Watershed Analysis French Creek Watershed

Trinity River Management Unit

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Introduction

The Purpose of Watershed Analysis

Watershed analysis (WA) provides a systematic way to organize and understand ecosystem information by characterizing the human, aquatic, riparian, and terrestrial features, conditions, processes, and interactions (collectively referred to as "ecosystem elements") within a watershed. As a result, the WA improves our ability to estimate direct, indirect and cumulative effects our management actions may have on ecosystem elements, as well as guide the general type, location and sequence of appropriate management activities within the watershed. Watershed analysis is required in Key Watersheds, for roadless areas in non-Key Watersheds and Riparian Reserves prior to determining how proposed land management activities meet Aquatic Conservation Strategy objectives (Shasta-Trinity Land Resource Management Plan (LRMP) pg 4-53)).

This landscape analysis is not a decision document; its purpose is to provide an information baseline to evaluate the existing conditions in terms of the desired conditions. This analysis will focus on collecting and compiling information within the watershed that is essential for making sound management decisions. The landscape analysis provides existing condition information 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 within the Shasta-Trinity Land and Resource Management Plan.

Focus of this Watershed Analysis

The focus of the French Creek watershed analysis is watershed function and vegetative condition as they relate to water quality and fisheries; wildlife habitat; fuel continuity, fuel loading and the potential for extreme fire behavior. The WA will illustrate the current conditions as well as the desired conditions based on the Land and Resource Management Plan (LRMP) for the Shasta-Trinity National Forest. This analysis will focus on lands within the French Creek watershed that are administered by the Shasta Trinity National Forest.

Format of the Document

This document is divided into five chapters.

Chapter 1 Watershed Characterization

The purpose of this chapter is to provide a brief overview of the physical setting within the watershed, and to identify, map and describe the most important land allocations and plan objectives that influence management within the watershed.

Chapter 2 Issues and Key Questions

This chapter provides the key elements of the ecosystem that are most relevant to the management objectives, human values, and/or resource conditions within the watershed.

Chapter 3 Current Conditions

This chapter addresses the dominant physical, biological and human processes or features of the watershed that affect ecosystem elements relevant to the issues and key questions identified in Chapter 2. The current range, distribution and condition of these ecosystem elements are documented.

Chapter 4 Desired Conditions

This chapter presents desired conditions of specific ecosystem elements based on the LRMP and professional judgment that are relevant to the issues and key questions identified in Chapter 2.

Chapter 5 Management Options to Meet the Desired Conditions

This chapter summarizes the opportunities to move from existing conditions to the desired conditions identified in the Forest Plan or this Watershed Analysis.

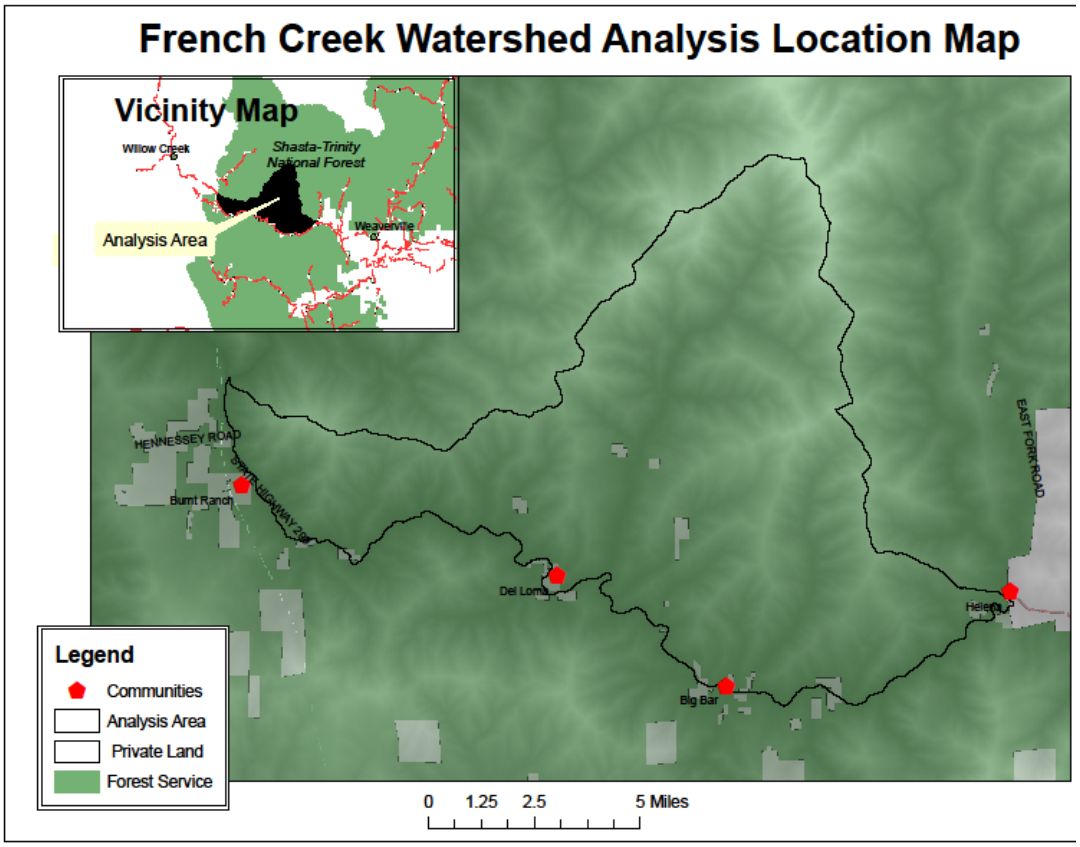
Chapter 1 - Watershed Characteristics

Physical Setting

Location

The French Creek planning watershed is located on the Trinity River Management Unit of the Shasta-Trinity National Forest, in Trinity County, California. The planning watershed includes the tributary drainages on the north side of the Trinity River, from the communities of Helena to Burnt Ranch (Figure 1-1). The planning watershed covers 61,789 acres, of which approximately 60,965 acres are National Forest System lands.

Figure 1-1. French Creek Watershed Analysis Area



Climate

The climate of the French Creek planning watershed is Mediterranean; characterized by warm dry summers and cold wet winters. Precipitation normally occurs as rainfall at the lower elevations and as snow above 4000 feet. Topographic and elevation variations produce significant changes in precipitation and temperature. Elevations within the watershed range from 690 feet to over 7,500 feet. Average summer maximum temperatures at lower elevations are in the mid 90° Fahrenheit range, and average minimum winter temperatures are in the low 30° Fahrenheit range. Average total precipitation is approximately 38 inches at Big Bar and approximately 48 inches at Burnt

Ranch (WRRC, 2008). Precipitation at higher elevations ranges from 50 to 60 inches (USGS, 2008). Most precipitation occurs between October and May, with snow usually remaining at the higher elevations through May or June.

Terrestrial

Fire and Fuels

Fire is the major large-scale disturbance agent within the northern Klamath Mountains. The variety of structural patterns and species composition found within the French Creek planning watershed is largely a factor of the effects from low to moderately severe wildfires. The effects of fire exclusion and other land management practices (grazing, logging, human settlement) have resulted in a change in stand composition and fuel loading (Taylor & Skinner 2003).

