments, conservation of old forest, hardwood management
Pallid bat	Sensitive	Fuels treatments, hardwood management
Townsend's big-eared bat	Sensitive	Fuels treatments, hardwood management
Western red-bat	Sensitive	Fuels treatments, management of riparian ecosystems
Foothill yellow-legged frog	Sensitive	Conservation of aquatic ecosystems
Western pond turtle	Sensitive	Fuels treatments, conservation of aquatic ecosystems
Hardhead	Sensitive	Conservation of aquatic ecosystems
Parry's horkelia (*Horkelia parryi*)	Sensitive plant	Fuels treatments
Tripod Buckwheat (Eriogonum tripodum)	Sensitive plant	Fuels treatments, OHV use
Mountain lady's slipper (*Cypripedium montanum*)	Sensitive plant	Fuels treatments, conservation of old forest ecosystems
Layne's ragwort (*Senecio layneae*)	Sensitive plants	Fuels treatments, OHV use
Mosses - (Meesia triquetra and M. uliginosa)	Sensitive plants	Mgt of meadow ecosystems
El Dorado Manzanita (Arctostaphylos nissenana)	Sensitive plant	Fuels treatments
Deer	MIS	Fuels treatments, Conservation of meadow and riparian ecosystems, hardwood management
Black bear	MIS	Fuels treatments, Conservation of meadow and riparian ecosystems, hardwood management
Mountain quail (Map 18)	MIS	Fuels treatments, hardwood management
Cavity Nesting Birds	MIS	Fuels treatments, hardwood management, conservation of old forest hardwood management, exotic species
Rainbow Trout	MIS	Conservation of aquatic ecosystems
Acorn Woodpecker	PIF watch list Oak Woodland Plan	Fuels treatments, hardwood management, exotic species
Warbling Vireo	Riparian Plan	Hardwood management, riparian management, fuels treatments
Flammulated owl	PIF watch list Coniferous Forest Plan	Fuels treatments, hardwood and old forest management
Olive-sided flycatcher	PIF watch list Coniferous Forest Plan	Fuels treatments, riparian management
Oak titmouse	Oak Woodland Plan	Hardwood management, exotic species
Swainson's thrush	SNFP high vulnerability Riparian	Conservation of meadow and riparian ecosystems, fuels treatment
Fox Sparrow	Coniferous Forest Plan	Fuels treatment
Dark-eyed junco	Coniferous Forest Plan	Fuels treatment, riparian and meadow management

Executive Order "Responsibilities of Federal Agencies to Protect Migratory Birds" (issued January 11, 2001), directs that agencies design migratory bird habitat and population conservation practices into agency plans and planning processes including watershed planning. Migratory birds identified in the Partners in Flight Watch List, or those receiving a "high vulnerability" ranking in the Sierra Nevada Forest Plan Amendment, are identified as "species of concern" under the executive order and are addressed as focal species in this assessment.

Data on known occurrences, habitat, and management areas for terrestrial wildlife, aquatic wildlife, and botanical focal species within the watershed are shown in Tables 4-4 through 4-7. Known occurrences are not an indication of likely occurrence or numbers since varying levels of survey effort and coverage have occurred for the various focal species. Detection probabilities also vary, with some species having a high likelihood of being detected through surveys or casual observations, and other species having low detection probabilities even when applying stringent survey protocols. The survey effort that has occurred to date is described in Appendix E.

Location and habitat data available for focal species will continue to be obtained and refined over time. For some species, such as the sensitive bat species, habitat associations are so broad or essential habitat elements such as roost structures cannot be mapped except at the local scale. Appendix E describes the assumptions used to identify and map occupied and suitable habitat for each of these species within the analysis area, using data available in a GIS.

This habitat mapping can serve as a starting point for project level analysis and for analyzing cumulative effects.

Table 4-4. GIS data available for terrestrial wildlife species within the landscape area

Data in Coverage	Type of Data	Results
Valley elderberry longhorn beetle potential habitat	Habitat Polygons. Modeled based on potential to grow elderberry plants	SFAR-Chili Bar 11,920ac. LMFAR 3,108 ac.
California spotted owl detections	Detection Points. Detections and associated territory numbers	SFAR-Chili Bar 13 territories LMFAR 6 territories
California spotted owl Protected Activity Centers (PACs)	Mgt Area Polygons. Best 300 acres of habitat surrounding the best detection for each owl territory	SFAR-Chili Bar 4,002 ac. LMFAR 1,569 ac.
California spotted owl Home Range Core Ar eas	Mgt Area Polygons. Best 1,000 acres of habitat surrounding the best detection for each owl territory	SFAR-Chili Bar 7,418 ac. LMFAR 3,760 ac.
Vegetation types likely to provide California spotted owl suitable habitat	Habitat Polygons. Modeled using forest vegetation inventory	SFAR-Chili Bar 49,099 ac. LMFAR 26,851 ac.
Northern goshawk detections	Detection Points. Detections and associated territory numbers	SFAR-Chili Bar 6 territories LMFAR 2 territories
Northern goshawk Protected Activity Centers (PACs)	Habitat Polygons. Best 200 acres of habitat surrounding the best detection for each goshawk territory	SFAR-Chili Bar 816 ac. LMFAR 499 ac.
Vegetation types likely to provide northern goshawk suitable habitat	Habitat Polygons. Modeled using forest vegetation inventory	SFAR-Chili Bar 22,154 ac. LMFAR 6,347 ac.
Vegetation types likely to provide Pacific fisher suitable habitat	Habitat polygons modeled using forest vegetation inventory	SFAR-Chili Bar 59,127 ac. LMFAR 19,908 ac.
Deer winter and summer range habitat	Habitat polygons. Summer through winter range mapped by the CDFG	SFAR-Chili Bar 46,889 ac. LMFAR 26,254 ac.
Mountain quail suitable habitat	Habitat polygons. Modeled from Forest vegetation inventory	SFAR-Chili Bar 16,034 ac. LMFAR 3,835 ac.
Cavity Nesting Birds suitable habitat	Habitat polygons. Modeled from Forest vegetation inventory	SFAR-Chili Bar 65,645 ac. LMFAR 21,994 ac.

Old Forest Associated Wildlife Species and Habitat

California spotted owl:

The existing California spotted owl PACs are well distributed on Forest Service lands within both watersheds (Map 16). Home range core area (HRCA) mapping indicates that sufficient suitable habitat surrounding these PACs exists to allow for movement within and between PACs for dispersing individuals, although many of the HRCAs overlap. However, suitable habitat outside of the identified PACs and HRCAs is limited in both

watersheds due to private land in-holdings, which generally do not provide high-quality owl habitat. The northeastern portion of the SF American River-Chili Bar watershed is mainly comprised of lands owned by Sierra Pacific Industries and is managed to maximize timber production. This area was identified in the CASPO Technical Assessment (Verner et al. 1992) as an "Area of Concern" for the spotted owl due to habitat fragmentation and a low density of known owl territories at the time the report was issued. The western half of both watersheds is comprised of private land and data is lacking as to distribution of owls here or any potential connectivity to PACs on Forest lands in the watersheds.

Northern goshawk:

The northern goshawk PACs are distributed throughout the landscape area (Map 17) watersheds, but more sparsely than the spotted owl PACs. One reason for this may be less intensive survey efforts for goshawks across the forest to date, resulting in a lower number of territorial goshawk detections than spotted owl detections. Habitat is well distributed on Forest Service land, and connects most of the existing PACs throughout the watershed. Private lands, however, fragment habitat connectivity, particularly to the northeast of the SF American River-Chili Bar watershed. Availability of high-quality suitable nesting habitat may also be a concern in both watersheds.

Forest carnivore species:

Reductions in the amount and quality of structurally complex forest in the Central Sierra Nevada, including the SF American River-Chili Bar and LMF American River landscape area, has likely played a substantial role in the apparent loss of fishers from the Central Sierra Nevada (Sierra Nevada Forest Plan Amendment EIS, Part 4.4, 2001). In both watersheds, historical practices of mining and logging, along with the large fires in the area, negatively impacted fisher habitat (Map 20) by removing large conifer trees, reducing the amount of large down logs, and increasing road density throughout both watersheds. The recent influx of residential development, particularly in the western portion of the SF American River-Chili Bar watershed and in the LMF American River watershed, has served to further fragment suitable fisher habitat. Even with the historical use, forest cover is relatively intact and mostly contiguous on National Forest System lands in the SF American River-Chili Bar watershed. The remaining structurally complex forest (LS/OG, Rank 4 and 5) is scattered throughout the watershed but occurs primarily along the steep drainages of Rock Creek, Slab Creek, and Slate Canyon Creek in the SF American River-Chili Bar watershed and along Otter Creek and the American River in the LMF American River watershed (Map 15). In addition, there is a relatively contiguous patch of LS/OG on National Forest lands around Big X Mountain on the eastern portion of SF American River-Chili Bar watershed. Suitable habitat in these watersheds, however, is somewhat isolated from other Forest Service lands to the northeast due to large tracts of privately owned timber lands.

Because the majority of these watersheds are below 5,500 feet in elevation, it is unlikely that the area supports either American marten or Sierra Nevada red fox.

Sierra landbird species:

The Draft Avian Conservation Plan for the Sierra Nevada Bioregion (Siegel & deSante 1999) identifies late-successional old-growth forests as one of four top priority habitats requiring immediate conservation efforts. The US Fish and Wildlife Service (2002a) and Partners in Flight (PIF 2002) have identified "priority bird species", based upon vulnerability rankings considering population trends, limited geographic range or area importance, and/or threats to breeding due to deteriorating habitats. Five of the ten species identified in the US FWS list of birds of conservation concern in the Sierra Nevada Bird Conservation Region (BCR), substantially utilize or are critically dependent upon late-successional/old growth forest: the spotted owl (declining population trend, limited geographic range, deteriorating habitat), the olive-sided flycatcher (declining population trend, threats to breeding) the white headed woodpecker (SN geographic importance), the flammulated owl (declining population trend), and the Williamson's sapsucker (declining population trend) (US FWS 2002a, Siegel & deSante 1999). Partners in Flight identified the following additional priority coniferous forest birds for the Sierra Nevada physiographic region: the northern pygmy owl (declining population trend), calliope hummingbird (limited geographic range), black-backed woodpecker (limited geographic range, threats to breeding) western wood-pewee (declining population trend), Hammond's flycatcher (threats to breeding), Cassin's vireo, Stellars's jay (declining population trend), mountain chickadee (declining population trend), brown creeper (threats to breeding), golden-crowned kinglet (declining population trend, threats to breeding), hermit warbler (threats to breeding), western tanager, and Cassin's finch (declining population trend).

The priority bird species that are best suited to serve as focal species for late-successional/old forest habitat within the SF American River-Chili Bar and LMF American River landscape areas, are those that are more narrowly associated with the lower- to mid-elevation coniferous forest habitat, and those for which management recommendations are available. Based on this reasoning, Table 4-5 displays the "priority species" that are best suited to serve as focal bird species within the SF American River-Chili Bar and LMF American River landscape areas. (Species that are federally listed as threatened or endangered, or are designated on the Regional Foresters sensitive species list (such as the California spotted owl) are discussed in previous sections.

Table 4-5. Landbirds suggested as focal species for late-successional forest habitat in the SF American River-Chili Bar and LMF American River landscape areas

Species	Habitat of Importance to the Species in the Landscape Area*	Management Action Likely to Affect Habitat*	Management Recommendations Available
Olive-sided flycatcher	Large, old trees and snags, post-fire habitats, small openings	Salvage logging, fire suppression, fuels treatments that remove understory shrubs from large diameter pine stands	Species Management Abstract (prepared by the Nature Conservancy for PIF), Focal Species Account (prepared by California PIF).
Flammulated owl	Lower elevation pine, oak woodland	Ingrowth of shade-tolerant species in pine/black oak communities, removal of brushy understory and brushy clearings for fuels reduction (especially on ridgetops and south aspects)	Species Management Abstract (prepared by the Nature Conservancy for PIF), Focal Species Account (prepared by California PIF).
Black-backed woodpecker	Areas of concentrated tree mortality due to pathogens or wildfire	Alteration of natural cycles of tree mortality associated with forest pathogens, lack of fire, post-fire salvage logging	Species Management Abstract (prepared by the Nature Conservancy for PIF), Focal Species Account (prepared by California PIF
Brown creeper	Old forest habitat with high conifer diversity and large snags	Understory thinning of incense cedar, salvage logging	Species Management Abstract (prepared by the Nature Conservancy for PIF), Focal Species Account (prepared by California PIF
Hermit warbler	Moderate to dense canopied coniferous forest	Understory thinning resulting in low canopy cover	Species Management Abstract (prepared by the Nature Conservancy for PIF) Focal Species Account (prepared by California PIF)
White-headed woodpecker	Pine and MC habitat with abundant large diameter trees and snags	Change in composition of tree species from pines to denser stands of fir & incense cedar has been detrimental.	Species Management Abstract (prepared by the Nature Conservancy for PIF)

Riparian and Meadow Associated Terrestrial Wildlife Species and Habitat

Valley elderberry longhorn beetle:

Habitat for valley elderberry longhorn beetle (VELB) is found the Central Valley and foothills, generally below 3,000 ft. elevation. Suitable habitat (see Map 18) consists of elderberry plants with one or more stems measuring one inch or greater in size. Although elderberry plants are known to occur in both watersheds, they are mostly found in upland sites and not in riparian corridors that seem to be preferred by this species. Potentially suitable habitat for VELB most likely occurs below the forest boundary on private lands. There is one sighting recorded along the American River west of the ENF.

Townsend's big-eared bat:

This bat primarily roosts in caves and abandoned mines, foraging in adjacent riparian areas. Little is known about the population status of this species but their numbers are thought to be declining, primarily due to roost site disturbance (SNFP Chapter 3, Part 4, pages 59-63 2001). There are approximately 104 abandoned mines in the landscape area (Map 63). The majority of these sites have not been evaluated for habitat suitability for Townsend's big-eared bat. Eleven mines are proposed for closure within the LMF American River watershed. Of those eleven, six were identified as providing potential bat habitat. Of these, two were observed to have bats exiting during 2002 surveys but the species is unknown. If Townsend's big-eared bats are utilizing these mines for roosting, human disturbance of the site could cause this species to permanently abandon the site.

Sierra landbird species:

Wet meadow habitat is considered to be one of four top priority habitats requiring immediate conservation efforts in the Sierra Nevada (Siegel & deSante 1999); the SF American River-Chili Bar and LMF American River landscape areas provide an insignificant amount of wet meadow habitat (Map 11). These landscape areas provide important streamside riparian habitat, however. The black swift is the only riparian associate identified on the US FWS list of Birds of Conservation Concern for the Sierra Nevada BCR. Since this species breeds in very specialized and localized habitats that are unlikely to be affected by Forest Service management actions (sheer cliff faces with cool wet microclimates often created by waterfalls), the black swift would not serve as a useful focal species for this landscape area. The American dipper and the wrentit are identified by Partners in Flight as "Priority Species" associated with riparian habitat in the Sierra Nevada physiographic region. With the exception of hydropower re-licensing, aquatic habitat utilized by the dipper is also unlikely to be affected by Forest Service management actions within the landscape areas. The CalPIF Riparian Bird Conservation Plan identifies several focal species that would be more appropriate to evaluate for the SF American River-Chili Bar and LMF American landscape analysis. Table 4-6 identifies the riparian bird focal species that are more narrowly associated with the montane riparian habitat that exists in the landscape area It includes those species for which management recommendations are available and likely to help inform the types of management actions expected to occur in the area.

Table 4-6. Landbirds suggested as focal species for riparian habitat in the landscape area

Species	Habitat of Importance to the Species in the Landscape Area*	Management Action Likely to Affect Habitat*	Management Recommendations Available
Song sparrow	Riparian habitat with dense shrub cover or dense understory vegetation	Fuels treatments that remove brushy understory or shrub cover within or adjacent to riparian zones.	Focal Species Account (prepared by California PIF).
Yellow warbler	Riparian deciduous, lakeshore, or wet, shrubby meadows	Fuels treatments that remove brushy understory or shrub cover within or adjacent to riparian zones.	Focal Species Account (prepared by California PIF)
wrentit	Riparian and shrub habitats	Fuels treatments that remove shrub habitat, particularly in proximity to riparian areas	
Wilson's warbler	Willows, alders and shrub thickets	Fuels treatments that remove shrub thickets within or adjacent to riparian zones.	Focal Species Account (prepared by California PIF)

*Based upon information included in Species Management Abstracts and Focal Species Accounts developed for Partners in Flight.

Hardwood Associated Wildlife Species and Habitat

Deer:

The SF American River-Chili Bar watershed provides habitat for the Pacific deer herd and the LMF American River watershed provides habitat for the Blue Canyon deer herd (Map 19). Each of these watersheds are mainly designated as either critical winter range or winter range for the herds due to their low elevation resulting in low snowfall and the presence of mast-producing oaks. The status of these herds is not completely known, but populations in the Central Sierra Nevada are thought to be declining (CDFG et al. 1998). A few of the primary factors thought to be influencing the decline on National Forest lands include the practice of aggressive reforestation, particularly after wildfires, and reduction in habitat disturbance that favors early-seral habitats (CDFG et al. 1998). Another significant factor influencing deer populations in these watersheds is the encroachment of urban growth. Residential development results in both a reduction in habitat and an increase in traffic-related mortalities.

Within the Rock Creek area of the SF American River-Chili Bar watershed, there have been several projects over the past 10-15 years that have improved foraging habitat for the Pacific deer herd. These projects have included understory thinning, brush mastication, and prescribed burning targeted to both reduce fuels and to improve deer habitat. A Habitat Evaluation Procedure (HEP) analysis has measured the Habitat Suitability Index for deer in the area on several occasions over the past 12 years showing improving conditions for deer in the area (ENF 2000).

Western red bat and pallid bat:

Little is known about the status of either western red bat or pallid bat in the SF American River-Chili Bar or LMF American River watersheds. Western red bat is generally found

below 3,000 feet in elevation and utilizes tree foliage for roosting. Pallid bat uses rock crevices, caves, abandon mines, and cavities in trees for roosting generally below 6,000 feet, but has been found up to 10,000 feet in elevation. The current conditions of hardwood habitat in both watersheds are described above under vegetative conditions. Hardwood stands throughout both watersheds are subject to conifer encroachment and lack of sufficient regeneration, likely due to fire suppression over the past century.

Sierra landbird species:

The Avian Conservation Plan for the Sierra Nevada Bioregion (Siegel & deSante 1999) identifies oak woodlands as one of four top priority habitats requiring immediate conservation efforts. In particular, the Sierra Nevada Bioregion is a key area for montane hardwood and hardwood-conifer vegetation types and associated bird populations. The Lewis' woodpecker is an oak woodland associate identified on the US FWS list of Birds of Conservation Concern for the Sierra Nevada BCR. The band-tailed pigeon, western screech owl, Lewis' woodpecker, Nuttall's woodpecker, plumbeous vireo, Hutton's vireo, oak titmouse, black-throated gray warbler, black-headed grosbeak, and Lawrence's goldfinch are "priority bird species" associated with oak woodland habitats identified by Partners in Flight. The Nuttall's woodpecker and Lawrence's goldfinch are most strongly associated with the lower elevation oak woodlands which occur in the landscape area. Oak woodlands do occur in the landscape area. The other species listed above are also likely to utilize the hardwood vegetation types that do occur. The species with management recommendations available (Table 4-7) would be appropriate focal species to utilize for analyses occurring within the montane hardwoods and harwood-conifer vegetation types.

Table 4-7. Landbirds suggested as focal species for oak woodland habitat in the landscape areas

Species	Habitat of Importance to the Species in the Landscape Area	Management Action Likely to Affect Habitat	Management Recommendations Available
Band-tailed pigeon	Riparian habitat with dense shrub cover or dense understory vegetation	Loss of oaks from pine-oak woodlands, fuels treatments that reduce the availability of fruiting shrubs and closed canopy forest for nesting	Species Management Abstract (prepared by the Nature Conservancy for PIF)
Lewis' woodpecker	Open deciduous and conifer habitat with brushy understory, oaks important in winter.	Lack of fire and associated loss of oaks from pine-oak woodlands	Species Management Abstract (prepared by the Nature Conservancy for PIF)
Oak titmouse	Montane hardwood and riparian habitats	Loss of oaks from pine-oak woodlands due to fire suppression	Focal Species Account (prepared by California PIF)
Black-throated gray warbler	Open canopied conifer and montane hardwood forests with brushy understory or interspersed shrubs	Fuels treatments that remove shrubby understory, particularly in open conifer and pine-oak habitats	Species Management Abstract (prepared by the Nature Conservancy for PIF) Focal Species Account (prepared by California PIF)
Black-headed grosbeak	Montane hardwood-conifer forest with high canopy complexity and tree species diversity, especially within and adjacent to riparian areas	Fuels treatments that reduce stand complexity and vertical diversity, particularly in montane hardwood-conifer and riparian forest type	Focal Species Account (prepared by California PIF)

Aquatic Wildlife Species and Habitat Conditions

Aquatic focal species are those which are either US Fish and Wildlife Service listed threatened or endangered, USDA Forest Service Region 5 designated sensitive, or management indicator species (Table 4-3). Management indicator species were designated by the ENF Land and Resource Management Plan (ENF 1989). Habitat for the following focal species lies in these two watersheds: 1) California red-legged frogs - Federally threatened, 2) foothill yellow-legged frogs, western pond turtles, and hardhead - Forest Service sensitive, and 3) trout – management indicator species. By applying resource management protections for these species, habitat for most other aquatic species would be maintained, as these species tend to be the most vulnerable or can be used as indicators of aquatic health.

Aquatic habitat (streams, ponds, and waterholes) for aquatic species, such as fish (see Map 24), amphibians, aquatic reptiles, and invertebrates, are all found on National Forest lands in the SF American River-Chili Bar and LMF American River watersheds. Table 4-8 quantifies by watershed the miles of aquatic species habitat available as perennial or

seasonal streams, the number of ponds per watershed, and the number of waterholes. Most types of aquatic species, such as rainbow trout, many types of frogs, and western pond turtles have found waterholes to be suitable for their needs. Known past TES species sighting locations are listed, including the year they were observed. The amounts of suitable habitat available for focal species and the type of data that was used to determine suitable habitat for each species is shown.

Table 4-8. GIS data available for aquatic focal species and their habitat within the landscape area. (Includes public and private lands unless otherwise noted.)

Data in Coverage	Type of Data*	Results
SF American River-Chili Bar		
Perennial and seasonal streams	Linear features	151 perennial and 165 seasonal stream miles
TES aquatic species detections	Point data	CRLF – 1975 – Traverse Creek FYLF –1994, 2002, 2003– SFAR WPT –1991,1996 – Traverse Creek 1994 – Bear Creek 1991, 1996 – Whaler Creek 1990, 1994, 1995, 2001 – Raccoon Ponds Hardhead – 1998, 2002, 2003 – SFAR
California red-legged frog (CRLF) suitable stream habitat	Linear stream segments less than or equal to 2% gradient	15.0 miles of suitable and key stream breeding habitat on NF lands, 18.7 miles on private lands
Foothill yellow-legged frog (FYLF) suitable stream habitat	Linear stream segments (perennial streams)	81 miles of suitable stream on NF lands; key breeding habitat same as CRLF
Western pond turtle (WPT) suitable stream habitat	Linear stream segments (perennial streams)	81 miles of stream on NF lands
Western pond turtle suitable nesting habitat	Polygons, modeled from slope, aspect, distance from stream and vegetation type.	12 acres of nesting habitat on NF lands, 166 acres on private land
Hardhead stream survey results	Linear stream segments with observed and suspected hardhead	5 miles occupied habitat
Rainbow trout stream survey results	Linear stream segments with observed and suspected rainbow trout	40 miles occupied habitat (an additional 24 miles suspected) on NF lands
Water hole locations	Point data	17 water holes
Locations of water bodies (ponds)	Polygon data	3 ponds on NF lands; 114 ponds on private lands
Lower Middle Fork American River		
Perennial and seasonal streams	Linear features	575 perennial and 73 seasonal stream miles **
TES aquatic species detections	Point data.	Hardhead – 1999 FYLF – 2002 WPT – 2002
California red-legged frog suitable stream habitat	Linear stream segments less than or equal to 2% gradient	6.3 miles of suitable and key stream breeding habitat on NF lands, 24.9 miles on private lands

Foothill yellow-legged frog suitable stream habitat	Linear stream segments (perennial streams)	21 miles of suitable stream on NF lands; key breeding habitat same as CRLF
Western pond turtle suitable stream habitat	Linear stream segments	21 miles of stream on NF lands
Western pond turtle suitable nesting habitat	Polygons, modeled from slope, aspect, distance from stream and vegetation type.	6 acres of nesting habitat on ENF, 9 acres on TNF, 159 acres on private lands
Hardhead stream survey results	Linear stream segments with observed and suspected hardhead	1 mile occupied habitat approximately 5 miles suspected
Rainbow trout stream survey results	Linear stream segments with observed and suspected rainbow trout	5 miles occupied habitat (an additional 8 miles suspected) on NF lands
Water hole locations	Point data	3 water holes
Locations of water bodies (ponds)	Polygon data	2 ponds on NF lands; 13 ponds on private lands

*Refer to Appendix E for explanation of variables used for habitat.

** The stream data set is not complete for LMF American River as streams are only available on USGS streams on the lower portion of the watershed and not a crenulated stream layer.

SF American River-Chili Bar Watershed

Aquatic Species Habitat:

The condition of aquatic species habitat can be changed by influences both naturally caused and management-related. Changes in habitat condition may be attributed to the water temperature, riparian and aquatic vegetation, large woody debris, amounts of sediment input, and tree canopy.

The highest average water temperature for a two-day period in upper Rock Creek was 61 degrees Fahrenheit in early July of 2001, whereas lower Rock Creek (above Bear Creek confluence) reached 69 degrees Fahrenheit during that time. Temperatures over 72 degrees Fahrenheit can be lethal to trout, but these milder temperatures ensure well-oxygenated water for trout, a popular cold-water sport fish. Most streams in this watershed on the National Forest have these cooler temperatures, except the SF American River, which is explained below.

Higher summer water temperatures are optimal for hardhead, a Forest Service sensitive fish that resides in reaches of the SF American River. Surveys in 2002 and/or 2003 show hardhead sighted in Slab Creek Reservoir (SMUD 2004a), few hardhead were found in the reach below the reservoir (SMUD 2004b), but over six miles downstream, they were more commonly sighted (SMUD 2004b). Water temperatures in the SF American River at Mosquito Bridge reached their highest in 2001 on July 3rd and 26th with a mean water temperature of 68.4 degrees Fahrenheit for both days (SMUD 2002a). Most streams in which hardhead generally occur have summer water temperatures in excess of 68 degrees Fahrenheit and optimal temperatures appear to be 75 to 82 degrees Fahrenheit (Moyle 2002). Therefore, the highest water temperatures on the SF American River tend to be on the cooler end of their preferred range as a result of cooler reservoir bottom releases out of Slab Creek reservoir during the summer, and may be a limiting factor in their survival in this reach below the reservoir. By the time the river flows beyond the Rock Creek confluence, the water warms to a more preferred summer temperature range for hardhead.

Stream habitat in the SF American River-Chili Bar area, which includes most of the streams in this analysis, is generally very shaded with adequate amounts of down large woody debris. Low water flows during the late summer and fall months are common. In the larger SF American River the dam at Slab Creek Reservoir has impeded the movement of large wood down the river and huge piles of down logs can be observed lying alongside the dam. This limiting factor for fish will be discussed/considered during hydropower re-licensing of the Upper American River Project.

Fisheries:

Rock Creek sub-watershed, which includes Whaler Creek, Bear Creek, and Traverse Creek, has been identified by Moyle et al. (1996) as a potential aquatic diversity management area. The goal of management of these aquatic ecosystems identified throughout the Sierra Nevada would be the protection of aquatic biodiversity. Over 130 taxa (down to genera) of invertebrates occur here, along with native fishes: rainbow trout, Sacramento sucker, riffle sculpin, Sacramento squawfish, California roach, with hardhead suspected near the mouth. Moyle et al. (1996) described this sub-watershed as one of the best examples of a diverse foothill drainage remaining.

Whaler Creek had a noteworthy abundance of brown trout during a 1979 survey. The surveyors found a biomass of 91 pounds/acre, one of the highest on the forest. The fish size averaged 9 inches. The surveyors mentioned that Slate Canyon, as well as Whaler Creek, had good spawning areas that contributed to this abundance. Brown trout is not native to California, but has been commonly introduced to the streams in this landscape area. Many streams have rock falls that are fish barriers, although in many cases brown trout were planted above these barriers, such as in Rock Creek. Brown trout may be detrimentally affecting the native rainbow trout populations in some streams through competition.

SF American River is a warmer, lower gradient system than other streams of this analysis area; streams typically warm the farther they flow downstream. Fish species found in this river include hardhead, rainbow trout, brown trout, riffle sculpin, prickly sculpin, Sacramento sucker, Sacramento pikeminnow, speckled dace, green sunfish, and California roach (SMUD 2004b). Smallmouth bass were observed to be common in the river above Chili Bar Reservoir during a USFS survey in 2003. Smallmouth bass have been identified as one of the primary predators of juvenile hardhead (Moyle and Nichols 1973) and may be affecting the hardhead populations below Rock Creek, where bass are common. Water level fluctuations during bass spawning have been noted as detrimental to their reproduction. California roach are a State Species of Special Concern.

Herptile species:

California red-legged frogs, a federally threatened species, are thought to have resided throughout the Sierra Nevada (Jennings 1996). Map 21 shows habitat considered suitable for this species based on watercourses with elevations below 5,000 feet having ponds and streams with gradients of 2% or less. One historical account in 1975 of an individual sighting was recorded on National Forest land in this analysis area on Traverse Creek. The Traverse Creek catchment (Map 1) has been designated as "core recovery habitat area 3" for California red-legged frogs by the US Fish and Wildlife Service (USDI FWS

2002b). Recovery habitat is land identified for potential future locations to reintroduce this species.

Western pond turtles are fairly common in this landscape area (Map 23), as this lower elevation is within their preferred range. The high number of ponds, most created by private landowners, has increased their available habitat. In 2003 three young western pond turtles were observed during two surveys on the SF American River between Rock Creek and Chili Bar Reservoir, all hiding under emergent grass clumps. For them to be so commonly observed there is probably a suitable reproductive nesting area nearby.

Sightings of foothill yellow-legged frogs on the SF American River have occurred upstream of Slab Creek Reservoir (SMUD 2004c) and below Rock Creek confluence (one in 2003 from USFS surveys). It is highly likely that in the future, more foothill yellow-legged frogs may be sighted on the streams of this analysis area as there is good habitat in the smaller streams that flow into the SF American River (Map 22). Stream reaches suitable for reproduction would have an open canopy creating sunny basking sites, and a cobble streambed with pools for escape cover.

Ponds and water holes are potential habitat for herptiles and fish. If connected to streams, fish may move in and out of ponds and waterholes, or may become trapped in waterholes depending on their piping, although this is rare. There are 17 water holes in this watershed (Map 25), primarily created for water withdrawal for land management activities. The watershed area has 117 ponds; only three of these are on National Forest System lands. Two of these three are called Raccoon ponds, located in the headwaters of Harricks Ravine, a tributary to Rock Creek; the third pond is near Traverse Creek in T 11N, R 11E, Section 6. The Raccoon Ponds are filled with bullfrogs, an invasive non-native species, hopping over from nearby private ponds. A western pond turtle has been observed with the bullfrogs in Raccoon ponds. Bullfrogs have been known to consume young turtles, as well as native frogs. The rearing of young for western pond turtles may be a limiting factor there. Bullfrogs have also been observed on Traverse Creek, Rock Canyon Creek, Slate Creek, and SF American River.

Many of the ponds on private land are located within a mile of National Forest lands and are potential dispersal habitat for California red-legged frogs to or from aquatic habitat on the forest. These ponds have not been surveyed to determine presence of California red-legged frogs and would likely not be surveyed because of their locations on private lands.

Lower Middle Fork American River

Aquatic Species Habitat:

Habitat condition for aquatic species can be detrimentally affected by excessive sedimentation or siltation. There can be many causes of this condition, and it can usually be avoided by resource management planning. Enormous amounts of natural sedimentation can occur as a result of floods and landslides, depending on the soils and geologic makeup of the watershed. Silt was commonly observed in streams of this landscape area, including Otter Creek and Canyon Creek. Many times no apparent cause was identified, other than the geology of the area. Other times historic mining, steep terrain, road and urban development issues, logging activities, and inappropriate off-road

vehicle uses were identified as possible sources of siltation. These sources will be identified in the "Recommendations Related to Watershed Condition" section in Step 7. In a 1992 survey on Canyon Creek, the pools and glides had a fairly heavy silt load, gravels deeply embedded in riffle sections, causing low reproductive success. In a 1993 survey, fourteen tributaries of Canyon Creek were surveyed with "the majority having been hydraulic mined, creating steep walled unstable gorges with an extreme potential for mass wasting".

Water developments, such as damming, diversion pipes, and canals were identified as an issue in the Volcanoville area USDA (1977) by rising water temperatures from loss of water flow. A pond located below Missouri Canyon confluence was identified as a fish barrier. The water rights for this pond and other diversions in streams are an issue for investigation in the "Recommendations Related to Watershed Condition" section in Step 7.

In 1994 six reaches of Canyon Creek were surveyed for down large woody debris in the stream course. A mean of 19.8 pieces per 1,000 feet was found (greater than 12 inches dbh and 10 feet long) with a range of 5.3 to 38.5 pieces. The mean overall is adequate, although the reaches with the lower amounts are lacking in large down wood. Large down wood is important for providing hiding cover, creating deep pools, and adding to habitat diversity for aquatic species.

Fisheries:

The expected native fish assemblage in foothill Sierran streams include speckled dace, Pacific lamprey, chinook salmon, riffle sculpin, hardhead, Sacramento pike-minnow, Sacramento sucker, California roach, and rainbow trout (including steelhead). Chinook salmon, Pacific lamprey, and steelhead were extirpated by the construction of Folsom Dam. Other fish species, such as hardhead (a FS sensitive species) have experienced reductions in numbers and distribution as a result of habitat loss. Besides dams, the primary form of habitat loss has been pool filling and loss of spawning gravels associated with sedimentation from mining, road building, and timber harvest. Hardhead fish have been observed in the pool below Ralston Dam. It is suspected that they live in the rest of the MF American River downstream in this landscape area, although surveys have not been performed there for this species.

Herptile species:

The present populations of native amphibian and reptile species, such as foothill yellow-legged frogs, California red-legged frogs, and western pond turtles, are suspected to be remnants of larger numbers that historically existed. They have been affected by habitat losses for similar reasons as fish. Bullfrogs were introduced into the area as a food source after miners had depleted the red-legged frog populations. Bullfrogs eat all life stages of native frogs and also have been known to swallow small western pond turtles. The continued introduction of bullfrogs as tadpoles to constructed ponds on private lands and expansion of their range has caused their invasion into ponds and streams on Forest System lands. Bullfrog tadpoles can be purchased as pets and end up being released or escape into nearby ponds.

Cooler water temperatures flowing from the bottom of dams, such as the Ralston Dam, can affect reproductive habitat of foothill yellow-legged frogs downstream. This species requires water temperatures above 12-15 degrees C for onset of reproduction and for successful rearing of eggs and tadpoles. During a survey in 2002 Jones and Stokes found a foothill yellow-legged frog in the Junction Bar area (Map 22). An unverified sighting of foothill yellow-legged frogs was recounted by a biologist as seen many years ago and believed to be in Jackass Gulch in Section 33. Many more foothill yellow-legged frogs are believed to reside along the LMF American River than are presently known.

No federally listed aquatic species are known to occur in the LMF American River watershed. In an adjacent watershed, a single sighting of a California red-legged frog occurred in 2001 in a pond on top of Ralston Ridge, between the MF American River and the Rubicon River. Follow-up surveys have failed to locate any additional frogs of this species in that pond. A historic sighting exists in the Michigan Bluff area, but recent surveys by the Tahoe NF have failed to locate any frogs. Six ponds lie in the Horseshoe Bar area on the MF American River that have suitable habitat for California red-legged frogs (Map 21). These ponds were surveyed in April and May, 2003; bullfrogs and Pacific tree frogs were found. In 2002, Jones and Stokes found a western pond turtle there. Western toads are commonly seen there crossing the dirt roads at night.

Aquatic and Hydrologic Conditions

The aquatic and hydrologic conditions of a watershed are controlled to a large extent by the condition of the watershed as a whole. The SF American River-Chili Bar watershed is located within an area with a high degree of urban influence containing all or portions of the towns Pollock Pines, Camino, Swansboro, Kelsey and Garden Valley. As a result the watershed is considered to be in condition class III which is indicative of low biotic and geomorphic integrity as compared to other 5th field watersheds located in the IBET Province (which includes the Inyo, Lake Tahoe Basin Management Unit, Eldorado, and Tahoe National Forests). There are relatively high disturbance levels and adverse conditions expressed within the stream system. The LMF American River includes portions of the towns of Georgetown, Forestville, and Volcanoville. It is considered to be in a condition class I with much watershed inaccessible and basically undeveloped. There is presence of old mining in portions of the watershed; refer to the geology section for a more thorough description. The LMF American River is considered to have a moderate hazard (a moderate disturbance level). Although field observations indicate that there is a low level of adverse conditions within the larger stream system there are a number of the tributary streams that show evidence of excessive silt loads. These watersheds have relatively high road densities and near-stream road densities when compared with other watersheds in the Sierra Nevada (see Table 4-9 and Figure 4-3 below).

Table 4-9. Watershed Analysis information from Regional Watershed Condition Assessment (ENF 2000)

ENF 5th Field Watersheds	R5 5th Field Analysis	Water-shed Acres	Road Miles	Road Density (mi/sq mi)	[1]Steep Road Miles	[2]Low Road Miles	[3]Stream Buffer Miles	Stream xings	[4]Hazard	[5]Express-ion	[6]Category
SFAR-Chili Bar		95,860	690	4.6	30	182	227	448	High	High	III
	Rock Cr.	47,792	346	4.6	7	96	122	235	High	High	III
	Slab Cr.	48,105	344	4.6	23	86	105	213	High	High	III
LMF American River	Volcano-Otter Cr.	29,255[7]	166	3.6	16	33	35	73	Mod	Low	I

1. Steep Road Miles" are roads on slopes >45%
2. Low Road Miles" are the roads on the lowermost 1/3 of slopes.
3. Stream Buffer Miles" are roads within 100 m of streams.
4. Hazard is a rating based on relative disturbance levels. A high hazard= high disturbance level.
5. USDA Forest Service 5th Field Watershed Condition Assessment 12/01: Expression is a rating based on interpretation of existing conditions and whether or not a watershed is exhibiting signs of stress. A low hazard is an indicator that the in -stream channel conditions are good.
6. USDA Forest Service 5th Field Watershed Condition Assessment 12/01: Geomorphic & biotic integrity ranked as I (best) - III (lowest). All road and stream miles are based on CFF features found on USGS Quad. Regional datasets depict fewer miles than more detailed forest datasets.
7. Covers only a portion of the watershed, specifically on inside ENF boundary.

A frequency distribution of road densities for the Sierra Nevada is displayed in Figure 4-1 below. Based on analysis done in 2000. While the road miles do not correlate for the 2 watersheds with the later data (from current GIS/INFRA files) the relationships remain the same.