Vegetation

The majority of vegetation cover type within the French Creek planning watershed is conifer forest and mixed conifer/hardwood forest. Pacific Douglas fir and tanoak are prevalent in lower elevations, while subalpine conifers, white fir and red fir dominate on higher elevation sites. Steep rocky slopes covered by canyon live oak are also scattered throughout the area.

Wildlife

The management indicator approach is used to reduce the complexity of discussing all the wildlife species on the forest and wildlife assemblages (groups of wildlife associated with vegetative communities and/or key habitat components) have been selected as management indicators in the LRMP. Management of these assemblages is directed under the LRMP standards and guidelines. Assemblages within the watershed include but are not limited to: late seral, multi-habitat, snag and down log, riparian and cliffs/caves/talus and rock outcrops. Late seral wildlife species known to occur within the French Creek watershed include the federally listed and Forest Service sensitive Northern spotted owl (*Strix occidentalis caurin*a) and Pacific fisher (*Martes pennanti*). Habitat for these species is primarily managed under Late Successional Reserves (LSRs), which are managed to protect, enhance and maintain a functional, interacting old growth forest ecosystem and Riparian Reserves that allow for connectivity and dispersal. Only 1.4% of the planning watershed is within three designated LSRs (Canyon Creek RC 333, Corral RC 332, and New River RC 305). Wildlife species are present at levels that represent the natural state within wilderness however and 54% of the planning watershed is designated as such. Northern spotted owl critical habitat units (CHU) were designated in 1992 (legacy) and the watershed includes portions of CHUs CA-30, CA-31 and CA-34 (total of 3,669 acres). The 2008 Final Recovery Plan for the Northern spotted owl (USDI USFWS, 2008) designated approximately 900,900 acres of critical habitat in northwestern California, including the designation of CH 24 (Western Klamath-Siskiyou Mountains). The planning watershed includes approximately 281 acres of CH 24, of which approximately 141 acres is nested within the legacy critical habitat. The Recovery

Plan also delineated Managed Owl Conservation Areas (MOCA), of which, there are two within the planning watershed; CMOCA-45 and CMOCA-50, totaling 24,386 acres. Managed Owl Conservation Areas are specific conservation area boundaries, or habitat blocks, within federal forests. The MOCAs provide a network of large blocks of contiguous habitat capable of supporting 20 pairs of owls and smaller blocks capable of supporting 1 to 19 pairs of owls and include habitats representative of the historic geographic and ecological distributions of the owl. The combination of legacy and 2008 critical habitat designations overlap and exceed the LSR allocation within the planning watershed, accounting for approximately 6% of the total watershed area. The two MOCAs account for approximately 39% of the watershed area and are primarily within the designated Trinity Alps Wilderness Area, with an additional 281 acres in LSR. There are no designated spotted owl activity centers, or territories, within the watershed although numerous observations in 1998 and 1999 documented nesting pairs and single males/females. Recent survey work related to several planned projects within and surrounding the planning watershed may lead to the development of additional activity centers within the watershed. There are three designated activity centers (TR 163, 165 and 281) within 1.3 miles of the watershed boundary however, and an assessment of fire effects to late seral old growth (LSOG) habitat within spotted owl territories and home ranges is included in Chapter 3.

Approximately sixteen observations of Pacific fisher, a candidate for federal listing and a STNF sensitive species, were documented within the watershed between 1967 and 1990 primarily for habitat utilization and population research as there is no current program for monitoring fisher presence or reproductive success on the forest. In addition to the species listed above, the watershed also provides excellent habitat for multi-habitat wildlife assemblage species such as the Black-tailed deer and black bear; snag and down log species such as pileated woodpecker and Western screech owl; and riparian species such as Willow flycatcher. Bald eagles (*Haliaetus leucocephalus*), a STNF sensitive species, forage and nest along the Trinity River but there are no documented nest or winter roost sites within the watershed. Documented occurrences of other STNF sensitive species (from October 15, 2007 appended list) include the American marten (*Martes americana*), Shasta chapparral (*Trilobopsis roperi*) and Pressley Hesperian (*Vespericola pressleyi*) snails. The Burnt Ranch eyrie, an active peregrine falcon (*Falco peregrinus anatum*) nest site, is located within the southwestern portion of the watershed and has been continually monitored from 1978 through 2007. There are numerous large cliffs and rock outcrops within other areas of the watershed that could also provide nesting habitat for the falcon and other cliff dependent species. Although suitable habitat for other sensitive species such as the Northern goshawk, Townsend's big eared bat and Willow flycatcher is present, these species have not been documented within the planning watershed.

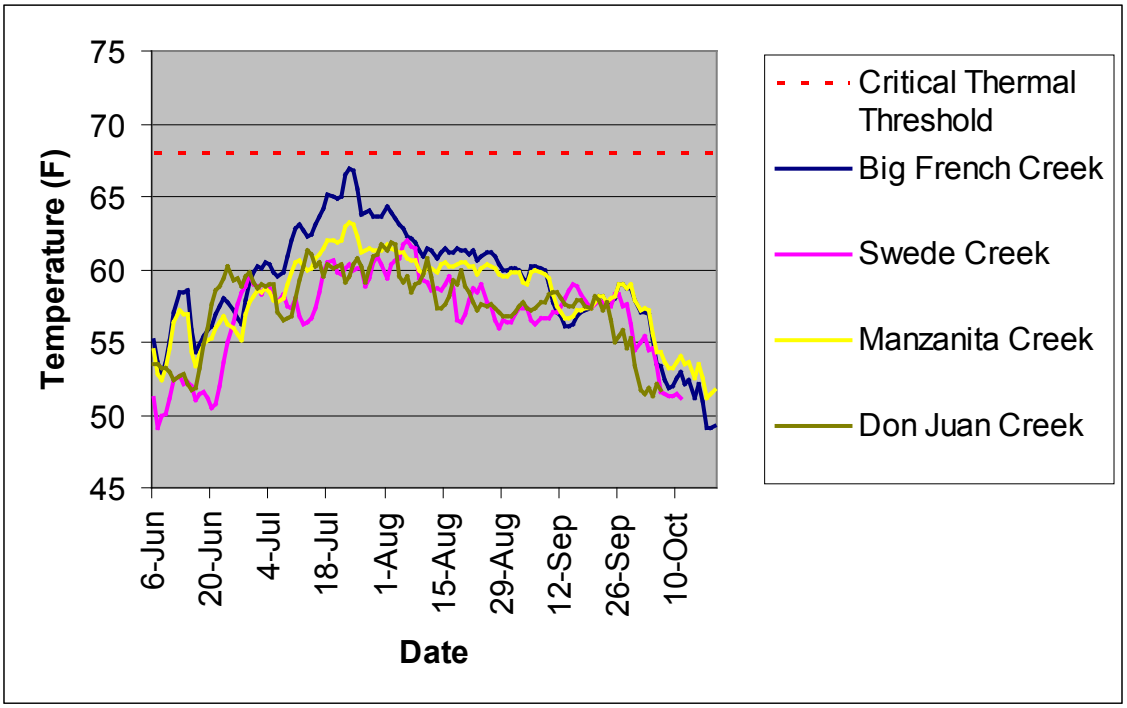
Aquatic Systems

Water Quality

Water quality data collected within the French Creek Planning Watershed is very limited. In general, the water quality is considered excellent due to the limited development and