Figure 4-1. Sierra Nevada Road Density Frequency Distribution

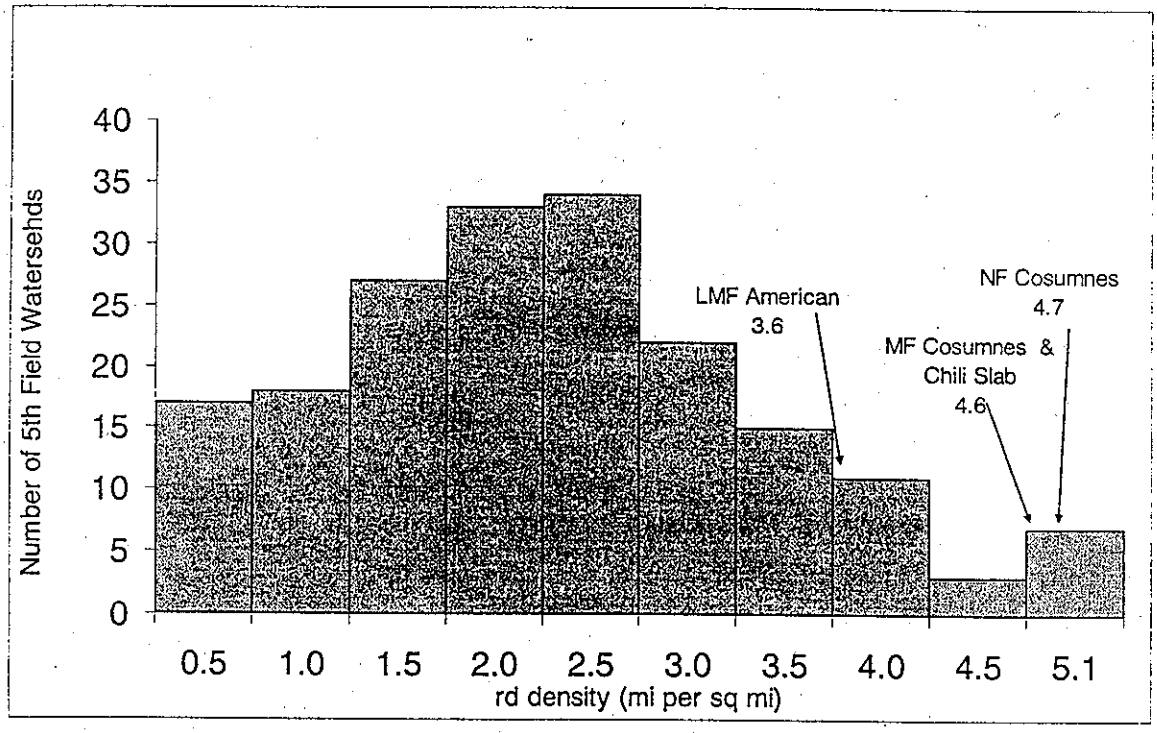


Table 4-10. GIS data available for hydrologic conditions within the landscape area

Data in Coverage	Type of Data	Slab- Chili Bar	LMF American River
Reservoirs	Polygons	6 reservoirs (Brush Cr, Slab Cr, Chili Bar, Forebay, Blakely, Finnon.)>4 ac ea totaling 348 acres	1 reservoir (Lake Walton) totaling 4 acres
Lakes and ponds	Polygons	119 ponds < 4 ac totaling 70 acres	8 <4 ac totaling 9.5 acres
Water hole locations	Point data	17 water holes: (10 in-channel, 3 off-channel and 4 unclassified)	3 water holes: (2 in-channel, 1 off-channel)
Location of perennial, intermittent and ephemeral streams	Linear features	1,158 stream miles: (842 miles ephemeral, 165 seasonal and 151 perennial)	574 stream miles: (404 miles ephemeral, 73 seasonal and 97 perennial) Available for ephemeral streams outside NF boundary
Locations of springs, seeps and special features?	Point data	9 springs	0 springs
Meadows	Polygons. Mapped from orthophotos and aerial PI	25 meadows: 143 acres	5 meadows: 17 acres
Riparian Conservation Areas	Buffering of aquatic features	Perennial – 5,776 acres Ephemeral – 13,309 acres Seasonal – 2,334 acres Inner Gorge – 4,317 acres Meadows – 328 acres Springs – 6.5 acres Waterbody – 60 acres	Perennial – 1,487 acres Ephemeral – 3,823 acres Seasonal – 579 acres Inner Gorge – 1,846 acres Meadows – 6.2 acres Springs – 0 acres Waterbody – 0 acres
Disturbance	Polygons	Acres of past disturbances by treatments and years	Fire history & some disturbance acres

Despite the high level of historical near-stream disturbance Tables 4-11 and 4-12 show that these watersheds also have a relatively low modeled risk levels for adverse cumulative watershed effects (CWE). It is possible that modeling has not been sensitive enough to pick up impacts within these stream systems. It is recommended that future projects within these watersheds that have high RCA disturbance levels be closely evaluated for any proposed ground-disturbing activities within the RCAs. It is quite likely that there are remnants of past disturbance that could be restored or improved with future activities within the RCAs, as well as areas where further rest and recovery in the watershed is the most prudent action to meet Riparian Conservation Objectives.

Iowa Canyon and Pollock Watersheds (HUC 7) located around the towns of Pollock Pines and Camino are the only watersheds that are numerically modeled to have a very high risk of adverse cumulative watershed effects (Table 4-11 below). While the disturbance levels in these watersheds are high due primarily to urban development, the majority of the disturbance occurs on the ridgetops and the headwater streams. The

disturbance along the SF American River in these watersheds is minimal due to the steep undeveloped inner gorge areas.

Table 4-11. Natural Sensitivity Index (NSI) and Threshold of Concern (TOC) for watersheds within the landscape areas

HUC5	HUC6	HUC7	HUC8	Watershed Acres	NSI	Risk Level
SFAR-Chili Bar	Rock Cr Total	Rock Cr	Al Brass Cr	756	130	L
			Bald Mountain Cyn	2,361	125	L
			Cyn Cr	1,953	109	L
			Dutch Cyn	808	52	L
			Rock Cr Main Stem	3,184	126	L
			Silver Rock	1,616	51	L
			Tobacco Gulch	891	52	L
			Upper Rock Cr.	1,435	86	M
			Whale Rock	474	116	L
		Bear Cr		5,340	59	H
		L Rock Cr		4,320	72	L
		One Eye Cr		4,523	66	M
		Traverse Cr		9,833	42	L
		Whaler Cr		10,210	90	M
	Chili Bar- Slab	Brush Cr		5,132	37	L
		Deer View		5,496	114	M
		Pino Grande		8,697	81	H
		Slab Cr Reservoir		6,866	150	L
		Chili Bar Reservoir		5,764	116	L
		Iowa Canyon		5,088	41	VH
		Pollock		2,871	69	VH
		Upper Chili		8,244	ND	ND
LMF American R	MF American R Bottle Hill	Georgetown Canyon Cr.		10,156	51	M
		MF American R. Canyon		21,436	ND	ND
		Otter Cr		11,454	109	M
	Todd Cr			19,125	ND	ND

Table 4-12. Historical disturbance levels within RCAs

HUC5	HUC6	HUC7	HUC8	Water shed Acres	Stream Miles	Historic RCA Disturb-ance Ac	Historic RCA Disturb-ance per stream mi
SFAR-Chili Bar	Rock Cr Total	Rock Cr	Upper Rock Cr	1433	19.6	22	1.1
			Al Brass Cr	756	10.4	20	1.9
			Bald Mountain Cyn	2361	32.9	8	0.2
			Cyn Cr	1953	25.0	5	0.2
			Dutch Cyn	808	12.3	182	14.8
			Rock Cr Main Stem	3184	46.1	72	1.6
			Silver Rock	1616	24.4	300	12.3
			Tobacco Gulch	891	11.8	192	16.2
			Whale Rock	474	8.0	20	2.5
				13476	190.5	821	4.3
		Bear Cr		5340	74.0	510	6.9
		L Rock Cr		4320	56.6	0.0	0.0
		One Eye Cr		4523	62.2	1204	19.3
		Traverse Cr		9833	132.2	344	2.6
		Whaler Cr		10210	121.6	224	1.8
				47702	637.1	3875	6.1
	Chili Bar-Slab	Brush Cr		5132	72.6	695	9.6
		Deer View		5496	69.2	170	2.5
		Pino Grande		8697	92.9	126	1.4
		Slab Cr Reservoir		6866	82.1	465	5.7
		Chili Bar Reservoir		5764	27.7	710	25.6
		Iowa Canyon		5088	52.3	69	1.3
		Pollock		2871	35.1	120	3.4
		Upper Chili		8244	89.4	710	7.9
				48158	521	3191	6.1
				95860	1158	7066	6.1
LMF American R	MF American R Bottle Hill	Georgetown Canyon Cr.		10156	127.1	125	1.0
		MF American R. Canyon		21436	255.6	25	0.1
		Otter Cr		11454	150.6	356	2.4
				43047	533	507	1.0
	Todd Cr			19125	nd	nd	nd
				62,172	574*		

*No mileages for ephemeral streams outside the NF boundary.

SF American River-Chili Bar Watershed

A number of stream surveys have been conducted over the past 30 years as the result of various projects in the watershed area. For those streams, information is summarized by stream in Appendix F. The major streams within the watershed include the main stem of the SF American River with the following tributaries coming in from the north: Rock, Bear, Traverse, Whaler, Slab, and Brush Creeks. Tributaries coming in from the south are Iowa Canyon and Long Canyon Creeks.

Lower Middle Fork American River Watershed

The Foresthill Ranger District of the Tahoe National Forest has completed a watershed assessment of the MF American River which includes the Upper Middle Fork American River and the North Fork American River east of Foresthill, CA. The water flows in this system are primarily controlled by Placer County Water Agency as part of the American River Project.

Stream surveys in portions of LMF American River watershed have been conducted over the past 25 years as the result of various projects on the Georgetown Ranger District. For those streams, detailed information is available and summarized by stream in Appendix F. No surveys or assessment of cumulative watershed effects have been completed for the Todd Creek Watershed which includes lands that are private or under control of other agencies.

Hydropower

Dams, diversions, and reservoirs have a continued negative effect on native fishes through changes in flow regime and in the physical environment downstream because they block migrations to upstream areas and provide a continuous source of introduced species as predators and competitors to both upstream and downstream reaches (Moyle et al. 1996). Forest Service sensitive species, hardhead and foothill yellow-legged frogs are key species that may be affected by hydropower projects in this landscape area. Timing of water flow and its relation to water temperature are the primary habitat elements that will be considered, along with other habitat elements in the re-licensing process.

SF American River-Chili Bar Watershed

As part of the Upper American River Project and the Chili Bar Project hydropower re-licensing process, studies and assessment of many aspects of resources management are being conducted in this landscape. The licensing process is scheduled to be completed and implemented in 2007.

Lower Middle Fork American River Watershed

It was concluded by an independent contractor (Jones and Stokes 2002) that below Ralston Afterbay Reservoir the existing substrate sizes in the channel were limiting suitable spawning habitat. In 2001, PLACWA began to implement a sediment management project. Its purpose is to allow sediment, presently stored in the reservoir, to pass downstream in order to restore the natural migration of coarse and fine sediment that occurred prior to dam construction. Monitoring occurred prior to the sediment

removal and will occur for a minimum of 2-3 years afterwards. This project is expected to have beneficial affects on aquatic habitat downstream of the dam.

Water Hole Conditions

Table 4-13. GIS data available for water holes within the landscape area

Data in Coverage	Type of Data	Results	
		SFAR-Chili Bar	LMFAR
Water holes	Points, Locations, Primary uses, Maintenance Needs	17 water holes: (10 in-channel; 3 off-channel; 4 unclassified.)	3 water holes: (2 in-channel; 1 off-channel)

As shown in Table 4-13 and Table 4-14, there are 17 developed water holes in the SF American River-Chili Bar watershed and 3 in the LMF American River watershed (Map 25). Thirteen of these water holes (all in SF American River-Chili Bar) were developed on National Forest lands for multiple uses primarily to provide water for dust abatement and fire protection with added value for livestock, wildlife, and aquatic species. All other water holes are on private lands. Ten of these water holes are developed within an active channel in SF American River-Chili Bar; two are in LMF American River; e channel design locations of 4 are unknown. It is more desirable to locate water holes outside of stream channels to protect water quality and to maintain channel form and function. All but 3 of the in-channel water holes are on public lands. Water rights have been acquired for all but one of the water holes on public lands. On private lands there are no records of water rights and it is uncertain if these have been acquired.

A few of the water holes are presently in need of maintenance and potential relocation is an option for all of the in-channel water holes. In addition to these developed water holes there are over 100 small ponds on private lands in the SF American River-Chili Bar watershed that are not included in this inventory. See aquatic species sections for a description of how these ponds are being utilized.

Table 4-14. Water hole inventory

Watershed	In or Off Channel	Water Right	Past Failure	Spill way	Mntce. Needed	TES Use	ID No	USGS Quad Name	Legal Location	System Road Access	Owner ship
SF American River-Chili Bar											
Rock Creek	In	Y	N	N	potential relocation	yes	gtn_012	tunnel_hill	T12N R11E SEC 3	12N70	public
Traverse Creek	In	Y	N	N	potential relocation	yes	gtn_045	garden_valley	T12N R10E SEC 24	12N92.2	public
Pino Grande	In	Y	N	N	potential relocation	yes	gtn_011	slate_mtn	T12N R12E SEC 28	12N59	public
Bear Creek	In	Y	N	N	potential relocation	yes	gtn_003	garden_valley	T12N R11E SEC 32	12N80.3	public
One Eye Creek	In	Y	N	N	potential relocation	yes	gtn_009	slate_mtn	T11N R11E SEC 12	11N89	public
Brush Creek	In	Y	N	Y	potential relocation	yes	gtn_005	pollock_pines	T11N R12E SEC 10	unknow n	public
One Eye Creek	In	Y	N	N	potential relocation	yes	gtn_007	slate_mtn	T11N R12E SEC 11	11N89	public
Deer View	In	Y	N	N	potential relocation	yes	gtn_008	slate_mtn	T11N R12E SEC 18	11N88	public
Rock Creek	In	N	N	N	potential relocation		gtn_013	tunnel_hill	T13N R11E SEC 27	12N10	public
Traverse Creek	Off	Y	N	uk	uk	unknown	gtn_045	georgetown	T12N R11E SEC 6	12N29	public
Brush Creek	Off	Y	N	Pip e	Y		gtn_006	pollock_pines	T12N R12E SEC 34	11N93	public
Iowa Canyon	Off	Y	N	N	N	unknown	plv_001	slate_mtn	T11N R12E SEC 33	11N08.1	public

Rock Creek	uk	Y	uk	uk	uk	unknown	gtn_057	tunnel_hill	T12N R11E SEC 11	12N20Y	public
Whaler Creek	In	N	N	N	potential relocation	yes	gtn_010	slate_mtn	T11N R11E SEC 1	12N70	private
Rock Creek	uk	uk	uk	uk	uk	unknown	gtn_047	tunnel_hill	T13N R11E SEC 34	12N10	private
Traverse Creek	uk	uk	uk	uk	uk	unknown	gtn_046	georgetown	T12N R11E SEC 5	12N80	private
Pino Grande	uk	N	uk	uk	uk	unknown	gtn_018	devil_peak	T12N R13E SEC 19	Jackson Sps	private
LMF American River											
Otter Creek	In	N	N	N	N	yes	gtn_014	tunnel_hill	T13N R11E SEC 23	14N35	private
Georgetown Canyon Creek	In	N	N	N	N	unknown	gtn_001	georgetown	T13N R11E SEC 33	12N85	private
Georgetown Canyon Creek	Off	N	N	Y	N	yes	gtn_002	georgetown	T12N R11E SEC 5	12N85	private

Transportation System

The transportation system within the landscape analysis area is well developed. See Maps 32 and 33 for the current road system and Table 4-15 which shows mileage of the various types of roads. It is unlikely that additional system roads will be required to meet Forest Plan goals or objectives in these watersheds.

Table 4-15. GIS data available related to roads and trails within the landscape area

Data in Coverage	Type of Data	Results		
		Maintenance Level	SFAR-Chili Bar	LMFAR
GIS location of roads and trails (from GPS data and DOQs)	Linear features. Road locations and maintenance levels	Level 1 and 2	179.69 mi.	43.55 mi.
		Level 3, 4, 5 roads	7.51 mi.	12.24 mi.
INFRA database with road miles by maintenance level, functional class, surface type, road id	INFRA database. Road miles are actual driven miles rather than map-based miles	Arterials	46.64 mi.	0.11 mi.
		Collectors	14.20 mi.	0.00 mi.
		Locals	176.36 mi.	55.68 mi.

Note: There is about a 10% discrepancy between mileage figures provided in the two data sources listed above due to the difference that results when comparing map-based mileage estimates and driven mileage records.

To better understand the current condition of the landscape with regard to its roads, forest specialists in hydrology, soils, and geology evaluated roads for number of road-stream crossings (see Maps 30 and 31) and miles of roads within RCAs. From the total roads in the landscape, they produced a list of "high risk to hydrologic resources" maintenance level 1 and 2 roads in the landscape area (see Maps 36 and 37).

Recognizing that there are differences in the effects of roads on various resources, a matrix was designed to evaluate both positive and negative effects of the road segments listed above for the other resources. For example, a road segment that bisects a spotted owl protected activity center (PAC) may have a negative effect for wildlife, but a high value for fire suppression. IDT members conducted resource analyses to evaluate specific factors related to the individual resources in order to derive the ratings that appear in the Road Matrix.

The road rating matrix (Table 4-16) reflects both the magnitude of the consequence and the type of the effect. From this matrix each road is given a set of descriptive attributes that indicates the type of effect and the magnitude of consequences (e.g., beneficial effect, low consequence) for each resource considered.

Table 4-16. Road rating matrix

	Effect on Resources		
Magnitude of Consequences	**Beneficial**	**Neutral**	**Detrimental**
Low	**L-B**	**L-N**	**L-D**
Moderate	**M-B**	**M-N**	**M-D**
High	**H-B**	**H-N**	**H-D**

The next step was to provide an integrated approach that considered issues, data, and information to systematically address all pertinent roads in this analysis. The following resource factors were considered to provide ratings for the tables:

- Commodity access needs for grazing and vegetation management
- Fire suppression and fuels management access needs
- Recreation access
- Access needs for special uses
- Effects to aquatic and terrestrial wildlife species

The result is that each road has a set of descriptive attributes that indicates the type of effect and the magnitude of consequences (e.g., beneficial effect, low consequence). The descriptive attributes for each road were plotted into a table representing the categories shown in Table 4-16, ranging from Low-Beneficial (L-B) to High-Detrimental (H-D).

Tables 4-17 and 4-18 show the individual ratings on each road for effects on each resource and display the magnitude of the consequences of those effects. They categorize the effects on resources and magnitude of consequences of the current road system and help identify opportunities for managing the road system and prioritizing expenditures of Forest road maintenance and improvement funds. They are an indicator system that combines many of the road matrix effects and consequence variables. Once the roads were rated and assigned to one of the nine categories by resource area, opportunities for future actions could be identified.

Another factor to be considered in project design is the watershed effects of the overall road densities in the 7th field sub-watersheds. See Figures 4-2 and 4-3 for a comparative display of the road densities in landscape areas.

Table 4-17. Magnitude of Consequences/Effect On resources matrix for Maintenance Level 1 and 2 roads that are high risk to aquatic resources in SF American River-Chili Bar watershed

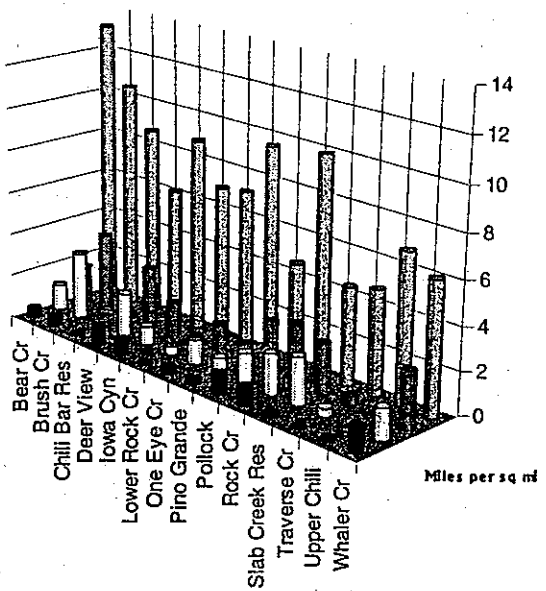
Road No.	Length/ Mi.	Treat-ment Possibil ities	Com-modity Access	Fire Access	Recreati on Access	Spec-ial Uses	Wildlife		USGS Quad	Comments
							Aquatic	Terres-trial		
Maintenance Level 1 Roads										
11N87	1.00	2,4,5	M - B	M - B	L - N	L - N	H - D	M - D	Slate Mtn	Up to Mtnce. Level 2
12N74	1.10	7	L - N	L - B	L - N	L - N	H - D	L - D	Slate Mtn	Closed (rock creek eis)
12N80D	2.40	8	H - B	H - B	L - N	H - B	L - D	M - D	Georgetwn	First 1.0 miles open, closed next 1.4 miles (rock creek eis)
Total =	4.50									
Maintenance Level 2 Roads										
11N89	2.90	2, 5	L – N	M – B	M – B	H – B	H – D	H - D	Slate Mtn	Needs brushing and drainage feature fixed
11N96	1.40	4, 5	H – B	H – B	L – N	H – B	L – N	L - N	Slate Mtn	Up to Mtnce. Level3
11N97	0.20	8	H – B	H – B	L – N	H – B	L – N	L - N	Slate Mtn	
11NY04	0.50	1, 5	H – D	H – D	L – N	L – N	H – B	H - D	Pollock P	Down to Mtnce. Level 1
11NY04	0,80	1, 5	H – D	H – D	L – N	L – N	H – D	H – D	Slate Mtn	Down to Mtnce. Level 1
12N34	5.40	8	H – B	H – B	M – B	H – D	L – D	L - D	Pollock P	
12N53	2.40	5	H – B	H – B	M – B	H – B	L – D	L – N	Pollock P	Up size culvert, parcel is in silver pearl land exchange
12N53	0.20	8	H – B	H – B	M – B	H – B	L – D	L - N	Devil Peak	
12N57	0.40	3, 4	M – B	M - B	M – B	M – B	H – D	H - D	Pollock P	Reroute/reconstr
12N72B	1.00	6	H – B	H – B	M – B	L – B	L – D	H - D	Tunnel H	Change to level 1mtnce. (rock creek eis)
12N81	0.60	5	H – B	H – B	H – B	M – N	L – D	M - D	Slate Mtn	Drainage problems west of darling ridge road
12N81	2.00	5	H – B	H – B	H – B	M – N	L – D	M - D	Garden V	

12N83	1.00	8	H – B	H – B	M – B	M – N	M – D	L - D	Slate Mtn
12N92	0.60	8	H – B	H – B	M – B	H – B	L – N	L - N	Georgetwn
Total =	24.80								

Table 4-18. Magnitude of Consequences/Effect on resources matrix for maintenance level 1 and 2 roads that are high risk to aquatic resources in LMF American River watershed

Road No.	Length/ Mi.	Treat-ment Possibil ities	Com-modity Access	Fire Access	Recrea-tion Access	Spec-ial Uses	Wildlife		USGS Quad	Comments
							Aquatic	Terres-trial		
Maintenance Level 1 Roads										
13N53C	0.80	8	H – B	H – B	M – B	H – B	L – D	L - D	Georgetwn	Needs brushing
13N58A	0.30	2	H – B	H – B	M – B	M – N	L – N	L - N	Georgetwn	Needs brushing
13N58B	0.90	2	H – B	H – B	M – B	L – N	L – D	L - D	Georgetwn	Needs barricade instead of gate
13N58F	0.50	2	H – B	H – B	M – B	L – N	L – D	H - D	Georgetwn	Reinstall barricade
13N58L	0.40	8	H – B	H – B	M – B	L – N	L – N	L - D	Georgetwn	
13N58N	0.90	8	H – B	H – B	M – B	L – N	L – D	H - D	Georgetwn	
13N58R	0.40	8	H - B	H – B	M – B	L – N	L – D	H - D	Georgetwn	Needs brushing
13N93A	0.20	5	H – B	H – B	M – B	L – N	L – D	L - D	Georgetwn	
14N35H	0.80	5	H – B	H – B	M – B	L – N	M – D	L - D	Georgetwn	Fix drainage crossing
Total =	5.40									
Maintenance Level 2 Roads										
14N35C	0.40	8, 5	H – B	H – B	L –N	H – B	L – D	L – D	Georgetwn	Pursue Easements
14N35C	0.10	8, 5	H – B	H – B	L – N	H – B	L – D	L - D	Tunnel H	Pursue Easements
Total =	0.50									

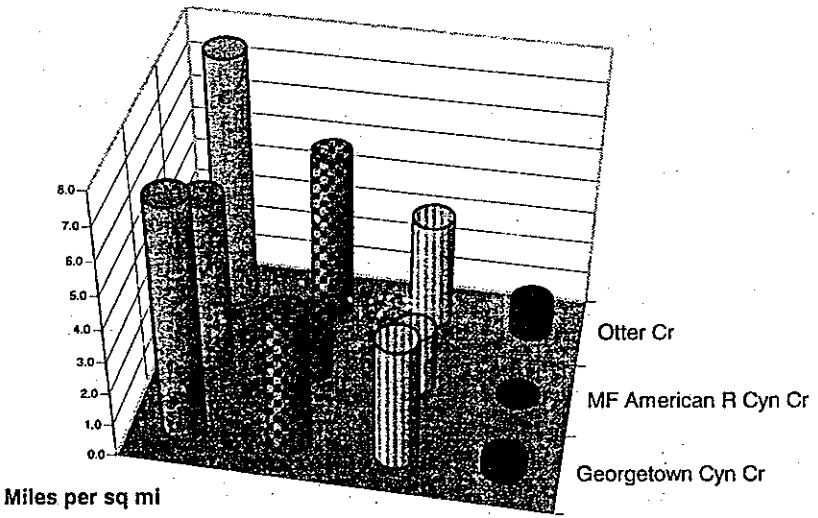
Figure 4-2. Road Density by Maintenance Level in SF American River-Chili Bar Watershed



	Bear Cr	Brush Cr	Chili Bar Res	Deer View	Iowa Cyn	Lower Rock Cr	One Eye Cr	Pino Grande	Pollock	Rock Cr	Slab Creek Res	Traverse Cr	Upper Chili	Whaler Cr
Level 3,4 &5 mi / sq mi	0.5	0.5	0.0	0.8	0.7	0.0	0.3	0.2	1.0	0.9	0.1	0.0	0.1	1.1
Level 1& 2 mi / sq mi	1.2	3.1	0.0	2.0	0.9	0.4	1.1	0.8	1.5	1.9	2.3	0.4	0.1	1.5
Total System rd mi / sq mi	1.7	3.6	0.0	2.9	1.6	0.4	1.4	1.0	2.5	2.8	2.4	0.5	0.1	2.6
Series1	13.2	10.6	8.7	6.2	8.9	7.0	7.2	9.6	4.7	10.0	4.5	4.8	6.9	6.1

Series 1 = total road miles (system and non-system)

Figure 4-3. Road Density by Maintenance Level in LMF American River Watershed



	Georgetown Cyn Cr	MF American R Cyn Cr	Otter Cr
Level 1& 2 mi / sq mi	0.4	0.0	1.0
Level 3,4 &5 mi / sq mi	3.7	1.8	3.3
Total System rd mi / sq mi	4.1	1.9	5.0
Total rd mi / sq mi	7.1	5.2	7.8

Total rd mi includes non-system roads.

Fuels Conditions

Fire Hazard and Risk

Both fire risk and fire hazard ratings for the majority of the landscape analysis area within the ENF boundary were determined by a Forest-wide analysis in 1996 to evaluate the relative risks and hazard for NF watersheds.

Fire risk is defined as the chance (probability) that a wildfire will start, either from natural or human causes, based on recent fire history. Relative risks are assigned the adjective ratings of Low, Medium, High, and Extreme.

Fire hazard is determined by the characteristics of fuels combined with the influences of topography and weather. The fuels characteristics apply to both dead and live fuels, and include loading (tonnage), size and shape, compactness, horizontal continuity, vertical arrangement, fuel moisture content, and chemical properties. Topographic and weather influences, combined with fuels characteristics, determine the rate of forward spread of a fire and the intensity at which a fire will burn. Fire hazard ratings are assigned adjective ratings combined with probable flame lengths and are as follows: Low (0' to 2' flame lengths), Moderate (2' to 4' flame lengths), High (4' to 8' flame lengths), Very High (8' to 11' flame lengths), and Extreme (> 11' flame lengths).

Map 42 displays the ranking of fire risk (risk of fire ignitions) within these landscape areas, based upon the history and patterns of human use within the landscape area. Map 41 shows the fire hazard ranking represented by expected flame lengths within the majority of the landscape area within the ENF boundary. These maps are based on the broad-scale 1996 Forest-wide assessment. These data provided focus for implementation of fuel treatments that occurred under CASPO guidelines.

Modeling of current conditions was done using existing vegetation and disturbance data with assigned fuel models in the fire behavior model. The model included both landscape areas. Map 50 shows the existing areas of differing flame lengths within the analyzed landscape area. Flame lengths less than 4 feet can usually be attacked successfully with hand tools; handline should hold the fire. Flame lengths 4 to 8 feet are too intense for direct attack on the head of the fire by persons using handtools; handline cannot be relied on to hold a fire. Equipment such as dozers, engines, and retardant aircraft can be effective. Flame lengths greater than 8 feet generate fire conditions where direct attack at the head of the fire is generally not successful and suppression tactics must rely on flanking and indirect attack methods. Generally indirect attack results in a fire burning through one or more 24-hour burn periods. Under current conditions, 43% of the landscape area is expected to burn with flame lengths less than 4 feet; 35% is expected to burn with flame lengths between 4 and 8 feet, and 22% is expected to burn at flame lengths greater than 8 feet.

Flame length is just one indicator for fire control resistance and lethal fire effects. The propensity of a fire to initiate crown fire activity (lethal fire) is based on fireline intensity (Btu/ft/s measured at the head of the fire) crown base height, foliar moisture, crown bulk density, topography, and weather.

Using a 90th percentile weather stream from the Bald Mountain remote automated weather station (RAWS) and 97th percentile winds, crown fire potential was modeled using FlamMap2 fire model. These conditions when present generally result in fires escaping initial attack on the ENF. Map 48 and Table 4-19 display the results.

Table 4-19. Existing Acres with potential for crown fire

Crown Fire	Existing Conditions (acres)
Non fire	2,594
Surface fire	45,578
Passive crown fire	101,717
Active crown fire	8,070

Non-fire acres are areas of rock or other non-fuel. Surface fires are generally considered to be non-lethal although smoldering activity in deep duff layers or in large down fuels can sometimes result in increased mortality in conifers and hardwoods. Passive crown fire generally occurs in pockets of high fuel loadings, high crown bulk density, and a low height to live crown where isolated torching of crowns can occur. Torching trees and burning snags can also lob burning embers in front of the main fire at times initiating spot fires that can burn together and/or increase the rate of spread of the main fire. Passive crowning is usually a mixture of lethal and non-lethal fire effects. Active crown fire is generally sustained crown fire activity, dependant on larger areas with elements conducive for crowning. With active crown fires, spotting can also occur. Independent crown fires, where the forward rate of spread is independent of the surface fire rate of spread, is not modeled in FlamMap and is generally thought not likely to occur within this landscape area.

Even-aged timber harvest in the landscape area (the majority of which occurred in the 1980's) has resulted in approximately 6,360 acres that are young and middle-aged plantations (Map 12). These plantations (natural or planted) remain susceptible to wildfires due to small diameters, stand structure, and shrub/herbaceous layers. While fuels treatments in these plantations can reduce their susceptibility, young plantations typically do not become highly resilient to fires until trees become larger and the height to live crown distance increases. Plantations 20+ years old are somewhat resilient, due to their size and height, dependent on pre-commercial thinning and fuels treatments.

Communities and Values at Risk

Land ownership within the Forest boundary on the Georgetown Ranger District has been heavily influenced by the historic granting of every other section of land to railroad companies in the 1800's. The result of this is a distinct "checkerboard" effect of ownership. With additional land exchanges, purchases, and disposal, a great deal of the Forest Service managed lands are comprised of sections, ½ sections, or smaller parcels intermixed with private land. Even the larger portions of Forest System lands often have private inholdings within them. The eastern portion of the lands within the Forest boundary and within the SF American River-Chili Bar watershed analysis area are owned

primarily by private timber companies and are being managed for commercial timber. Consequently there are few residences within them.

The private lands within the Forest boundary and generally in the west and south areas are owned primarily by private citizens and subdivided into generally 1 to 80 acre parcels. This has produced a relatively large number of private residences (approximately 600), outside of incorporated area, within the Forest boundary. This pattern of ownership extends to the private land outside of and adjacent to the Forest boundary. In addition to private residences within the Forest boundary there are numerous commercial enterprises (restaurants, commercial camping facilities, mobile home parks, stores, etc.); these are generally located along Wentworth Springs Road, which bisects the analysis area. In addition, the communities of Pollock Pines and Camino lie on the south and southwestern boundary of the landscape area with Apple Hill and other agricultural areas, and a portion of the Highway 50 corridor just outside the Forest boundary.

Recreation Use

Table 4-20. GIS data on recreational use and development within the landscape area

Data in Coverage	Type of Data	Results
SF American River-Chili Bar		
Dispersed recreation sites on Georgetown and Placerville Ranger Districts	Points. Locations, size, condition.	15 inventoried sites. 2 sites are >5 ac in size. One site is 4.7 acres.
Location of developed recreation sites	Polygons showing existing and potential developed recreation sites, listing the type of use, capacity, and acreage.	1 picnic area and 2 trailheads.
Lower Middle Fork American River		
Dispersed recreation sites on Georgetown and Foresthill Ranger Districts	Points. Locations, size, condition.	4 inventoried sites. 1 site is >5 ac in size. Most sites are 1 acre.
Location of developed recreation sites	Polygons showing existing and potential developed recreation sites, listing the type of use, capacity, and acreage.	1 campground and 2 trailheads.

Recreation Road and Trail Use

The low elevation of these two watersheds allows for almost year-round road and trail recreation use. This type of use is concentrated on the road and trail systems in the Rock Creek (Map 38), Traverse Creek, and SF and MF American River areas. Table 4-21 below shows the number of miles of system trails and OHV roads in the landscape area.

Table 4-21. Recreational use by watershed

HUC 5 Watershed	HUC 6 Watershed	HUC 7 Watershed	HUC 8 Watershed	Dispersed Recreation Sites	Developed Recreation Sites	System Trails (mi)	OHV Roads (mi)
SFAR-Chili Bar	Rock Cr	Traverse Cr	NA		1	0.6	
		Bear Cr	NA		1	5.5	1.0
		Whaler Cr	NA	2*		14.1	
		Lower Rock Cr				2.2	
		One Eye Cr				11.2	
		Rock Cr	Bald Mountain Cyn			8.5	
			Canyon Cr	2*		4.9	0.9
			Rock Cr Main	2, 7*		11.8	
			Silver Rock	1, 7*		13.4	
			Al Brass Cr			3.4	
			Tobacco Gulch	2*		5.9	
			Dutch Cyn			3.0	
			Upper Rock Cr			0.8	
			Whale Rock			0.3	
	Chili Bar-Slab	Pino Grande				0.6	
		Deer View				3.8	
		Slab Cr Res	NA	1		1.7	
				15	2	91.5	1.9
LMF American R	MF American Bottle Hill	Georgetown Cyn Cr		2	2	2.4	
		MF American Canyon Cr		1		18.5	
		Otter Cr		1		10.0	
				4	2	30.9	0.0

* dispersed recreation site extends across watershed boundaries

There is a need to review the data files for the SF American River-Chili Bar watershed with the data files for the Rock Creek FEIS because of the difference in the miles of OHV trails (Map 39). Some changes in one or both of the data files may be needed. Table 4-22 is a comparison of trails data in GIS and the *Rock Creek Trails FEIS.*

Table 4-22. Comparison of GIS trails data and Rock Creek Recreational Trails FEIS data

Data in Coverage	Type of Data	Road and Trail Miles		
GIS locations of OHV roads and trails (from GPS data and DOQs)	Linear features		SFAR-Chili Bar	LMFAR
		OHV roads	53.3 mi.	0.0 mi.
		OHV trails	53.3 mi.	30.9 mi.
OHV roads and trails from Rock Creek FEIS (Aug. 2003)	Linear features	Rock Creek analysis area OHV trails – 49.4 miles.		

SF American River-Chili Bar Watershed

The SF American River-Chili Bar watershed has a high road density, which provides extensive accessibility. Off-highway vehicle, equestrian, mountain bike, and hiking uses are all popular on the trail system in the SF American River-Chili Bar watershed (Map 32). The Rock Creek Recreational Trails are especially popular for off-highway vehicles (primarily motorcycles). In 2001, an estimated 1,200 OHV riders used the Rock Creek Recreational Trails and of this number approximately 686 OHV contacts were made. Non-motorized user counts estimated approximately 288 for 2001. In 2002, an estimated 2,690 OHV riders used the Rock Creek Trails and contact was made with 1,694 of these users. In 2002, approximately 250 non-motorized visitors used the Rock Creek Trails.

The Mace Mill and Bald Mountain Staging Areas are located in this watershed and primarily serve OHV riders. The Mace Mill Staging Area is a popular dispersed recreation area that straddles the ridge between two eighth field watersheds. It has approximately 28 acres of areas used for parking and camping and people utilize multiple openings on this ridge for their recreation use. The Bald Mountain Staging Area has approximately 5 acres of parking and camping area. These two areas receive moderate recreation use and do not have an assigned capacity as measured in PAOT (people at one time). Associated problems with these two staging areas are increasing compaction, loss of vegetation, and inadequate sanitation. *The Rock Creek Recreational Trails Record of Decision* specified the installation of vault toilets and fire rings at Mace Mill and Bald Mountain Staging Areas to convert them from concentrated use areas to developed recreation sites.

There are approximately 43 miles of non-system trails many with ongoing OHV use, in the SF American River-Chili Bar watershed. Many of the non-designated trails are located on old skid trails and roads on steep ground. Use of some of these trails is resulting in erosion and resource damage.

Lower Middle Fork American River Watershed

There are approximately 12.3 miles of system trails in the LMF American River watershed (Map 33). There are approximately 10 miles of trails on private land within the Forest boundary and approximately 12 miles of trails outside of the Forest boundary in the watershed. Approximately 3 miles of trails in the watershed are within the Tahoe National Forest.

Dru Barner Campground and the trails to Otter Creek, and MF American River are the main attractions for recreation use. The Dru Barner Campground is approximately 17 acres and has a PAOT of 235. The Balderson Trailhead, serving primarily equestrians, is located in this watershed. It is approximately 3 acres and provides parking for approximately 4 vehicles with horse trailers; it has a PAOT of 36.

The Donaldson Staging Area is partially located in this watershed. A picnic area has been constructed and there are plans to construct the remaining trailer parking spurs in 2004. The picnic and parking areas covers approximately 1.5 acres and has a PAOT of 30.

Other Recreation Uses

Recreation, other than on roads and trails, is concentrated along the rivers, reservoirs, and the Highway 50 corridor. Map 7 displays the locations and Table 4-21 above shows the number of developed and dispersed recreation sites in the landscape area.

SF American River-Chili Bar Watershed

Map 7 displays the locations of the developed and known dispersed recreation sites within the SF American River-Chili Bar watershed area. Camping, hunting, target shooting, fishing, gold panning, rock and mineral collection, and non-motorized boating are other recreational uses in the SF American River-Chili Bar watershed. Two kayak outfitter-guides hold special use permits on Slab Creek Reservoir.

The 4-unit Bear Creek picnic area has a PAOT of 20. The Traverse Creek Botanical Interest Area has a 0.25-acre parking area and 4 trails that total to 2.6 miles with a PAOT of 20. It receives light recreation use, but littering and garbage dumping are recurring problems.

Dispersed camping does not appear to be increasing in this watershed. There is a sandbar on the SF American River, approximately 5 acres in size that receives moderate recreation use. Problems associated with this site are littering and inadequate sanitation.

Also within the SF American River-Chili Bar landscape area are Ghost Mountain, a private recreation area, and the popular Apple Hill destination.

Lower Middle Fork American River Watershed

This watershed receives little dispersed recreation use at this time. There is a sandbar known as Cache Rock, about 5 acres in size that is a popular destination for dispersed camping (Map 7). Problems associated with this site include littering and inadequate sanitation.

Grazing Use

Table 4-23. GIS Data for grazing allotments within the landscape area

Data in Coverage	Type of Data	Results
Livestock grazing allotments	Polygons. Management area boundaries.	Old Pino allotment 25,132 acres on NFS land 7 acres outside Forest 15,399 acres on private land

Old Pino Allotment is allowed to have up to 360 head of cattle. In 2003 the current permittee had 325 head on the allotment utilizing 767 head months (783 head months are permitted). Current range conditions and management issues associated with the Old Pino allotment will be addressed as allotment management plans area prepared. The last allotment management plan for the Old Pino Allotment was prepared in 1965. This landscape analysis does not evaluate current range conditions or capacity since allotment management planning is intended to address those issues (see Map 5).

Geologic and Soils Conditions

Table 4-24. GIS data available for geologic and soils conditions within the landscape area

Data in Coverage	Type of Data	Results
SF American River-Chili Bar		
Soil Resource Inventories: Soil Survey Eldorado NF & Soil Survey El Dorado Area	Soil Map Units and Management Evaluations of the soils found in the area	Map 59
Maximum Erosion Hazard	Soil Interpretative Map based on the Erosion Hazard Rating System	4,379 acres Low EHR 10,509 acres Moderate EHR 33,134 acres High EHR 48,428 acres Very High EHR
Geological Resource Inventory of Eldorado NF	Bedrock Map Units & Geomorphic Map Units	Map 61 Areas of High Geologic Risk or Instability 6,630 acres Inner gorge
Lower Middle Fork American River		
Soil Resource Inventories: Soil Survey Eldorado NF& Soil Survey El Dorado Area	Soil Map Units and Management Evaluations of the soils found in the area	Map 59
Maximum Erosion Hazard	Soil Interpretative Map based on the Erosion Hazard Rating System	1,375 acres Low EHR 2,685 acres Moderate EHR 8,871 acres High EHR 12,679 acres Very High EHR
Geological Resource Inventory of Eldorado NF	Bedrock Map Units & Geomorphic Map Units	Map 61 Areas of High Geologic Risk or Instability 2,367 acres Inner gorge

Physical Landscape Conditions

Map 59 displays the type and arrangement of soils found in the watersheds. Information about the specific soil characteristics and their soil management capabilities is found in the published Soil Survey Reports that cover this landscape area: *Soil Survey of the Eldorado National Forest* (Mitchell 1985) and *Soil Survey of El Dorado Area* (Rogers 1974).

Many land use activities have the potential to cause erosion rates to exceed natural soil erosion or soil formation rates. Potential consequences of accelerated erosion include reduction in the productive capacity of the soil and adverse effects on water quality. Map 60 displays the Maximum Erosion Hazard (EHR) for soils found in this landscape area. Approximately 84% of the landscape area has a High or Very High erosion hazard rating. The maximum EHRs are based on little or no vegetative cover present and on the long-term average occurrence of 2-year 6-hour storm events. The risk and consequences for the erosion hazard rating are described below.

Low EHR. Accelerated erosion is not likely to occur, except during periods of above average storm occurrences. If accelerated erosion does occur, adverse effects on soil productivity and to nearby water quality are not expected. Erosion control measures are usually not needed for these areas.

Moderate EHR. Accelerated erosion is likely to occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality may occur during periods of above average storm occurrence. The need for erosion control should be evaluated for these areas.

High EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and nearby water quality are likely to occur, especially during periods of above average storm occurrence. Erosion control is necessary for these areas to prevent accelerated erosion. The selection of measures and methods of application are limited.

Very High EHR. Accelerated erosion will occur in most years. Adverse effects on soil productivity and to nearby water quality are very likely to occur, even during periods of below average storm occurrence. Erosion control is essential for these areas to prevent accelerated erosion but the selection of measures and methods of application are limited.

Map 62 shows the type and arrangement of geological units found in the watershed. Information about the specific lithological characteristics of these units can be found in the Geological Inventory that covers this landscape area. In general the analysis area straddles an ancient subduction zone where the oceanic crust was pushed under the continental crust several million years ago. Today there are slivers of oceanic igneous rock exposed along the Melones Fault Zone that is roughly parallel to State Highway 193 along the western Forest boundary and approximates the boundaries of the subduction zone. Associated with these igneous rocks are metamorphic serpentinites that contain nickel, chromite, and cobalt. These heavy metals create an ecosystem characterized by plants and trees that can tolerate the concentration of these metals; the Traverse Creek

area is an excellent example of this case. To the west of the Melones Fault Zone are ancient metamorphic rocks that were initially sediments on the oceanic crust. These slates and gneisses are the "Mother Lode" in the Sierra Nevada Mountain Range. The gold discovered in the Mother Lode is found in bodies of rock formed by quartz "stringers" that intruded the metamorphized sediments during the subduction of the oceanic plate. To the east of the Melones Fault Zone are bodies of intrusive rock that had formed the "roots" of an ancient volcanic mountain range that has now been heavily eroded exposing the roots. Ancient rock that the igneous rock intruded was also metamorphosed into slate and gneiss; here too quartz stringers were deposited with gold.

According to state and Forest records there are 104 abandoned mines in the study area (Map 63). Of these 6 have a high physical hazard due to open shafts and adits; seven have a low physical hazard, and 91 have not been evaluated. During watershed surveys it was noted that within the Otter Creek Watershed, there are some abandoned mine features (horizontal adits, vertical shafts, and open pits) that pose a safety threat to the general public, wildland firefighters, and wildlife. The Georgetown Ranger District has closed some of these features and continues to analyze and evaluate others. The Cabin Mine is known to have hazardous chemical discharges. (See description of site under the Missouri Canyon Creek heading in the description of LMF American River Watershed in Appendix F.)

Little natural landsliding is occurring in the area with the exception of steep slopes in inner gorges or where slope gradients are greater than 60%. A broad base slope stability analysis of the soil series indicate that landslides are rare and in general the hazard rating is very low for all soils except for the metamorphic rock land series, which has a low hazard rating. When landsliding does occur it is an isolated episode of a few acres in size and associate with elevated ground water along very steep slopes. In general, management activities in areas susceptible to natural landsliding, increase the potential for slope failures. Operations such as road construction, drainage diversions, vegetation management activities, mining, and other development have created some potentially unstable slopes conditions.

Map 61 shows the geomorphic map units for this landscape area. Some of these map units have a geological hazard of instability. These units are described below:

Inner gorge (Ig) is an area of particular concern, as landsliding can often be initiated by only minor alterations to this landform. The areas within the inner gorge that are the most sensitive to the activities of man, are those which are also considered susceptible to natural landsliding processes. Careful site-specific evaluations for proposed inner gorge projects could significantly reduce the adverse effects related to poor site selection and improper development practices.

Steep slopes (Ch), which are usually located above inner gorge areas may also be sensitive to the activities of man. Although these areas are generally not as sensitive as the inner gorge, road construction, and vegetation management may create conditions that encourage local instability. Such operations remove root support for slopes, create unsupported cut slopes, and may modify drainage and ground water conditions.

Active (Mwu5 to Mwu7) or dormant (Mwu3) landslides often present significant potential for initiating landsliding. Operations in such areas might create favorable conditions for reactivating these existing landslide features. Site-specific evaluations of proposed projects located within designated landslide features could be valuable in delineation potential areas of instability.

Heritage

To assess the current conditions of heritage resources within the analysis area, archaeological site records, monitoring forms, site evaluations, District cultural atlases and geographic information system (GIS) coverages from the Georgetown and Placerville Ranger Districts were examined. Information gathered regarding heritage resources in the analysis areas includes the types of sites present, the current condition of sites, sources of negative impacts, and National Register of Historic Places eligibility status. Lastly, current use of the analysis areas by Native American tribes will be discussed.

Information on cultural resources was available only for Forest Service administered land. It is expected that archaeological sites located on private property within the analysis area represent roughly the same classes of resources that are present on the adjacent public land. It is not possible to gauge their present condition with the available data set. Isolated finds are not addressed in this discussion due to the fact that they are considered *a priori* ineligible for inclusion on the National Register of Historic Places (NRHP).

SF American River-Chili Bar Watershed

Heritage resource sites in the SF American River-Chili Bar analysis area are comprised of both historic and prehistoric properties that represent several thousand years of human occupation. A total of 109 sites have been identified on Forest Service administered land within the analysis area.

Prehistoric archaeological resources in the area cover a broad range of site types, from small prehistoric surface scatters of lithic tools and debitage to relatively complex sites containing a range of resource classes such as bedrock mortars, groundstone, lithic scatters (flaked and ground stone), and middens (culturally modified soil). No burial grounds are known to exist on Forest System lands within the analysis area. However, burial grounds have been reported on private property in close proximity. Two possible year-round villages have been identified within the analysis area. To date, 27 prehistoric archaeological sites have been recorded on Forest System lands within the analysis area.

Historic resources located within the analysis area are related to past mining, water delivery, logging, narrow gauge railroad, ranching, farming, transportation, and homesteading. Resource classes include shafts, adits, rock walls, rock pits, ditches, structures, refuse scatters, railroad grades, trestles, trails, corrals, orchards, and other miscellaneous features. A total of 69 historic sites have been identified to date. Thirteen heritage resource sites contain both prehistoric and historic resources. Table 4-25 shows the type and number of sites within the analysis area.

Table 4-25. Heritage resource sites within the SF American River-Chili Bar analysis area

Prehistoric	Historic	Prehistoric/ historic	Total
27	69	13	109

The current condition of sites within the analysis area was assessed by reviewing archaeological site records and monitoring forms. Records indicate that 30% (n=33) of heritage resource sites have been monitored within the last five years, with 13% (n=14) having been monitored within the last twelve months. 41% (n=45) have never been monitored. Table 4-26 shows the condition of archaeological sites. The frequency distribution for the condition of sites resembles a bell-shaped curve, with 77% of the sites in good or fair condition.

Table 4-26. Condition of archaeological sites within the SF American River-Chili Bar analysis area

Site Type	Excellent 100 – 90% intact	Good 90 – 50% intact	Fair 50 – 10% intact	Poor <10% intact	Total
Prehistoric	4	10	5	8	27
Historic	1	26	31	11	69
Prehistoric/ historic	0	6	7	0	13
Total	5	42	42	19	109

Archaeological site records and monitoring forms were also used to identify the sources of negative impacts to archaeological sites within the analysis area. Impacts have resulted from one or more of three broad categories: permitted Forest activities, non-permitted Forest activities, and natural processes.

Permitted activities account for the largest number of site impacts. They account for 63% of all reported impacts. Permitted activities that have impacted sites include logging, road construction and maintenance, trail construction, use and maintenance, dispersed camping, mechanical vegetation treatment, grazing, mining, and infrastructure maintenance (transmission lines). Non-permitted Forest activities that have impacted heritage resources include vandalism/looting, construction/use of non-system trails, and illegal trash dumping. Non-permitted activities account for 24% of reported impacts. Naturally caused impacts to archaeological sites in the analysis area have resulted primarily from erosion, fire, and decay. Figure 4-4 shows the proportion of permitted

Forest activities, non-permitted, and natural processes that have impacted sites. Table 4-27 shows the frequency of specific impact sources to sites.

Figure 4-4. Sources of impacts to heritage resources within the SF American River-Chili Bar analysis area

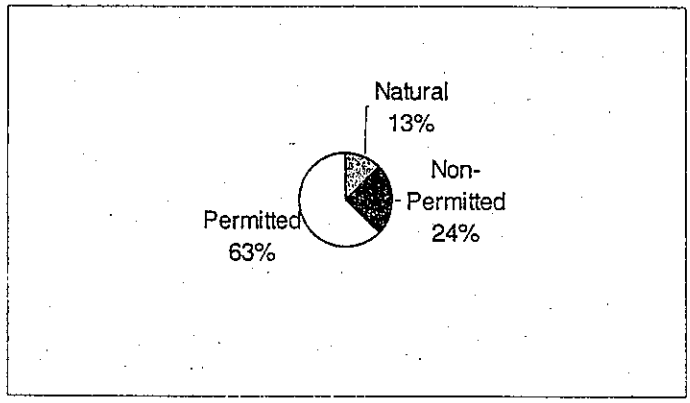


Table 4-27. Impacts to heritage resources within the SF American River-Chili Bar analysis area

Type of Impact	Frequency
Logging	38
Erosion	27
Roads	24
Vandalism	16
Trails (permitted)	12
Camping	7
Fire	6
Mechanical Treatment	4
Grazing	2
Dumping	2
Decay	2
Mining (modern)	1
Power line	1
Trails (non permitted)	1

Of the 109 heritage resource sites within the SF American River-Chili Bar analysis area, ten (9%) have been evaluated for inclusion on the National Register of Historic Places. All ten were found to be ineligible and have been released from management.

Of the 41,205 acres of Forest Service administered land within the analysis areas, 25,350 acres (60%) have been inventoried for the presence of cultural resources. Survey strategies used during field reconnaissance include <15 meter, 30 meter, and 50 meter transect spacing.

Two properties located within the analysis area are currently being managed for interpretation. Located on the District compound is Stop #2 on the Georgetown History Tour, known as the Georgetown Interpretive and Educational Knoll. A reconstructed miner's cabin is the focal point of an educational display that also includes artifacts related to historic mining, as well as a lithic workshop and bedrock mortar. The second property is Stop #4 on the History Tour, known as the Rock Creek (Tipton Hill) site (FS 05-03-53-40). The site contains a mix of historic and prehistoric resources including drift tunnels used in mining and a large bedrock mortar. The Rock Creek site has not been evaluated for inclusion on the National Register of Historic Places.

Local Native American tribes and other communities have expressed a desire to collect forest resources for crafts, traditional/ceremonial purposes, as well as educational tools. Resources commonly sought include bear grass, cedar bark, rocks, willow, elderberry, acorns, and yew wood.

Lower Middle Fork American River Watershed

Heritage resource sites in the LMF American River analysis area are comprised of both historic and prehistoric properties that represent several thousand years of human occupation. A total of 71 sites have been identified on Forest Service administered land within the analysis area.

Prehistoric archaeological resources cover a broad range of site types, from small prehistoric surface scatters of lithic debitage to relatively complex sites containing a range of resource classes such as bedrock mortars, groundstone, lithic scatters, petroglyphs, and middens (culturally modified soil). No burial grounds are known to exist on Forest Service land within the analysis area. No year-round villages have been identified within the analysis area, although there is a potential for their existence at the lowest elevations. To date, 5 prehistoric archaeological sites have been identified on Forest System land within the analysis area.

Historic resources located are related to past mining, water delivery, logging, timber milling, transportation, homesteading, and early Forest Service activities. Resource classes include shafts, adits, rock walls, ditches, structures, refuse scatters, trails, a fire lookout, a sawmill, and other miscellaneous features. A total of 57 historic sites have been identified within the analysis area to date. Nine heritage resource sites contain both prehistoric and historic resources. Table 4-28 shows the type and number of sites.

Table 4-28. Heritage resource sites within the LMF American River analysis area

Prehistoric	Historic	Pre/historic	Total
5	57	9	71

The current condition of sites within the analysis area was assessed by reviewing archaeological site records and monitoring forms. Records indicate that 30% (n=21) of heritage resource sites have been monitored within the last five years, with 6% (n=4) having been monitored within the last twelve months. 46% (n=33) have never been

monitored. Table 4-29 shows the condition of sites within the LMF American River watershed. The frequency distribution for the condition of sites resembles a bell-shaped curve, with 86% of the sites in good or fair condition.

Table 4-29. Condition of archaeological sites within the LMF American River analysis area

Site Type	Excellent 100 – 90% intact	Good 90 – 50% intact	Fair 50 – 10% intact	Poor <10% intact	Total
Prehistoric	0	2	2	1	5
Historic	5	19	30	3	57
Pre / hist	1	5	3	0	9
Total	6	26	35	4	71

Archaeological site records and monitoring forms were also used to identify the sources of negative impacts to archaeological sites within the analysis area. Impacts have resulted from one or more of three broad categories: permitted Forest activities, non-permitted Forest activities, and natural processes.

Permitted activities account for the largest number of site impacts (76%). Permitted activities that have impacted sites include logging, road construction and maintenance, trail construction, use and maintenance, dispersed camping, mechanical vegetation treatment, grazing, mining, and infrastructure maintenance (well drilling). Although it was not possible to determine with the available data set, it is likely that many of these impacts occurred prior to the advent of modern cultural resource management, particularly those attributable to road construction and logging activity. Non-permitted Forest activities that have impacted heritage resources include vandalism/looting and construction/use of non-system trails. Naturally caused impacts to archaeological sites in the analysis area have resulted primarily from erosion and fire. Figure 4-5 shows the proportion of permitted Forest activities, non-permitted, and natural processes that have impacted sites. Table 4-30 shows the frequency of impact sources to sites.

Figure 4-5. Sources of impacts to heritage resources within the LMF American River analysis area

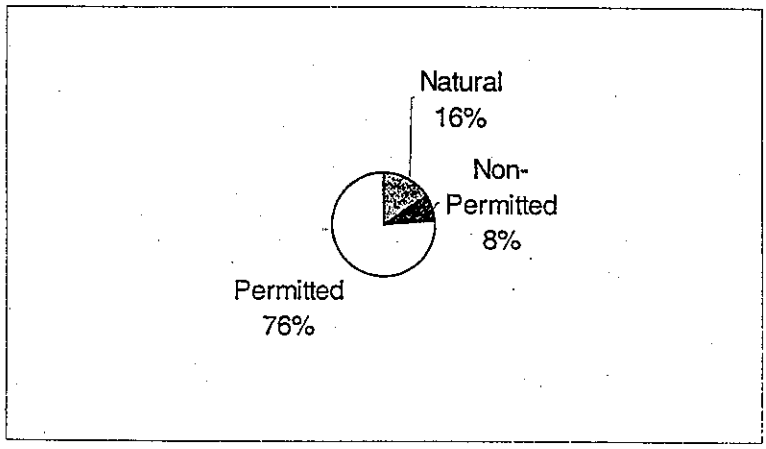


Table 4-30. Impacts to heritage resources within the LMF American River analysis area

Type of Impact	Frequency
Roads	25
Logging	23
Erosion	9
Dispersed camping	7
Vandalism	6
Mining (modern)	5
Fire	3
Trails (permitted)	3
Grazing	2
Mechanical Treatment	2
Trails (non permitted)	1
Fallen trees	1
Facilities	1

Of the 71 heritage resource sites, none have been evaluated for inclusion on the National Register of Historic Places. As a result, all sites are presumed to be eligible for inclusion. Avoidance has been the primary means by which potentially significant heritage resources have been protected in the LMF American River area.

Of the 14,969 acres of Forest Service administered land within the analysis area, 3,723 acres (25%) have been inventoried for the presence of cultural resources. Survey strategies used during field reconnaissance include <15 meter, 30 meter, and 50 meter transect spacing.

At present the Georgetown District has one property within the LMF American River analysis area that is actively being managed for its interpretational value. The Heritage Oak, Stop #3 on the Georgetown History Tour, is a huge live oak that is on the Register of Large Species.

Local Native American tribes and other communities have consistently expressed a desire to collect forest resources for crafts, traditional/ceremonial purposes, as well as educational tools. Resources commonly sought include bear grass, cedar bark, rocks, willow, elderberry, acorns, and yew wood. At present, the distribution of traditionally important plants is not well understood. However, a small patch of bear grass, which is prized by basket makers, was recently located within the area.

Step 5: Reference and Desired Conditions

This step analyzes existing conditions relative to the reference conditions and desired conditions. Reference conditions are those conditions that would follow from current conditions in the absence of major disturbance. Desired conditions are described in SNFP as a common vision for the land that management will move toward or maintain. Descriptions of desired condition found in SNFP are shown in italics of the following pages.

Vegetation Conditions

Reference Conditions (potential natural vegetation)

Potential Natural Communities (PNC) describes the assemblage of plant species expected to occur in an area in the absence of major disturbance. Plant associations are the primary level in the classification hierarchy and are characterized by a group of co-occurring plant species that would develop and sustain itself without disturbance. Plant associations usually are named for the climax species that dominate, or have the potential to dominate, the principle vegetation layers. In California, frequent natural fires are an important component of ecosystems and in some cases, frequent fire would prevent potential natural vegetation from fully developing. When describing potential natural vegetation, the fire ecology and effects of a natural fire regime on the species composition and structure are usually included, if known. For example, the natural fire regime for a Ponderosa pine-mixed conifer/bearclover/Bolander's bedstraw plant association is frequent low-intensity fires. Under this regime the tree layers would be dominated by pine species and incense cedar rather than a mixed layer that also includes Douglas-fir and white fir.

For the landscape assessment area, description of the PNC types is based on a composite of several source potential natural vegetation layers. The primary source includes areas mapped in detail at the Order II level (landtype phase) using photo-interpretation and extensive ground-truthing (Rock Creek Ecological Unit Inventory). The second source includes areas mapped using photo-interpretation with some ground-truthing and previous ecological classification plots in relatively undisturbed sites in the montane portion (mixed conifer) of the forest. The third source was modeled potential natural vegetation for the montane portion of the forest (Fites 2003). Approximately 85,000 acres have been mapped into potential natural communities (Maps 13 and 14) using the dominant association (PNV1) and the co-dominant or second association (PNV2) if present. These have been grouped into broader categories using primarily PNV1 and common environmental characteristics that include aspect, topographic position, hydrologic characteristics (moisture, humidity, precipitation), and soil information such as depth, or amount of rock or coarse fragments. These broader categories (moist, dry, moderate, rocky) are similar to habitat types and are useful for depicting landscape

patterns. The designations into plant series is based on Region 5 PNV Official Code Table updated to March 26, 2003.

SF American River-Chili Bar Watershed

Ten forest series, and both shrub dominated and herb dominated non-forest plant series, occur in the watershed. The Mixed Conifer series typically occurs between 3,000-6,000 feet. This series is comprised of a diverse mixture of Douglas-fir, ponderosa pine, incense cedar, white fir, and sugar pine with various mixtures of hardwoods such as black oak, canyon live oak, tanoak, and madrone. On moister sites dogwood and bigleaf maple dominate the lower and middle midstory levels with white alder along riparian areas bordering perennial streams.

Within the Mixed Conifer and Douglas-fir series, tanoak may be present in areas of higher precipitation (greater than 50 inches) and on cool moist sites. Although it is most prevalent on the Tahoe and Plumas National Forests, it also occurs in large areas on the Georgetown Ranger District within the SF American River-Chili Bar Watershed. Tanoak occurs on various aspects, but often where the microclimate is moist and cooler, such as in drainages or on north or east-facing slopes at lower elevations. Plant associations or habitat groups with a tanoak component have a characteristic multi-layered or bi-layered canopy structure with a dense mid-story of tanoak (Fites 1993). Canyon live oak may occur with tan oak as a co-dominant species.

Below 3,000 feet in elevation, the Douglas-fir series, Douglas-fir-ponderosa pine series, and Ponderosa pine series occur along the western portion of the watershed. The Douglas-fir series can be found on moderate to steep slopes with a northerly aspect or along drainages. The topographic position ranges from upper to lower slopes. Rock outcrops or surface rock may be present especially on steeper slopes. The Douglas-fir-Ponderosa pine series can be found on north to northwest facing gentle to moderate upper slopes and ridges with a typical bi-layered canopy. Widely scattered hardwoods are present in the midstory with black oak as the dominant species. On shallow soils and steeper slopes, the forest canopy is more open and canyon live oak dominates the mid-story. The Ponderosa pine series occurs below 3,000 feet usually above the blue oak-gray pine and below the mixed conifer on south or west facing slopes and ridges, or shallow soils. It generally covers small areas on National Forest land, with the larger areas found on private lands to the west of Forest boundaries. It is typically an open forest or woodland, and black oak is often present in the mid-story. The Gray pine-blue oak and Gray pine series are open woodlands and typically occur on south to west facing slopes in dry, rocky areas at lower elevations or on serpentine soils. Mid-story species include blue oak, canyon live oak, interior live oak, and black oak. The Canyon live oak series dominate the steep river gorges in the lower montane and foothill regions and may also be found on rocky sites, rock outcrops, or shallow soils in montane areas. Widely scattered conifers may occur in very low amounts.

The shrubland plant series: Sierran montane serpentine, Sierran lower montane, and Sierra foothill are found on rocky exposed sites that have very shallow soil developing between rock outcrops or on serpentine areas. These sites typically occur on ridge tops or steep slopes at elevations of 2,000 to 4,500 feet. Shrub cover is dominated by whiteleaf manzanita, chamise, deer brush, or some other low elevation shrub species. Within the

non-forest plant series, the herb-dominated communities are primarily meadows that include common meadow species such as sedges, forbs, and grasses.

PNC groups

The PNC layer (Map 13) includes plant associations or plant association groups (ecological or habitat groups) based on environmental variables (e.g. elevation, aspect, topographic position, soil characteristics). The plant associations for the mixed conifer area are described in *Ecological Field Guide to Mixed Conifer Plant Associations* (USDA FS 1993b) and for the lower elevation within the SF American River-Chili Bar Watershed in the Ecological Unit Inventories for Rock Creek Area. It is difficult to map and describe the difference between various plant associations and where they occur. For ease of analysis types are grouped into categories of ecological or habitat groups such as ponderosa pine-mixed conifer dry or Douglas-fir-mixed conifer moist. Refer to Table 5-1 for a listing of PNV groups and representative plant associations (depicted as numerical types). The full names of the plant associations found in each watershed are listed in Appendix D.

Table 5-1. GIS data on potential natural communities within the SF American River-Chili Bar landscape area

PNV1	Potential Natural Community Group	Acres	Plant Series
300, 302, 304 (309, 310)	Douglas-fir moist (includes Douglas-fir wet or riparian)	737	Douglas-fir
305, 320, 321, 322	Douglas-fir moist/rocky	582	Douglas-fir
325, 326, 327,	Douglas-fir dry	2,045	Douglas-fir
329, 330, 331, 332, 334, 340 (749)	Douglas-fir dry/rocky	3,394	Douglas-fir
341, 342	Douglas-fir – tan oak dry	3,733	Douglas-fir-tan oak
351, 352, 360	Douglas-fir – tan oak moist	778	Douglas-fir-tan oak
370, 371, 372	Douglas-fir-ponderosa pine dry	2,870	Douglas-fir-ponderosa pine
380, 381, 382, 384	Douglas-fir-ponderosa pine dry/rocky	3,528	Douglas-fir-ponderosa pine
383	Douglas-fir-ponderosa pine woodland	36	Douglas-fir-ponderosa pine
390, 391	Ponderosa pine dry	498	Ponderosa pine
392, 400, 401	Ponderosa pine dry/rocky	1,716	Ponderosa pine
420, 421, 425	Gray pine - oak woodland	310	Gray pine-blue oak
450, 453, 454	Canyon live oak hardwood forest/ woodland	921	Canyon live oak
761, 762	Douglas-fir -mixed conifer-tan oak dry	3,320	Douglas- fir-mixed conifer-tan oak
803, 816	Douglas-fir-mixed conifer-tan oak wet riparian	120	Douglas-fir-mixed conifer-tan oak
765, 766, 770	Douglas-fir-mixed conifer moderate	3724	Douglas-fir-mixed conifer
775, 779	Douglas-fir-mixed conifer moist	8,418	Douglas-fir-mixed conifer
785, 786	Douglas-fir-mixed conifer moist/rocky	346	Douglas-fir-mixed conifer
841, 850	White fir-mixed conifer dry	293	White fir-mixed conifer
901, 902, 910, 912	Ponderosa pine-mixed conifer	22,289	Ponderosa pine-mixed conifer
915, 916, 917, 918	Ponderosa pine-mixed conifer dry/rocky	1,409	Ponderosa pine-mixed conifer
1001, 431	Sierran montane serpentine shrubland, Gray pine	72	Sierran montane serpentine shrubland, Gray pine
2001, 2003	Sierran lower montane shrub group, Sierra foothill shrub group	1,826	Sierran lower montane shrub group, Sierra foothill shrub group
2200, 5000	Moist meadow, meadow, meadow (undifferentiated)	116	Meadow

Existing vegetation

Comparing existing natural vegetation with potential natural communities may be useful in understanding PNC within the landscape. Existing natural vegetation is the vegetation that occurs on a site at any given time. It may change through time in both species composition and structure, especially if it represents an early-seral stage. In contrast,

using PNC, the classification of the area would remain the same over time, changing only with major environmental changes such as landslides, or severe soil erosion.

The existing vegetation layer (Map 8 and Table 5-2) uses the CALVEG Classification System. The cover type is developed from Landsat Imagery and divided into hierarchical classes based on the percent cover (greater than 10%) of the dominant type. For Conifer, the dominant type has greater than 10% conifer cover; for Mixed it is greater than 10% cover of conifers and greater than 20% cover of hardwoods. Barren includes less than 10% cover of any natural vegetation. The vegetation type has been developed by vegetation zone and dominant tree type. The CWHR refers to the California Wildlife Habitat Relationship classification system.

Table 5-2. Existing vegetation in the SF American River-Chili Bar landscape area

Cover type	Veg type	CWHR	Acres
Agr	Agriculture		1,073
Bar	Barren		433
Conifer	Douglas-fir-Ponderosa pine	DFR	21,062
Conifer	Mixed conifer-fir	SMC	487
Conifer	Mixed conifer-pine	SMC	11,829
Conifer	Ponderosa pine	PPN	21,619
Mixed	Douglas-fir - pine	DFR/MHC	8,220
Mixed	Mixed conifer-fir	MHC	11
Mixed	Mixed conifer-pine	MHC/SMC	875
Mixed	Gray pine	MHC/MHW/BOP	153
Mixed	Ponderosa pine	PPN/MHC	13,795
Hardwood	Canyon Live Oak	MHW	2,881
Hardwood	Blue Oak	BOW	367
Hardwood	Black Oak	MHW	1,715
Hardwood	Cottonwood/Alder	MRI	22
Hardwood	Willow	MRI	12
Hardwood	Interior Live Oak	MHW	1,659
Shrub	Mixed Chaparral*	MCH	6,899
Herbaceous	Annual grassland/forbs	AGS	1,749
Herbaceous	Wet Meadow	WTM	142
Urban			103

Comparison of Current Conditions with the Reference Conditions

Comparisons between PNC, existing vegetation using the CALVEG classification system, and CWHR types is difficult due to acreage differences (PNC mapping for the SF American River-Chili Bar Watershed covers less than70% of the landscape), WHR or tree density crosswalks (assumptions are too broad to use), and complexity and diversity of the vegetation overall (transition between foothill and montane, species label

definitions). In addition, almost 1,200 acres have been developed for residential or agricultural uses.

The vegetation within the watershed has been modified as a result of timber harvest, mining, fire suppression activities, wildfires, residential development, and agriculture. Fire suppression since the early 1900's and selective harvesting of ponderosa and sugar pines have affected stand composition, structure and susceptibility to insect attack (Bakke 1997). The result is a decrease in the number of large diameter old trees, a decrease in both ponderosa pine and sugar pine in those areas, and an increase in more shade tolerant trees such as incense cedar, Douglas-fir, and white fir (along the eastern edge of the watershed). In addition, the increase in shade-tolerant fir and cedar create a multi-layered stand structure where previously the historic range was more open-canopied ponderosa pine-dominated stands. The increase in shade-tolerant conifers along with fire suppression activities may have reduced the proportion of oak especially black oak within many stands. Black oak is ranked as one of the most shade intolerant tree species (Minore 1979). Within the overstory of mixed conifer PNC groups, the relative cover of white fir ranges from 23 to 42% cover on those sites that are moist with multi-layer canopies. For drier sites such as Ponderosa pine-mixed conifer, the relative cover of white fir ranges from 7 to 32%. Although white fir is a minor associate in the highest overstory layers of late-seral forests, it is prevalent in the mid-story because of fire suppression and in higher amounts in the understory and regeneration layers along with incense cedar (Fites 1993).

In landscape assessment conducted on the ENF in 1996, a vegetation submodel was developed to identify those areas of the forest in the ponderosa and mixed conifer zones where the existing conifer structure and species should be dominantly ponderosa pine (ENF 1996). The submodel compared the existing vegetation layer of the Ponderosa pine (PP) type with the mapped Ponderosa pine-mixed conifer PNC (PP-MC) group. Where the PP type and PP-MC type did not overlap or correlate, then the assumption was made that the vegetation was outside of the recommended management variability. This range was defined to identify areas where the historic open-canopied ponderosa pine dominated stands have changed. In addition comparison of crown closure class in the existing vegetation layer of "G" (>70%) against Ponderosa pine-mixed conifer, Douglas-fir-Ponderosa pine, and White fir-mixed conifer dry PNC types was assessed. This would indicate an existing closed canopy condition that would be considered outside of the range and is likely due to increase of shade-tolerant species. The relationship was expressed as a rating of the percent of the total forested acres in a watershed outside of the range. Within the SF American River-Chili Bar 5th field Watershed, there were four watersheds that had vegetation outside of the recommended management variability: two HUC 7 watersheds: Pino Grande and Brush Creek, and two HUC 8 watersheds: Rock Creek Main and Canyon Creek (see Map 8 for locations).

Lower Middle Fork American River

Plant series

The landscape assessment area for the LMF American River covers 62,172 acres of the watershed. Description of the PNC types is based on modeled potential natural vegetation for the montane portion of the forest and a few areas mapped using photo-interpretation with some ground-truthing. Only 19,970 acres were mapped for PNV

(32% of the watershed, within ENF boundary). Ten forest series and three shrub dominated non-forest plant series occur in the watershed. The Mixed Conifer series comprises a diverse mixture of Douglas-fir, ponderosa pine, incense cedar, white fir, and sugar pine with various mixtures of hardwoods such as black oak, canyon live oak, tanoak, and madrone. On moister sites dogwood and bigleaf maple may dominate the midstory with white alder, cottonwood, and willows along riparian areas bordering perennial streams. Below 3,000 feet in elevation, the Douglas-fir series and Ponderosa pine series occur along the eastern portion of the watershed. The Douglas-fir series can be found on moderate to steep slopes with a northerly aspect or along drainages. The topographic position ranges from upper to lower slopes. Rock outcrops or surface rock may be present especially on steeper slopes. Within the Mixed Conifer and Douglas-fir series, tanoak may be present in areas of higher precipitation (greater than 50 inches) and on cool moist sites. In the LMF American River Watershed, tan oak is restricted to small areas in the eastern portion of the ENF and probably the northern portion on the Tahoe National Forest. Tanoak occurs on various aspects, but often where the microclimate is moist and cooler, such as in drainages or on north or east-facing slopes at lower elevations (Fites 1993).

The Ponderosa pine series occurs below 3,000 feet usually above the blue oak-gray pine area and below the mixed conifer on south or west facing slopes and ridges, or shallow soils. It is typically an open forest or woodland, and black oak is often present in the mid-story. The Canyon live oak series dominates the steep river gorges in the lower montane and foothill regions and may also be found on rocky sites, rock outcrops, or shallow soils. Other oaks such as blue oak, interior live oak, and black oak may also be present in varying amounts along with scattered conifers such as gray pine that may occur in low amounts.

The Sierran montane serpentine shrubland and Sierran lower montane shrub group series are found on rocky exposed sites that have very shallow soil developing between rock outcrops and on serpentine areas. These sites typically occur on ridge tops or steep slopes at elevations of 2,000 to 4,500 feet. Shrub cover is dominated by whiteleaf manzanita, chamise, scrub oak, ceanothus, or some other low elevation shrub species. On serpentine soils, the plant series may include abundant amounts of chamise and toyon; local serpentine endemics may also be prevalent along with scattered gray pine. Within the LMF American River watershed, a serpentine area extends in a southwest direction along Volcano Canyon on the Tahoe National Forest to the LMF American River and along a low ridge between Kanaka Gulch and Josephine Canyon through Volcanoville and Little Bald Mountain toward Canyon Creek on the ENF. The willow shrub and undifferentiated series may be part of riparian habitat that may include willow occuring as stringers along seeps or streams.

PNC groups

The plant associations for the mixed conifer area are described in *Ecological Field Guide to Mixed Conifer Plant Associations* (USFS 1993), the Ecological Unit Inventories plant descriptions for Rock Creek Area for some of the lower elevation types, and the *Draft Eldorado National Forest Ecological Unit Inventory Landtype Association* (Fites 2003). For a complete listing for this landscape analysis see Appendix F. Plant associations are

grouped into categories of ecological or habitat groups such as ponderosa pine-mixed conifer dry or Douglas-fir-mixed conifer moist for ease of analysis. The mapped PNC layer (Map 14) is a draft version and the types derived from the model are still being refined and checked. Table 5-3 lists PNV groups and representative plant associations found in each with changes noted from the mapped PNC layer. The mixed conifer series typically occurs above 3,000 feet in elevation. PNC within the watershed below 3,000 feet that was typed as Douglas-fir mixed conifer was changed to Douglas-fir PNC group and series. The PNC type described as rock may include scattered herbaceous or shrub plant species that grow either on rock outcrops or within cracks of granite outcrops.

Table 5-3. GIS data on potential natural communities within the LMF American River landscape area (limited to that portion mapped on the Eldorado NF)

PNV1	Potential Natural Community Group	Acres	Plant series
300, 810	Douglas-fir moist (includes Douglas-fir wet or riparian)	80	Douglas-fir
325	Douglas-fir dry to moderate	2,594	Douglas-fir
329	Douglas-fir dry to moderate/rocky	1,183*	Douglas-fir-canyon live oak
390	Ponderosa pine dry	16	Ponderosa pine
392, 400	Ponderosa pine dry/rocky	3,716	Ponderosa pine-canyon live oak
450, 452, 453	Canyon live oak hardwood forest/ woodland	676	Canyon live oak
761	Douglas-fir -mixed conifer-tan oak	5	Douglas-fir-mixed conifer-tan oak
765, 766, 770	Douglas-fir -mixed conifer moderate	1,131**	Douglas- fir-mixed conifer
775	Douglas-fir -mixed conifer moist	2,646	Douglas- fir-mixed conifer
786	Douglas-fir -mixed conifer moist/rocky	7	Douglas- fir-mixed conifer-canyon live oak
901, 910, 912	Ponderosa pine-mixed conifer dry	6,526	Ponderosa pine-mixed conifer
918	Ponderosa pine-mixed conifer dry/rocky	213	Ponderosa pine-mixed conifer-canyon live oak
1001	Sierran montane serpentine shrubland	266	Sierran montane serpentine shrubland
2001	Sierran lower montane shrub group	836	Sierran lower montane shrub group
1700	Willow shrub undifferentiated	16	Willow shrub
3000	Rock/tailings	59	Rock

* Entire Douglas-fir-mixed conifer-canyon live oak group retyped as Douglas-fir-canyon live oak due to location below 3,000 ft.