lower road densities. Fire Disturbances within the planning watershed have not had a noticeable effect on water quality. The most important water quality parameters that influence the beneficial uses are water temperature and turbidity. Water temperatures remain below thermal thresholds for anadromous fish throughout the critical summer period. In addition, the watersheds cold water inputs provide critical thermal refugia in the main stem Trinity River for migrating adult and juvenile salmonids. Refer to Figure 1-2 below for the average summer water temperatures of four streams located within the planning watershed. Temperatures are maintained below the critical summer threshold of 68° Fahrenheit per water temperature probes that were deployed by USFS personnel from June to October (Big French and Manzanita Creek 1994; Swede and Don Juan Creek, 1995).

Figure 1-2. Summer water temperatures for four anadromous streams within the French Creek Watershed



The Trinity River is listed as sediment impaired by the Environmental Protection Agency (EPA) under the Clean Water Act section 303(d) (2001 Total Maximum Daily Load or TMDL). The New River, North Fork Trinity, East Fork North Fork, Big French Creek and Manzanita Creek, all major tributaries to the lower-middle mainstem, are presently considered "properly functioning" with regard to aquatic habitat and watershed conditions (De la Fuente et al., 2000). Big French Creek and Manzanita Creek are both within the planning watershed. Manzanita Creek is designated in the LRMP FEIS to be studied as a candidate for Wild and Scenic River status. The studies have yet to be completed. Based on the presence of adult Coho salmon and the robustness of the steelhead fishery in Manzanita Creek, it has been determined to possess Outstanding Remarkable Values (ORV) for anadromous fisheries. The Manzanita Creek watershed is also a Research Natural Area (RNA), with the botanical target element of Ponderosa

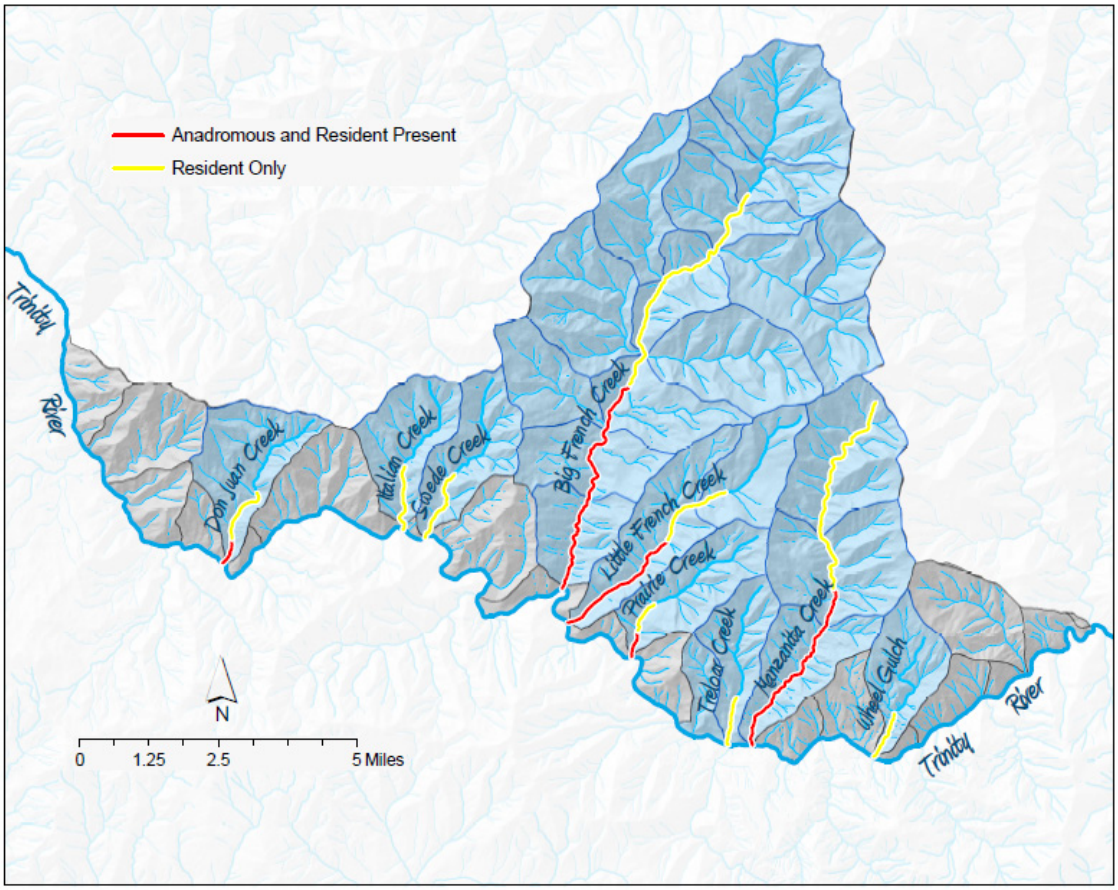
Pine-Douglas Fir. It is recognized for a high botanical diversity, with nine SAF forest types and 17 plant associations recognized (PSW GTR 2004).

Fish Species

The anadromous fish species present within the planning watershed include fall-run Chinook salmon *(Oncorhynchus tshawytscha)*, Coho salmon *(kisutch),* steelhead trout *(Oncorhynchus mykiss)*, and Pacific Lamprey (*Lampetra tridentata*). Steelhead trout are the dominant anadromous salmonid within the watershed. Resident species include rainbow trout (*Oncorhynchus mykiss*), Klamath small scale sucker *(Catostomas rimiculus)*, speckled dace (*Rhinichthys osculus*) and coast range and prickly sculpin (*Cottidae* spp.).

The Southern Oregon Northern California Coast Evolutionary Significant Unit (SONCC ESU) for Coho salmon has been listed as threatened under the Endangered Species Act (ESA) since February 1997. All streams within the planning watershed are included in the SONCC ESU. All stream areas within the watershed that are accessible to anadromous fish have also been listed as critical habitat (CH) for coho salmon. Refer to Figure 1-3 below for a map of resident and anadromous streams within the planning watershed. Due to the long-term overall decline of Chinook salmon and steelhead trout, the Pacific Southwest Region of the Forest Service has included them on a regional sensitive species list to help ensure that Forest Service activities do not result in a trend towards federal listing. Those species listed as Sensitive include: Upper Klamath/Trinity Chinook Evolutionary Significant Unit (ESU)-spring run, Upper Trinity River Chinook ESU-fall run, and Klamath Mountains Province steelhead trout. The Magnuson-Stevens Fishery Conservation and Management Act (MSA), in concordance with the Sustainable Fisheries Act of 1996 (Public Law 104-267), also designated Essential Fish Habitat (EFH) for coho and Chinook salmon (Federal Register, Vol. 67, No. 12). The MSA defined EFH as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (Federal Register, Vol. 67, No. 12). EFH for Coho and Chinook salmon in the planning watershed is identical to SONCC Coho CH. These ESUs are not listed under the federal ESA at this time.