**Those polygons of Douglas-fir-mixed conifer/moderate below 3,000 ft in elevation retyped as Douglas-fir dry to moderate type

Existing vegetation

The existing vegetation layer (Map 8 and Table 5-4 is based on the CALVEG Classification System and has been developed by vegetation zone and dominant tree type. The CWHR refers to the California Wildlife Habitat Relationship classification system. Within the watershed, 58,975 acres have been mapped as existing vegetation, which covers 98% of the total watershed acres. Existing vegetation for the lowest western

portion of the watershed in the Pilot Hill quadrangle and a small sliver in the Colfax quadrangle are not available for this landscape assessment.

Table 5-4. Existing Vegetation in the LMF American River landscape area

Cover type	Veg type	CWHR	Acres
Agr	Agriculture	CRP	5
Bar	Barren	BAR	398
Conifer	Douglas-fir-Ponderosa pine	DFR	10,979
Conifer	Mixed conifer-non-native	CRP	66
Conifer	Mixed conifer-pine	SMC	486
Conifer	Gray pine	BOP	353
Conifer	Knobcone pine	CPC	116
Conifer	Ponderosa pine	PPN	7559
Conifer	Non-native/Ornamental conifer	CRP	66
Mixed	Douglas-fir - pine	DFR,MHC,MHW	9333
Mixed	Mixed conifer-knobcone pine	CPC,MHC	46
Mixed	Mixed conifer-pine	MHC,SMC	162
Mixed	Gray pine	MHW,MHC,BOP	1574
Mixed	Ponderosa pine	PPN,MHW,MHC	10549
Hardwood	Canyon Live Oak	MHW	5513
Hardwood	Blue Oak	BOW	645
Hardwood	Black Oak	MHW	2322
Hardwood	Interior Live Oak	MHW	3317
Hardwood	Mixed hardwoods (non-productive)	MHW	75
Shrub	Mixed Chaparral*	MCH, MCP	4029
Herbaceous	Annual grass/forb	AGS	1151
Herbaceous	Wet Meadows	WTM	14
Urban	Urban/residential	URB	185

*Combination of Ceanothus Mixed Chaparral, Scrub Oak, Manzanita, Upper and Lower Montane mixed chaparral

Only a small portion of the LMF American River watershed is above 3,000 feet in elevation, generally east of the towns of Foresthill, Volcanoville, and Georgetown. The majority of the watershed is within the 2,000-foot zone and the majority of the mainstem of the LMF American River is within the 1,000-foot zone. The vegetation reflects these zones in the predominance of hardwood cover as mixed conifer/hardwood woodlands or hardwood forest/woodlands in the lower elevations. These are dominated by varying combinations of canyon live oak, interior live oak, and black oak with occasional scrub or blue oak present. The shrub lands tend to be limited to serpentine areas and to the south facing slopes of the foothills in the lower portion of the watershed. There are small pockets of knobcone pine, a closed cone fire dependent species, located mostly on the Tahoe National Forest with one pocket on the ENF near Volcanoville. Interior live oak occurs along the south facing inner gorge areas of the LMF American River and may occur with canyon live oak and Gray pine in varying amounts. Mixed conifer/hardwood

woodlands and forests of Douglas-fir occur along the steep north facing steeper slopes above the major river canyons of the LMF American River, Otter and Canyon Creeks while ponderosa pine forests dominate the areas along the south facing slopes and ridges.

Comparison of Current Conditions with the Reference Potential Natural Community Conditions

Since only a small portion of the watershed has been mapped for PNC, it is not practical to do any comparisons with current conditions (existing vegetation).

Desired Conditions for Old Forest Emphasis Area land allocation

> *Old Forest conditions, as determined by site capability, exist and are maintained on the greatest proportion of acres in old forest emphasis areas as possible.*
>
> *Old forest emphasis areas provide a network of large, relatively contiguous landscapes...where old forest conditions and associated ecological processes predominate. These areas provide a substantial contribution of ecological conditions to maintain viable populations of old forest associated species.*

Comparison of the Existing Condition with the Desired Condition

As previously described, a "definitive" mapping of existing "old forest" does not exist. Two data sources that can be compared to this desired conditions statement are: (1) Proportion of the landscape and proportion of old forest emphasis areas in SNEP Rank 4 and 5 LS/OG polygons and (2) Proportion of the landscape and proportion of old forest emphasis areas in CWHR size class 5 or 6.

The EIS for the *Sierra Nevada Forest Plan Amendment* estimated that approximately 50 to 90% of Sierra Nevada coniferous forests were in old forest conditions historically. Currently, the EIS estimates that old forest conditions occur on 2 to 20% of these National Forest lands (based upon mapping of Rank 4 and 5 old forest for the Sierra Nevada Ecosystem Project). These lower elevation landscapes fall into the lower end of this range. LMF American River is below this range, and SF American River-Chili Bar is at the lower end with 5% mapped as Rank 4. However, there is some potential to increase the high quality late-successional conditions as Rank 3 areas continue to mature. The low-quality early-successional areas (Rank 0-2) mostly lack the potential to provide late-successional conditions.

Additional Information or Analysis Needs: The need remains for development of stand-level inventory techniques for mapping existing old forest, and techniques for monitoring changes in the amount of old forest over time. In addition, estimates of historic conditions will undoubtedly be refined over time as well, with improved analysis techniques and refined knowledge of historic disturbance regimes.

Desired Conditions for Riparian Conservation Area Allocation – Meadows

The ecological status of meadow vegetation is late-seral (50% or more of the relative cover of the herbaceous layer is late-seral with high similarity to the potential natural community).

Meadows are hydrologically functioning. Sites of accelerated erosion, such as gullies and headcuts are stabilized and recovering. Vegetative rooting occurs throughout the available soil profile.

Comparison of the Existing Condition with the Desired Condition

Vegetative and hydrologic conditions of meadow-like features in the SF American River-Chili Bar and LMF American River landscape areas are generally unknown. It has been noted that Kings Meadow in the SF American River-Chili Bar watershed has a diverse vegetative community; however this meadow is mostly located on private land.

Additional Information or Analysis Needs: Measurement of existing vegetative and hydrological condition for these features in both landscape areas would be helpful. Future management options are probably limited.

Desired Conditions for Lower Westside Hardwood Ecosystems

A diversity of structural and seral conditions is present in landscapes in proportions that are ecologically sustainable at the watershed scale.

Regeneration and recruitment of young hardwood trees is sufficient over time to replace mortality of older trees.

Hardwood ecosystems are present in sufficient quality and quantity to provide important habitat elements for wildlife and native plant species.

Comparison of the Existing Condition with the Desired Condition

Field review of various oak stands within the SF American River-Chili Bar and LMF American River landscape areas indicate that these areas consist of mostly mature trees with little regeneration. This is mainly attributed to a change in the historic fire regime resulting in increased conifer encroachment shading out oaks and an increase in the duff layer inhibiting seedling establishment. Some oak stands have been treated in the SF American River-Chili Bar watershed to encourage oak regeneration by thinning conifers and some mature oaks and following up with prescribed burning. There has been a noticeable increase in oak sprouts following treatment.

Additional Information or Analysis Needs: The need remains for refinement of historic condition estimates for oak woodlands and conifer/oak vegetation types. Improved mapping techniques for hardwoods, particularly in conifer/oak types, and techniques for monitoring of oak density and distribution over time are also needed. Sampling for birds dependant on this habitat type could provide a mechanism for long-term monitoring of the quality of oak woodland habitat.

Desired Conditions related to noxious weeds

While the desired condition is that there will be no noxious weeds on the forest, a more realistic goal is to have an integrated weed management approach that (1) Prevents the introduction of new invaders; (2) Conducts early treatment of new infestations; and (3) Contains and controls established infestations.

Comparison of the Existing Condition with the Desired Condition

Scotch broom, yellow starthistle, and skeletonweed, the 3 most prevalent noxious weeds in the analysis area are currently being managed at the project level using various prescribed techniques. As funding becomes available it is planned that a forest-wide noxious weeds control analysis will be completed which will give a more definitive picture of the extent of control and eradication of these and other noxious weeds.

Wildlife Species and Habitat Conditions

Reference Conditions

With the exception of information pertaining to the historic range of various species, reference conditions for wildlife populations in the SF American River-Chili Bar and LMF American River landscape area remain largely unknown. Because figures are unavailable on historic populations or changes over time, reference conditions for various habitat types generally provide the best mechanism for describing historic conditions for wildlife species.

Changes familiar across coniferous forests in the Sierra Nevada also exist within the SF American River-Chili Bar and LMF American River watersheds, such as the reduction of fire frequency and the subsequent conversion of many forest communities from pine dominated to fir dominated stands, resulting from logging and fire suppression (see discussion above). These changes have undoubtedly affected habitat conditions for a number of species, and are specifically addressed for avian species in Bird Conservation Plans prepared by California Partners in Flight. In the Sierra Nevada, the gradual conversion to stands dominated by white fir rather than pine and oak, may have resulted in changes to avian communities. The combined Douglas-fir/oak woodland habitats of the Klamath/Siskiyou Mountains were found to support the highest abundance and diversity of birds (Alexander 1999). To the extent that the abundance of Douglas-fir and oak has declined within the SF American River-Chili Bar and LMF American River landscape area (see the discussion of current and reference conditions for vegetation), changes in bird species composition or abundance may have occurred.

A substantial number of avian species found within the coniferous forest types occurring within the landscape area are known to be associated with hardwood species, including the following priority bird species: black-headed grosbeaks, black-throated gray warblers, Lewis' woodpeckers, and band-tailed pigeons (CalPIF 2002a, CalPIF 2002b, RHJV 2000). Where management for timber has created plantations or stands that no longer provide the same diversity of deciduous and other non-timber tree species, changes in bird species composition and abundance have likely occurred. About 4% of the National Forest lands in the landscape area are in plantations. Managing for oak recruitment in

plantations that occur in the appropriate community types in this landscape area should be an important objective for forest birds.

Historic distribution of the California red-legged frog included the entire western half of El Dorado and Placer counties (US FWS 2002) thus are known to have suffered substantial range reduction. Western pond turtle distribution has suffered as well. Historically, they had enormous population sizes as a result of a lack of many types of predators or competitors (Holland 1986). These population sizes changed, mostly as a result of extension of the range of humans into the areas of the landscape. Bullfrogs, a predator to young western pond turtles and all life stages of native frogs, were known to have been introduced to California from the southeastern states early this century, and have been affecting native aquatic species exponentially as bullfrog range expands.

The range of hardhead fish probably existed continuously within both the SF American River and the MF American River. Prior to the era of dam building, there were optimum water temperatures and flows for spawning and rearing during spring and summer, and habitat complexity elements near the banks for hiding cover for young.

The range of foothill yellow-legged frogs was in large river locations similar to hardhead, as well as in the connecting tributary streams. Bedload elements of river bars contained suitable substrate sizes for egg mass attachment near warmer water, shallow side channel and edge locations for tadpole rearing. Complexity of habitats for all aquatic species was dynamic from the annual downstream movement of large wood elements.

Desired Condition for General Forest

> *The amount, quality, and connectivity of old forests in the general forest areas, support replacement rate reproduction for the California spotted owl and other old forest associated species. The density of large, old trees and the continuity and distribution of old forests across the landscape is increased. The amount of forest with late-successional characteristics (for example diverse species composition, higher canopy cover, multi-layered canopy, higher density of large diameter trees, snags and coarse woody material) is also increased.*

Comparison of the Existing Condition with the Desired Condition

California spotted owl: The *Sierra Nevada Forest Plan Amendment* directs that at least 1,000 acres of suitable habitat (defined as stands with at least 50% canopy cover and trees an average of at least 11 inches in dbh), be provided within a "home range core area" occurring within 1.5 miles of each spotted owl activity center, as one means of moving toward this desired condition for the California spotted owl. Home range core areas (HRCAs) have been mapped for spotted owl activity centers within the SF American River-Chili Bar and LMF American River landscape areas. There are 13 spotted owl sites currently identified on ENF lands in the SF American River-Chili Bar watershed. Five owl sites have been identified on ENF lands and one site on private land in the LMF American River watershed. Each of the spotted owl sites was found to have at least

1,000 acres of suitable habitat available within a 1.5-mile radius of the activity center, although many of the HRCAs overlap with other owl sites.

Desired Condition for Spotted owl PACs, HRCAs and goshawk PACs

Stand structure for each of these land allocations includes (1) at least two tree canopy layers, (2) trees in the dominant and co-dominant crown classes averaging at least 24 inches dbh, (3) at least 70% tree canopy cover, and (4) a number of very large (greater than 45 inches dbh) old trees, and (5) higher than average levels of snags and down woody material.

Comparison of the Existing Condition with the Desired Condition

The 5 and 6 CWHR size classes with greater than 70% canopy cover provide the closest approximation for these desired conditions using vegetation data available throughout the landscape area. The mean proportion of 5 and 6 size class stands with greater than 70% canopy cover found within 13 spotted owl PACs in the SF American River-Chili Bar landscape area is approximately 23%. These proportions range from 0 to 52%. The proportion is considerably smaller within the larger HRCA allocation. The mean proportion of highly suitable habitat within the 5 spotted owl sites on Forest Service lands in the LMF American River landscape area is approximately 14%, ranging from 6 to 28%. Within goshawk PACs, the mean proportion of habitat within the 4 PACs in the SF American River-Chili Bar watershed that meets these desired conditions is 32%. In the three goshawk PACs in the LMF American River landscape area, the mean proportion of habitat meeting desired condition is 23%. Based on these figures, spotted owl PACs and goshawk PACs are not meeting desired conditions. Current management direction under the SNFP, however, is designed to move forested landscapes both outside and within PACs toward desired conditions.

Additional Information or Analysis Needs: Further information on PACs could identify opportunities for increasing the rate of development of old forest conditions in certain types of stands. These efforts should focus on identifying where plantations and stands of dense, even-aged, and small diameter trees occur within PACs.

Hydrology

Reference Conditions

The Sierra Nevada Forest Plan Amendment provides nine broad statements of desired conditions or goals for Riparian Conservation Areas (RCA), also referred to as "Aquatic Management Strategy Goals" (*Sierra Nevada Forest Plan Amendment ROD*, pages 10-11) summarized categorically below:

Desired Condition (Aquatic Management Strategy Goals)

#1. Water Quality
#2. Species Viability
#3. Plant and Animal Community Diversity
#4. Species Habitats
#5. Watershed Connectivity
#6. Floodplains and Water Tables
#7. Watershed Condition
#8. Streamflow Patterns and Sediment Regimes
#9. Streambanks and Shorelines

This landscape assessment compares desired conditions and current conditions by evaluating the management factors most likely to be affecting achievement of these goals. See Map 27 for locations of the RCAs in the landscape area.

A Hydrologic Condition Assessment (ENF March 2003) determined which primary physical and biological drivers affect flow, quality, and timing of water within the SF American River-Chili Bar watershed. It is assumed that the LMF American River has similar characteristics; there has been no HCA assessment nor is one scheduled in the near future. Drivers were rated based on review of existing aquatic and hydrologic surveys, and local knowledge of journey level hydrologist, a geologist, and fish biologist. The main drivers in this watershed include precipitation, drainage density, fire, urbanization, roads, and water rights development. Soil erosion, vegetation, and mass failure also have a notable influence on flow, quality, and timing of water flow in SF American River-Chili Bar watershed. Of the above mentioned drivers, forest management has the ability to influence fire, roads, vegetation, and drainage density as it is related to the extension of the drainage network with hydrologically connected roads, and to a lesser degree, water rights development and urbanization.

The primary drivers identified in the Hydrologic Condition Assessment for SF American River-Chili Bar, were evaluated based on existing information to determine current values for both of the landscape analysis areas versus relatively general reference conditions, the significance of departure from reference, and the potential for recovery. This is shown in Table 5-5 below.

Table 5-5. Comparison of Current and Reference conditions of key factors influencing watershed processes (ENF 2003)

Factor	Units	Current	Reference	Significance	Recovery
Drainage Density	mi/sq mi	SFAR-Chili Bar – 11.5 LMFAR – 8.5	Unknown	Low	Low
Roads	mi/sq mi	SFAR-Chili Bar – 6.9 LMFAR – 6.3	0 (Sierran Mode 1.5-3.5)	High	Mod
Roads	tons/ac/yr	4*	0.0067	High	Mod
Wild Fires	Cu yd/yr	Low	Low	Low	Low
Wild Fires	acres burned/yr	302.7 Given 303 ac burned annually it would take 411 yrs to burn whole watershed.	Historic Fire Database (ENF) Mean Fire interval 4-6 yrs at low elevations (Caprillo & Sweenam 1995)	Mod	Low
Vegetation Density	Stems/ac SDI	79% over desired SDI. (Sample size 96 stands)	Desired is >55-80% of Max SDIs shown below Black Oak=382 D.Fir=545 PPine<421 Sugar pine<645 WFir=755 Cedar<709 Numbers vary by species comp & size	Mod	Mod
Water Rights Development	cfs	High level of water /pond development & unknown status of water rights	None	High	Low

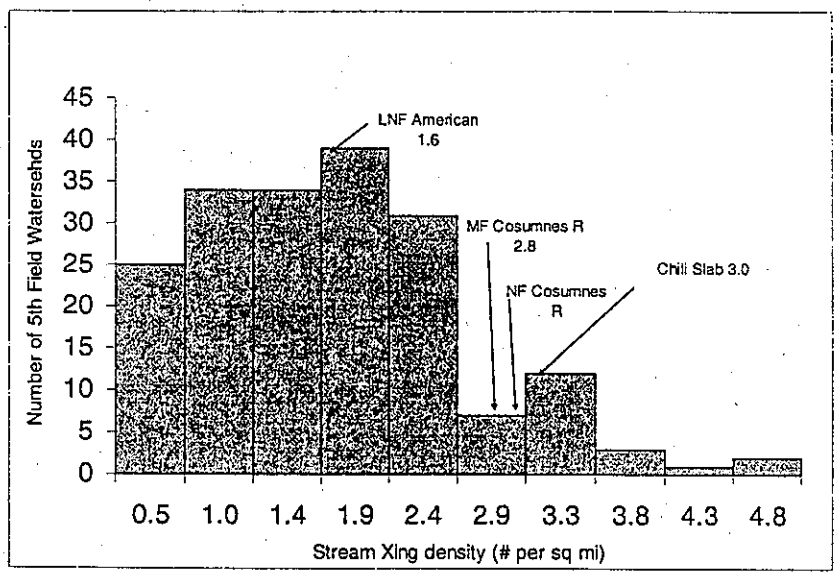
* Colorado State University silt fence average data for roads.

The SF American River-Chili Bar Hydrologic Condition Assessment (ENF March 2003) results, as well as some information compiled for LMF American River indicates that road densities are high and the associated erosion potential associated with these roads is also relatively high. See Figure 4.1 for Sierra Road Density Frequency Distribution. Land uses within the watershed include urbanization in portions and road and trails, timber harvesting, vegetation and fuels management and other uses including grazing and mining. These uses are perceived to be contributing to changes in flow and sediment routing through the fluvial system. Vegetation densities are high and are perceived to be reducing surface and subsurface flow rates through the SF American River-Chili Bar watershed. Active management of roads and vegetation within both watersheds has the ability to influence future water quality, quantity, and timing.

The locations of roads determine the degree of potential impacts, making some roads more environmentally sensitive than others. The presence of roads can increase the frequency of slope failures compared with the rate for undisturbed forest by hundreds of times (Sidle et al. 1985). See Figures 5.1 through 5.6 and Table 5.6 for assessments of near-stream road, stream crossing densities as well as roads per stream mile comparisons within each of the 5th field watersheds and their sub-watersheds.

Road-stream crossings constructed with culverts have been identified as a significant source of road derived sediment (Hagans and Weaver 1987, Best et al. 1995, Weaver et al. 1995, Park et al. 1998) as reported by Moll 1998. Maps 30 and 31 display the locations of road-stream crossings in the landscape area. In addition activities conducted within 100 meters of streams have been found to significantly influence stream channel conditions (McGurk and Fong 1995). A frequency distribution of the stream crossing density for the Sierra Nevada Range is displayed by 5th field watershed in Figure 5-1 below.

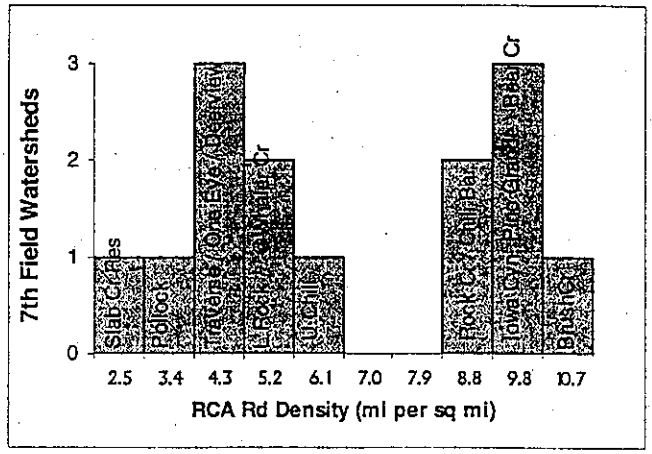
Figure 5-1. Sierra Nevada stream crossing density frequency distribution



Typically road densities are evaluated based on miles per square mile within a watershed. Figure 5-1 indicates that the distribution of roads with high numbers of stream crossings within the SF American River-Chili Bar watershed is significantly higher than most other watersheds in the Sierra Nevada.

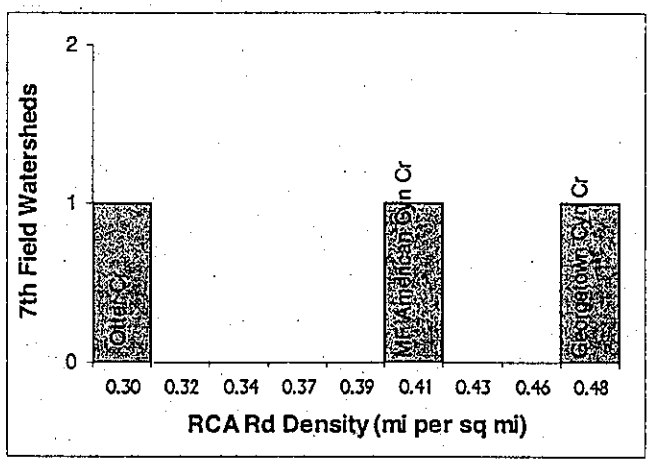
Figures 5.2 and 5.3 below assess near-stream road densities using forest data sets for the sub-watersheds within the 5th field watersheds. Iowa Canyon, Pino Grande, Bear Creek and Brush Creek watersheds have greater than 8.8 miles of near-stream roads per sq mile. These watersheds are good candidates for the potential of reducing near-stream road densities to benefit watershed condition. Many of these watersheds have high levels of private ownership and fairly high levels of urbanization which makes it difficult to influence road densities. Nonetheless, these would be potential areas to prioritize for treatments to roads on federal lands.

Figure 5-2. SF American River-Chili Bar near-stream road density frequency distribution



The LMF American River watershed has lower near-stream road densities, however they are highest in Georgetown Canyon Creek and Otter Creek Watersheds (Figure 5-3). Unfortunately each of these 7th field watersheds also has a very high level of private ownership so the ability to decrease road densities in these locations is limited. Comparatively, road densities are a much greater concern in the SF American River-Chili Bar Watershed.

Figure 5-3. LMF American River near-stream road density frequency distribution



If a watershed has few streams the likelihood of affecting these streams is lower; with higher stream density there is a greater likelihood that disturbances will be within or adjacent to streams and thereby affect more streams. Table 5-6 shows how the roads are distributed relative to streams within the watershed, roads within RCAs, and by stream crossings per stream mile.

Table 5-6. Road density by stream miles

5th Field Watershed	7th & 8th Field Watersheds	Total Rd mi/ Stream mi	Total RCA Rd Mi/ Stream mi	Total crossings/ Stream mi
SFAR-Chili Bar	Bear Creek	0.5	0.4	2.4
	Brush Creek	0.3	0.3	2.7
	Chili Bar Reservoir	1.3	1.2	1.6
	Deer View	0.4	0.3	1.9
	Iowa Canyon	0.9	0.9	2.5
	Lower Rock Creek	0.6	0.4	2.5
	One Eye Creek	0.7	0.4	3.0
	Pino Grande	0.5	0.5	2.1
	Pollock	1.1	0.7	2.3
	Rock Creek	0.5	0.5	2.8
	Slab Creek Reservoir	0.5	0.3	1.9
	Traverse Creek	0.6	0.4	2.5
	Upper Chili	0.8	0.7	2.9
	Whaler Creek	0.6	0.5	2.7
LMF American R	Georgetown Canyon Cr.	1.6	0.5	2.3
	MF American R Canyon Cr.	1.0	0.4	1.6
	Otter Cr	1.6	0.3	2.2

Chili Bar Reservoir and Pollock watersheds have high amounts of roads relative to total stream length in SF American River-Chili Bar watershed, as do Georgetown Canyon Creek and Otter Creek in LMF American River. Chili Bar Reservoir also has a very high level of roads within riparian conservation areas. This is likely due to the amount of inner gorge and the number of small tributary streams crossed in this watershed. Topography otherwise limits the amount of access into the main stem. Upper Chili Bar and Rock Creek also stand out for having high stream crossing densities; these are predominantly ephemeral type stream crossings with few crossing actually present on the main-stem streams.

Activities conducted within 100 meters of streams have been found to significantly influence stream channel conditions (McGurk and Fong 1995). A frequency distribution of road densities within stream adjacent areas for the Sierra Nevada and for the 7th field watersheds within each of the analysis area is summarized in Figure 5-4, 5-5 and 5-6 below.

Figure 5-4. Sierra Nevada road density in riparian conservation areas

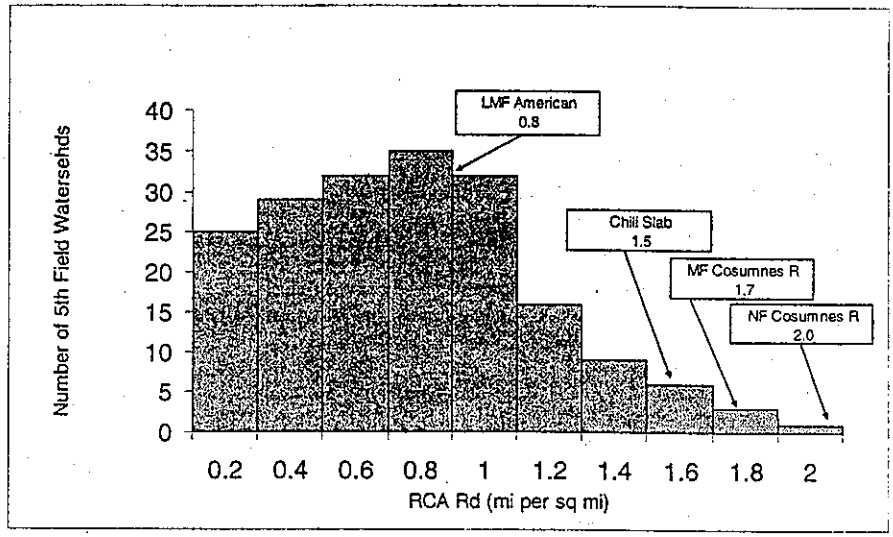


Figure 5-5. SF American River-Chili Bar road density frequency distribution

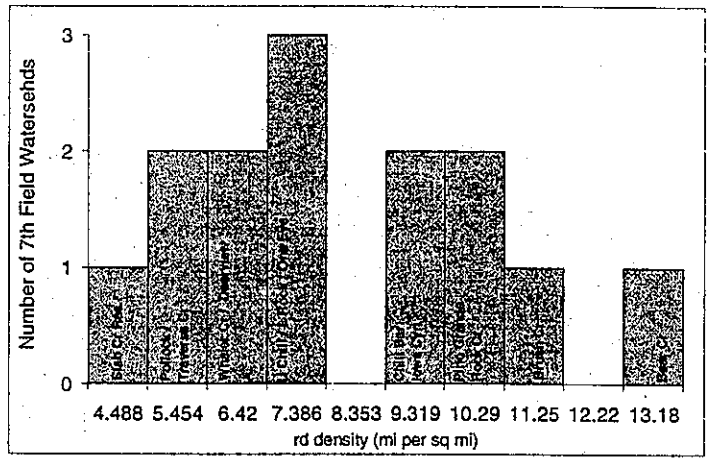
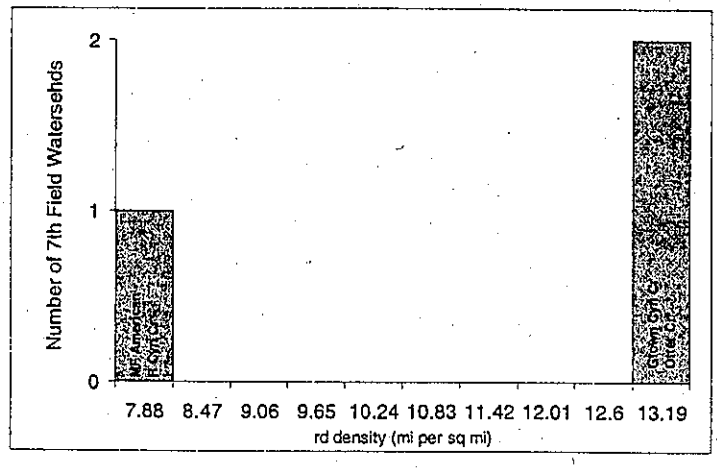


Figure 5-6. LMF American River road density frequency distribution



Transportation

Desired Conditions

Maps 36 and 37 identify both system and non-system roads considered to have a high likelihood of impacting aquatic or hydrologic conditions (the definition used for identifying the "high risk" road segments is provided in Step 6 Number 2, Eldorado National Forest, *Forest Scale Roads Analysis*, September, 2003). The maps do not currently label or distinguish system roads from non-system roads; this should be a further step in the analysis process, in order to prioritize treatment efforts as described above.

Table 5-7 lists the roads on Georgetown Ranger District that have been identified as high risk to aquatic resources. Treatment possibilities include: (1) closure; (2) seasonal closure (3) relocation; (4) reconstruct; (5) upgrades of stream crossings and surface drainage; (6) upgrade or downgrade of maintenance level; (7) decommissioning and (8) maintain as is.

Table 5-7. "High risk" system roads by USGS Quadrangle

Water shed	Route No.	Mntc level	George town	Tunnel hill	Pollock Pines	Slate Mtn	Garden Valley	Devil Peak	Most Critical Routes	Grand Total Miles
SFAR-Chili Bar	12N80D	1	0.3				2.1			2.4
	12N74	1				1.1			*	1.1
	11N87	1				1.0			*	1.0
	12N34	2			5.4	5.4				10.8
	11N89	2				2.9				2.9
	12N53	2			2.4			0.2		2.6
	12N81	2				0.6	2.0			2.6
	11N96	2				1.4			*	1.4
	11NY04	2			0.5	0.8				1.3
	12N72B	2		1.0						1.0
	12N83	2				1.0				1.0
	12N92	2	0.6							0.6
	12N57	2			0.4				*	0.4
	11N97	2				0.2				0.2
			0.9	1.0	8.7	14.4	4.1	0.2	0.0	29.3
LMF American River	13N53C	1	0.8							0.8
	13N58A	1	0.3							0.3
	13N58B	1	0.9							0.9
	13N58F	1	0.5							0.5
	13N58L	1	0.4							0.4
	13N58N	1	0.9							0.9
	13N58R	1	0.4							0.4
	13N93A	1	0.2							0.2
	13N53C	1		0.2						0.2
	14N35H	1	0.8							0.8
	14N35C	2	0.4	0.1						0.5
			5.6	0.3	0.0	0.0	0.0	0.0	0.0	5.9

Fuels Conditions

Reference Conditions (historic fire return intervals and regimes)

Table 5-8 and Map 57 display historic fire regimes in the landscape area, utilizing data provided by FRAP (Fire and Resource Assessment Program, Calif. Dept. of Forestry and Fire Protection).

Table 5-8. GIS data on historic fire regimes within the landscape area

Data in Coverage	Type of Data	Results			
			SFAR-Chili Bar (acres)	LMFAR (acres)	Total (acres)
Historic Fire Regimes	Vegetation Polygons	Frequent low intensity	48,764	12,478	61,242
		Frequent mixed severity	45	287	332
		Mod. frequent high severity	7,375	1,557	8,932
		Mod. frequent low intensity	8,072	4,786	12,858
		Mod. frequent mixed severity	24,760	10,922	35,682
		Non-fuel	6,092	755	6,847

Comparison of Existing Conditions with Desired Conditions

Condition Classes are frequently used to describe, in broad terms, the degree of departure from historical fire regimes that have resulted in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. Volume 4, Appendix G6-8 of the EIS for the *Sierra Nevada Forest Plan Amendment*, provides a more thorough explanation of condition classes.

Table 5-9 and Map 56 provide an estimate of the number of acres within the ENF boundary (and a portion on private lands along the western boundary) of the SF American River-Chili Bar and LMF American River landscape areas currently in Condition Classes 1, 2, or 3. Condition Class 1 represents the area that is thought to be within the range of conditions for historic fire regimes. FRAP modeled fire regimes are found on Map 57. This estimate was based upon data used in the EIS for the *Sierra Nevada Forest Plan Amendment*, and refined based upon an evaluation of past vegetation management projects, including prescribed burning. The data in Table 5-12 were further refined assuming that lands recently treated or affected by wildfire, were moved from Condition Class 3 into Condition Class 1 or 2. This analysis assumes that the treatments that have occurred within the landscape areas have resulted in a change to Condition Class 1 or 2 as follows:

Condition Class 1: Areas that have received all three of the following treatments: (1) commercial thinning from below; (2) pre-commercial thinning or biomass removal; and (3) surface fuel treatments.

Condition Class 2: Areas that have received either (1) Commercial thinning from below and/or (2) One or two applications of prescribed fire.

Condition Class 3: Areas that have not received any fuels treatments or where fires have not occurred within the known data.

Table 5-9. Acres in various condition classes within the analysis area

Condition Class	Fire Regime	Management Activities	SFAR-Chili Bar (acres)	LMFAR. (acres)	Total (acres)
1	Fire regimes are within an historical range and the risk of losing key ecosystem components is low. Species composition and structure are intact and functioning within an historical range.	1. Commercial "CASPO" sales (thin from below) 2. Pre-commercial thinning. 3. Surface fuel treatment.*	3,126	776	3,902
2	Fire regimes are moderately altered from their historical range and the risk of losing key ecosystem components is moderate.	1. Commercial "CASPO" sales and/or 2. One or two applications of prescribed fire.	11,064	5,428	16,492
3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high.	No treatments or fires have occurred.	26,522	4,536	31,058

(based upon FRAP data)

Table 5-9 provides a conservative estimate of the acres of land in Condition Class 1 since it assumes that the landscapes are Condition Class 3 unless treatments or wildfire have occurred. In reality, there are areas that could be considered Condition Class 1 due to their location and soil types, such as the tabular ridges of ancient Merhten mudflows, where site conditions restrict growth and species composition. Inclusion of soil types in Condition Class analysis is an opportunity to further define where treatments may or may not be needed. In addition, treatments have been more or less effective and a proportion of the area having received only prescribed fire treatment may, in fact be in Condition Class 1. This type of information can only be acquired through actual field review, and is appropriate to collect for project-level analysis.

Comparison between existing and desired conditions can also be made by modeling current fire intensities expected on these landscapes and the conditions expected to result from effective fuels treatments within SPLATs designed across these landscapes through this analysis. (Table 5-10). FlamMap 2 modeling was used to model both existing and desired conditions. For the purposes of modeling, both landscapes were modeled as a single unit, due to the fact that fire does not recognize artificial boundaries. Modeling was completed across the entire landscape. Historically, it is likely that the majority of

acres within the combined landscape area would have been expected to burn with low intensity (surface) fires. Table 5-10 and Maps 48 and 49 illustrate the projected change in fire intensity across the combined landscapes.

Table 5-10. Comparison of current and historic conditions relative to fire severity

Crown Fire	Existing Condition (Acres)	Desired Condition (Acres)
Non Fire	2,594	2,594
Surface Fire (low intensity)	47,218	73,862
Passive Crown Fire (mixed severity)	103,270	77,276
Active Crown Fire (high severity)	7,543	6,893

A combination of fire behavior modeling using both FARSITE and FlamMap 2 provided projected results for evaluation of effective fuel treatments within this combined landscape area. A comparison of flame length for existing and desired conditions is illustrated on Maps 50 and 51, while a rate of spread comparison is shown on Maps 52 and 53. Intensity at the head of the fire in compared by Maps 54 and 55. All of these fire behavior comparisons illustrate progress toward desired conditions through the fuel treatment areas modeled for the combined landscape area.

The *Sierra Nevada Forest Plan Amendment* outlines a strategy for reducing hazardous fuels conditions that involves, (1) focusing treatments within a zone surrounding human communities in need of protection (the wildland urban intermix, or WUI) and (2) strategically placing treatments to modify fire behavior across the landscape area. The following desired conditions are based upon implementation of the strategy.

Desired Conditions for Urban Wildland Intermix Zone

Fuel reduction treatments protect human communities from wildland fires as well as minimize the spread of fires that might originate in urban areas. Fire suppression capabilities are enhanced by modified fire behavior inside the zone and providing a safe and effective area for fire suppression activities.

SNEP direction is to place the highest density and intensity of treatments in developed areas within the urban wildland intermix zone to achieve the following objectives:

- Fuel treatments increase the efficiency of firefighting efforts and reduce risks to firefighters, the public, facilities and structures, and natural resources.
- Fires are controlled through initial attack under all but the most severe weather conditions.
- 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) Rate of spread at the head of the fire is reduced to at least 50% of pre-treatment levels for a minimum of five years,

(3) Hazards to firefighters are reduced by keeping snag levels to two per acre (outside of California spotted owl and northern goshawk PACs and forest carnivore den site buffers), and

(4) Production rates for fire line construction are doubled from pre-treatment levels.

Comparison of the Existing Condition with the Desired Condition

Mapping of the Wildland Urban Intermix (WUI): Although the Sierra Nevada Forest Plan Amendment provided an initial mapping of the WUI, it also provided direction for refining this mapping at the local level. Map 43 shows the location of the defense and threat zones which have been refined within the SF American River-Chili Bar and LMF American River landscape areas as refined for these landscape areas. The defense zone generally extends about 0.25 miles surrounding communities, and the threat zone encompasses another 1.5 miles beyond the defense zone. The WUI encompasses about 44,690 acres, or about 52% of the landscape area within the ENF boundary with 11,544 acres in the defense zone and 33,146 acres in the threat zone. The WUI encompasses about 28,696 acres of federal land, or about 60% of the federally owned landscape area, with 3,890 acres in the defense zone and 24,806 acres in the threat zone on federally owned land.

In a GIS exercise the threat zone has been modified from the original zone developed by the SNFPA at an eco-region scale that was based on housing density derived from census data.. The modified threat zone is based on defense zone density, fuels, fire behavior, and topography. The threat zone now encompasses a slightly larger area in the eastern portion of the watershed based on updated housing locations, fuels, fire behavior, and topography.

An increased opportunity exists for refining defense and threat zones at the project level in order to ground-truth the fuel and fire behavior modeling, and work with the landowners to develop the best location of defense and threat zones, as well as treatment strategies.

Strategically Placed Landscape Area Treatments (SPLATs): Map 44 displays the SPLATs from the original SNFP modeling. During this landscape analysis, SPLATs were refined to respond to wildlife PACs, topography, fuel conditions, and landscape-specific fire behavior modeling. Map 45 and Table 5-11 display the SPLATs that are thought to be necessary to modify fire behavior and meet the desired conditions described above. It is recommended that approximately 10,846 acres of SPLATs be maintained through time within the National Forest boundary of the landscape area. It is assumed, however, that (1) Treatment schedules might not allow for all SPLATs to meet fuels objectives at any one point in time and (2) The actual area treated within each SPLAT may vary from the acreage shown in Table 5-11 following site-specific review of stand conditions and constraints. This landscape analysis identifies areas for SPLATs that should be reviewed at the project scale.

Table 5-11 shows that about 61% of the SPLATs areas occur within the WUI. Since the WUI represents 52% of this landscape area within the National Forest lands boundary,

this strategy will place the highest density and intensity of treatments within the urban wildland intermix zone, as described in the desired conditions, and consistent with both the SNFP and National Fire Plan goals.

Table 5-11. Strategically Placed Landscape Area Treatments

SPLAT #	Forest Service (Acres)	Within WUI (Acres)
1	31	31
2	78	78
3	100	100
4	167	167
5	48	48
6	278	278
7	83	83
8	203	203
9	45	45
10	122	122
11	108	108
12	69	69
13	52	52
14	47	47
15	24	24
16	23	23
17	82	82
18	46	46
19	73	19
20	40	0
21	145	0
22	91	0
23	367	0
24	359	359
25	498	498
26	751	627
27	272	272
28	435	435
29	521	521
30	459	68
31	350	350
32	185	185
33	104	0
34	308	0
35	240	240
36	210	210

37	68	68
38	43	43
39	460	0
40	344	0
41	1,352	120
42	893	643
43	287	44
44	27	27
45	56	56
46	221	221
47	59	59

Portion of the Wildland Urban Intermix currently meeting Desired Fuels Conditions: A thorough review of the effectiveness of past treatments and the current condition of SPLAT areas can only be accomplished through field review. Map 46 provides a display of the various types and combinations of treatments that have occurred within SPLATs to date. For purposes of this landscape analysis, however, estimates are made based upon the following assumptions: (1) Areas that have been "effectively treated" (i.e. are likely to meet desired fuels conditions) have received at least three types of treatment: CASPO thinning treatment (thinning from below), treatment to remove sub-merchantable material, and treatment of surface fuels. (2) Areas that have received one or two of the above treatments are assumed to have received partial treatment and to require additional treatment to reach desired conditions.

Based on these assumptions, Table 5-12 displays the percentage of each SPLAT area that is assumed to have received effective fuels treatments, and the percentage of each SPLAT area that is assumed to have received partial treatment. Overall, about 31% of the total area identified in SPLATs has received effective treatments and <1% has received partial treatments. For SPLATs occurring predominantly within WUI, about 30% of the area in SPLATs has received effective treatments and <1% has received partial treatment. This indicates that work to date has been somewhat, but not entirely, focused within the urban wildland intermix zone. Treatments have been focused primarily on south facing slopes and ridgelines per direction in CASPO interim guidelines. Maps 46 and 47 display existing fuel treatments in this combined landscape area.

Table 5-12. Percentage of SPLAT having received fuels treatments

SPLAT #	Forest Service (Acres)	SPLATs with Effective Treatment
1	31	100%
2	78	23%
3	100	0%
*4	167	29%
5	48	40%
6	278	7%

7	83	0%
8	203	1%
9	45	73%
10	122	22%
11	108	2%
12	69	12%
13	52	8%
14	47	0%
15	24	17%
16	23	0%
*17	82	67%
*18	46	0%
19	73	2%
20	40	47%
*21	145	37%
*22	91	38%
*23	367	46%
*24	359	43%
*25	498	8%
*26	751	36%
27	272	3%
28	435	89%
29	521	70%
30	459	33%
31	350	51%
32	185	13%
*33	104	14%
*34	308	15%
35	240	28%
*36	210	15%
37	68	9%
38	43	6%
39	460	15%
40	344	20%
41	1,352	40%
42	893	9%
43	287	41%
44	27	2%
45	56	59%
46	221	69%
47	59	38%

*SPLATs that are predominantly outside the WUI.

Heritage

Desired Conditions

The management and research strategy outlined in the *Framework for Archaeological Research and Management* (FARM) emphasizes an approach that is driven by the values associated with specific classes of cultural resources (Jackson et al. 1994). Once the values (e.g. research, interpretation, recreation, commercial use, resource use, biological/ watershed management, etc) associated with the resources have been identified, it is necessary to assess the quality and character of the property in order to weigh its ability to contribute to the given value. Then an informed recommendation can be offered whether to conserve, rehabilitate/stabilize, or release the resource from further management. This approach requires a comprehensive program to identify, evaluate, and treat properties.

Ideally, all land administered by the Forest Service within the SF American River-Chili Bar and LMF American River analysis areas deemed high sensitivity for the presence of cultural resources would be surveyed to contemporary professional standards. Determining the eligibility of heritage resources for inclusion on the National Register of Historic Places should be undertaken in tandem with efforts to identify such resources.

Treatment or management of heritage resources must be tailored to suit the value(s) inherent in individual properties. If, for example, an archaeological site is recognized to have a wealth of data potential and good integrity, it should be managed in such a way as to minimize or eliminate any disturbances that are likely to degrade the information contained within. Other possible desired treatment options include conservation or stabilization for use in interpretation, enhancement for traditional use (i.e. collecting), data recovery and release, and outright release from management. Many other management options exist and must be considered on a case-by-case basis.

Comparison of the Existing with Desired Conditions

At present a combined total of 52% (29,073 acres) of the analysis areas administered by the ENF have been surveyed for the presence of cultural resources. While not complete, a considerable amount of land deemed high to medium sensitivity for the presence of heritage resources has been inventoried. In many cases, particularly the SF American River-Chili Bar area, identification of heritage resources is severely hampered by dense brush (primarily manzanita) and leaf litter. In the worst cases, it is feasible to conduct field survey only after a vegetation treatment, such as mastication or burning, has been implemented. The situation is not the same in the LMF American River analysis area, which has more northern aspects, different land use patterns, and different vegetation conditions. There exists more opportunities to undertake cultural resource surveys prior to treatments or natural disturbances in the LMF American River area.

Of the 180 recorded heritage resource sites within the analysis areas, only a small fraction (5%) has been evaluated to determine their eligibility for listing on the National Register of Historic Places. Evaluation of heritage resource sites in far greater numbers than is currently being undertaken will result in the identification and recognition of truly

significant sites and release from management those that fail to meet the criteria set forth. Because avoidance has been the default protection measure used in most Forest undertakings, the effect has been to limit land use in those areas to a single use. Evaluation will likely expand land use options by releasing many sites from management and identifying those resources deemed significant.

Although the records indicate that there has been an overall reduction in the number of impacts caused from Forest activities such as logging, mining, and vegetation treatments, there is a trend towards more frequent impacts from recreational use of the Forest, as well as intentional site vandalism and theft. Furthermore, a review of site records and monitoring forms indicates that many sites within the analysis areas have been substantively degraded due to erosion and other cumulative natural impacts.

Step 6: Synthesis and Interpretation

This section is intended to identify the capability of the landscape area to achieve key management plan objectives. These objectives, and the "Key Analysis Questions" associated with these objectives, were identified in Step 2 of the Landscape Analysis process.

1. Conservation of terrestrial ecosystems and species

What management actions are needed to move existing vegetation types to desired conditions?

Management actions that would move stands closer to the range of species composition described for the particular PNV type should be considered where areas are outside the natural range of variability, and where stands are not at or moving towards desired conditions. Forest thinning treatments and prescribed burning treatments called for in the *Sierra Nevada Forest Plan Amendment* (SNFPA) and the *Healthy Forest Restoration Act* (HFRA) should decrease density and the proportion of white fir and incense cedar in treated conifer forested stands and move species composition closer to historic conditions. There is some concern, however, that Standards and Guidelines requiring retention of larger trees and canopy cover may not allow for the creation of sufficient openings to support regeneration of pine species and black oak.

The best opportunity to increase the proportion of shade intolerant species (oaks, ponderosa pine, and sugar pine) is to favor them during treatment operations by retaining these species while removing the shade tolerant species (white fir and incense cedar). Regeneration opportunities to increase these species are limited under current direction to breaks or openings that occur within stands caused by mortality from drought, insects, disease, and/or fire. Adaptive management available under the direction of the SNFPA may offer additional opportunities for regeneration of these species to help move toward historic conditions in these landscapes.

> *To improve habitat quality for a number of wildlife species, opportunities should be explored to increase the retention and recruitment of black oaks in vegetation types where a higher abundance of oaks would be expected to occur under natural disturbance regimes (see Step 5). The existing distribution, abundance, and health of oaks should be evaluated within stands during planning of vegetation treatments.*

What management actions are needed to increase the amount, quality, and connectivity of old forest habitat?

Fuels treatments have the potential to increase the rate of development of old forest attributes in certain types of stands. Efforts to increase the amount and distribution of old forest should aim management efforts toward treatments in plantations and stands comprised of small to mid-sized dense white fir that is predominantly even-aged. This portion of the CWHR 4D vegetation class could benefit greatly from treatments designed to speed development of old forest characteristics. Treatments that are designed to reduce fuels within these stands can also serve to increase the rate of development of larger trees, but project and stand-level analyses should also consider treatments that may vary from the treatment limitations described in the *Sierra Nevada Forest Plan Amendment* Standards and Guidelines, within these types of stands. In particular, where small diameter white fir thickets, or other stagnated stands, occur and are not contributing habitat for California spotted owls or other late-seral associated species, project level analysis should identify treatments that would improve structural complexity and species diversity.

There may be opportunities to increase the rate of development of old forest conditions in areas mapped in the SNEP Report as having Rank 3 late-successional or old growth (LS/OG) conditions. Closer inspection of stand-level conditions within these broad areas may help to target areas for treatments. Areas currently mapped as Rank 4 or 5 should be considered high priority for protection from the effects of catastrophic wildfire.

Landscape areas identified as being important for connectivity of old forest habitat are the Rock Creek, Slab Creek, and Brush Creek drainages in the SF American River-Chili Bar watershed and Otter Creek and Missouri Canyon Creek in the LMF American River watershed. Habitat along these drainages would provide linkage between the SF American River in the south to the Rubicon River and the LMF American River in the north. SPLATs along these corridors should be evaluated for options to maintain or improve the connectivity of mature forest habitat. Habitat linkage to the east is limited, however, due to the large amount of private land at the northeast portion of the SF American River-Chili Bar watershed.

The Draft *Avian Conservation Plan for the Sierra Nevada Bioregion* (Siegel and deSante 1999) identifies old forest habitat as one of four top priority habitats for conservation of avian species in the Sierra Nevada. The management objectives and direction provided in the *Sierra Nevada Forest Plan Amendment* (USDA Forest Service 2001) and the *Healthy Forest Restoration Act* (Dec 2003) support the following recommendations included in the *California Partners in Flight Coniferous Forest Bird Conservation Plan* (2002):

- Managing for old-growth/late-successional conditions;
- Mimicking natural fire regimes;
- Managing for large trees;
- Managing for large snags;

- Prioritizing protection of existing old-growth/late-successional coniferous forest habitats.

Designing management to focus on maintaining natural patterns of forest fire, wood-boring insects, disease, and decay is especially important for several avian species of conservation concern: the black backed woodpecker, white-headed woodpecker, olive-sided flycatcher, and Lewis' woodpecker. There is also a need to promote a return to the more open, large diameter pine stands typical of pre-European settlement conditions where such conditions are consistent with the potential natural community type to address the habitat needs of other priority species (the flammulated owl, white-headed woodpecker, and Lewis' woodpecker. Understory thinning and the use of prescribed fire can help improve conditions for these species. A number of priority bird species and birds of conservation concern are associated with natural disturbance events such as insect outbreaks or fire-dependent habitats: the Lewis' woodpecker, black-backed woodpecker, white-headed woodpecker, and olive-sided flycatcher. The introduction of prescribed fire designed to mimic the natural disturbance regime is important to providing adequate habitat for these species.

What management actions are needed to achieve desired conditions within hardwood habitats?

Objectives in the Oak Woodland Bird Conservation Plan include: (1) Prioritize oak woodlands for protection; (2) Increase acreage of protected oak woodlands; (3) Prioritize oak woodland sites for restoration; (4) Restore protected oak woodland systems to benefit healthy bird populations by promoting oak regeneration, re-establishing understory components, mimicking natural fire regimes, providing cavity component, having a mosaic of different oak species, including age diversity; (5) Implement time management activities to increase avian reproductive success and enhance populations by managing at the landscape level and providing for a grass and shrub understory; and (6) Manage for diversity of forest types, processes and characteristics including management of non-native species, retaining dead oaks and mistletoe, protecting seedling and saplings to enhance recruitment, and maintaining corridors between oak woodlands and other habitats.

The following strategies for management of a deciduous canopy may be applicable to areas within the SF American River-Chili Bar and LMF American River landscape area, and should be considered at the project planning stage:

- Conducting conifer tree thinning in young plantations; prioritizing treatments where there is potential for understory development of deciduous trees; and release of existing older hardwoods.
- Providing for release of black oaks by thinning of conifers particularly along ridgetops and in lower elevations.
- Considering removing some mature oaks to both encourage stump-sprouting and to create openings for oak regeneration.
- Following SNFP guidelines to avoid interplanting of conifers with oak stands and allow natural regeneration of oaks to occur within these areas. This can also

apply to landings and roads that are no longer part of the system and will be blended back into the environment.

What management actions are needed to increase the amount, quality, and connectivity of oak woodland habitat?

The following strategies for management of a deciduous canopy within coniferous forest are described within the *Coniferous Forest Bird Conservation Plan*. These strategies should be considered within appropriate areas of the landscape area:

- Conducting conifer tree thinning in plantations and prioritizing such treatments where there is potential for understory development of deciduous trees (generally moist PNV types).
- Conducting thinning in variably spaced scattered patches designed to open-up the canopy in suitable stands where hardwoods have not been retained. Such treatments should be designed to allow for understory development of hardwood trees within and adjacent to a closed-canopy dominated forest.
- Providing for release of existing black oaks by thinning of conifers shading them out.

What actions are necessary to prevent and control the spread of noxious weeds within the landscape area?

All management activities that result in ground disturbance have the potential to introduce seed or expand existing weed infestations. Various mitigation measures have recently been institutionalized by the *Sierra Nevada Forest Plan Amendment*.

These measures include:

- Cooperating with State and local agencies to prevent introduction and establishment of noxious weeds.
- Conducting noxious weed risk assessments as part of project planning to determine whether project activities have low, moderate, or high risks.
- Cleaning clauses for off-road equipment used on Forest Service projects.
- Requiring the use of certified weed free straw for erosion control.
- Specifying weed prevention measures when issuing permits for grazing, special uses, mining plans of operations, etc.
- Completing noxious weed inventories.
- Eradicating new, small weed infestations.

Where does the existing road and trail system have the greatest impact upon habitat values for terrestrial species?

Wildlife

Road density thresholds are not apparent for most wildlife species. It is clear for many of the focal species evaluated in this assessment, however, that habitat values increase as road densities decrease. Table 5-6 displays the miles of road per square mile of area within 7th field sub-watersheds. This includes system and non-system roads and trails

identified in the latest transportation layer. The SF American River-Chili Bar watershed has an estimated road density of 4.6 mi/mi^2 and the LMF American River is estimated at 3.6 mi/mi^2. Considerable opportunity exists to improve habitat values for terrestrial wildlife species through reducing road densities within the landscape area. This could be accomplished through closure (seasonal and/or permanent gating, or barricades), or obliteration of roads. Impacts upon species and habitat are assumed to be greatest within the 7th field watersheds with the highest density of roads per square mile. See Figures 5-5 and 5-6. The Rock Creek Recreational Trails FEIS has a road closure plan to reduce road and trail densities to 2.5 mi/mi^2 as recommended by the ENF LRMP.

Sensitive Plants

Within the analysis area at least one occurrence of the El Dorado manzanita in the Slate Mountain area is being impacted by OHV use. An illegal route into this occurrence has been created over the past several years. Initial entry was by motorcycles resulting in a single track being created over the top of these small shrubs. More recently the track was widened due to larger 4-WD vehicles following the single track to the top of the occurrence. At least a hundred El Dorado manzanita plants have been crushed and killed as this route has been created and more are killed each year as the route continues to be used and widened.

Mitigating the plant damage is difficult as the hard shale makes sinking fence/gate posts almost impossible, and barricading with large boulders is expensive because the frontage along road 11N88 is over 200 feet and boulders would have to be transported a long distance to the site. An informational sign has been placed at the entrance to the trail explaining the status of the plant and asking recreationists to park and walk to the top of the hill where the attraction is a beautiful, sweeping view of the South Fork of the American River Canyon.

Parry's horkelia, Layne's butterweed, and tripod buckwheat are found along roads and trails on both forest system and private lands. The extent of impact on these sensitive plants will be evaluated during site-specific project analysis.

Where do existing uses potentially reduce habitat values for terrestrial species associated with this landscape area?

Current information and analysis does not identify existing uses, other than roads and trails that are reducing habitat values for terrestrial wildlife species. The Old Pino Allotment for cattle grazing is active in the SF American River-Chili Bar watershed but negative impacts to terrestrial wildlife habitat are not apparent. Recreational use of the Rock Creek area in the SF American River-Chili Bar watershed was identified in the *Rock Creek Recreational Trails FEIS* and BE as potentially impacting terrestrial habitat. Measures such as limited operating periods for recreational events to avoid nesting disturbance to spotted owl and goshawk and various road and trail closures to reduce road and motorized trail density were implemented as part of the Record of Decision (ENF 1999).

Where are fuels treatments reducing or likely to reduce habitat values for terrestrial species associated with this landscape area?

An overlay of the estimated SPLAT locations in both watersheds with spotted owl and goshawk PACs indicates that there is little or no overlap. Approximately 2,300 acres of SPLATs overlap spotted owl HRCAs in the SF American River-Chili Bar landscape area, which is about 23% of the area identified as HRCAs. In the LMF American River landscape area, approximately 320 acres of SPLATs overlap owl HRCAs, representing about 6% of the area identified as HRCA. Treatments within this acreage should be able to be designed to avoid substantial alteration of the habitat suitability for spotted owl or goshawk.

Under Standards and Guidelines in the *Sierra Nevada Forest Plan Amendment* and direction given in the Healthy Forest Restoration Act, fuels treatments are generally designed to reduce the degree of uncertainty related to impacts to wildlife habitat. Given that fuels treatments will generally reduce the structural canopy diversity and the understory components in forested stands, it is essential to consider the diverse habitat features that are beneficial to landbirds when designing fuels treatments within the landscape area. Several priority bird species, including the hermit warbler, brown creeper, and black-headed grosbeak are associated with well-developed forest canopy, a high diversity of tree species and sizes, and/or high vertical structural diversity of the canopy. It is important at the project level, to ensure treatments will maintain sufficient areas providing complex structural elements and a high diversity of conifer species (generally most appropriate on the more mesic north aspects and lower slopes). The following recommendations included in the Draft *Coniferous Forest Bird Conservation Plan* (CalPIF 2002), are important considerations when designing the location of fuels treatments, since these objectives are likely to conflict with objectives for SPLATs:

- Managing for closed canopy forest;
- Managing for tree species diversity;
- Managing for structural diversity and diverse tree age (canopy layers);
- Managing for shrub understory;
- Managing for forest floor complexity; and
- Managing for herbaceous understory.

It is therefore important to evaluate the extent to which areas outside of SPLATs will provide habitat for priority bird species such as the hermit warbler, black-headed grosbeak, song sparrow, brown creeper and wrentit, and to plan for maintenance of such habitat within appropriate portions of the landscape area. Understory shrubs provide essential nesting and/or foraging habitat for a large number of bird species. The development of a shrub habitat stage following disturbance events or fuels treatments will need to be encouraged in some portions of the landscape to provide habitat.

Where are fuels treatments improving or likely to increase habitat values for terrestrial species associated with this landscape area?

Fuels treatments are replacing decadent brush and conifer thickets with new shrub growth and hardwoods, especially at the lower elevations. Numerous treatments have occurred

in both the SF American River-Chili Bar and LMF American River watersheds, particularly along Darling Ridge. This has enhanced both forage and cover for focal species dependent on hardwoods and early-successional habitat. Future fuels treatments will continue to improve forage conditions for these species. Fuels treatment to reduce dense thickets, provide understory vegetation and increase tree growth within or adjacent to PACs will enhance habitat for old forest focal species.

2. Conservation of aquatic, riparian, and meadow ecosystems and species

What are the existing hydrologic and aquatic conditions of greatest concern?

Roads are considered the principal cause of accelerated erosion in forests throughout the western United States (California Division of Soil Conservation 1971, California Division of Forestry 1972, Reid and Dunne 1984, McCashion and Rice 1983, Furniss et al. 1991, Harr and Nichols 1993 as reported in SNEP (Kattleman 1996). See Figures 4-1 to 4-3, 5-5 and 5-6. Activities conducted within 100 meters of streams have been found to significantly influence stream channel conditions (McGurk and Fong 1995). See Figures 5-1 to 5-4 and Table 5-6. Roads in the watersheds contribute to a change in runoff with impervious surfaces and concentration of otherwise dispersed flow, and with the interception of groundwater through road cuts. The change in runoff in addition to added sedimentation creates a potentially significant driver within the watershed with respect to flow, water quality, and timing of flow. The potential recovery is rated as moderate (Table 5-5), with the consideration that there is a need to retain a transportation network within the SF American River-Chili Bar and LMF American River watersheds. However the opportunity exists to examine the roads within the watershed, especially the road segments on National Forest lands that have been identified as a potential risk to aquatic resources.

Sedimentation and increased runoff associated with roads and parking lots is usually a primary contributor to reducing the quality of aquatic species habitat. In addition, road-stream crossings with improper placement can be barriers to fish and amphibian species passage. Raw stream crossings can directly kill amphibians and fish from vehicles crossing, and also cause petroleum products to enter the watercourse.

Stream crossings can also create movement barriers for fish and amphibian species. A number of stream crossings have been identified as potential barriers to fish passage in past surveys (See specific areas of concern, below).

For aquatic species viability, primary concerns in these watersheds besides roads, are habitat affects from hydropower projects, diversions, and competition from introduced non-native species. With hydropower projects on the SF and MF American River, the timing of flows can adversely affect reproduction of sensitive species from high flow velocities, inappropriate water temperatures, change of riparian condition, and lack of bedload movement. Diversions either cause barriers to movement for aquatic species or reduce water quantity, thus affecting aquatic habitat quality. The increasing invasion of

low elevation rivers and streams by non-native fishes and bullfrogs reduces habitat space for native species and increases the competition for survival.

Water drafting for roadwork and fire suppression or prescribed fire can suck up amphibians and fish and potentially reduce flow levels over a short-term to the extent that aquatic species could be adversely affected. Guidelines in the Forest Service Timber Sale Administration Handbook (FSH 2409.15 [5/88 Supplement 15.21]) for water drafting prevent dewatering streams for water withdrawal. Use of these guidelines and use of Forest Service approved screen covered drafting boxes, would prevent small aquatic species from being affected. Instream water drafting sources can also lead to impacts to the aquatic habitat conditions from altered channel morphology, disruption of natural streamflow and sediment transport dynamics, and increase in the potential for overdrafting. Relocating water sources outside of the stream channel improves stream and aquatic habitat conditions by limiting or reducing direct impacts to a stream channel.

Management actions to address hydrologic and aquatic conditions of greatest concern include:

- Reducing road densities by focusing on non-system road closures.
- Reducing numbers of stream crossings
- Improving design and condition of stream crossings to ensure they are adequate for fish and amphibian passage.
- Focusing road maintenance funding in watersheds with highest levels of near-stream roads
- Redesigning in stream water holes to locations outside of the active channel and improve waterholes with degraded conditions.
- Continuing active involvement in FERC re-licensing processes to ensure adequate stream flows, timing of flows, and protection of aquatic habitats.
- Restoring riparian vegetation density and composition to mimic healthy functioning ecosystems.
- Restoring areas identified as having direct sediment sources to key areas of aquatic habitat.

What management actions are needed to achieve desired conditions within riparian habitats?

The Riparian Bird Conservation Plan (RHJV 2000) states that large tree size and high foliage volume promote avian diversity in riparian areas, but that vegetation structural diversity may be even more important. Seven of the ten focal species that have suffered the greatest range reductions and/or are declining trend depend upon early-successional riparian habitat, particularly willow-alder habitats with dense understory cover. These include the song sparrow and yellow warbler that may occur in the landscape area. The following management actions, provided in the *California Partners in Flight Riparian Bird Conservation Plan* (RHJV 2000) are applicable to the SF American River-Chili Bar and LMF American River landscape areas:

- Restoring and managing riparian forests to promote structural diversity and volume of the understory.

- Managing riparian and adjacent habitats to maintain a diverse and vigorous understory and herbaceous layer, particularly during the breeding season.
- Incorporating avian habitat needs into management practices on all meadows.

Additional riparian habitat improvement measures include:

- Recruiting and maintaining large woody debris especially along stream courses.
- Reducing anthropogenically accelerated sedimentation inputs to stream channels.
- Maintaining and or restoring amount and timing of streamflows; promoting higher soil moisture retention and moderated peak flows to avoid the creation of flashy stream systems.

What management actions are needed to achieve desired conditions within meadow habitats?

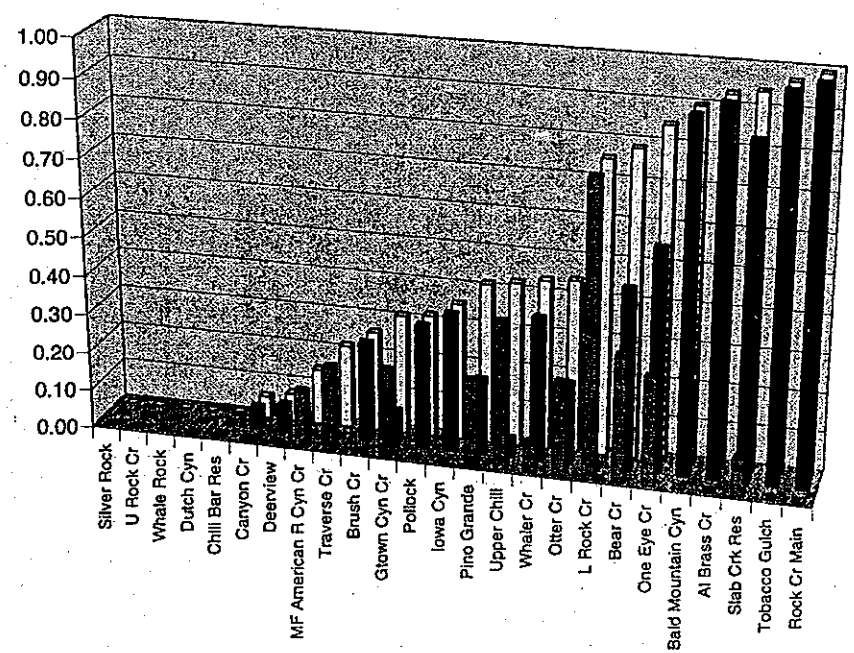
Because meadow habitat is such a minor component of these watersheds and are located primarily on private land, they are not a high priority for treatment. On the other hand, since this habitat type is limited in both of these watersheds, management actions to maintain and improve conditions on existing meadows on national forest system lands should be considered during site-specific analysis for future projects.

Where does the existing road and trail system have the greatest impact upon hydrologic conditions or habitat values for aquatic species?

"High-risk roads" have been mapped as those that have many stream crossings and/or have a proportion of the road traveling through the Riparian Conservation Area (Maps 36 and 37). This category best reflects the effects of roads on the stream channel from sedimentation and increased runoff, which are usually a primary contributor to reducing the quality of aquatic species habitat. Figure 6-1 below displays the miles of "high risk" system and non-system road that occur within each 7th field watershed. Note the high levels of non-system roads within the Lower Rock Creek watershed. The ability to influence conditions of non-system roads is low since forest funding is typically used for system road maintenance. Reducing road densities is best achieved through the closure of non-system routes which are commonly non-designed user-generated routes. These roads have some of the highest potential for erosion and sedimentation, yet have no funds allocated for maintenance or closure to improve conditions.

Critical trail segment surveys are conducted annually in the Rock Creek Recreational Trails Area. In addition the state OHV Division requires trail condition monitoring for any trails that utilize state funding, using a system of Red, Yellow, or Green ratings. The areas that are identified as being in a red condition class (based on the State monitoring system) or that have excessive soil loss or direct sediment input to streams become the priority areas for future trail improvement work. Many trails in the Rock Creek area have been rerouted or closed; stream crossings have been redesigned and maintenance focuses in the areas that are identified in need of improvements.

Figure 6-1. Critical road segments by 7th and 8th field watersheds



	Silver Rock	U Rock Cr	Whale Rock	Dutch Cyn	Chili Bar Res	Canyon Cr	Deerview	MF American	Traverse Cr	Brush Cr	Gtown Cyn	Pollock	Iowa Cyn	Pino Grande	Upper Chili	Whaler Cr	Otter Cr	L Rock Cr	Bear Cr	One Eye Cr	Bald Mountain	Al Brass Cr	Slab Crk Res	Tobacco Gulch	Rock Cr Main
Non-System Rd Mi/sq mi	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.14	0.22	0.00	0.22	0.00	0.00	0.22	0.38	0.07	0.24	0.75	0.32	0.28	0.00	0.00	0.09	0.00	0.00
System Rd Mi/sq mi	0.00	0.00	0.00	0.00	0.00	0.06	0.07	0.00	0.00	0.26	0.09	0.32	0.35	0.19	0.05	0.37	0.20	0.00	0.46	0.57	0.90	0.93	0.85	0.97	0.99
All Critical Rd Mi/sq mi	0.00	0.00	0.00	0.00	0.01	0.06	0.07	0.14	0.22	0.26	0.31	0.32	0.35	0.41	0.42	0.44	0.44	0.75	0.78	0.85	0.90	0.93	0.94	0.97	0.99

Table 6-1 on the next page identifies several factors, which, if appropriately weighted, could provide a mechanism for prioritizing road closure or restoration opportunities by 7th field watershed. Road miles in low gradient habitats are included as a factor, because the highest quality stream habitat for the majority of aquatic focal species in the landscape area (the western pond turtle, California red-legged frog, foothill yellow-legged frog, and hardhead) seem to be associated with these lower gradient stream reaches (0-2%).

Table 6-1. High-risk road miles by 7th field watershed

5th Field Wshed	6th Field Wshed	7th Field Wshed	8th Field Wshed	Wshed Acres	NSI	2003 CWE Risk Level	Critical System Rd Mi	Critical Non System Rd Mi	All Critical Rd Mi/sq mi
Slab/ Chili Bar	Rock Cr	Rock Cr	Al Brass Cr	756	130	L	1.1	0.0	0.93
			Bald Mtn Cyn	2,361	125	L	3.3	0.0	0.90
			Canyon Cr	1,953	109	L	0.2	0.0	0.06
			Dutch Cyn	803	52	L	0.0	0.0	0.00
			Rock Cr Main	3,184	126	L	5.0	0.0	0.99
			Silver Rock	1,616	51	L	0.0	0.0	0.00
			Tobacco Gulch	891	52	L	1.4	0.0	0.97
			U Rock Cr	1,434	86	M	0.0	0.0	0.00
			Whale Rock	474	116	L	0.0	0.0	0.00
		Bear Cr		5,340	59	H	3.8	2.7	0.78
		One Eye Cr		4,523	66	M	4.0	1.9	0.85
		Traverse Cr		9,833	42	L	0.0	3.2	0.22
		Whaler Cr		10,210	90	M	5.8	1.1	0.44
		L Rock Cr		4,320	72	L	0.0	5.6	0.75
	SF American Chili Bar	Brush Cr		5,132	37	L	2.1	0.0	0.26
		Deerview		5,496	114	M	0.6	0.0	0.07
		Iowa Cyn		5,088	41	VH	2.8	0.0	0.35
		Upper Chili		8,244	ND	ND	0.6	4.9	0.42
		Pino Grande		8,697	81	H	2.6	3.0	0.41
		Pollock		2,871	69	VH	1.4	0.0	0.32
		Slab Crk Res		6,866	150	L	9.1	1.0	0.94
		Chili Bar Res		5,764	116	L	0.0	0.1	0.01

LMF American R	MF American R Bottle Hill	Gtown Cyn Cr	10,156	51	M	1.4	3.6	0.31
		Otter Cr	11,454	109	M	3.7	4.3	0.44
		MF American R Cyn Cr	21,436	ND	ND	0.0	4.8	0.14

Where do existing uses impact hydrologic conditions or aquatic habitat values?

Recreation

Recreational use by off-highway vehicles, motorcycles, and ATVs can have effects to riparian areas if stream crossings and approaches are poorly maintained, and especially, if no hardened crossing exists. The high-use area of the Rock Creek Recreational Trails area is of particular concern, and should continue to be a focus for management to improve habitat quality. Any new areas of riparian degradation from excessive recreational use should be addressed and improved quickly.

Dispersed recreation occurs in some locations within the watershed, most often within riparian areas, with direct impacts to the aquatic environment. Although there are less dispersed recreation sites in these two watersheds in relation to other landscape areas, there is the potential for increase because of the close proximity to urban areas. Recreation sites in the streamside areas tend to reduce riparian vegetation, compact the soil, and may increase sediment runoff to the stream. Recreation sites in riparian areas are the most common areas for nearby user-created roads and trails that can cause further riparian damage. People congregating near streams disrupt the aquatic species living there by indirect effects to the habitat as well as in increased potential for direct impacts due to handling and disturbing them.

Hydropower and Water Diversions

Hydropower projects along Rock Creek, MF American River, and SF American River are existing uses that have, for some species, reduced habitat quality. The timing and quantity of flow releases may be eliminating reproductive habitat or causing available habitat quality to be marginal, which is most likely the case for foothill yellow-legged frogs. During the future re-licensing of the projects on these rivers, aquatic resources will be studied and evaluated for possible improvements of habitat quality for all life stages, focusing especially on TES species.

Water diversions can be barriers to aquatic species movements, such as the Rock Creek Hydroelectric Project, which causes a barrier near the mouth of Rock Creek. Water diversions should also be evaluated for dewatering streams or reducing water quality by low flows and possible high water temperatures, such as when damming a stream to create a pond. Water diversions will continue to be an important public use because of the close proximity of the urban and agricultural areas in these watersheds. Low flows during the mid- to late-summer months are common in the streams of these watersheds as a result of the natural hydrograph. Diversions in addition to these low flows during the summer can dramatically change a stream. A survey on Otter Creek (in the fisheries files) recorded the stream channel dammed up to create a pond causing a barrier to trout migrating up into Missouri Canyon Creek. The Summerfield Ditch failure in 1992 in Lost Canyon Creek severely degraded the fishery in Slab Creek downstream.

Slab Creek Reservoir dam has the potential to release a large range of flows during any time of the year. These flows could be potentially used for rafting, for simulating the

natural movement of bedload, or for other downstream uses. During hydropower relicensing, the quantity and timing of greater flows, as well as a standard flow release for the five different water year types, will be considered. Primary concerns with the timing and quantity of these various flow releases with regard to aquatics species are effects to the reproduction of foothill yellow-legged frogs and the spawning season for trout and hardhead. If possible, the reduction of suitable habitat for bullfrogs and smallmouth bass will be considered when considering the timing or quantity of flows below Slab Creek Reservoir.

Water Holes

A few water holes are presently in need of maintenance and can cause localized habitat degradation to streams nearby. A GPS inventory of these waterholes (2005) will provide information to evaluate their condition to help rank them for repair or obliteration. Aquatic species utilizing these water holes will also be surveyed. If sensitive species are found to inhabit these sites, further actions will be recommended to protect these water holes as sensitive habitat.

Roads

Roads affect hydrologic function by increasing the length of the stream network where roads are connected to streams. The net result of this connectivity is more rapid runoff and higher peak flows. The best way to decrease this effect is to disconnect roads from streams. Inside and lead-off ditches should not drain into stream courses but rather dissipate flow out into relatively flat areas away from streams. Areas with high densities of near-stream roads (see Figures 5.2 and 5.3) have the highest potential for this type of connectivity and should be considered priorities for treatment to minimize impacts to hydrologic function.

Stream crossings on roads are also sources of impacts to aquatic systems as they can create barriers to aquatic organisms and can be a sizable source of sediment given crossing failures. Ensuring good crossing designs as well as maintaining road surface and structures will decrease the potential for impacts at road crossings.

Vegetation

Sites that are overstocked may be utilizing more water than stands that are released to grow without having to compete for water. Late-seral species also utilize lower levels of moisture than young trees with higher growth rates. By returning stands to desired stocking levels potentially more water may be available for trees and for stream flows.

Where are fuel treatments most likely to impact hydrologic conditions or aquatic habitat values?

Effects to aquatics species from prescribed burning could occur from the loss of riparian vegetation and loss of ground cover from high intensity burns. During winter rainfall there may be increased sediment runoff to streams. Species that travel overland, such as western pond turtle and CA red-legged frog, could be caught in the burning area. Frogs could be burned when hiding in piles.

Underburning in the RCAs under cool burning conditions would result in lower intensity fire and shorter flame lengths. Under these conditions the fire should extinguish itself prior to affecting the riparian vegetation, and bare soil areas would be less likely to occur. Impacts of underburning can be reduced by (1) applying Limited Operating Periods (LOPs) for CA red-legged frog where there are areas of possible overland travel between two or more locations of low gradient stream or pond habitat, or within 300 feet of these locations for dispersal habitat; (2) building piles using a buffer from streams; (3) ensuring a renewable supply of large down logs that can reach the stream channel; and (4) providing suitable habitat within and adjacent to the RCA.

Mechanical fuels treatments in RCAs may reduce riparian vegetation and crush aquatic species living there. Mechanical equipment crossing sunny, exposed hillslopes with south, southeast, or southwest exposures could crush western pond turtle nests and their eggs.

The application of buffers for mechanical exclusion in the RCAs may reduce potential impacts, and using LOPs for mechanical treatment in areas of possible overland travel by CA red-legged frogs. Aquatic conditions should be assessed and documented using Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for the CA red-legged frog, and foothill yellow-legged frog, (USDA 2001).

Treated areas for fuels reduction result in lower fire severities during a wildfire than untreated areas. In addition, these areas may provide an edge effect of reduced flame lengths and fire severity levels as the fire moves into adjacent untreated areas. This edge effect would be of particular value to riparian areas.

Strategically Placed Area Treatments (SPLATs) within RCAs have the highest potential for affecting hydrologic conditions (Table 6-2, Map 28). The more fuel treatment needed per stream mile the higher the potential for impact to stream systems. Watersheds with higher risk levels and more proposed disturbance should have more field reconnaissance and channel condition evaluation before land management planning at the project scale can be completed. It is recommended to complete road work in highly roaded, highly sensitive watersheds prior to conducting other forest management activities in those watersheds. If a SPLAT is needed in a RCA, a site-specific assessment by watershed/aquatic specialists is needed. The outcome of the assessment would be recommendations regarding the appropriate type and level of activities that could occur in RCAs. Also peer review is required if ground disturbing activities occur in more than 25% of RCAs. Table 6-2 below shows that one watershed (Silver Rock) has 25% of the RCA in a SPLAT and two other watersheds (Upper Chili and Dutch Canyon) have over 20% of the RCA in a SPLAT. These are high levels of activity proposed in the RCAs and should be looked at closely to insure that treatments will benefit the RCAs. If modifications to proposed treatments or the need for specific mitigations are evident they should be added to future projects and be documented in the RCO analysis for the SPLAT project work.