Figure 1-3. Fish Bearing Streams within the French Creek Watershed



Management Direction and Land Allocations

Management Direction

The Shasta-Trinity National Forest is divided into 22 management areas. The Land and Resource Management Plan (LRMP) define the desired future conditions and management prescriptions within each management area. The French Creek planning watershed falls within Management Area 15, Trinity River and Management Area 4, Forest Wilderness Areas.

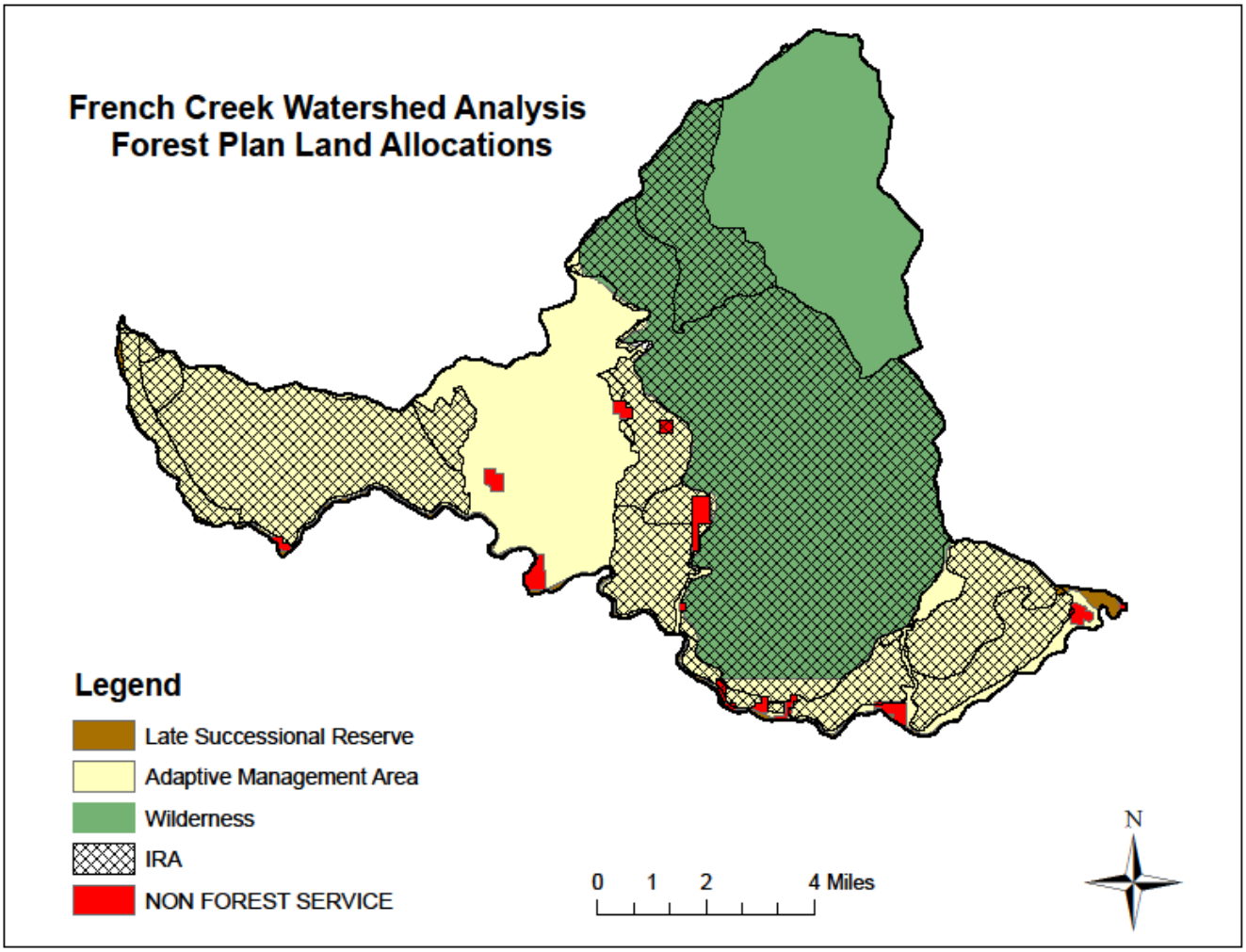
Land Allocations

Table 1-1 summarizes the mapped land allocations within the planning watersheds and Figure 1-4 displays the location of the allocations. The acres listed do not add up to the watershed acreage, due to overlap in the allocations and designations. Priorities for application of standards and guides where overlap occurs are listed in Appendix A to the ROD for the Northwest Forest Plan.

Table 1-1. Forest Plan Mapped Land Allocations

Management Area	Acres
Late Successional Reserve (LSR)	861
Adaptive Management Area (AMA)	28,739
Wilderness	33,649
Inventoried Roadless Areas (IRA)	41,414
Other (Private, BLM, outside National Forest)	825

Figure 1-4. Forest Plan Allocations within the French Creek Watershed



Aquatic Conservation Strategy Components

Riparian Reserves (RR) are an unmapped land allocation. Riparian Reserves are defined as a geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it. Their exact locations will be identified during project planning, and

would override the mapped LRMP prescriptions where present (LRMP, page 4-60). Riparian Reserves are to be managed to maintain or enhance riparian areas, wildlife and fisheries habitat, and water quality by emphasizing streamside and wetland management (LRMP, page 4-59). Management of RR is to be informed and directed by watershed analysis and must meet the Aquatic Conservation Strategy (ACS) objectives, as follows:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Standards and guides for RR are to be met when implementing any projects that may affect them. These include the requirement for conducting watershed analysis, a set of standards and guides for resource activities, and a prescribed interim set of riparian buffer widths, which may be modified as an outcome of watershed analysis. These are listed in the LRMP on pages 4-53 to 4-59. The LRMP also describes the designation of Key Watersheds as refugia for anadromous fish and sources of high-quality water. No Key Watershed designations occur within the French Creek watershed, but two adjacent watersheds (North Fork Trinity River and New River) are Tier I Key Watersheds.

Late-Successional Reserves

These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem. A portion of the French Creek planning watershed is located within Late-Successional Reserves (LSR). Late-Successional Reserves are to be managed to protect and enhance late successional and old growth forest ecosystems, which serve as habitat for late successional and old-growth dependent species (LRMP, page 4-37). A more thorough discussion of LSRs in the planning watershed is included in the Terrestrial Wildlife Habitat and Species section of Chapter 3.

Adaptive Management Areas

Adaptive Management Areas are landscape units designated to encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives. A portion of the French Creek planning watershed is within the Hayfork Adaptive Management Area. The objectives of Adaptive Management Areas are development, demonstration, implementation, and evaluation of monitoring programs and innovative management practices (LRMP, page 4-69). Management prescriptions and standards and guidelines for Matrix, Riparian Reserves, Administratively Withdrawn Areas, and LSR's will be adhered to within the AMA (LRMP, page 4-71).