Table 6-2. Strategically Placed Landscape Area Treatments within Riparian Conservation Areas

HUC5	HUC6	HUC7	HUC8	SPLAT Acre in RCAs	Acres	Stream Miles	RCA Splat Acre per stream mi	% of RCA in SPLAT	Total RCA Acres
SFAR-Chili Bar	Rock Cr Total	Rock Cr	Al Brass Cr	111	756	10.4	10.7	15%	756
			Bald Mountain Cyn	75	2,361	32.9	2.3	3%	2266
			Cyn Cr	161	1,953	25.0	6.4	11%	1447
			Dutch Cyn	167	808	12.3	**13.6**	21%	808
			Rock Cr Main Stem	417	3,184	46.1	9.1	13%	3184
			Silver Rock	309	1,616	24.3	**12.7**	25%	1241
			Tobacco Gulch	73	891	11.8	6.2	15%	494
			Whale Rock	37	474	8.0	4.6	8%	474
				1,351	13,476	190.5	7.1	13%	10669
		Bear Cr		318	5,340	74.0	4.3	6%	5147
		L Rock Cr		72	4,320	56.6	1.3	2%	3815
		One Eye Cr		481	4,523	62.2	7.7	11%	4523
		Traverse Cr		50	9,833	132.2	0.4	1%	7919
		Whaler Cr		406	10,210	121.6	3.3	5%	7499
				2,677	47,702	637.1	4.2	7%	39572
	Chili Bar-Slab	Brush Cr		529	5,132	72.6	7.3	10%	5132
		Deer View		806	5,496	69.2	11.6	15%	5496
		Pino Grande		268	8,697	92.9	2.9	5%	5606
		Slab Cr Reservoir		451	6,866	82.1	5.5	7%	6361
		Chili Bar Reservoir		99	5,764	27.7	3.6	5%	2015
		Iowa Canyon		76	5,088	52.3	1.5	3%	2858
		Pollock		236	2,871	35.1	6.7	12%	1949
		Upper Chili		1327	8,244	89.4	**14.8**	22%	5991
				3792	48,158	521.0	6.8	13%	27469
				6469	95,860	1158.0	5.6	10%	67041

LMF American R Grand Total	M Fork American R Bottle Hill	Georgetown Cyn Cr	NA	151	10156	127.1	1.2	2%	6602
		M Fork American R Cyn Cr	NA	467	21436	255.6	1.8	4%	12241
		Otter Cr	NA	302	11454	150.6	2.0	3%	10050
				920	43047	533.0	1.7	3%	28894
				920	124344	574.0	1.6	3%	28894

Within the SF American River-Chili Bar watershed there are 4 sub-watersheds (8^{th} field) and one 7^{th} field that have relatively high levels of SPLATs proposed per stream mile (Silver Rock, Dutch Canyon, Al Brass, Tobacco Gulch, and Deerview) respectively These watersheds should also have further field analysis to develop appropriate treatment levels and identify any additional treatment needs within RCAs. Deerview watershed has over 800 acres of treatments proposed within the RCA most within SPLATs #3 and #25. Within the smaller 8^{th} field watersheds there are fewer acres of SPLATs proposed within RCAs however these smaller watersheds are more likely to exhibit a response from treating a relatively large portion of the RCA.

Within the LMF American River none of the watersheds stand out as having a particularly high level of SPLATs proposed within RCAs.

3. Risk of fire and fuels buildup

Where should Strategically Placed Landscape Area Treatments be prioritized to meet fuels objectives in this landscape area?

Through direction of the National Fire Plan, the highest priority would be given to SPLATs that lie within the WUI, specifically those adjacent to, or near, Defense Zones.

To what extent can effective fuels management be achieved to modify fire behavior within the landscape area?

To answer this question, modeling was done using FlamMap and the FarSite model. For this modeling it was assumed that SPLATs achieved the desired outcomes for fuels treatments within the threat zone of the urban intermix. These outcomes, described in the ROD for the *Sierra Nevada Forest Plan Amendment*, are as follows:

1. Stands with 30% or less canopy cover would have an average live crown base height of 15 feet following treatments.

2. Stands between 40 and 60% canopy cover would have an average live crown base height of 20 feet following treatments.

3. Stands with 61% canopy cover and greater would have an average live crown base height of 25 feet following treatments.

Fuel Model 9 (long needle conifer/pine) or a validated variation was used for modeling the hot slopes (south and west aspects and ridgetops) and Fuel Model 8 (short needle conifer) or a validated variation was used for modeling the cooler slopes (north and east aspects and drainage bottoms). For brush areas validated variations of Fuel Model 5 were used.

Based upon the FlamMap model and above assumptions, Table 6-3 displays the effectiveness of SPLATs in the landscape area in changing from crown fire to surface fire (Maps 48 and 49), flame lengths (Maps 50 and 51), and rate of spread (Maps 52 and 53) display these comparisons as well). The table displays an overall reduction in acres of

active and passive crown fire, and in flame lengths greater than 4 feet. Rate of spread is not reduced by 50% (a Desired Condition for the Threat Zone allocation) but this is generally a less useful measure for evaluating fire effects than flame length or crown fire.

Table 6-3. Acres of crown fire activity, flame lengths and rate of spread for the current condition and post-SPLAT activity

	Current Condition	Post-SPLATs
Surface Fire	45,578	74,115
Passive Crown Fire	101,717	76,514
Active Crown	8,070	7,331
Flame Lengths 1-4 ft	84,543	98,913
FL 5-6 ft.	32,183	24,661
FL 7-8 ft	11,703	10,400
FL 9-10 ft	5,762	4,850
FL 11 ft. plus	23,718	19,022
Rate of Spread <.5 mph	142,033	144,672
ROS .5 – 1 mph	11,293	8,830
ROS 1 – 1.5 mph	3,191	3,027
ROS 1.5 – 2 mph	686	678
ROS 2 – 2.5 mph	600	603
ROS 2.5 – 3	73	73
ROS >3 mph	3	3

(Modeling assumed that treatments were applied to FS lands only.)

How and where is the ability to achieve desired fuels conditions limited within the landscape area?

The SPLATs designated in these landscape analysis areas were designed to avoid currently identified protected activity centers (PACs). A potential exists, however, for the expansion or relocation of PACs that may limit the amount or type of fuel reduction activity permitted within designated SPLATs. Another limiting factor may be treatments within riparian conservation areas (RCAs). Limitations on the type or amount of treatments permitted in these areas have the potential to segment what would have been contiguous areas of fuel treatments.

Step 7: Recommendations

This section describes recommendations for management or treatment priorities within the landscape area. A decision as to whether to implement any of these actions, will involve project-level environmental analysis, and will be documented in a NEPA decision document.

Recommendations for Improving Terrestrial Ecosystems

➢ *Increase the amount of hardwood forest.*

Prioritize treatments designed to maintain oaks and increase hardwood regeneration where appropriate. During project planning, evaluate opportunities to:

- Provide for release of existing black oaks, where appropriate, by thinning conifers.
- Emphasize reintroduction of fire within oak woodland and conifer/oak ecosystems, designing burn prescriptions and techniques to mimic natural fire regimes and create small openings that will favor regeneration of oaks.
- Encourage stump sprouting as a means of regeneration by thinning existing oaks.

➢ *Increase the amount and quality of old forest.*

- Maintain existing quantities of old forest. Efforts to increase structural complexity and species diversity will improve stand resiliency to drought, insects, disease, and fire.
- Reintroduce fire into the SF American River-Chili Bar and LMF American River watersheds to mimic natural fire regimes to increase the quality of old forest habitat.
- Evaluate treatments designed to increase structural complexity and tree species diversity and to increase the rate of development of old forest habitat characteristics during project-level analysis. This should be focused in those areas where the potential to produce old forest habitat exists and where dense stands of even-aged small diameter white fir and/or incense cedar have resulted from past management practices.
- Consider maintenance of habitat connectivity during planning of SPLATs in order to maintain habitat linkages along Rock Creek, Slab Creek, Otter Creek, and Missouri Canyon Creek.

➢ *Control and treat noxious weeds.*

Scotch Broom (Cytisus scoparius): Controlled burning is effective in reducing the seed bank and can be used to treat dense monocultures. Fire kills mature stands of broom and stimulates seedling germination. If areas are burned in the summer,

seedlings that emerge after the burn are exposed to the harsh, dry environment, increasing seedling mortality. Allow some time for the drying action of the sun to kill seedlings. Follow-up treatments to the initial burn are necessary and may include subsequent controlled burns, grazing, hand pulling, and revegetation with fast growing native species (Archibald 1996).

Repeated burning has been used to control broom in Marin County, California. Broom stems were cut in the fall and burned in the spring when weather conditions were more favorable. The cut debris was left on the site to provide fuel for the burn. After the initial burn, sterile plants were planted to prevent broom re-establishment and to provide the necessary fuel source for subsequent burns. Even though these plants provided a small, patchy amount of fuel, the following burn killed broom seedlings and resprouts, and also stimulated native vegetation that is adapted to fire. At present it is unclear how many subsequent burns are required to deplete the long-lasting seed bank; however, Boyd has seen dramatic reductions of broom densities after 3 burns. For control of scotch broom, as with most noxious weed species, long-term treatments are necessary (Boyd 1996 and 1997).

Creating and maintaining a boundary strip between broom-infested areas and non-infested areas may control large infestations that are impractical to eradicate. A 33-foot boundary will encompass seeds that are explosively shot out of seedpods. Boundaries can be effectively controlled to prevent the establishment of broom onto adjacent lands.

Yellow starthistle (Centaurea solstitialis): A forest-wide project to control yellow starthistle was begun in 2001. Treatment of small isolated populations is ongoing and eradication is expected. Larger populations that are moving onto the Forest from adjacent private lands are also being treated. The desired goal is control, not eradication of the infestation.

Skeletonweed (*Chondrilla juncea*): As funding becomes available this and other invasive exotics will be addressed in a forest-wide control analysis. In the meantime the strategy is to use hand treatments of problem areas and avoidance of large infestations (reduction of seed distribution by vehicles) during project activities.

Medusahead (Taienatherum asperum) and goatgrass (Aegilops trincialis): Prevention is the key in dealing with these species; once they become established, controlling them is very difficult.

➢ *Prevent new infestations of noxious weeds.*

Experience has demonstrated that prevention is the least expensive and most effective way to halt the spread of noxious and invasive weeds. To prevent the establishment or spread of weeds:

- Educate workers about the importance of managing weeds on an ongoing basis;
- Properly identify weed species;
- Avoid ground disturbance of existing weed populations;

- Incorporate measures into projects that prevent weed seeds or other plant parts from establishing new populations such as certification of weed-free products and equipment cleaning clauses.

Recommendations for Improving Aquatic, Riparian, and Meadow Ecosystems

➢ *Evaluate watershed condition and rehabilitate where necessary.*

- Rehabilitate dispersed recreation areas, off-road vehicle routes, and implement road improvements identified through the roads analysis.
- Identify landings used for forest management activities in the past that are located in RCAs, or are no longer needed for management activities, as candidates for obliteration.
- Investigate water rights for water diversions, such as dams, piping, and canals throughout both landscape areas, because lower flows increase water temperatures and reduce water quality, thus causing habitat loss for aquatic species.

SF American River-Chili Bar Watershed

- Continue to monitor the Summerfield Ditch, as it failed in 1992 and severely degraded the fishery in Slab Creek downstream. Monitor for continued erosion, and if possible, look for opportunities of riparian planting or reducing the impacts of silt deposits.
- Investigate sediment sources in Canyon Creek, which continues to show low-quality in-stream aquatic habitat due to siltation.
- Continue to monitor and investigate the possibility of reducing or eliminating bullfrogs in Raccoon Ponds.
- During hydropower re-licensing, survey the SF American River to determine aquatic species presence and effects to their reproduction stages by hydropower facilities: water temperature, substrate, and flow releases.
- In 1999, a letter in the files from fishery biologist Mark Allen of Thomas R. Payne and Associates noted the association of hardhead in the SF American River with sedge roots and overhanging vegetative growth. He suggested planting sedges along the edges of pools to increase habitat for hardhead, as sensitive fish.
- Close off the lower parking lot in the Traverse Creek Special Interest area and restore the wetland areas.

Lower Middle Fork American Watershed

- Investigate sediment sources in Otter Creek, which continues to show low-quality instream aquatic habitat due to siltation.
- Continue to monitor the existing species populations in the six ponds at Horseshoe Bar, especially after flood events. Pursue methods to reduce bullfrogs there to improve habitat for native species.
- Continue to survey for suitable California red-legged frog habitat especially near the Ralston Ridge pond location of the 2001 sighting. Complete survey coverage of low gradient suitable habitat for California red-legged frogs.

- During hydropower re-licensing, survey the MF American River to determine aquatic species presence and effects to their reproduction stages by hydropower facilities: water temperature, substrate, and flow releases. Two species to focus on are hardhead fish and foothill yellow-legged frogs.
- In 1994, reach areas on Canyon Creek were identified as being limited in quantities of large woody debris. Introduce large woody debris to the stream channel if necessary to meet standards to improve aquatic habitat complexity.

➢ *Evaluate water holes and stock ponds for need and impacts to resources.*

Opportunities exist for future investigations of water hole and stock pond locations. Water holes would be maintained with options for mitigations for impacts on aquatic resources, including habitat for amphibian species, stream channel stability, and stream flow during low flow seasons. Surveys are needed to evaluate the impacts of these sites on aquatic resources, in addition to obtaining information on forest water rights use for required reporting to the California State Department of Water Resources. The GIS water hole database has missing attributes, which are planned to be collected in 2004 and sent to the database steward for updating. The updated database would be useful to many resource areas. Specific recommendations are:

- Follow guidelines in the Forest Service Timber Sale Handbook for water drafting to prevent dewatering streams for withdrawal.
- Use Forest Service approved screen covered drafting boxes to prevent affecting small aquatic species.
- Relocate water sources outside of the stream channel to improve stream and aquatic habitat conditions.
- Rehabilitate needed water holes and access roads that are in need of repair.

Recommendations for Transportation System Management

The priority order for closure/obliteration of roads is as follows: (1) non-system roads and trails, (2) maintenance level 1 roads, and (3) maintenance level 2 roads. Maintenance level 3, 4, and 5 roads are the backbone road system and, as such, are unlikely to be candidates for closure or obliteration.

➢ *Address road impacts to terrestrial wildlife.*

Impacts to terrestrial wildlife habitat from roads generally increase as road densities increase. Therefore, priorities for addressing potential road impacts should focus on the 7th field watersheds with the highest density of roads (Table 6-1). Emphasis should be placed on lowering road densities in areas that overlap key habitat areas for focal species, such as winter range for deer and in spotted owl and goshawk PACs. The road closure plan outlined in the *Rock Creek Recreational Trails FEIS* should continue to be implemented to address road impacts in the Pacific Deer Herd winter range.

➢ *Address road impacts to aquatic wildlife.*

To improve habitat values for aquatic species, the order of priority for road restoration or improvement to roads that are deemed necessary should be: (1) raw stream crossings, (2) user-created roads and trails, (3) non-designated OHV roads and trails, (4) landings, (5) Level 1 and 2 roads in the RCAs, and (6) road crossing failures/problems on Level 3 and 4 roads.

Recommendations are to:

- Conduct road assessment of culverts annually in order to fix plugged culverts prior to the rainy season.
- Analyze identified road crossings that are barriers to fish and amphibians for possible replacement, especially when other roadwork is being accomplished in that area. Streams that have culvert barriers to fish may have habitat above for amphibians, so any removal of barriers requires an aquatic biologist input as to whether allowing fish upstream could affect known sensitive amphibian populations.
- Eliminate raw stream crossings, especially when road is used daily.
- Ensure fish and amphibian passage is considered in the stream crossing design. (There is a Region 5 fish crossing CD that can be of help.)
- Use 2 mm screens on water drafting intakes from ponds, lakes, and streams and use pumps with low entry velocity.
- Reduce road densities in RCAs where possible, and utilize the following ranking mechanism for prioritizing the closure, obliteration or improvement of roads:

The priority for roads analysis and action identified for hydrology (Table 7-1), terrestrial species (Table 7-2), and aquatic species (Table 7-3) are shown below. Table 7-4 displays the combined ranking from the three tables. The highest rank is one. In the SF American River-Chili Bar Watershed the sub-watershed with the highest rank for project consideration is Rock Creek. In the LMF American River Watershed the Georgetown Canyon sub-watershed is ranked highest.

Table 7-1. Priority ranking of opportunities for further analysis and actions associated with roads in the landscape area to provide improvements in hydrological conditions

7th Field Watershed Name	# of Road crossings / sq. mile	# of Near stream crossings / sq. mile	CWE Risk	Miles / sq. mile of roads	Rank
SF American River-Chili Bar					
Bear Creek	2.4	.4	H	13	5
Brush Creek	2.7	.3	L	10	7
Chili Bar Reservoir	1.6	1.2	L	9	12
Deer View	1.9	.3	M	6	10
Iowa Canyon	2.5	.9	VH	9	3
Lower Rock Creek	2.5	.4	L	7	11
One Eye Creek	3.0	.4	M	7	4
Pino Grande	2.1	.5	H	10	9
Pollock	2.3	.7	VH	5	6
Rock Creek	2.8	.5	L	10	2
Slab Creek Reservoir	1.9	.3	L	4	14
Traverse Creek	2.5	.4	L	5	13
Upper Chili	2.9	.7	ND	7	1
Whaler Creek	2.7	.5	M	6	8
Lower Middle Fork American River					
Georgetown Cyn Cr.	2.3	.4	M	7	1
MF American R Cyn Cr	1.6	.7	M	5	3
Otter Cr	2.7	.5	ND	8	2

Table 7-2. Priority ranking of opportunities for further analysis and actions associated with roads in the landscape area to provide benefits to terrestrial species

7th Field Watershed Name	Road density	Critical Habitats	Rank
SF American River-Chili Bar			
Bear Creek	13.18	Critical winter range	3
Brush Creek	10.57	1 PAC, Critical winter range	2
Chili Bar Reservoir	8.72	Winter range	5
Deer View	6.19	PAC, Winter range	12
Iowa Canyon	8.93	2 PACs	4
Lower Rock Creek	7.04	Critical winter range	8
One Eye Creek	7.23	2 PACs, Critical winter range	7
Pino Grande	9.64	½ Pac, Winter range	6
Pollock	4.71	Winter range	14
Rock Creek	9.96	2 ½ PACs, Critical winter range	1
Slab Creek Reservoir	4.49	PAC, Critical winter range	11
Traverse Creek	4.82	Critical winter range, Winter range	13
Upper Chili	6.88	Critical winter range	9
Whaler Creek	6.09	3 ½ PACs, Winter Range	10
Lower Middle Fork American River			
Georgetown Cyn Cr.	7.14	PAC, Winter range	2
MF American R Cyn Cr	5.2	PAC, Winter range	3
Otter Cr	7.76	3 PACs, Winter range	1

Table 7-3. Priority ranking of opportunities for further analysis and actions associated with roads in the landscape area to provide benefits to aquatic species

7th Field Watershed Name	Road crossings	Miles in RCAs	Rank
SF American River-Chili Bar			
Bear Creek	2.4	.4	9
Brush Creek	2.7	.3	14
Chili Bar Reservoir	1.6	1.2	3
Deer View	1.9	.3	13
Iowa Canyon	2.5	.9	7
Lower Rock Creek	2.5	.4	8
One Eye Creek	3.0	.4	4
Pino Grande	2.1	.5	6
Pollock	2.3	.7	10
Rock Creek	2.8	.5	1
Slab Creek Reservoir	1.9	.3	12
Traverse Creek	2.5	.4	2
Upper Chili	2.9	.7	5
Whaler Creek	2.7	.5	11
Lower Middle Fork American River			
Georgetown Cyn Cr.	2.3	.5	1
MF American R Cyn Cr	1.6	.4	2
Otter Cr	2.2	.3	3

Table 7-4. Priority ranking of opportunities for further analysis and actions associated with roads in the landscape area to benefit terrestrial and aquatic species and hydrological considerations

7th Field Watershed Name	Terrestrial Wildlife Ranking	Aquatic Wildlife Ranking	Hydrology Ranking	Combined Ranking
SF American River-Chili Bar				
Bear Creek	3	9	5	4
Brush Creek	2	14	7	7
Chili Bar Reservoir	5	3	12	5
Deer View	12	13	10	12
Iowa Canyon	4	7	3	2
Lower Rock Creek	8	8	11	8
One Eye Creek	7	4	4	3
Pino Grande	6	6	9	6
Pollock	14	10	6	11
Rock Creek	1	1	2	1
Slab Creek Reservoir	11	12	14	13
Traverse Creek	13	2	13	9
Upper Chili	9	5	1	3
Whaler Creek	10	11	8	10
Lower Middle Fork American River				
Georgetown Cyn Cr.	2	1	1	1
MF American R Cyn Cr	3	2	3	3
Otter Cr	1	3	2	2

Recommendations for Management of Recreation Uses

➢ *Identify and evaluate non-system trails and roads for need and resource impact.*

- Monitor the Rock Creek Recreational Trails area to identify if additional non-system trails have been created or if closed routes are being traveled. Additional environmental analysis may be necessary if the effects are not adequately addressed in the *Rock Creek Recreational Trails Final Environmental Impact Statement* or if new information or changed conditions come to light.
- Survey areas outside of the Rock Creek Recreational Trails for non-system trails and roads. Evaluate these routes for future needs and effects on natural resources. During the site-specific project environmental analysis, options for treatment would be evaluated for environmental effects. Possible treatments include closure to vehicle access, work to restore vegetation or habitat or incorporate the trail or

road as part of the transportation system with management requirements to reduce or avoid adverse effects on the natural environment.

➢ *Plan riparian-friendly recreation facilities in the RCAs.*

- Eliminate stream crossing for vehicles that enter into the water with bridges or culverts.
- Place barrier rocks or barricades where necessary to prevent vehicles from entering into riparian areas where they may cause damage.
- Block and rehabilitate non-system roads and trails in the Rock Creek Recreational Trails area.
- Enforce the Forest Order requiring that wheeled vehicles stay on designated trails and roads.

Recommendations for Management of Hazardous Fuels

➢ *Prioritize SPLATs*

Table 7-5 displays the priority for work within the SPLATs identified for the landscape areas. As described in Step 6, SPLATs have been prioritized based upon the following criteria: (1) areas with the highest fire danger inside the WUI; (2) areas largely inside the WUI where treatments have already occurred on a majority of the SPLAT; and (3) areas where SPLATs reduce the spread of wildfire into an adjacent landscape area or sub-watershed within the landscape areas.

Table 7-5. Priority for completing work within SPLATs

SPLAT by Treatment Priority	Forest Service (Acres)	Within WUI (Acres)
42	893	643
26	751	627
29	521	521
25	498	498
28	435	435
24	359	359
31	350	350
6	278	278
27	272	272
35	240	240
46	221	221
36	210	210
8	203	203
32	185	185

4	167	167
10	122	122
41	1,352	120
11	108	108
3	100	100
7	83	83
17	82	82
2	78	78
12	69	69
30	459	68
37	68	68
47	59	59
45	56	56
13	52	52
5	48	48
14	47	47
18	46	46
9	45	45
43	287	44
38	43	43
1	31	31
44	27	27
15	24	24
16	23	23
19	73	19
20	40	0
21	145	0
22	91	0
23	367	0
33	104	0
34	308	0
39	460	0
40	344	0

When all of the recommended treatment areas meet objectives for hazardous fuels reduction, it is assumed that the "Finney Effect", resulting in substantially modified fire behavior within the landscape, will have been achieved. The timeframe within which this result is achieved varies according to treatment rates. Table 7-6 displays the annual acres of treatments necessary to complete treatment of the WUI within 10 years and areas outside the WUI within 20 years.

Table 7-6. Annual treatment acres recommended for achieving landscape objectives for modified fire behavior within a 20-year timeframe

Timeframe	Initial Treatment (Acres/year)	Secondary Treatment (Acres/year)	Maintenance (Acres/year)
Within 5 years	4,176 within WUI	1,103 within WUI	
Within 10 years	2,312 outside WUI	1,103 within WUI 1,421 outside WUI	4,176 within WUI
Within 20 years		1,420 outside WUI	In 20 yrs. Begin Maintenance @ 10,824 ac/yr in combined WUI & outside WUI

In order to maintain the effectiveness of treated areas, it is estimated that 500 acres/year of maintenance treatment, using a combination of mechanical (mastication or piling) and prescribe fire, would need to begin in approximately 10 years. This time frame meets the Comprehensive Strategy of reducing hazardous fuels with the Wildland Urban Intermix (WUI) within ten years.

As the SPLATs are completed and move into a maintenance mode, the complexity of prescribe burning is expected to be reduced, with a correlated reduction in personnel and equipment required at the scene for implementation and as contingency forces for back up. It is also reasonable to expect that some portions of the SPLATs may not require maintenance on such a rigid schedule and acres treated per year would be reduced.

Recommendations Related to Heritage Resources

Recommendations for heritage resources pertain to deficiencies observed in the identification, evaluation, and management of those resources and are guided by the management strategies outlined in the FARM and Regional PA.

➢ *Expand heritage resource inventory efforts.*

- Identify Forest Service administered lands that are deemed medium to high sensitivity for the presence of cultural resources. Conduct archaeological surveys well in advance of ground disturbing projects in those areas.
- Identify sensitive areas by overlaying natural and cultural landscape features in a geographic information system enabling the prioritization of future survey projects.
- As part of the effort to make a complete inventory of public lands in the analysis areas, bring cultural geographic information systems coverages up to date. Additionally, expand attributes recorded for heritage sites in the GIS database to include more detailed information regarding site constituents, condition, and impacts.

➢ *Substantially increase the number of sites evaluated.*

- Evaluation of historic properties in far greater numbers than is currently being undertaken will result in a greater amount of land use options and more effective management of significant cultural resources.
- Analysis at the watershed level provides an opportunity to develop thematic research designs to evaluate specific classes of resources at one time (e.g. isolated lithic scatters, bedrock mortars, ditches, etc.).
- Development of a plan for the systematic evaluation of sites within the watersheds, which emphasizes properties at risk of degradation from ongoing Forest activities.

➢ *Manage heritage resources for specific values.*

- Given the broad range of resources present in the analysis areas, there exists the potential to manage significant properties for their scientific, interpretational, and traditional values.
- Site types that can contribute substantively to the key research questions for the north central Sierra Nevada should be managed so as to preserve the scientific integrity of the deposit. Sites with very limited, yet useful data components, such as isolated flaked stone scatters and isolated bedrock mortars, should be exploited for their full data potential and released from further management unless other values associated with them would necessitate further conservation. Regional research domains that archaeological sites in the analysis area are likely to contribute to include: prehistoric settlement and subsistence patterns, lithic technology, cultural chronology, and paleo-ecological reconstructions.
- Interpretation of the area's cultural heritage will be aided by identifying archaeological sites in close proximity to Forest infrastructure such as roads, trails, and campgrounds. Additional signage, guided tours, and presentations at high-visibility sites can be used to instill the stewardship ethic in Forest users and thus contribute to the protection of such non-renewable resources.
- Treatment of properties with a high traditional value (whether for collection, ceremonial, or other uses) should incorporate aboriginal land management practices in order to enhance the resources. Possible techniques include burning, pruning, tilling, harvesting, etc.

➢ *Develop and strengthen relationships within the community.*

- Many of the issues raised in this analysis can be addressed through the formation and strengthening ties to the local community, local Native American tribal groups, users of the Forest, as well as colleges and universities.
- Within the local community, as well as in local Native American communities, *site stewards* can be trained to monitor sensitive sites. Outreach in the local schools and a heritage program presence at local events will help to foster a cultural resource conservation ethic among the local population. Regular events such as site tours and *Passport in Time* (PIT) projects will create a greater awareness, understanding, and appreciation of local heritage resources.

- Cooperation with regional colleges and universities can bring research goals to fruition by making artifact collections and data sets available for study. A large amount of information pertaining to local pre/history maintained by the Forest has yet to be synthesized into a broader regional view and provides an excellent opportunity for graduate students and undergraduate interns. By allowing universities to conduct archaeological field schools within the Forest it may be possible to complete site evaluations and data collection projects at a cost substantially lower than market value.

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Appendix A

Descriptions of the Management Prescriptions modeled for the SNFP Selected Alternative (Modified 8)

(Found in SNFP FEIS Volume 4, Appendix B-39 through B-56 Modeling)

1. LET-GROW [letgrw] [1]

The objective of the management prescription is to let stands grow naturally over time without any fuel treatments, timber harvests or wildfire. Stands conditions are projected without treatments using the Forest Vegetation Simulator. The only tree mortality is associated with inter-tree competition.

2. UNDER-BURN [unburn] [11]

The objective of this prescription is to restore fire as an ecosystem process. While the prescription is successful in restoring fire as an ecosystem process, it has little or no effect in meeting fuel reduction objectives necessary to modify wildfire behavior, either within the individual stand or across a broader landscape. However, meeting Finney height to live crown (HLC) targets though this prescription may occasionally occur.

In simulating the under-burn prescription, estimates of mortality are made for each individual tree within a stand. The factors that affect tree mortality include scorch height and bark thickness. Scorch height was based on estimated flame-length. Bark thickness is calculated using Region 5 species-specific equations found in the Wessin, Sornec, and Icasca variants of the Forest Vegetation Simulator source code.

When an area is treated with an under burn, the burning was assumed to be successful on 75% of the area. This is due to the fact that under burning frequently does not occur evenly throughout the area. Each subsequent time the area is burned again on a re-entry, a different 75% of the area is randomly selected.

Some of the results of applying this prescription include:

- An average flame length of 2 feet.
- Dead and down material < 3.0" is reduced by 25%, dead and down material >= 3.0" is reduced by 25%.
- Snags numbers are reduced by 10%
- Shrub density is reduced by 100%.

3. PRESCRIBED FIRE [ecburn] [15]

The objective of this management prescription is to remove surface and ladder fuels and return fire to the ecosystem. The prescription results are expected to be highly variable.

In simulating the prescribed fire prescription, estimates of mortality are made for each individual tree within a stand. The factors that affect tree mortality include scorch height and bark thickness. Scorch height was based on estimated flame-length. Bark thickness

is calculated using Region 5 species-specific equations found in the Wessin, Sornec, and Icasca variants of the Forest Vegetation Simulator source code.

When an area is treated with prescribed fire, the burning was assumed to be successful on 75% of the area. This is due to the fact that prescribed fire frequently does not occur evenly throughout the area. Each subsequent time the area is burned again on a re-entry, a different 75% of the area is randomly selected..

Some of the results of applying this prescription include

- An average flame length of 4 feet.
- Dead and down material < 3.0" is reduced by 90%, dead and down material >= 3.0" is reduced by 50%.
- Snags numbers are reduced by 50%.
- Shrub density is reduced by 100%.
- The prescription is effective in changing wildfire behavior both within the stand itself, and across the landscape as well. Therefore this management prescription is considered to meet the "Finney" condition.
- Re-entries occur every 20 years.
- In re-entries, the height of shrubs is ½ of initial effective shrub height or 2-ft, whichever is smaller.
- For re-entries, subsequent treatments include:
    - Prescribed fire only.
    - Prescribed fire followed by chain saw cutting, manual piling, and burning.

4. LIGHT THIN FROM BELOW - [ltthin] [21]

The objective of this prescription is fire hazard reduction. The prescription results are less variable compared to the prescribed fire prescription. Variation will be designed into site-specific prescriptions. This prescription will require a service contract to accomplish. Material will either be disposed of on-site or removed for products.

Some of the results of applying this prescription include:

- Stands are thinned from below until the height to live crown is 8.5' above effective shrub height and the fuel ladder tree non-overlapping canopy cover is less than 10%. Tree selection is in order of increasing height to bottom of crown base.
- Treatments are applied to 95% of sample points. On re-entry, a different set of sample points is randomly selected.
- A post-thinning (re-treatment) Rx-fire [model using a 2.0' flame length] will occur within 10 yrs.
- Dead and down material < 3.0" is reduced by 75%, dead and down material >= 3.0" is reduced by 25%.
- Snag numbers are not reduced.
- Shrub density is reduced by 75%.
- Re-entries occur every 20 years.
- For re-entries, subsequent treatments include:

- Thinning (for disposal or for chips) only
- Thinning followed by prescribed fire

5. FREE THIN – Canopy Cover Ranges - [owlcov] [31]

The objective of this management prescription is to sustain canopy cover, existing forest structure, and habitat elements within the range of the California Spotted Owl while also producing wood. Site-specific prescriptions will focus on sustaining habitat elements for the owl. This prescription will maintain current forest structure for as long a period of time as the let-grow prescription. This prescription will be accomplished with a timber sale. As a byproduct sawtimber removal will occur. Chips will either be removed or disposed of on-site.

Some of the results of applying this prescription include:

- Stands are thinned proportionally (on a tree per acre basis) throughout the range of existing diameters up to 20". Overall stand density (on a canopy cover basis) declines. The prescribed residual density varies with initial stand conditions.
- Harvest volume is less than 3 mbf/ac, if it exists.
- Stands with canopy cover currently over 70%, are thinned to 70% canopy cover. Re-entry occurs every 40 years.
- Stands with canopy cover between 50% and 69%, are thinned to 50% canopy cover. Re-entry occurs every 40 years. Some individual stands will grow into the 70% canopy cover condition between evaluation intervals.
- Stands with canopy cover less than 50% will not be treated.
- Dead and down material < 3.0" is reduced by 10%, dead and down material >= 3.0" is reduced by 0.0%.
- Snags numbers are reduced by 10%.
- Shrubs are unaffected.
- All live trees showing signs of rot and all snags are retained.
- Activity generated slash is piled and burned.

6. SINGLE-TREE SELECTION – Nesting Habitat [ownest and gosnst] [35]

The objective of this management prescription is to move the stand towards the average stand characteristics found in California Spotted Owl nesting habitat and then maintain that condition for the longest time possible. The prescription as a byproduct will also produce wood. This prescription will be accomplished with a timber sale. Some saw timber removal will occur. Chips will either be removed or disposed of on-site.

While either single tree selection or group-selection could be used in practice, the single tree selection silvicultural system best responds to this objective because it has the potential to maintain conditions for the longest time possible.

Some of the results of applying this prescription include:

- Treatments will occur over 95% of the stand. The remaining 5% of the stand with the highest number of large trees are reserved from cutting.

- Entry and re-entries will occur when the basal area in trees greater than 10" dbh exceeds
- 249 square feet per acre and the harvest volume exceeds 3 mbf/ac.
- Trees in excess of the average California Spotted Owl nest stand conditions will be harvested.
- Dead and down material < 3.0" is reduced by 25%, dead and down material >= 3.0" is reduced by 00%.
- Shrubs are unaffected.

7. MODIFIED MEDIUM THIN FROM BELOW [comthn] [41]

This management prescription applies to plantations only. It has the objective of a moderate level of fire hazard reduction and protection from drought related mortality. Plantations are thinned using this prescription to accomplish these objectives. As plantations age, other prescriptions would apply. This prescription will be accomplished with a timber sale. Sawtimber removal is required. Chips will either be removed or disposed of on-site.

Some of the results of applying this prescription include:

- Approximately 95% of the stand will be treated. On re-entry, a different 95% will be treated.
- The stand will be treated once it is at or above 55% of maximum stand density index (SDI) and the harvest volume exceeds 3 mbf/ac. During treatment the basal area will be reduced by 35%.
- Dead and down material < 3.0" is reduced by 75%. Dead and down material >= 3.0" and snags are reduced by 25%.
- Snags numbers are reduced by 25%.
- Shrub density is reduced by 50%.
- Re-entry will occur every 20 years after initial treatment.

8. MEDIUM THIN FROM BELOW - [mtiprd] [45]

The objective of this management prescription is a moderate level of fire hazard reduction and protection from drought related mortality. A byproduct of this prescription will include wood products. Results of this prescription will be less variable compared to the prescribed fire prescription. What variation there is will be designed into site-specific prescriptions. This prescription will be accomplished with a timber sale. Both chip and sawtimber removals will occur in the first entry.

Some of the results of applying this prescription include:

- Approximately 90% of the stand will be treated on the first entry. On re-entry, a different 90% will be treated.
- No trees greater than 30" dbh will be harvested.

- The stand will be thinned from below to 50% canopy cover (or more if all residual trees are over 30" dbh). Tree selection will be in order of increasing height to live crown.
- After thinning, prescribed fire will be used in the stand every 20 yrs.
- Dead and down material < 3.0" is reduced by 75%, dead and down material >= 3.0" and is reduced by 25%.
- Snags are reduced by 25%.
- Shrub density is reduced by 50%.
- For re-entry, subsequent treatments include:
- Thinning (multi-products) only
- Thinning followed by prescribed fire

9. SINGLE-TREE SELECTION – Foraging Habitat [owlfor] [51]

The objective of this management prescription is to move stands towards the averaged characteristics found in California Spotted Owl foraging areas and maintain those conditions for the longest time possible. As a byproduct this prescription will also have wood products. This prescription will be accomplished with a timber sale. Some saw timber removal is required. Chips will either be removed or disposed of on-site. While either single tree selection or group selection would be used in practice, the single-tree selection silvicultural system best responds to this objective because it has the potential to maintain conditions for the longest time possible.

Some results of applying this prescription include:

- Re-entries treatments will occur when the basal area in trees greater than 10" dbh exceeds 136 square feet per acre.
- Only those trees in excess of California Spotted Owl foraging needs will be harvested.
- Dead and down material < 3.0" is reduced by 75%, dead and down material >= 3.0" is reduced by 25%.
- Shrubs density is reduced by 50%.

10. HEAVY THIN FROM BELOW - [hvthin] [55]

The objective of this management prescription is a high level of fire hazard reduction and protection from drought related mortality. As a byproduct of this prescription there will be some wood production. The prescription results will be less variable compared to the prescribed fire prescription. Variation will be designed into site-specific prescriptions. This prescription will be accomplished with timber sales. Both chip and saw timber removal will occur.

Some of the results of applying this prescription include:

- Approximately 95% of the stand will be treated. Subsequent treatments on re-entry will treat a different 95%.
- No trees greater than 30" dbh will be harvested.

- Stands will be thinned from below to a 40% canopy cover (or more if all residual trees are over 30" dbh). The treatment will be repeated every 20 years or when height to live crown is less than 8.5-feet.
- After each thinning, an under burning will occur within 10 years to maintain the stand conditions.
- Dead and down material < 3.0" is reduced by 90%.
- Dead and down material >= 3.0" and snags are reduced by 90%.
- Shrub density is reduced by 90%.
- Subsequent treatments may involve:
- Thinning (multi-products) only
- Thinning followed by prescribed fire

11. GROUP SELECTION with THINNING - [grthin] [61]

The objective of this management prescription is to produce California Wildlife Habitat Relationship class 6 stands and to provide a "sustainable" timber supply while modifying fire Treatments will occur over a 30-year cycle, which requires treating 10% of the area every 30 years with a regeneration harvest of small groups. Thinning will also be performed between groups. This prescription will not only modify fire behavior within the stand in which it is performed, but it will also modify fire behavior in a landscape scale (meeting the "Finney" condition). There will be three initial starting periods, followed by a 30-year re-entry cycle.

Some of the results of applying this prescription include:

- Approximately 95% of the stand will be treated. Treatments on re-entry will involve a different 95%.
- Dead and down material < 3.0" is reduced by 50%, dead and down material >= 3.0" is reduced by 50%.
- Snags are reduced by 50%.
- Shrub density is reduced by 90% in the groups.

12. SEED TREE with RESERVES [stresv] [71]

This prescription would be used in landscapes that have relatively small amounts of young and open habitat conditions. The objective is to achieve a more equal distribution of habitat stages on the landscape and achieve a stand structure with at least 3 distinct structural features. Habitat stages that are relatively abundant are selected for this prescription. Size of area and details of the prescription would be determined locally.

This prescription creates an open forest environment with intent to reforest using a combination of natural and artificial means. In addition, some intact patches are reserved from cutting to function as habitat niches.

Seed trees representing all species present are selected from the best available seed producing phenotypes. Seed trees are retained in sufficient quantity and in locations to cover the area with ample amounts of seed. Habitat patches are reserved in sufficient quantity, size, and location to insure functionality.

Some of the results of applying this prescription include:

- Approximately 95% of each stand will be treated. However, within the treated area, the 8 largest healthy trees per acre will be retained.
- Five percent of each stand is left untreated and allowed to grow. The 5% is selected which has the highest stand density.
- All other trees are removed.
- Dead and down material < 3.0" is reduced by 75%.
- Dead and down material >= 3.0" and snags are reduced by 50%.
- Snags are reduced by 50%.
- Shrub density is reduced by 90%.

13. GROUP SELECTION - [grselt] [81]

The objective of this management prescription is to provide for gaps for regeneration and sustainable flows of timber harvest.

Some of the results of applying this prescription include:

- Approximately 95% of the stand will be treated. Subsequent re-entry treatments will involve a different 95%.
- Dead and down material < 3.0" is reduced by 75%.
- Dead and down material >= 3.0" and snags are reduced by 50%.
- Snags are reduced by 100%.
- Shrub density is reduced by 90%.

Appendix B

Accuracy of the Forest Vegetation Inventory

Accuracy of the Forest Vegetation Inventory is approximately 86% for the total vegetation inventory; accuracy is higher at the extremes of the attributes (for example the reflectance of water is usually specific enough that its accuracy is approximately 99%). The 10 cover class breakdowns add more flexibility than actual accuracy. Accuracy increases significantly when these are lumped back into the S, N, P, and G classes for canopy cover.

RSL vegetation mapping for the Eldorado was done by Thematic Mapper satellite imagery. The vegetation polygons on the map are drawn by the computer; based on the reflectance of the satellite image pixels. After the polygons are designated, they are given labels based on areas of similar reflection, ecological modeling, and, in some areas, input from the Forests. The primary reason the Digital Ortho Quads and the RSL vegetation mapping are so disparate, is that the satellite imagery from the Thematic Mapper has 900 times less resolution than the digital ortho quads.

FIA grid plots are used for the vegetation map accuracy assessment. The FIA plots sample for Dominant, Co-dominant, and Pre-dominant trees, and give information on the under-story vegetation. The accuracy assessment is independent of the vegetation mapping, and cannot be used to correct errors in the satellite mapping. Because the FIA grid is independent of polygon boundaries from the vegetation mapping, there is no spatial relationship to the polygon boundaries in the map, so it is not a sampling of the vegetation map; it is an independent sample on the same land base. This gives a very conservative accuracy assessment, but, there is no way to estimate sampling error, FIA grid plots may span 2 vegetation map polygons, etc.

Another source of error is that the FIA grid plots are sampling viewed from the ground, rather than looking down at the crown. This is likely the smallest source of error in the data.

The FIA method also assumes random distribution of trees on the plots, which is a larger source of error for clumpy, non-random stands. There are many areas where distribution of trees is not random, i.e., with clumpy stands, stands with mixed features (such as rock outcrops,) areas with meadow edges, riparian stringers, etc.

To increase accuracy, the Eldorado chose some vegetation types to increase the sampling density from the 3.5-mile grid to a 1.75-mile grid. This was done to increase the number of samples for vegetation types with smaller acreages. Current mapping on the Eldorado has increased plot densities for ponderosa pine, and the types with white fir (mixed con/fir, white fir) due to the concern that these types are likely to be areas with higher fuel loads that may be candidate fuel treatment areas.

The accuracy assessment method is "fuzzy logic", which assigns labels from "best-fit" rather than by exact measurements. It attempts to allow for the range of variability in

biological systems. Fuzzy logic allows classification divisions for contiguous conditions, such as cover density, and size class. The accuracy assessment uses fuzzy ratings based on threshold values for each vegetation attribute, and each attribute is evaluated independent of all the others. There are some advantages to this method, including that this method:

1. Indicates the magnitude of error
2. Gives more information about the utility of a map to meet an analysis objective
3. Depicts the error for a given attribute, or class
4. Depicts the distribution of error across an attribute
5. Error trends can be seen fairly easily

For the Eldorado vegetation mapping, these are some areas of error:

- Mapping is biased toward the dominant condition; for the Eldorado, conifers are the dominant life form.
- There is confusion between shrubs and conifers – i.e., shrubs classified as conifer, and conifer classed as shrub. Because of dominant conditions, there are probably more conifers miss-classified as shrubs than shrubs miss-classified as conifers.
- The Sierra Nevada has a preponderance of mixed vegetation communities; on the Eldorado there is confusion among Ponderosa pine, Douglas-fir/pine, and Douglas-fir.
- Eldorado red fir is heavily over-mapped. Mapping shows red fir correctly at its lower elevation, but at its upper elevation, red fir is shown in stands that are, in reality, Lodgepole pine, mountain hemlock, Jeffery pine, white pine, etc.

Appendix C

PNV to WHR Crosswalk Assumptions

The PNC descriptions of types, even where they are grouped, is typed under a different, and in most cases, more precise manner than are the WHR types as described in *A Guide To Wildlife Habitats of California*, W. Laudenslayer, Jr. editor 1988. For this reason some assumptions were made to come up with a crosswalk for use in the SF American River-Chili Bar and Lower Middle Fork American River Landscape Analysis. Because of these assumptions, and the differences in how the typing is conducted, the resulting crosswalk should be used with some caution.

White Fir and Sierran Mixed Conifer

No stands within the analysis area meet, or were close, to the WHR standard of 80% canopy closure of white fir, with other mixed species. For this reason all PNV types of all ABCO-MCN (white fir-mixed conifer) were typed as Sierran Mixed Conifer (SMC) under the WHR typing.

Douglas-fir and Montane Hardwood Conifer

For Douglas-fir there is no WHR dominant canopy closure percentage assigned to this species, so the Potential Natural Vegetation (PNV) groups (PSME_MCN) coded Douglas-fir-mixed conifer stands were all coded to WHR DFR types. The exception to this being the PSME-MCN/ moist (PNV# 775/775), PSME-MCN/ moist rocky and moist (PNV # 785/775), and PSME-MCN/ moist and moist rocky (PNV # 775,785) which were all coded MHC Montane Hardwood Conifer (MHC_DFR) based on increased hardwood components.

Ponderosa Pine and Montane Hardwood Conifer

For the ponderosa pine (PPN) WHR type, none of the PNV types met the 50 ponderosa pine canopy closure standard, but were close and therefore coded PPN, with the exception of the PIPO-MCN/ dry rocky and PIPO_MCN /dry PNV#915/901, and PIPO-MCN/ dry and PIPO_MCN /dry rocky PNV#901/915 which were classified as MHC (MHC_PPN) based on increased hardwood components.

Appendix D

Descriptions of PNC and PNC groups

SF American River-Chili Bar Watershed

Douglas-fir/moist (300, 302, 304, 309, 310*)*

300 = Douglas-fir/moist
302 = Douglas-fir-dogwood/poison oak/starflower
304 = Douglas-fir/poison oak/starflower
309 = Douglas-fir/wet riparian
310 = Douglas-fir-white alder//alumroot

*309 and 310 are riparian but acreage is too small to separate as group

Douglas-fir/moist-rocky (305, 320, 321, 322):

305 = Douglas-fir/moist rocky
320 = Douglas-fir-canyon live oak/poison oak/sword fern
321 = Douglas-fir-canyon live oak/buckeye
322 = Douglas-fir-canyon live oak/mock orange

Douglas-fir dry (325, 326, 327)

325 = Douglas-fir//Bolander's bedstraw
326 = Douglas-fir/poison oak/Bolander's bedstraw
327 = Douglas-fir//sticky cinquefoil

Douglas-fir dry rocky: 329, 330, 331, 332, 334, (749)*

329 = Douglas-fir-canyon live oak
330 = Douglas-fir-canyon live oak/creeping snowberry
331 = Douglas-fir-canyon live oak//Bolander's bedstraw
332 = Douglas-fir-canyon live oak/poison oak
334 = Douglas-fir-canyon live oak/Fresno mat/creeping sage

**749=Mixed Conifer unknown: in analysis area this type was changed to Douglas-fir dry rocky based on photo interpretation and similarity to adjacent polygons*

Douglas-fir-tan oak dry: 340, 341, 342

340 = Douglas-fir-tan oak/poison oak/Bolander's bedstraw
341 = Douglas-fir-tan oak//Bolander's bedstraw
342 = Douglas-fir-tan oak-canyon live oak//Bolander's bedstraw

Douglas-fir-tanoak moist: 351, 352, 360

351 = Douglas-fir – tan oak/poison oak/starflower
352 = Douglas-fir - tan oak-dogwood/starflower
360 = Douglas-fir - tan oak-bigleaf maple/hazelnut

Douglas-fir-Ponderosa pine dry: 370, 371, 372

370 = Douglas-fir - ponderosa pine/mod_unknown
371 = Douglas-fir - ponderosa pine/bearclover/Bolander's bedstraw
372 = Douglas-fir - ponderosa pine/Bolander's bedstraw

Ponderosa pine dry: 390, 391

390 = Ponderosa pine/dry
391 = Ponderosa pine/bearclover/Bolander's bedstraw

Ponderosa pine dry rocky: 392, 400, 401

392 = Ponderosa pine/dry rock
400 = Ponderosa pine-canyon live oak
401 = Ponderosa pine-canyon live oak/whiteleaf manzanita

Douglas-fir – mixed conifer – tanoak dry: 761, 762

761 = Douglas-fir – mixed conifer – tan oak//iris
762 = Douglas-fir – mixed conifer – tan oak/bearclover

Douglas-fir – mixed conifer/moderate: 765, 766, 770

765 = Douglas-fir-mixed conifer/moderate
766 = Douglas-fir-mixed conifer//starflower
770 = Douglas-fir – mixed conifer/moderate rocky

Douglas-fir – mixed conifer/moist: 775, 779, 841

775 = Douglas-fir – mixed conifer/moist
779 = Douglas-fir – mixed conifer – dogwood//trailplant
816 = Douglas-fir – mixed conifer – big leaf maple/hazelnut

Douglas-fir – mixed conifer/moist rocky: 785, 786

785 = Douglas-fir – mixed conifer/moist rocky
786 = Douglas-fir – mixed conifer-canyon live oak/moist

Douglas-fir – mixed conifer – tan oak/moist: 800, 801, 803

800 = Douglas-fir – mixed conifer – tan oak/moist
801 = Douglas-fir – mixed conifer – tan oak – dogwood
803 = Douglas-fir – mixed conifer – tan oak – big leaf maple

White fir-mixed conifer/dry: 841, 850

841 = White fir-mixed conifer/dry
850 = White fir-mixed conifer/moist*

* changed to dry based on photo interpretation and similarity to adjacent polygons

Ponderosa pine – mixed conifer/dry: 902, 910, 912

902 = Ponderosa pine – mixed conifer//Bolander's bedstraw-milkwort
910 = Ponderosa pine – mixed conifer/bearclover/Bolander's bedstraw
912 = Ponderosa pine – mixed conifer/bearclover-Fresno mat ceanothus

Ponderosa pine – mixed conifer/dry rocky: 916, 917, 918

916 = Ponderosa pine – mixed conifer/dry rocky
917 = Ponderosa pine – mixed conifer – canyon live oak/bearclover
918 = Ponderosa pine – mixed conifer – canyon live oak

Canyon live oak: 450, 453, 454

450 = Canyon live oak
453 = Canyon live oak/dry herb
454 = Canyon live oak/buckbrush

Gray pine: 420, 421, 425, 431

420 = Gray pine
421 = Gray pine - blue oak
425 = Gray pine - canyon live oak
431 = Gray pine/buckbrush

Sierran montane serpentine shrubland: 1001, 431

1001 = Serpentine chapparal/rocky
431 = Gray pine/buckbrush

Sierran lower montane shrub group, Sierra foothill shrub group: 2001, 2003

2001 = Shrub/rocky (lower mixed conifer)
2003 = Chaparral/rocky (foothill)

Moist meadow, meadow: 2200, 5000

2200 = meadow moist
5000 = meadow

Lower Middle Fork American River Watershed

Douglas-fir/moist (300, 810)*

300 = Douglas-fir/moist
810 = Douglas-fir/riparian

*810 is riparian type but acreage is too small to separate as group

Douglas-fir dry to moderate (325)

325 = Douglas-fir//Bolander's bedstraw

Douglas-fir dry rocky (canyon live oak): 329

329 = Douglas-fir-canyon live oak

Douglas-fir-Ponderosa pine dry rocky: 382

382 = Douglas-fir - ponderosa pine-canyon live oak//Bolander's bedstraw

Douglas-fir – mixed conifer – tanoak dry: 761

761 = Douglas-fir – mixed conifer – tan oak//iris

Douglas-fir – mixed conifer/moderate: 765, 766, 770

765 = Douglas-fir-mixed conifer/moderate
766 = Douglas-fir-mixed conifer//starflower
770 = Douglas-fir – mixed conifer/moderate rocky

Douglas-fir – mixed conifer/dry rocky: 756

756 = Douglas-fir – mixed conifer- canyon live oak

Douglas-fir – mixed conifer/moist: 775

775 = Douglas-fir – mixed conifer/moist

Douglas-fir – mixed conifer/moist rocky: 786

786 = Douglas-fir – mixed conifer-canyon live oak/moist

Ponderosa pine dry: 390

390 = Ponderosa pine/dry

Ponderosa pine dry rocky: 392, 400

392 = Ponderosa pine/dry rock
400 = Ponderosa pine-canyon live oak

Ponderosa pine – mixed conifer/dry: 901, 910, 912

901 = Ponderosa pine – mixed conifer/dry
910 = Ponderosa pine – mixed conifer/bearclover/Bolander's bedstraw
912 = Ponderosa pine – mixed conifer/bearclover-Fresno mat ceanothus

Ponderosa pine – mixed conifer/dry rocky: 918

918 = Ponderosa pine – mixed conifer – canyon live oak

Canyon live oak: 450, 452, 453

450 = Canyon live oak
452 = Canyon live oak/manzanita
453=Canyon live oak/dry herb

Serpentine chaparral/rocky: 1001

1001 = Serpentine chapparal/rocky

Chaparral/rocky: 2001

2001 = Shrub/rocky (lower mixed conifer)

Shrub, riparian (willow): 1700

1700 = Riparian shrub

Appendix E

Species and Habitat Data

Forest-wide Habitat Mapping for Threatened, Endangered, and Sensitive Species and MIS

Habitat mapping for MIS and TES species across the Eldorado National Forest is not intended to be a precise mapping exercise. Habitat mapping elements are limited to those currently available as GIS spatial data, and field review or closer evaluation is often desirable for project level analysis. These data layers should serve as a starting point for landscape assessments and project-level habitat assessments, particularly when evaluating broader scale habitat availability and cumulative effects. The California Wildlife Habitat Relationships (CWHR) vegetation classification system is used as the basis for much of the habitat mapping. CWHR habitat types are mapped in the Forest vegetation inventory, using 1999 remote sensing imagery. This data layer, however, has differing degrees of accuracy for various mapping elements (see Appendix B). The CWHR database was reviewed and CWHR habitat types were utilized as the mapping criteria for some species. For other species it was necessary to adjust the mapping criteria due to known limitations in the Forest's vegetation inventory, or where additional GIS data (such as elevation, slope, percent cover) allowed for an improvement or refinement of the broad CWHR habitat categories assigned for a species. Such changes are explained in the species narrative.

Definitions:

Occupied habitat. Habitat mapped surrounding documented species occurrences and/or management areas established based upon species occurrences.

Suitable habitat. This represents habitat that may potentially be used by a species. Habitat mapping elements are limited to those currently available as GIS spatial data. Because many habitat factors of importance cannot be evaluated without field inspection, "suitable habitat" will often cover broad areas, the entirety of which is not suitable for a particular species, but within which suitable habitat may be found. Suitable habitat may be subdivided into suitability for various life stages or requirements, such as nesting or foraging.

Key habitat. This is a subset of mapped "suitable habitat" and represents the habitat known to be preferentially selected by a species or clearly known to be of highest value, where this can be readily defined.

Summary of wildlife surveys performed in the landscape area

Bald Eagle
Occupied Habitat
Wintering—within ½ mile of reservoirs with documented winter use.
Nesting—within a locally determined distance from current and historic nest sites.
Suitable Habitat

Nesting and wintering habitat mapped in the Draft Eldorado National Forest Bald Eagle Habitat Management Plan. This mapping was completed in 1998 using aerial photography, survey records, and past habitat mapping efforts.

Valley Elderberry Longhorn Beetle

Occupied Habitat

None mapped.

Suitable Habitat

Mapping elements:

Elevation – below 3,000 ft (elevation layer)
Veg density - < 20 % (existveg)
Veg type – plantation (Plantation layer)

Key Habitat

Mapping elements:

Elevation – below 3,000 ft (elevation layer)
Detections – mapped locations of elderberry plants

Peregrine Falcon

Occupied Habitat

None mapped.

Suitable Habitat

Mapping elements:

1980 mapping of cliff sites from topographic quad maps and field reviews (digitize?)

Spotted Owl

Occupied Habitat

Nesting -- PAC habitat mapping (PAC layer)
Foraging -- HRCA habitat mapping (HRCA layer)

Suitable Habitat

Mapping elements:

CWHR size class – size class 4, 5, & 6 (existveg)
vegetation density – 50 percent (>/= 5) (den_total)

Northern Goshawk

Occupied Habitat

Nesting -- GPAC habitat (eld_GPAC02)

Suitable Habitat (Nesting)

Mapping elements:

CWHR size class – size class 4, 5, & 6 (existveg)
vegetation density – 60 percent (>/= 6) (den_total)

Key Habitat (Nesting)

Mapping elements:

CWHR size class – size class 5, & 6 (existveg)
vegetation density – 60 percent (>/= 6) (den_total)

Marten

Occupied Habitat

Mapping elements:

Detections --0.25 mile buffer surrounding marten detections including only polygons that meet suitable habitat criteria below.

Suitable Habitat

Mapping elements:

Elevation -- above 5,500 feet

Vegetation density >/= 3 (existveg, den_total)

CWHR size class --- 4, 5, & 6 (esitveg, WHR size)

Fisher

Occupied Habitat

None mapped.

Suitable Habitat

Mapping elements:

(based on habitat description on page 6, chapter 3, part 4.4 of SNFPA EIS)

CWHR class -- 4M, 4D, 5M, 5D, 6

Polygon size -- greater than 80 acres in size

(consider buffering polygons to create larger contiguous areas)

Wolverine

Occupied Habitat

None mapped.

Suitable Habitat

Mapping elements:

Elevation -- above 5,000 feet

Roads -- Sections with road densities below 2 miles/sq mile

Facilities and structures --Greater than .5 mile from campgrounds and structures

Sierra Nevada Red Fox

Occupied Habitat

None mapped.

Suitable Habitat

Mapping elements:

Elevation -- above 5,500 feet (same as marten)

Vegetation -- >/= 30% cover within 2 miles of meadows

Great Gray Owl

Occupied Habitat

Detections -- Meadows with GGO detections buffered with forested stands w/in 1,000 meters

Suitable Habitat

Mapping elements:

Vegetation -- Meadows and meadow complexes greater than 15 acres in size and forested stands within 1,000 meters of meadows

(Tech. Asses, 1994) (Forest ggo and wifl layer)

Willow Flycatcher

Occupied Habitat

Historic detections -- Framework occupied habitat layer

Suitable Habitat

Mapping elements:
Framework wifl habitat layer (O, E, and S categories)

Pallid Bat and Townsend's Bat
Occupied Habitat
None mapped
Suitable Habitat
None mapped
Key Habitat
Bridges (transportation layer)
Mines (GIS layer not currently available)

Western red bat
Occupied Habitat
None mapped
Suitable Habitat
Elevation -- below 3,000 feet in elevation
Vegetation – forested types

Deer
Occupied Habitat
Deer ranges — as shown in CDFG deer range maps
Suitable Habitat
Same as occupied habitat
Key Habitat
Critical winter range, critical fawning habitat, critical summer range

Black Bear
Occupied Habitat
Entire Forest
Suitable Habitat
Same as occupied habitat

Mountain Quail
Occupied Habitat
Grass, Brush, stands with <20 % cover
Suitable Habitat
Same as occupied habitat

Cavity Nesting Birds
Occupied Habitat
CWHR size class -- 4, 5, & 6 (existveg)
Suitable Habitat
Same as occupied habitat

California Red-legged Frog
Suitable Habitat
Perennial and seasonal streams less than or equal to 2% gradient and below 5,000 feet elevation
Key Habitat

Same as suitable habitat

California Red-legged Frog

Suitable Habitat

Perennial and seasonal streams less than or equal to 2% gradient and below 5,000 feet elevation

Key Habitat

Same as suitable habitat

Foothill yellow-legged Frog

Suitable Habitat

Perennial and seasonal streams below 6,000 feet elevation

Key Habitat

Perennial and seasonal streams less than or equal to 2% gradient and below 6,000 feet elevation

Western Pond Turtle

Suitable Habitat

Perennial and seasonal streams and ponds below 6,000 feet elevation

Suitable Nesting Habitat

Open areas dominated by grasses/herbaceous annuals with few trees or shrubs with 20% or less cover below 5,000 feet elevation and at a 15 degrees slope and a southeast, south, or southwest aspect within 150 m from perennial and seasonal streams.

Hardhead fish

Occupied Habitat

Mapped from detections or suspected detections

Suitable Habitat

Large low-gradient rivers in low to mid elevations

Rainbow Trout

Occupied Habitat

Mapped from detections or suspected detections

Suitable Habitat

All perennial streams

Appendix F

Stream Surveys

SF American River-Chili Bar Watershed

South Fork American River

The portion of the SF American River within the watershed includes the mainstem from its confluence with Silver Creek in the east to Chili Bar Reservoir in the west. It flows through a steep inner gorge and has a low to moderate gradient (0-4%) dominated by bedrock and boulder substrates. It provides moderate fisheries habitat, with high amounts of bedrock cover, but is lacking in spawning habitat as a result of the two dams. Riparian vegetation is in good condition but may be limited in areas due to the steep slopes and areas of disturbance from dams, powerhouses, urbanization and roads. Conifers and canyon live oak along with the steep hillslopes provide much of the shade to the stream. Riparian vegetation includes alders, bigleaf maple, riparian forbs, and sedges. The inner gorge tends to be unstable due to the over-steepened slopes and high potential for landslides. A debris slide that occurred during the 1997 flood event on the west-facing slope above Slab Creek Reservoir has eliminated a portion of road 11N96.

There is a high level of disturbance in the southern portion of the watershed concentrated mostly along the ridgetops and upper slopes above the SFAmerican River. There is extensive urban residential development associated with Pollock Pines, Camino, Swansboro, and Placerville and agricultural use concentrated along Carson Road and the Apple Hill area. The SF American River is used for hydropower generation under the Upper American River Project (Sacramento Municipal Utility District), the Chili Bar Project (Pacific Gas and Electric), and the El Dorado Hydroelectric Project (El Dorado Irrigation District).

Rock Creek

Rock Creek is a perennial stream that flows from its source near Georgetown Divide and Chiquita Lake into the SF American River downstream of the American River Powerhouse. Rock Creek was identified in the Sierra Nevada Ecosystem Project as an area that is an Aquatic Diversity Management Area.

The upper portion of Rock Creek is bedrock and cobble controlled stream with dense shade canopy (87%), stable banks, and low to moderate gradients (1-4%). Riparian vegetation consists of alder, bigleaf maple, dogwood, hazelnut, and riparian forbs and sedges and a Douglas-fir dominated mixed conifer on the mid to lower slopes. However, there is a high degree of Scotch broom and star thistle noxious weed invasion throughout the watershed. In addition there has been a large invasion of non-native Himalayan blackberry that lines large portions of the stream courses. Recent stream monitoring (1999-2002) conducted on a reach upstream of the confluence with Canyon Creek includes water quality tests, cross-section data, pebble counts, and benthic macroinvertebrate sampling. Water quality test results ranged from good to excellent. Results from benthic macroinvertebrates sampling indicate that Rock Creek is in good to excellent condition with high diversity in the community and only slight organic enrichment. The overall results of the survey indicate that the stream was stable with low amounts of silt. Brown and rainbow trout occur mostly in the main channel pools. Additional Bioassessment work completed at key trail stream crossings (Holst et al.

2002) also indicates good water quality and associated habitat as illustrated by macroinvertabrate populations and diversity.
Stream surveys conducted along the central portion indicated that Rock Creek has a moderate gradient (mean is 2.7%). The dominant Rosgen channel types are A1, A2, and B1 with bedrock or boulder substrate. The stream alternates between deeply entrenched and well-confined to shallow entrenchment and moderate confinement and has a step/pool morphology. Surveys conducted along five tributaries used Pfankuch channel stability ratings to assess stream conditions. The ratings for three tributaries were in a low to medium-good condition, and two in high-fair. Stream gradients for the tributaries were steep and ranged from 6 to 20%. The substrate was composed predominately of gravel, sand, and silt/clay materials. Impacts from historical hydraulic mining and potential for mass wasting were reported throughout the tributaries.
The primary tributaries along the lower portion of Rock Creek are Nelson Canyon, Trail Gulch and Harricks Ravine. The condition of Lower Rock Creek was rated as good with stable streambanks. However, stream cover was noted to be within the 40 to 60% range or fair condition. No fish were seen in Harricks Ravine down to the mouth of Rock Creek however western pond turtle as well as bull frogs are utilizing this area. Barriers within Harricks Creek may limit fish passage. Both shade canopy and bank stability were reported as good and over all stream condition was rated as excellent.

Tributaries to Rock Creek

Canyon Creek

Stream surveys conducted along the mainstem and tributary stream channels of Canyon Creek assessed the condition of stream channels and fish habitat. Based on the Rosgen classification over half of the reaches surveyed in the mainstem of Canyon Creek have either bedrock or small boulder and large cobble channels, which have a low sensitivity to disturbance. Of the remaining channels surveyed, about a third have a moderate gradient, cobble and gravel channels that are moderately sensitive to disturbance and a small portion have steep, coarse-grained channels which are highly sensitive to disturbance. Pfankuch ratings reported for the mainstem indicate that the half of the reaches are in the range of excellent to medium-good condition, a third in low-good, and 7% in high-fair. Canyon Creek supports naturally reproducing populations of rainbow and brown trout. Trout populations may be limited by a combination of natural conditions and effects from increased sedimentation due to land disturbance activities.

According to Rosgen classification conducted on the 11 tributary reaches surveyed, the majority have steep, erodible fine-grained or silt and clay channels that are extremely sensitive to disturbance. The Pfankuch ratings reported for the 11 tributary reaches indicate that about two-thirds are in good condition and one-third in fair condition. In general, the watershed is characterized by steep upper bank slopes and high stream gradients, especially in the ephemeral and intermittent channels. Increased sedimentation and/or lower bank cutting was observed in the majority of reaches surveyed, mostly the tributary streams.

Tobacco Gulch

Tobacco Gulch Creek is one of the tributaries near the headwaters of Rock Creek. Based on Rosgen classification, the upper reach has a steep bedrock and boulder channel with low sensitivity to disturbance and the lower reach has a moderate gradient, large cobble and coarse gravel channel with a moderate sensitivity to disturbance. The Pfankuch ratings indicate that both reaches are in a low-good condition. Degraded habitat conditions (high embeddedness and siltation, high water temperature fluctuations, and low invertebrate and fish productivity) resulting from excessive sedimentation were observed throughout the surveyed sections and may be associated with past land use disturbances. Marginal populations of brown trout were observed in the lower end of Tobacco Gulch Creek. Fish may be limited in this watershed due to possible natural conditions including inadequate pool habitat, lack of gravel for spawning habitat and invertebrate production, and migration barriers combined with the degraded habitat conditions.

Al Brass Creek

Al Brass Creek is a perennial stream that flows westerly to Rock Creek. Near the headwaters of the stream it is mainly a gravel and cobble dominated reach. The remaining lower reach is described as a bedrock cascade with steep gradient and a step pool sequence. The majority of the tributaries surveyed have erodible silt and clay channels or coarse-grained channels that are sensitive to disturbance. Isolated areas of unstable conditions exist in all reaches surveyed as indicated by lower bank cutting and mass wasting, unstable substrate material, and/or pool filling. It is likely that natural conditions, including low summer flows, migration barriers, and channel stability problems could be limiting the fishery in the mainstem of Al Brass Creek.

Little Silver Creek

Conditions on the perennial reach of Little Silver Creek, below the major fork were in good condition and several fish were observed. Observations indicate that lower bank cutting and mass wasting were minimal. However, in the area of an abandoned mining ditch, several hundred feet are undercut by the stream. Hydraulic mining deposits are frequently observed to flank the stream, and occasionally cause the stream to braid at peak flows. There are isolated areas of unstable conditions such as lower bank cutting, mass wasting, unstable substrate material, and/or channel scour and deposition. The riparian zone seems healthy and intact, averaging 20 to 30 feet on either side of the stream, with dense canopy cover. The intermittent channels Pfankuch ratings are in medium to low-good category. Isolated areas of unstable conditions observed in the lower reach include bank cutting where the stream is incised 4-6 feet into old hydraulic mining alluvium with vertical, raw banks. Streambed silt deposits are noted below an OHV trail crossing. There have been numerous trail stream crossing failures which likely contributed to this silt load. All of these crossings have been replaced with bridges which have a much lower potential for failure and impacts to stream channels.

Bald Mountain Canyon Creek

Bald Mountain Canyon Creek is a perennial tributary to Rock Creek and supports a small population of naturally reproducing brown trout. Fish numbers may be limited however due to inadequate pool habitat, low summer flows, limited spawning gravels, and/or migration barriers. Fish and aquatic invertebrates may also be limited by degraded habitat due to increased sedimentation from previous activities. Previous surveys have also identified siltation of pool and riffle habitats in the mainstem and tributary streams.

Based on the Rosgen classification about 45%of the mainstem of Bald Mountain Canyon Creek has either bedrock or small boulder and large cobble channels, which have a low sensitivity to disturbance. Of the remaining reaches surveyed, 25% have a moderate gradient, cobble and gravel channels that are moderately sensitive to disturbance and 30 have coarse-grained channels which are highly sensitive to disturbance. Pfankuch ratings indicate that all are in low to medium-good condition; however, sedimentation was reported throughout.

The Rosgen classification indicates that over half of the tributaries have steep, erodible fine-grained silt and clay channels that are extremely sensitive to disturbance and one-third have steep, erodible, coarse-grained channels which are highly sensitive to disturbance. The remaining have steep, bedrock channels that have a low sensitivity to disturbance. The Pfankuch ratings show that the majority is in low-good to medium-good condition. Generally, steep upper bank slopes and high stream gradients, especially in the ephemeral and intermittent channels.

Dutch Canyon Creek

Stream channel condition based on Pfankuch ratings is high-fair to medium-good condition. However, degraded channel and habitat conditions exist due to bank cutting and sedimentation. These conditions are thought to exist due to a combination of naturally sensitive characteristics including steep slopes and gradients, inner gorge morphology, and erodible substrate materials as well as direct and indirect effects from past land management activities. Dutch Canyon Creek supports a small, naturally reproducing population of rainbow trout. However, fish numbers may be limited due to inadequate pool habitat and instream cover, channel stability problems, very low amounts of large woody debris, and/or inadequate spawning habitat.

Whale Rock Watershed

Stream channel and aquatic habitat condition surveys were conducted on the main unnamed perennial stream and two tributaries. Based on Rosgen classification, the mainstem reach has a moderate gradient, unstable cobble/gravel channel substrate which has a moderate sensitivity to disturbance. The two tributary reaches have steep gradients and silt/clay channel substrates that have an extreme sensitivity to disturbance. The Pfankuch ratings indicate that the mainstem is in a low-good condition, and the majority of the channel in the tributary reach ranged from a low-good condition to a high-fair condition. Historical mining activities have impacted sections of the reaches surveyed. Mass wasting occurred throughout the mainstem reach and was most active in the vicinity of historical mining, where upper bank

slopes exceeded 65% slope and increased to nearly vertical by mining activities. Mining activities also impacted the tributary reaches with steep potentially unstable upper banks. The lower reach had nearly continuous lower bank cuts. No fish or amphibians were observed in the watershed.

One Eye Creek

Stream surveys indicate that aquatic habitat and the stream channel is in fair to good condition. The stream channel ranged from stable to unstable in steepest areas for channel side slopes. Self-sustaining populations of rainbow trout were found throughout the creek. Overall the productivity of One Eye Creek is rated as low and possible limiting factors are silt deposits, poor riffle/pool ratio, low flows, and lack of available aquatic food organisms.

Traverse Creek

Traverse Creek is a major tributary to Rock Creek in the western part of the watershed. The Fish and Wildlife Service has recently designated Traverse Creek (one of the primary tributaries to Rock Creek) as a Recovery Area for the Threatened and Endangered Red Legged Frog. A detailed cumulative impact assessment of the Traverse Creek Watershed was completed by the Foresters Co-Op and the Sierra Economic Development District (2001). This study developed an extensive GIS database, made recommendation for future proposed activities within the watershed and identified a number of sites poor condition primarily associated with road drainage issues. The upper reaches of Traverse Creek consist mainly of bedrock in both pools and riffles. The substrate near the mouth of Rock Creek is mainly cobble. Rocks and gravel were noted in the riffles, small cobbles and gravel in the pools. Most of the mainstem appears to be relatively stable. The main stem supports populations of green sunfish and rainbow trout with minor amounts of red ear sunfish and largemouth bass. The number of green sunfish, especially in the larger slow moving pools, appears to be abundant. Adult bullfrogs and their tadpoles also occur along the stream. There are signs fishing due to the amount of stream adjacent user created trails and fishing litter. Water temperatures at Rock Creek near the Traverse Creek confluence are relatively high during the summer. Although Traverse Creek is a perennial stream, high water temperatures may affect the trout fishery in the lower reaches of the creek. Shade canopy in the lower section is moderately dense with steep side slopes providing shade, and less so in the upper section. There are some steep rock falls in the upper reaches of Traverse Creek that may act as a barrier to fish during low flow. Impacts from active mining (dredging) were noted in the stream. The Meadow Brook day use area, also known as the Botanical Special Interest Area has extensive equestrian and foot trail use. Parking facilities are limited in the area and some of the parking presently used is in undesirable locations that encroach upon the meadows and springs in the area.

Bear Creek

Bear Creek is a perennial stream that flows into Rock Creek approximately 1.5 miles upstream of where Rock Creek joins the SF American River. The creek has two seasonal tributaries: Pegleg Creek entering from the west and Hog Canyon Creek

entering from the east. There are currently no water diversions from Bear Creek or its tributaries. The Bear Creek Watershed contains two small reservoirs in the northern half and a series of log weirs on tributaries in the southern half of the watershed. The Forest Service placed log weirs as a habitat improvement project near the Bear Creek Picnic Area. The Bear Creek Picnic Area is located near the southern boundary of the watershed. Stream channel stability was reported to be good, with little spawning gravel and a predominance of rubble substrate. The riparian canopy was reported to be dense.

Bear Creek supports a naturally reproducing population of non-native brown trout (*Salmo trutta*). Population estimates of brown trout indicate a moderate level fishery. Although the reaches in the mainstem appear to be stable, many of the tributaries have significant impacts from historic mining. Adits and tailings located within and adjacent to the streams as well as a number of diversions have resulted in creating two parallel stream channels. Pegleg Creek near the intersection with private land is vegetated almost exclusively with the noxious weed Scotch Broom, which has a great potential for rapid spread given the high potential for stream transport of seeds.

Whaler Creek

Whaler Creek is a cold-water perennial stream that flows into Rock Creek. There are four named tributaries to Whaler Creek: Slate Canyon Creek, Ballarat Canyon Creek, Tunnel Creek, and Sailor Ravine Creek. Slate Canyon Creek and Sailor Creek are perennial streams for nearly all their length. The lower and middle sections of Whaler Creek flow through an inner gorge. The channel is dominated by bedrock in half of the reaches and cobble, boulders, and sand in the remaining reaches. The channel in most of the reaches is relatively to moderately stable. The riparian overstory is dominated by hardwoods in the lower reaches and by mixed hardwoods and conifers in the upper reaches. The overall stream channel gradient is 4.2 percent. Sailor Ravine Creek is dominated by cobble, boulder, and small areas of bedrock in the lower reaches and by sand and silt in the upper reaches. The overall stream gradient is 6.8 percent. Overall, the channel was rated as moderately stable. Aquatic habitat and stream channels are in fair to good condition for both creeks.

Whaler Creek and Sailor Ravine Creek support naturally reproducing populations of the non-native brown trout (*Salmo trutta*). Both creeks provide sport-fishing opportunities, and some areas may receive fairly heavy fishing pressure. A wide variety of stream habitat types are represented in both Whaler and Sailor Ravine creeks. Step runs make up nearly half of the surveyed channel length in Whaler Creek. Step pools, runs, mid-channel pools, and high-gradient riffles are the most common habitat types. Canopy cover in Whaler Creek ranges from 70 to 96% with large woody debris reported in all reaches. Sixty percent of the Sailor Ravine Creek channel length surveyed has both low and high gradient riffles. Runs and step runs are the most common habitat types represented. Canopy cover in the various reaches ranged from 64 to 94% which provides good cover to maintain water temperatures within the preferred ranges for brown trout.

The riparian canopy along Whaler and Sailor Ravine creeks was reported to be of medium density, with forbs dominating the lower vegetation layer and hardwoods dominating most of the upper vegetation layer. Conifers occur with hardwoods along some of the upper reaches of both creeks.

Slab Creek Reservoir area

Iowa Canyon Creek

Iowa Canyon Creek is a perennial stream that enters the SF American River below Slab Creek Reservoir. The watershed has been impacted in the past by historic mining, logging, and development for agricultural and urban residential uses. Except for mining, which probably impacted all sections of the channel system, the majority of land use has been concentrated in the upper reaches. The vegetative cover in the developed portions of the watershed in private ownership has been altered, reduced, or cleared for structures and other residential uses.

Iowa Canyon Creek flows through an inner gorge in the lower half of the watershed. Sections of the channel system that have been surveyed are primarily stable. Based on Rosgen ratings (A1, A1a+, B1) the majority of reaches in the main stem have a low sensitivity to disturbance. Rosgen ratings for five tributaries (A type channels) also indicate that the sensitivity to disturbance is low. This is based on the stream attributes of confinement, channel substrate, gradient from which most of the reaches are identified as a transport or source reach. The upper and middle sections are low to moderate gradient (<5%) with gentle to moderate side-slopes, whereas the lower section has a steep gradient (5-25%) with numerous falls over 20 feet high and steep side-slopes.