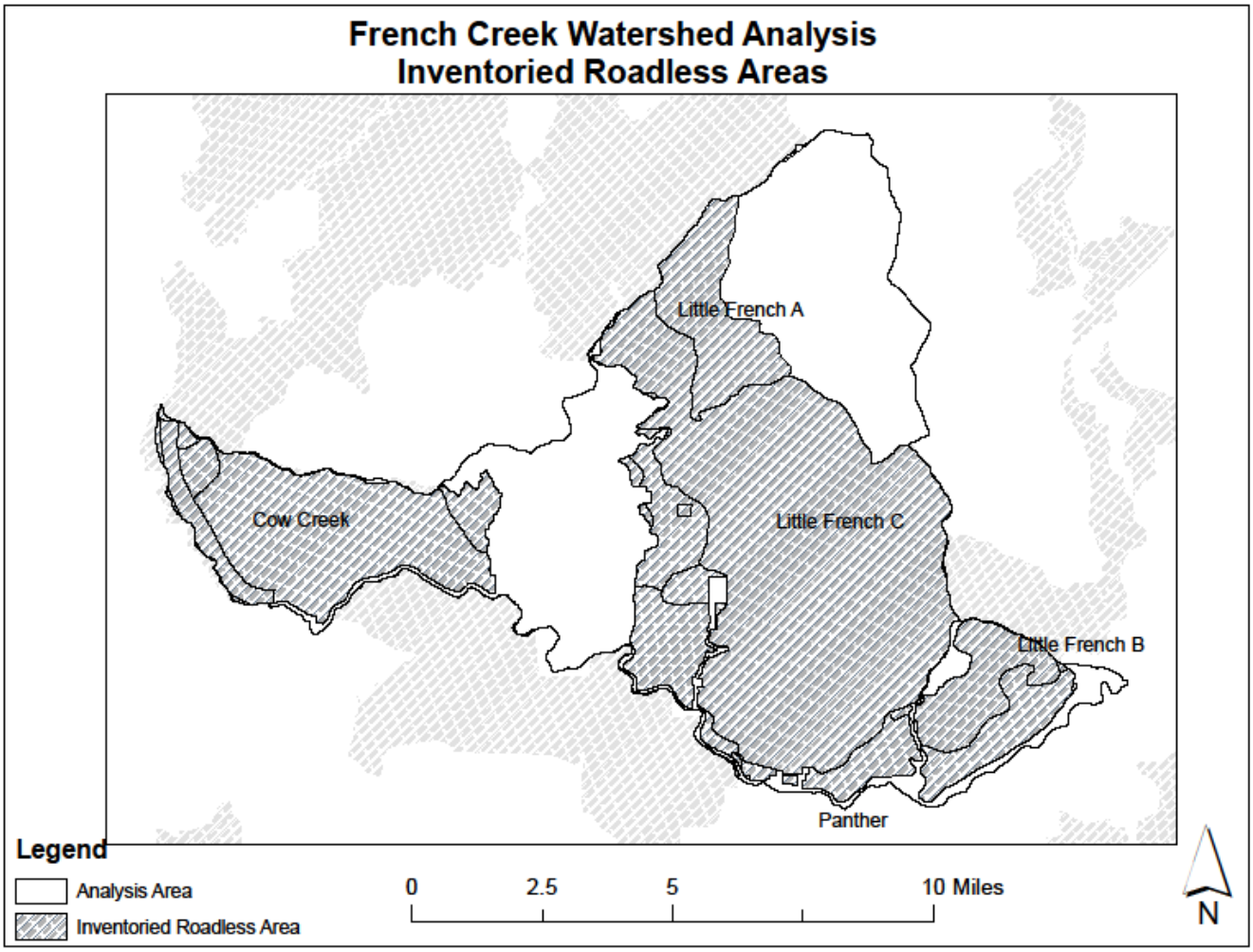
Inventoried Roadless Areas

Inventoried Roadless Areas refer to those areas identified and mapped in accordance with the Roadless Area Conservation Final Rule (the '2001 Roadless Rule'). Reference 36 Code of Federal Regulations, Part 294 and 66 Federal Register 3244-3272 (Jan. 12, 2001). Inventoried roadless areas (IRAs) were identified in the Final Environmental Impact Statement prepared for the Roadless Area Conservation Rule in November 2000. Portions of three IRAs are located within the planning watershed as summarized in Table 1-2 and shown in Figure 1-5.

Table 1-2. Inventoried Roadless Areas within the French Creek Watershed

Inventoried Roadless Area	Acres
Cow Creek	8,857
Little French A	3,168
Little French B	14
Little French C	29,326
Panther	49
TOTAL IRA ACRES	41,414

Figure 1-5. Inventoried Roadless Areas within the French Creek Watershed



Human Uses

Communities

The river communities of Hayden-Del Loma, Big Bar-Big Flat, and Burnt Ranch are within and adjacent to the planning watershed. Service and tourism as they relate to river based recreation are the primary industries. Several gold dredging operations have been active during the summer along the Trinity River and its tributaries up until August 2009 when the State issued a moratorium on suction dredge mining (Senate Bill 670), in response to litigation alleging harm to spawning grounds and other in stream habitat. The ban will remain in effect until the California Department of Fish and Game assesses and modifies existing regulations on this specific mining practice.

Transportation

The ground transportation system in the watershed consists of state highways, county roads, collector routes, and a series of local spur roads. State Highway 299 runs along the southern edge of the watershed and is the primary travel route from the Arcata/Eureka area on the coast to the Redding area in the Sacramento Valley. Several county roads provide access to private lands located along the river, but the majority of the roads and trails in the planning watersheds are Forest Service roads. National Forest System roads are classified by maintenance level. Many roads in the watershed are primitive roads at low maintenance levels, and there is a backlog of road maintenance that has implications for access and road-related erosion. Many spur roads are unmaintained, and are either blocked by berms or are overgrown. Unclassified roads are not inventoried, and the extent and condition of the unclassified road network is not well known.

Recreation Resources

Recreation use is primarily associated with water based recreation along the Trinity River, including whitewater boating, drift boat fishing, bank fishing, and water play. Opportunities within the watersheds consist of driving for pleasure, hiking, wildlife viewing, hunting, and dispersed camping. The east-central portion of the watershed in the Trinity Alps Wilderness is lightly used compared to the higher elevation areas north and east of the analysis area, and offers outstanding opportunities for solitude.

Chapter 2 - Issues and Key Questions

Chapter 3 addresses the dominant physical, biological and human processes or features of the watershed that affect ecosystem elements relevant to the issues and key questions identified in Chapter 2. Chapter 4 presents desired conditions of specific ecosystem elements based on the LRMP and professional judgment that are relevant to the issues and key questions identified in Chapter 2.

Five issues critical to the future management of this watershed were identified by a team of interdisciplinary resource specialists. They are:

Issue #1: Fire and Fuels
Issue #2: Human Uses and Values
Issue #3: Erosional Processes
Issue #4: Aquatic Systems
Issue #5: Terrestrial Wildlife Habitat and Species

Issue #1: Fire and Fuels

Key Question 1.1 What is the degree of threat from wildfires to local communities and what are the other values at risk within the watershed?
Outcome 1.1 Determination of the level of threat to local communities from wildfire. Identify other values at risk from wildfire within the watershed.

Key Question 1.2 What are the fire hazards and risks within the watershed?
Outcome 1.2 Determination of the level of threat to the watershed.

Issue #2: Human Uses and Values

Key Question 2.1 What are the major recreation resources and uses of the watershed?
Outcome 2.1 Identification of recreation resources and areas within the watershed.

Key Question 2.2 What role does the transportation system play in access to the area?
Outcome 2.2 Identify roads of concern to local and extended users as they relate to recreation opportunities and safe access and egress during wildfire.

Issue #3: Erosional Processes

Key Question 3.1 What mass wasting processes are inherent within the watershed?
Outcome 3.1 Identify predominant mass wasting features.

Key Question 3.2 What soil erosion processes are occurring in the analysis area? What is the soils' sensitivity to erosion?

Outcome 3.2 Identify predominant soil erosion areas.

Issue #4: Aquatic Systems

Key Question 4.1 What is the relative abundance and distribution of anadromous fish in the watershed? What contributions does the watershed make to the viability of at risk fish stocks?

Outcome 4.1 Identify the distribution of anadromous fish populations and population trends within the watershed. Understanding of the importance of existing fish stocks and habitat in the watershed to the Trinity Basin.

Key Question 4.2 What is the current condition of in stream habitat to support anadromous and resident fish and other aquatic organisms? What trends in stream condition are apparent compared to historic and desired future conditions? What is the current condition of instream habitat expressed in terms of landscape disturbance, particularly wildfire?

Outcome 4.2 Qualify and quantify the condition of specific habitat elements relative to anadromous and resident fish. Identify trends for in stream habitat elements relative to past and desired conditions. Identify how landscape disturbances, particularly wildfire, have affected the in stream habitat and Riparian Reserves and their ability to meet the Aquatic Conservation Standards.

Key Question 4.3 What is the current watershed condition expressed in terms of landscape disturbance? What trends in watershed condition are apparent compared to historic and desired future conditions?

Outcome 4.3 Describe the existing condition and trends in watershed condition within the French Creek watershed.

Key Question 4.4 How do landscape disturbances, particularly wildfire, influence watershed and stream condition? How would landscape treatments such as vegetation manipulation influence the effects of disturbance and trends in watershed and stream condition?

Outcome 4.4 Identify how landscape disturbances, particularly wildfire, have affected watershed condition. Describe how landscape treatments such as vegetation manipulation might influence the effects of disturbance and trends in watershed and stream condition.

Issue #5: Terrestrial Wildlife Habitat and Species

Key Question 5.1 What is the amount and condition of Late Successional Old Growth (LSOG) habitat within the watershed?

Outcome 5.1 Identify the amount and quality of LSOG habitat within the watershed. Identify priority treatment areas (if any) and appropriate techniques to protect and/or improve LSOG habitat.

Key Question 5.2 Did the 2006 and 2008 fires create areas that no longer provide suitable conditions for species associated with LSOG habitat?

Outcome 5.2 Provide an analysis of soil severity and vegetation burn severity effects from the 2006 and 2008 fires on LSOG habitat.

Key Question 5.3 Did the 2006 and 2008 fires affect habitat conditions within the territories and home ranges of spotted owl activity centers that lie within or adjacent to the planning watershed?

Outcome 5.3 Analyze habitat conditions related to spotted owl activity centers (territories and home ranges) within and/or adjacent the watershed.

Chapter 3 - Current Conditions

Issue #1: Fire and Fuels

1.1 What is the degree of threat from wildfires to local communities and what are the other values at risk within the watershed?

Developments and associated infrastructure within the Highway 299 corridor are classified as wildland urban interface (WUI), the area where structures and other human development meet or intermingle with undeveloped wildland. The potential for damage to these features from unwanted wildfire exists. There are approximately 9,802 acres identified as wildland urban interface within the watershed analysis boundary. Areas of mapped WUI within the analysis area include Big Bar-Big Flat, Hayden-Del Loma and Burnt Ranch (Figure 3-1). The Burnt Ranch WUI is on the south side of the River. There may be slivers of the WUI on the north side due to GIS errors, but the Burnt Ranch WUI is not within the analysis area.

In 2006 the Pigeon fire ignited off of Highway 299 near Pigeon Point and quickly spread north into the canyons above the main stem of the Trinity River. This fire eventually combined with others to form the Bar Complex which burned for approximately 122 days over 100,000 acres. 11,239 acres within the analysis area were affected from the Bar Complex. Table 3-1 shows the extent of the soil burn severity[1] within the analysis area from the 2006 Bar Complex fires.