Iowa Canyon Creek supports a naturally reproducing rainbow trout fishery. Rainbow trout were found in low numbers in the lower reaches of two tributaries to Iowa Canyon Creek: Brushy Canyon Creek and an unnamed tributary. Absence of fry indicates that the tributaries are not used for spawning. The occurrence of fines in the channel substrate of riffles is less than 20% for all surveyed reaches, except the upper section of Iowa Canyon Creek above Cable Road. Fines contribute to 50% of the riffle substrate composition in that section and may be limiting fish production. Erosion from side banks of Cable Road was observed contributing sediment to the upper portion of the middle survey section. The pool/riffle ratio was observed to be the ideal 1:1 for all survey sections except the lower section of Iowa Canyon Creek, which was 1:2. Canopy cover providing stream shade was described as dense for all survey sections. Aquatic invertebrates are common throughout.

Channel stability surveys identified impacts to this watershed from mining, roads, logging, and farming noticeable mainly in the upper reaches of tributaries to Iowa Canyon Creek. Hydraulic mining activities have left alluvial terraces that have been incised by several streams, leaving steep, unstable banks. These streams have now stabilized and are not expected to contribute additional sediment. Silt aggradation and bank deterioration in tributaries is likely due to impacts from farming activities, clearcutting on private lands, and road crossings. Overall the tributaries are in fairly

good condition with a few site-specific occurrences of habitat degradation from excessive fines.

Long Canyon Creek

Long Canyon Creek is a perennial stream that enters Slab Creek Reservoir from Forebay Reservoir. The watershed is located within the urban interface of Pollock Pines with nearly 60% of the watershed zoned for residential, commercial or agricultural development. The mainstem is in stable condition (Pfankuch rating of excellent) and there is no evidence of any instability in the steep inner gorge canyon in the lower half of Long Canyon Creek. Within the inner gorge, the side slopes range from 70 to 95% and the stream gradient ranges from 4 to 7%. With the exception of evidence of some placer activity, the lower portion has little disturbance. The main stem of Long Canyon has good (dense) canopy cover. There are no known fisheries in Long Canyon Creek although the potential for fisheries use may extend up from the confluence with the SF American River to any migration barrier that may exist.

The upper reaches of this watershed, near the town of Pollock Pines, are heavily impacted by logging, road building, and urban development. Canopy cover is moderate to poor in this area. Historic hydraulic mining occurred in the mid-to-late-1800s in portions of the watershed. Terraces composed of hydraulic mining alluvium are found along several of the tributaries. Sediment and tailings from this mining was washed downslope into tributary streams. Hydraulic mining has seriously impacted two tributaries. One has down-cut about ten feet through mining out-wash colluvium, leaving steep, unstable upper banks. In the other tributary, colluvium has filled the drainage bottom, and has the potential for down-cutting. Scouring and deposition are currently evident in this intermittent stream.

Brush Creek

Brush Creek is a perennial creek that drains the eastern portion of the watershed below Saddle, Chaix, and Big X Mountains. The dam on Brush Creek is part of the Upper American River Project and is used primarily for hydroelectric power generation. The main stem of Brush Creek appears to be in better condition than the remainder of the tributaries. The majority of the streams in the entire watershed (93% of the reaches surveyed by length) were considered to be in fair to good condition utilizing the Pfankuch stream stability rating system.

Lower Middle Fork American River Watershed

Lower Middle Fork American River

The LMF American River is a low gradient stream dominated by bedrock and boulder substrates. The entire length of the stream is located within a steep inner gorge with slopes greater than 60%. Vegetation on the steep hillslopes consists primarily of oaks and shrubs; riparian vegetation along the stream channel is in good condition. Oaks and the steep hillslopes provide most of the shade to the stream. The stream provides moderate fisheries habitat, with high amounts of bedrock cover, but is lacking in spawning habitat as a result of the dams located upstream. Pool filling is generally low, but it tends to increase downstream. The uplands tend to be unstable and impacted by

land management practices including past mining activity. This instability has impacted many of the seasonal tributaries to the LMF American River resulting in some bank cutting and sediment delivery to the main channel.

Otter Creek

Otter Creek is a perennial stream that flows through an inner gorge into the MF American River at Ford's Bar. Otter Creek is considered to be a significant fishery and provides a domestic source of water from its confluence with MF American River to Missouri Canyon Creek and is used less extensively by fish upstream of this point. Fishery surveys were conducted in Otter Creek from the Volcanoville Rd. crossing to the mouth at Ford's Bar. From 800 feet to 960 feet in elevation, the lower stream was characterized as a boulder and cobble dominated reach with dense shade canopy due to the proximity of canyon walls along with riparian vegetation dominated by white alder with bigleaf maple, conifers, and few aquatic plants including some sedges. The fishery was rated as good trout habitat with medium productivity and moderate fishing pressure although in a later survey only sculpin were observed. The evaluation of the fishery habitat from Silver Falls (in section 24, T13N, R10E) to its mouth at MF American River indicated that numerous large trout were present in the pool at the base of the falls, but that habitat conditions changed below. The stream substrate was composed of large and small cobbles with shallow bedrock pools. No trout were observed below this area and for a mile below and water temperatures reached the maximum acceptable levels for cold fishery habitat at 68-70° F. The downstream range of the trout fishery is limited by temperature.

The middle section from 1,540 feet to 2,600 feet in elevation includes Quartz Canyon and Missouri Canyon tributaries and the Otter Creek trail and Little Bald Mountain trail crossings. This reach was considered fairly good trout habitat. There was a pronounced change in species dominance as the stream dropped in elevation. At the Otter Creek trail, brown trout were more numerous and at Little Bald Mountain trail, rainbow trout were more abundant. There are several waterfalls and medium sized pools mostly formed from bedrock and cobbles. Riparian vegetation is similar to that in the lower reach.

The upstream section extends from Volcanoville Road crossing to about ½ mile below Kentucky Flat Road crossing (private lands). A considerable amount of silt was present and may be attributed activities upstream or due to an abandoned in channel water hole located downstream from the Volcanoville Rd. Brown trout appeared to be numerous in the pond but very uncommon within the stream itself. The stream channel is a cobble and gravel dominated reach with riparian vegetation composed of white alder, big leaf maple, berries, and sedges. Shade canopy is very dense.

Stream surveys conducted in a few individual reaches of tributaries to Otter Creek appear to have impacts from historic mining practices. Considerable silt and sediment loads are noted in the perennial reaches. Most of the sources of sediment are due to numerous dams, ditches, and mining adits located within or along the streambeds. The mining has created steep unstable gorges with a high potential for mass wasting, and has contributed large volumes of coarse and fine sediments to downstream reaches. In many cases this aggradation has created a damming effect that has disrupted natural sediment transport

rates causing further bed aggradation and stream bank instability upstream. Other identifiable sources of sediment are coming from roads primarily at stream crossings.

Missouri Canyon Creek

Missouri Canyon Creek is a perennial tributary to Otter Creek that flows through an inner gorge in the lower section near the confluence. Shade canopy was rated as dense with riparian vegetation dominated by white alder and other hardwoods, conifers and shrubs. The substrate type is bedrock, gravel and cobble with a pool to riffle ratio of 1:1. Stability was rated as excellent and only negligible amounts of silt were observed. Only rainbow trout were observed within the reach.

The Cabin Mine site is an abandoned mine site located on National Forest lands. At the site, the discharge of acid mine drainage from the collapsed adits enters directly into the channel of a seasonal tributary to Missouri Canyon Creek. The pH values of the water at the adit is acidic (pH of 3.5) and contains three heavy metals (cadmium, nickel, and zinc) at concentrations exceeding the EPA and California water quality standards for drinking water. The primary threat is to the environment due to the concentration of heavy metals and acidity exceeding the water quality goals protective of freshwater aquatic life. The secondary threat is present to hikers, hunters, and other human populations that could use the water for drinking. The Cabin Mine site has been identified as a superfund site for removal under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The adverse conditions reported above are diluted within a few hundred feet downstream and overall water quality in the MF American River is not directly influenced by this site.

Canyon Creek

Canyon Creek is a perennial stream that flows approximately 10.5 miles to its confluence with the MF American River. The substrate is dominated by cobble, bedrock, and fines. Surveys using Pfankuch ratings indicated that the majority of the reaches were in good condition and about 25% in fair condition. Stream channel gradient averaged 3% with a range of 1-6%. Canopy closure ranged from 75 to 85% and white alder and dogwood provided most of the riparian cover. Vegetation on the upper slopes was a combination of mixed conifer and hardwoods (madrone and oak). Fish surveys were conducted in two pool habitats along Canyon Creek and both brown and rainbow trout were observed.

Heavy recreational use and gold prospecting activities were noted along Canyon Creek and its tributaries. Surveys conducted on tributaries to Canyon Creek found them to be moderately unstable with Pfankuch ratings predominantly in the "low good" to "high fair" range. The majority of these tributaries were hydraulically mined creating steep and unstable slopes with the potential for mass wasting in the headwaters. Canyon Creek was observed to have a fairly heavy silt load especially in the pools and glides. Historic hydraulic mining has impacted sections of the stream and its tributaries creating over-steepened and unstable upper banks with high potential for mass wasting, downcutting, and the addition of large amounts of coarse and fine sediment to downstream reaches. Runoff from roads downstream of stream crossings is causing aggradation of fine sediment in some of the tributaries.

Appendix G

Roads Inventory (Maintenance Levels 1-5)

Table G-1. SF American River-Chili Bar Watershed System Roads

ROUTE NO.	MILES	OPER MAINT. LEVEL	FUNCT CLASS	SURFACE TYPE	OWNERSHIP
11N08B	0.12	1	Local	Native	ENF
11N08D	0.21	1	Local	Native	ENF
11N08D	0.02	1	Local	Native	Private Land
11N78	0.70	1	Local	Native	ENF
11N84	0.89	1	Local	Native	ENF
11N84	0.42	1	Local	Native	Private Land
11N84B	0.58	1	Local	Native	ENF
11N87	0.96	1	Local	Native	ENF
11N87	0.10	1	Local	Native	Private Land
11N93	2.76	1	Local	Native	ENF
11N93B	0.23	1	Local	Native	ENF
11NY04	1.03	1	Local	Native	ENF
11NY04	0.25	1	Local	Native	Private Land
11NY17	1.11	1	Local	Native	Outside ENF
11NY17A	0.07	1	Local	Native	ENF
11NY17A	0.05	1	Local	Native	Outside ENF
11NY18	0.52	1	Local	Native	ENF
11NY18	0.11	1	Local	Native	Outside ENF
11NY20A	0.49	1	Local	Native	ENF
11NY20B	0.18	1	Local	Native	ENF
11NY22	0.63	1	Local	Native	ENF
11NY23	0.73	1	Local	Native	ENF
11NY23A	0.46	1	Local	Native	ENF
12N07	0.90	1	Local	Native	ENF
12N07	0.01	1	Local	Native	Private Land
12N07A	0.22	1	Local	Native	ENF
12N07B	0.39	1	Local	Native	ENF
12N08	0.41	1	Local	Native	ENF
12N08A	0.09	1	Local	Native	ENF
12N10	0.95	1	Local	Native	ENF
12N10	1.73	1	Local	Native	Private Land
12N12	0.38	1	Local	Native	ENF
12N27	0.68	1	Local	Native	ENF
12N27A	0.20	1	Local	Native	ENF
12N31	0.44	1	Local	Native	ENF
12N34A	0.31	1	Local	Native	ENF

12N34B	0.18	1	Local	Native	ENF
12N34B	0.02	1	Local	Native	Private Land
12N34C	0.94	1	Local	Native	ENF
12N34D	0.57	1	Local	Native	ENF
12N34E	1.10	1	Local	Native	ENF
12N34F	0.52	1	Local	Native	ENF
12N34H	0.26	1	Local	Native	ENF
12N34J	0.31	1	Local	Native	ENF
12N53A	0.01	1	Local	Native	ENF
12N53B	2.31	1	Local	Native	ENF
12N56D	0.57	1	Local	Native	ENF
12N57C	0.77	1	Local	Native	ENF
12N57C	0.04	1	Local	Native	Private Land
12N57D	0.54	1	Local	Native	ENF
12N57F	0.25	1	Local	Native	ENF
12N59A	0.94	1	Local	Native	ENF
12N59E	0.61	1	Local	Native	ENF
12N60B	3.43	1	Local	Native	ENF
12N60B	0.23	1	Local	Native	Private Land
12N60D	0.89	1	Local	Native	ENF
12N60G	0.49	1	Local	Native	ENF
12N60G	0.01	1	Local	Native	Private Land
12N64A	0.64	1	Local	Native	Private Land
12N70J	0.42	1	Local	Native	ENF
12N70S	0.41	1	Local	Native	ENF
12N70T	0.35	1	Local	Native	ENF
12N72C	1.04	1	Local	Native	ENF
12N79C	0.53	1	Local	Native	ENF
12N80D	2.31	1	Local	Native	ENF
12N80H	0.68	1	Local	Native	ENF
12N80H	0.11	1	Local	Native	Private Land
12N80J	1.14	1	Local	Native	ENF
12N80J	0.04	1	Local	Native	Private Land
12N81C	1.08	1	Local	Native	ENF
12N81D	0.32	1	Local	Native	ENF
12N83C	0.18	1	Local	Native	ENF
12N83F	0.13	1	Local	Native	Private Land
12N84A	0.35	1	Local	Native	ENF
12N89	1.53	1	Local	Native	ENF
12N89B	0.24	1	Local	Native	ENF
12N89C	0.24	1	Local	Native	ENF
12N90	0.05	1	Local	Native	ENF
12N92B	0.36	1	Local	Native	ENF
12N92C	0.11	1	Local	Native	ENF
12N94	0.47	1	Local	Native	ENF
12N94	0.43	1	Local	Native	Private Land
12NY01A	0.49	1	Local	Native	ENF

12NY18	1.12	1	Local	Native	ENF
12NY18A	0.43	1	Local	Native	ENF
12NY19A	1.94	1	Local	Native	ENF
12NY20	0.35	1	Local	Native	ENF
12NY20A	0.43	1	Local	Native	ENF
12NY21	2.48	1	Local	Native	ENF
12NY21B	0.60	1	Local	Native	ENF
12NY21C	0.62	1	Local	Native	ENF
12NY24	0.86	1	Local	Native	ENF
12NY24A	0.32	1	Local	Native	ENF
12NY29	0.29	1	Local	Native	ENF
12NY29A	0.25	1	Local	Native	ENF
Total =	**57.66**				
11N12	1.39	2	Local	Native	ENF
11N12A	0.83	2	Local	Native	ENF
11N68	0.59	2	Local	Native	ENF
11N80A	0.66	2	Local	Native	ENF
11N80B	0.44	2	Local	Native	ENF
11N81	2.78	2	Local	Native	ENF
11N81B	0.48	2	Local	Native	ENF
11N82	1.57	2	Local	Native	ENF
11N82	1.56	2	Local	Native	Private Land
11N85	1.69	2	Local	Native	ENF
11N88	2.73	2	Local	Native	ENF
11N88	0.94	2	Local	Native	Outside ENF
11N88	0.21	2	Local	Native	Private Land
11N88B	0.48	2	Local	Native	ENF
11N88B	0.09	2	Local	Native	Outside ENF
11N89	2.88	2	Local	Native	ENF
11N91	0.72	2	Local	Native	ENF
11N92	0.84	2	Local	Native	ENF
11N92A	0.31	2	Local	Native	ENF
11N96	0.95	2	Local	Native	ENF
11N96	0.13	2	Local	Native	Outside ENF
11N96	0.33	2	Local	Native	Private Land
11N97	0.12	2	Local	Native	ENF
11N97	0.05	2	Local	Native	Outside ENF
11N97	0.70	2	Local	Native	Private Land
11NY05	1.67	2	Local	Native	ENF
11NY19	0.35	2	Local	Native	ENF
11NY20	2.00	2	Local	Native	ENF
12N19	2.02	2	Local	Native	ENF
12N34	11.80	2	Arterial	Native	ENF
12N34	0.35	2	Arterial	Native	Private Land
12N34G	0.20	2	Local	Native	ENF
12N34G	0.03	2	Local	Native	Private Land
12N34L	0.23	2	Local	Native	ENF

12N38	1.96	2	Local	Native	ENF
12N38A	0.31	2	Local	Native	ENF
12N43	1.08	2	Local	Native	ENF
12N43A	0.22	2	Local	Native	ENF
12N43B	0.28	2	Local	Native	ENF
12N53	0.63	2	Arterial	Native	ENF
12N53	3.63	2	Arterial	Native	Private Land
12N55	0.61	2	Local	Native	ENF
12N56	5.47	2	Local	Native	ENF
12N56	2.04	2	Local	Native	Private Land
12N56B	1.60	2	Local	Native	ENF
12N56E	0.33	2	Local	Native	ENF
12N56F	0.43	2	Local	Native	ENF
12N56G	0.31	2	Local	Native	ENF
12N57	5.46	2	Local	Native	ENF
12N57	1.43	2	Local	Native	Private Land
12N58	1.49	2	Local	Native	ENF
12N58	0.17	2	Local	Native	Private Land
12N59B	0.64	2	Local	Agg Base	ENF
12N59D	1.34	2	Local	Native	ENF
12N59D	0.27	2	Local	Native	Private Land
12N60GN	0.24	2	Local	Native	ENF
12N60H	0.77	2	Local	Agg Base	ENF
12N60H	0.07	2	Local	Agg Base	Private Land
12N60J	0.33	2	Local	Native	ENF
12N60P	0.11	2	Local	Native	Outside ENF
12N61	2.12	2	Local	Native	ENF
12N69	1.15	2	Local	Native	ENF
12N69C	0.24	2	Local	Native	ENF
12N70A	0.69	2	Local	Native	ENF
12N70B	0.25	2	Local	Native	ENF
12N70B	0.07	2	Local	Native	Private Land
12N70D	0.69	2	Local	Native	ENF
12N70F	0.56	2	Local	Native	ENF
12N70G	1.15	2	Local	Native	ENF
12N70H	0.06	2	Local	Native	ENF
12N71A	0.93	2	Local	Native	ENF
12N72A	1.18	2	Local	Native	ENF
12N72A	0.06	2	Local	Native	Private Land
12N72B	1.03	2	Local	Native	ENF
12N74	0.90	2	Local	Native	ENF
12N74	0.19	2	Local	Native	Private Land
12N74A	0.77	2	Local	Native	ENF
12N75	0.55	2	Local	Native	ENF
12N76	1.82	2	Local	Native	ENF
12N76	0.87	2	Local	Native	Private Land
12N79A	1.49	2	Local	Native	ENF

12N79B	0.39	2	Local	Native	ENF
12N80A	1.38	2	Local	Native	ENF
12N80G	0.45	2	Local	Native	ENF
12N80G	0.04	2	Local	Native	Outside ENF
12N81	2.63	2	Local	Native	ENF
12N81B	0.27	2	Local	Native	ENF
12N81B	0.01	2	Local	Native	Private Land
12N81E	0.26	2	Local	Native	ENF
12N82	2.90	2	Local	Native	ENF
12N82	0.22	2	Local	Native	Private Land
12N82A	0.21	2	Local	Native	ENF
12N82B	0.45	2	Local	Native	ENF
12N82C	1.03	2	Local	Native	ENF
12N82D	0.82	2	Local	Native	ENF
12N83	2.17	2	Local	Native	ENF
12N83	1.98	2	Local	Native	Private Land
12N83A	1.39	2	Local	Native	ENF
12N83A	0.01	2	Local	Native	Private Land
12N83D	0.57	2	Local	Native	ENF
12N83E	1.00	2	Local	Native	ENF
12N84	0.82	2	Local	Native	ENF
12N87B	0.28	2	Local	Native	ENF
12N88	0.01	2	Local	Native	ENF
12N91	0.63	2	Local	Native	ENF
12N92	1.37	2	Local	Native	ENF
12N92	0.45	2	Local	Native	Outside ENF
12N92	1.17	2	Local	Native	Private Land
12N92A	0.77	2	Local	Native	ENF
12N92A	0.08	2	Local	Native	Private Land
12N95	1.53	2	Local	Native	ENF
12N95	0.74	2	Local	Native	Outside ENF
12N95	0.13	2	Local	Native	Private Land
12NY01	1.72	2	Local	Native	ENF
12NY19	1.83	2	Local	Native	ENF
12NY19	0.00	2	Local	Native	Private Land
12NY27	0.93	2	Local	Native	ENF
12NY27A	0.53	2	Local	Native	ENF
12NY28	0.39	2	Local	Native	ENF
12NY28	0.02	2	Local	Native	Outside ENF
12NY28C	0.34	2	Local	Native	ENF
Total =	**122.03**				
11N80	5.80	3	Collector	Native	ENF
11N80	0.43	3	Collector	Native	Private Land
12N70	17.10	3	Arterial	Native	ENF
12N70	1.98	3	Arterial	Native	Private Land
12N71	1.90	3	Local	Native	ENF
12N71	0.08	3	Local	Native	Private Land

12N79	3.13	3	Local	Native	ENF
12N79	0.02	3	Local	Native	Private Land
12N92E	0.05	3	Local	Agg Base	ENF
Total =	**30.49**				
12N59	2.97	4	Collector	Chip Seal	ENF
12N59	5.00	4	Collector	Chip Seal	Private Land
12N64	0.18	4	Arterial	Chip Seal	ENF
12N64	4.83	4	Arterial	Chip Seal	Private Land
12N72	4.30	4	Local	Chip Seal	ENF
12N72	0.02	4	Local	Chip Seal	Private Land
12N80	5.18	4	Arterial	Chip Seal	ENF
12N80	0.18	4	Arterial	Chip Seal	Outside ENF
12N80	0.78	4	Arterial	Chip Seal	Private Land
12N87	2.55	4	Local	Chip Seal	ENF
13N58	0.05	4	Local	Native	Private Land
Total =	**26.04**				
10N81	0.19	5	Local	Asphalt	Outside ENF
12N29L	0.53	5	Local	Chip Seal	ENF
12N29N	0.06	5	Local	Asphalt	ENF
12N80F	0.06	5	Local	Chip Seal	ENF
12N29LA	0.14	5	Local	Asphalt	ENF
Total =	**0.98**				
County Roads					
CA03645-65	0.42	4	Arterial	Chip Seal	ENF
CA03645-65	0.12	4	Arterial	Chip Seal	Private Land
CA10270-121	4.00	3	Local	Native	ENF
CA10270-121	3.32	3	Local	Native	Outside ENF
CA10270-121	1.33	3	Local	Native	Private Land
CA10270-8014	0.54	2	Local	Native	ENF
CA10270-8014	0.65	2	Local	Native	Outside ENF
CA10270-8014	0.21	2	Local	Native	Private Land
CA29350-46	1.23				ENF
CA29350-46	4.68				Outside ENF
CA29350-46	0.26				Private Land
CA29350-47	0.05	2	Local	Native	ENF
CA29350-47	1.06	2	Local	Native	Outside ENF
CA29350-47	0.21	2	Local	Native	Private Land
CA38030-44	0.18				ENF
CA38030-44	2.17				Outside ENF
CA38030-44	0.21				Private Land
CA58030-1680	0.61	4	Arterial	Chip Seal	ENF
CA58030-1680	2.25	4	Arterial	Chip Seal	Outside ENF
CA58030-1680	1.00	4	Arterial	Chip Seal	Private Land
CA59100-63	0.60				ENF
CA59100-63	0.53				Outside ENF
CA59100-63	5.32				Private Land
CA72457-60	4.13				ENF

CA72457-60	7.95				Outside ENF
CA72457-60	3.85				Private Land
CA83098-64	0.00	4	Arterial	Chip Seal	Private Land
Total =	**46.88**				

Table G-2. SF American River-Chili Bar Watershed Non-System Roads and Trails

RTE NO	CFF1	LEVEL ID	OWNERSHIP	MILES
	0	Unknown	ENF	5.01
	0	Unknown	Outside ENF	0.02
	0	Unknown	Private Land	1.21
	89	Level 2	ENF	1.45
	96	Level 2	ENF	2.04
	96	Level 2	Outside ENF	0.06
	96	Level 2	Private Land	1.08
	101	Level 5	Outside ENF	1.47
	103	Level 5	Outside ENF	10.33
	103	Level 5	Private Land	0.00
	105	Level 3	ENF	0.91
	105	Level 3	Outside ENF	97.54
	105	Level 3	Private Land	1.22
	106	Level 1 & 2	ENF	60.77
	106	Level 1 & 2	Outside ENF	147.14
	106	Level 1 & 2	Private Land	98.84
	107	Trail	ENF	43.96
	107	Trail	Outside ENF	1.09
	107	Trail	Private Land	8.11
	514	Level 1 & 2	ENF	0.91
	515	Level 3	ENF	1.12
	515	Level 3	Outside ENF	0.25
	515	Level 3	Private Land	6.73
	517	Level 3 & 4	Private Land	0.07
	518	Level 3	ENF	0.43
	539	OHV Trail	ENF	0.97
	539	OHV Trail	Private Land	0.03
			Total Non-System=	**492.76**
11E13	539	OHV Trail	ENF	2.96
11E16	539	OHV Trail	ENF	1.07
11E17	539	OHV Trail	ENF	0.42
11E18	539	OHV Trail	ENF	6.04
11E22	514	Level 1 & 2	ENF	0.89
11E22	539	OHV Trail	ENF	15.02
11E26	539	OHV Trail	ENF	1.10
11E27	106	Level 1 & 2	ENF	0.32
11E30	539	OHV Trail	ENF	2.45
11E31	539	OHV Trail	ENF	1.85
11E32	106	Level 1 & 2	ENF	0.17
11E34	539	OHV Trail	ENF	0.37
11E35	539	OHV Trail	ENF	1.14

11E36	539	OHV Trail	ENF	0.51
11E37	539	OHV Trail	ENF	2.68
11E38	539	OHV Trail	ENF	0.68
11E41	539	OHV Trail	ENF	0.92
			Total System=	**38.59**

Table G-3. Lower Middle Fork American River Watershed System Roads

ROUTE NO.	MILES	OPER MAINT LEVEL	FUNCT CLASS	SURFACE TYPE	OWNERSHIP
12N29M	1.12	1	Local	Native	ENF
12N29M	0.11	1	Local	Native	Private Land
12N88A	0.27	1	Local	Native	ENF
12N88B	0.38	1	Local	Native	ENF
12N90	0.13	1	Local	Native	ENF
12N90	0.39	1	Local	Native	Private Land
12N97	0.49	1	Local	Native	ENF
12N97A	0.28	1	Local	Native	ENF
13N51A	0.41	1	Local	Native	ENF
13N51A	0.00	1	Local	Native	Private Land
13N51B	0.05	1	Local	Native	ENF
13N51B	0.25	1	Local	Native	Private Land
13N53C	0.77	1	Local	Native	Private Land
13N53D	0.04	1	Local	Native	ENF
13N53D	0.88	1	Local	Native	Private Land
13N58A	0.28	1	Local	Native	ENF
13N58B	0.87	1	Local	Native	ENF
13N58D	0.44	1	Local	Native	ENF
13N58D	0.28	1	Local	Native	Private Land
13N58F	0.48	1	Local	Native	ENF
13N58G	0.20	1	Local	Native	ENF
13N58H	0.36	1	Local	Native	ENF
13N58L	0.37	1	Local	Native	ENF
13N58M	0.74	1	Local	Native	ENF
13N58N	0.69	1	Local	Native	ENF
13N58N	0.20	1	Local	Native	Outside ENF
13N58P	0.54	1	Local	Native	ENF
13N58P	0.06	1	Local	Native	Private Land
13N58R	0.44	1	Local	Native	ENF
13N58T	0.54	1	Local	Native	ENF
13N92	1.44	1	Local	Native	ENF
13N92	0.36	1	Local	Native	Private Land
13N92A	0.86	1	Local	Native	ENF
13N93	0.94	1	Local	Native	ENF
13N93A	0.18	1	Local	Native	ENF
14N35H	0.23	1	Local	Native	ENF
Total =	16.07				
12N88	0.89	2	Local	Native	ENF
12N95	0.04	2	Local	Native	Outside ENF
13N16A	0.14	2	Local	Native	ENF

13N49	0.01	2	Local	Native	
13N49	0.19	2	Local	Native	ENF
13N49	0.13	2	Local	Native	Private Land
13N49A	0.21	2	Local	Native	ENF
13N51	0.46	2	Local	Native	ENF
13N51	2.48	2	Local	Native	Private Land
13N53	1.80	2	Local	Native	ENF
13N53	1.70	2	Local	Native	Private Land
13N53B	0.49	2	Local	Native	ENF
13N53W	0.06	2	Local	Native	Private Land
13N55	1.34	2	Local	Native	ENF
13N55	0.43	2	Local	Native	Private Land
13N56	1.52	2	Local	Native	ENF
13N56	3.01	2	Local	Native	Private Land
13N56B	0.16	2	Local	Native	ENF
13N56C	0.55	2	Local	Native	ENF
13N60	0.65	2	Local	Native	ENF
13N60	0.55	2	Local	Native	Private Land
13N60A	0.47	2	Local	Native	ENF
13N60A	0.12	2	Local	Native	Private Land
13N66	0.58	2	Local	Native	Private Land
13N97	1.06	2	Local	Native	Outside ENF
14N35	1.12	2	Local	Native	ENF
14N35	1.09	2	Local	Native	Private Land
14N35A	0.81	2	Local	Native	ENF
14N35A	1.24	2	Local	Native	Private Land
14N35B	0.35	2	Local	Native	ENF
14N35B	0.12	2	Local	Native	Private Land
14N35C	0.22	2	Local	Native	ENF
14N35C	0.34	2	Local	Native	Private Land
14N35D	0.13	2	Local	Native	ENF
14N35D	0.30	2	Local	Native	Private Land
14N35E	0.95	2	Local	Native	ENF
14N35E	1.37	2	Local	Native	Private Land
14N35F	0.40	2	Local	Native	ENF
Total =	**27.48**				
12N29G	0.11	3	Local	Agg Base	ENF
12N70	0.07	3	Arterial	Native	Private Land
Total =	**0.18**				
12N80	0.04	4	Arterial	Chip Seal	Private Land
12N87	0.27	4	Local	Chip Seal	ENF
13N16	1.05	4	Local	Native	ENF
13N58	4.27	4	Local	Native	ENF
13N58	2.81	4	Local	Native	Outside ENF
13N58	2.87	4	Local	Native	Private Land
13N58J	0.67	4	Local	Agg Base	ENF
Total =	**11.98**				

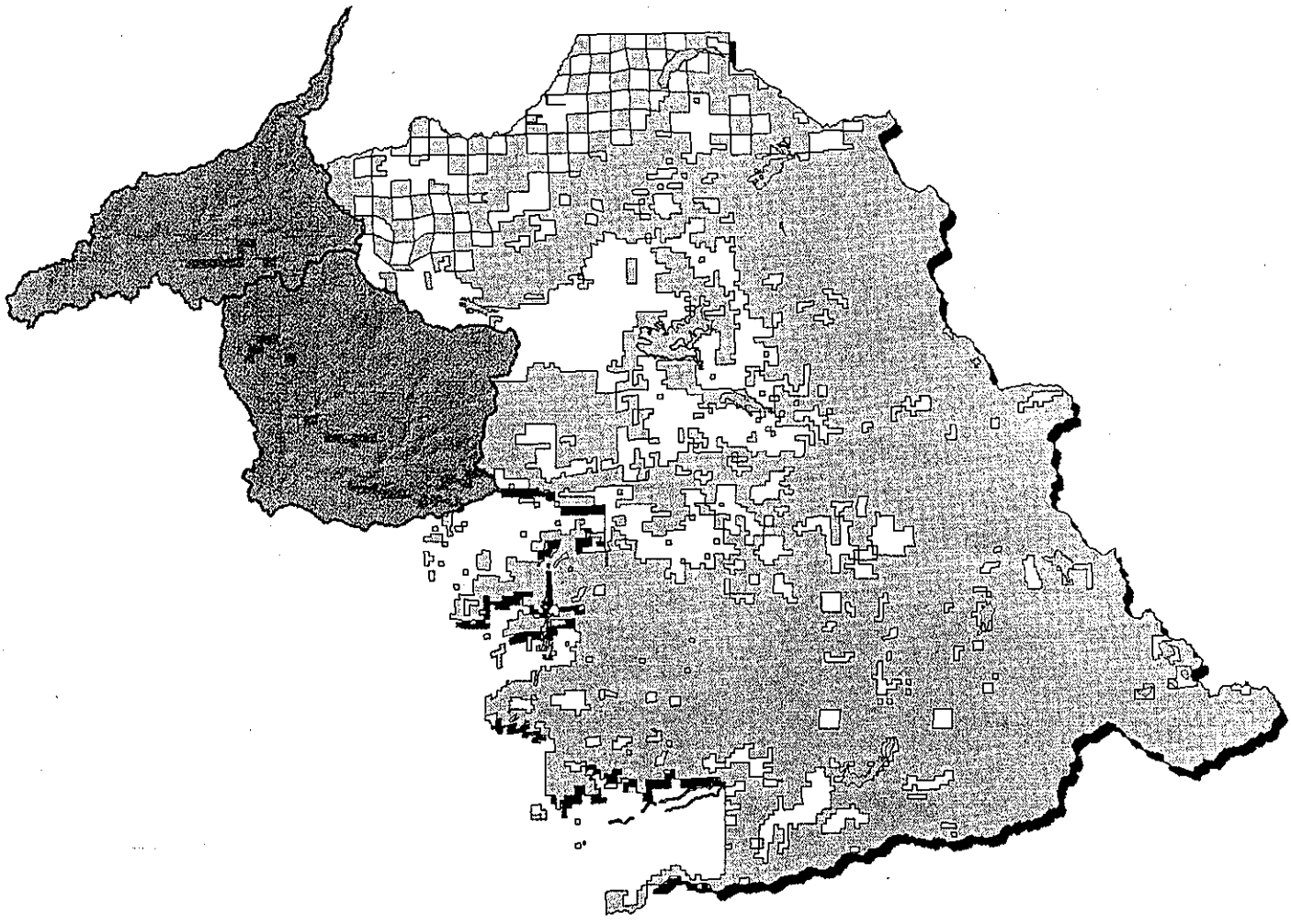
12N29N	0.08	5	Local	Asphalt	ENF
Total =	**0.08**				
County Roads					
CA08664-112	0.03	3	Local	Asphalt	ENF
CA29350-111	1.76	2	Local	Native	Outside ENF
CA08664-112	1.70	3	Local	Asphalt	Outside ENF
CA08664-112	0.61	3	Local	Asphalt	Private Land
CA03645-65	1.08	4	Arterial	Chip Seal	ENF
CA03645-65	1.21	4	Arterial	Chip Seal	Private Land
CA83098-64	1.33	4	Arterial	Chip Seal	ENF
CA83098-64	5.65	4	Arterial	Chip Seal	Private Land
CA59100-63	0.97				ENF
CA59100-63	2.38				Outside ENF
CA59100-63	2.12				Private Land
Total =	**18.84**				

Table G-4. Lower Middle Fork American River Watershed Non System Roads and Trails

RTE NO	CFF1	LEVEL ID	OWNERSHIP	MILES
	0	Unknown	ENF	0.41
	0	Unknown	Private Land	0.12
	96	Level 2	ENF	0.45
	96	Level 2	Outside ENF	12.08
	96	Level 2	Private Land	6.81
	103	Level 5	Outside ENF	9.28
	103	Level 5	TNF	7.62
	105	Level 3	Outside ENF	19.54
	105	Level 3	Private Land	0.23
	105	Level 3	TNF	0.10
	106	Level 1 & 2	ENF	10.14
	106	Level 1 & 2	Outside ENF	67.18
	106	Level 1 & 2	Private Land	39.14
	106	Level 1 & 2	TNF	12.72
	107	Trail	ENF	6.61
	107	Trail	Outside ENF	11.63
	107	Trail	Private Land	10.10
	107	Trail	TNF	2.52
	515	Level 3	Outside ENF	0.63
	515	Level 3	Private Land	0.89
	515	Level 3	TNF	2.92
	517	3 & 4	Outside ENF	0.03
	517	3 & 4	Private Land	0.06
	517	3 & 4	TNF	1.38
	518	Level 3	TNF	0.38
			Total=	**222.97**

South Fork American River - Chili Bar Watershed
Lower Middle Fork American River Watershed
Landscape and Roads Analysis

Data List and Maps



Prepared for the Landscape Team by the GIS Staff of the Eldorado National Forest

Map List for South Fork American River - Chili Bar and Lower Middle Fork American River Watersheds

All data contained on these maps are dated May 2003.

Map #	Contains
1	HUC 5, HUC 6, HUC 7, HUC 8 Watershed Boundaries
2	Digital Ortho Quad View
Management Allocations	
3	Framework Allocation Priorities
4	LRMP Land Allocation (ROS & VQO)
5	LRMP Range Allotment
6	Special Interest Area
7	Developed Recreation and Dispersed Sites
Vegetation	
8	Existing Vegetation
9	Existing Vegetation by Density/Size Class
10	Noxious Weeds and Sensitive Plants
11	Meadows
12	Plantations
13	Potential Natural Community – Chili Bar Watershed
14	Potential Natural Community – Lower Middle Fork American River Watershed
15	SNEP Late Successional Old Growth
Wildlife	
16	All PACs and Home Range Core Area
17	Goshawk PACs
18	Quail and Valley Elderberry Longhorn Beetle Habitat
19	Deer Herds
20	Potential Fisher Habitat
21	California Red-Legged Frog Habitat and Key Habitat
22	Yellow-Legged Frog Habitat
23	Western Pond Turtle Nesting Habitat
24	Fish Presence and Species
Hydrologic	
25	Stream, Waterbody, Spring, Waterhole
26	Stream Gradient
27	ENF Riparian Conservation Area
28	ENF Riparian Conservation Area with SPLATs
29	Hydrologic Facilities
Transportation	
30	Crossings of Transportation and Streams – Chili Bar Watershed
31	Crossings of Transportation and Streams – Lower Middle Fork American River Watershed

South Fork American River – Chili Bar Watershed
Lower Middle Fork American River Watershed
Landscape and Roads Analysis

Map #	Contains
32	System / Non-System Transportation - Chili Bar Watershed
33	System / Non-System Transportation – Lower Middle Fork American River Watershed
34	Transportation by Maintenance Level – Chili Bar Watershed
35	Transportation by Maintenance Level – Lower Middle Fork American River Watershed
36	Transportation Routes Flagged as Hydrologic Risk – Chili Bar Watershed
37	Transportation Routes Flagged as Hydrologic Risk – Lower Middle Fork American River Watershed
38	Rock Creek Transportation
39	OHV Trail Data
Fire	
40	Fire History – Including C+ fires and AB fires
41	Fire Hazard
42	Fire Risk
43	Landscape Analysis Urban Interface Zone and Old Forest Emphasis Area
44	Framework SPLATs
45	ENF SPLATs
46	Fuel Treatment
47	Fuel Treatment – Underburn History
48	Existing Situation Crown Fire – based on modeling
49	Desired Situation Crown Fire – based on modeling
50	Existing Situation Flame Length – based on modeling
51	Desired Condition Flame Length – based on modeling
52	Existing Situation Rate of Spread – based on modeling
53	Desired Condition Rate of Spread – based on modeling
54	Existing Situation Fire Line Intensity – based on modeling
55	Desired Condition Fire Line Intensity – based on modeling
56	Condition Class (FRAP)
57	Fire Regime (FRAP)
Terra	
58	Slope
59	Soil
60	Soil Erosion Hazard Rating
61	Geomorphology
62	Geology
63	Mines

All data contained on these maps are dated May 2003.