Table 3-1. Soil Burn Severity – 2006 Bar Complex

Severity	Acres
High	1,349
Medium	2,576
Low	7,315
Total	11,239

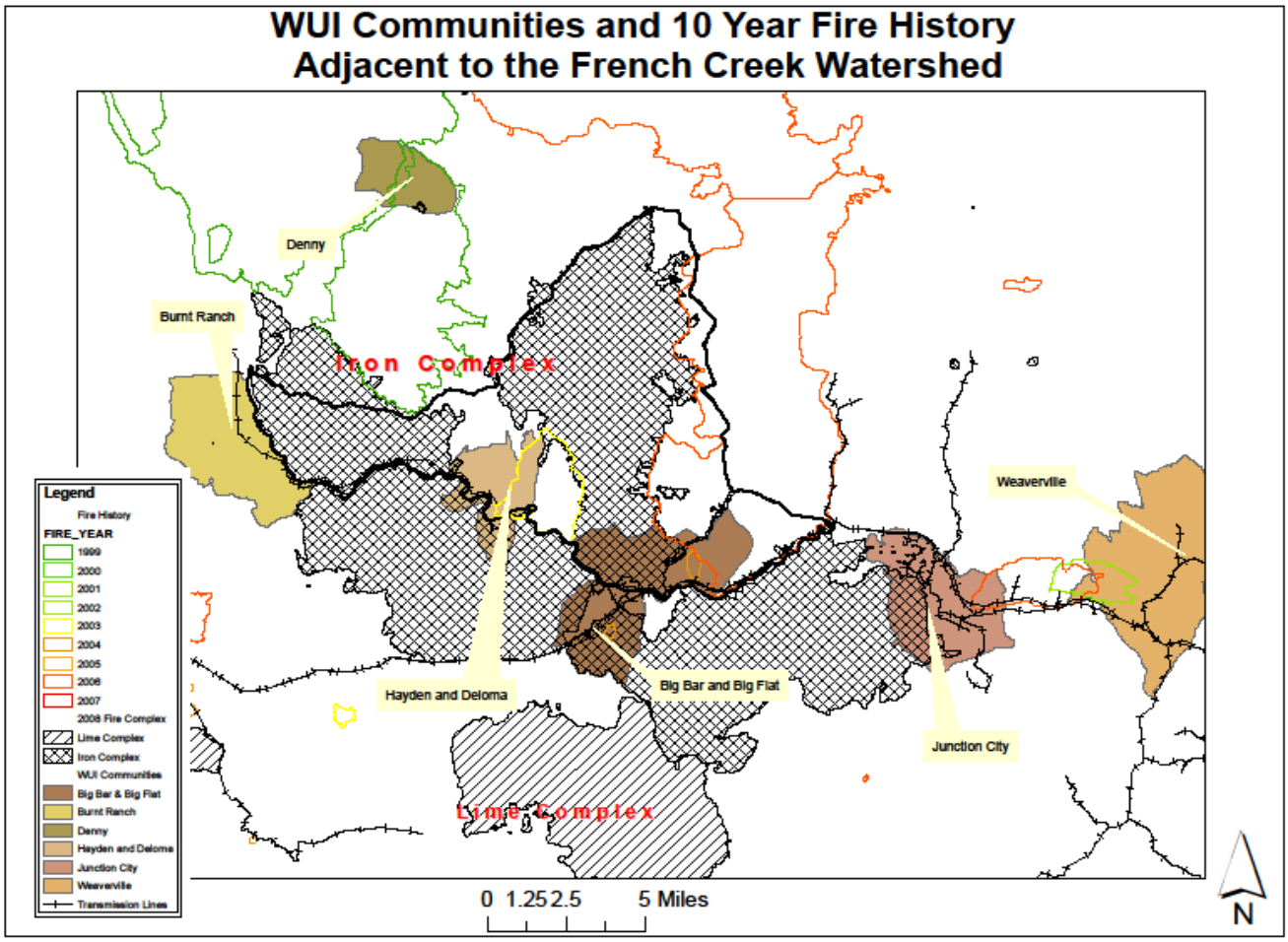
On June 21, 2008 a series of lightning strikes ignited approximately 35 fires within and adjacent to the analysis area. Many of these fires grew together into what became known as the Iron/Alps Complex. These fires burned for about two months over 100,000 acres before reaching full containment. 37,011 acres within the analysis area were affected from the Iron/Alps Complex. Table 3-2 shows the soil burn severity within the analysis area from the 2008 Iron/Alps Complex fires.

[1] High soil burn severity: all vegetative cover is removed and only white, red, or gray ash left, with deep soil char, deep water repellency, and loose structureless surface.
Medium soil burn severity: dead vegetation with frozen needles or leaves, gray to black ash, some soil char and some water repellency, structure unaffected.
Low soil burn severity: mixed vegetative mortality, black ash, no soil char and no water repellency with structure unaffected.

Table 3-2. Soil Burn Severity – 2008 Iron Complex

Severity	Acres
High	603
Medium	6,503
Low	29,905
Total	37,011

Figure 3-1. Wildland Urban Interface and Fire History within and adjacent the French Creek Watershed



There are four identified power lines within the analysis area: the Pacific Gas and Electric Cottonwood-Humboldt 100KV line, the Junction City-Humboldt 60KV line, the Trinity-Maple 60KV line and a Trinity County PUD line.

Natural resource values at risk from fire include but are not limited to commercial timber, timber plantations, anadromous fish habitat, terrestrial and aquatic wildlife habitat, domestic water supply and recreational opportunities.

1.2 What are the fire hazards and risks within the watershed?

Fire regime is a general term for the role that fire plays within a given ecosystem. Within the northern Klamath Mountains, the most widespread fire regime is characterized by frequent, low to moderately intense fires. Even within a particular forest type, fire severity and effects vary considerably with changes in topography, structural stage, fuel loads and moisture levels, weather, fire behavior in adjacent areas, and chance (Frost, Evan J., Sweeney, Rob. 2000). The analysis area contains sections of steep slopes and continuous fuels. This complex topography makes it difficult to separate fire regimes by ecological zones. In general the frequent, low to moderate intensity fire regime is found at lower montane elevations, and spreads up into the upper montane (Sugihara, Van Wagtendonk, Shaffer, Fites-Kaufman, Thode, 2006).

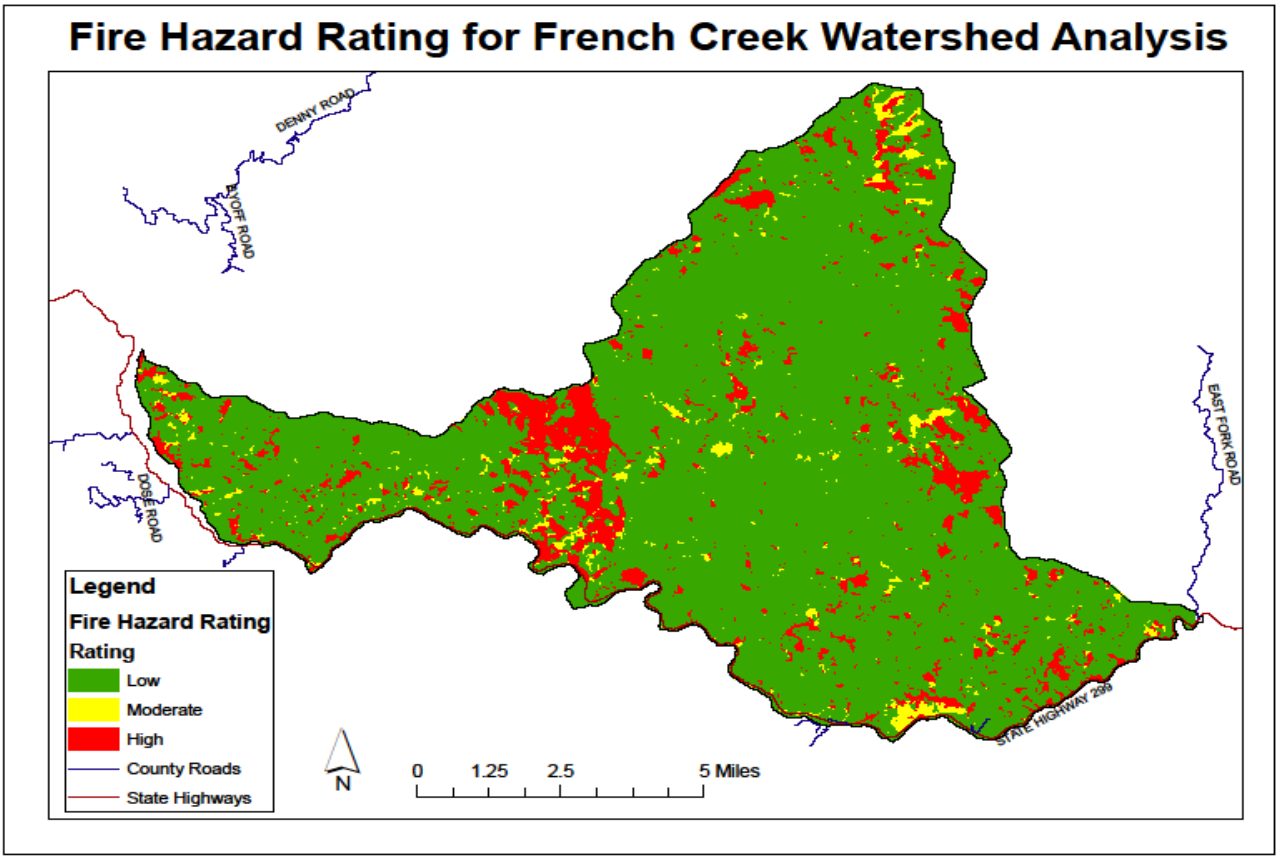
Median fire-return (MFR) intervals for Klamath mixed conifer can vary by elevation, aspect, vegetation, and climate. In one study, fire scar records for Douglas-fir, ponderosa pine, and sugar pine scattered within live oak stands (lower to mid-montane) show a historical MFR interval of 6-22 years (Sugihara et al. 2008). On mid to upper montane slopes, median fire-return intervals were found to be 26 to 40 years, vegetation dependent.

Fire hazard is an expression of the potential fire behavior (i.e., flame length, rate of spread, fire severity, fire intensity) for a fuel type, regardless of the fuel type's weather-influenced fuel moisture content (Hardy, Colin C. 2005). Potential fire behavior was modeled using FlamMap a spatial fire behavior mapping and analysis program that requires a multi-layered landscape depiction (developed in GIS), fuel moisture and weather data (USDA Forest Service. 2009. Fire Management Plan). A hazard rating of low, moderate or high was assigned to portions of the analysis area based on the potential for resource damage should a fire occur. The hazard rating classification utilized in this analysis is based upon flame length and is classified as follows:

Table 3-3. Fuel Hazard Rating Classification

Hazard Rating	Flame Length
Low	< 4 feet
Moderate	4-8 feet
High	> 8 feet

Figure 3-2. Fire Hazard Ratings in the French Creek Watershed

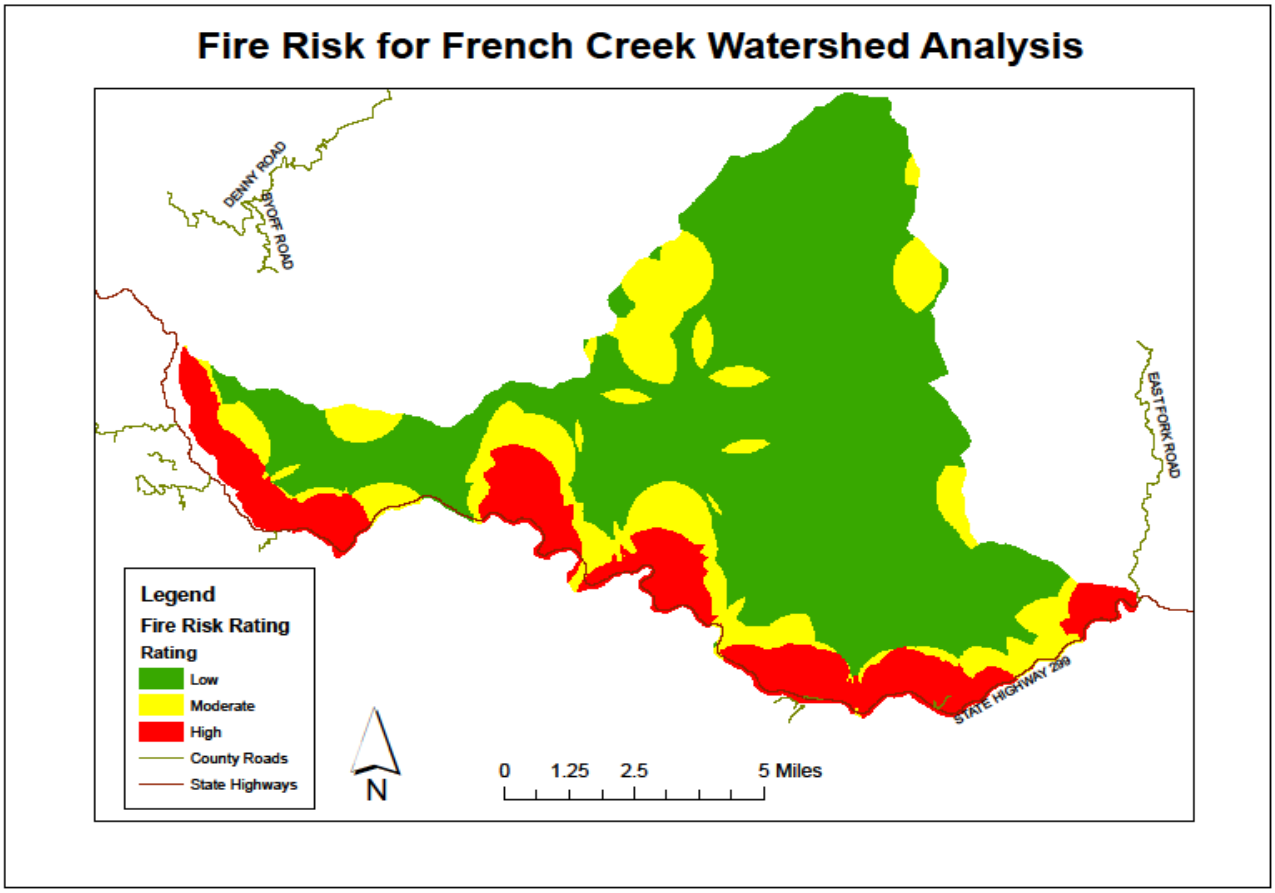


Fire risk describes the probability of a fire occurring in a given area based on past fire occurrence (USDA Forest Service. 2009. Fire Management Plan). Lightning and human caused occurrences are the two historical sources of ignition within the analysis area. For this analysis, the combined lightning and human caused fires are used to develop an overall picture of risk. Using the fire points of origin for a 20 year time frame (1987 – 2006), a point density analysis was conducted in GIS using a 1500 meter radius around each point. The following table shows how the risk rating classification is categorized (USDA Forest Service. 2009. Fire Management Plan). As Figure 3-3 shows, fire risk is greater along the Trinity River corridor. This is primarily due to the heavy recreational use along the Trinity River, travel along highway 299, and people living in adjacent communities.

Table 3-4. Fire Risk Rating

Risk Rating	Fires/1000 acres/decade
Low	< 0.5
Moderate	0.5-1
High	> 1

Figure 3-3. Fire Risk Ratings in the French Creek Watershed



Issue #2: Human Uses and Values

2.1 What are the major human uses of the watershed?

Wood Products

Timber Harvest

The French Creek watershed is dominated by mixed conifer timber stands, primarily consisting of Douglas fir. Current timber harvesting opportunities that would contribute to ecosystem management objectives are available on Forest Service land, as displayed in Table 3-5.

Table 3-5. Current Timber Harvesting Opportunities within Analysis Area

Conifer dominated stands	Roaded Recreation Emphasis	Late Successional Reserve (LSR)	Commercial Wood Products Emphasis	Wildlife Habitat Management Emphasis	Total Acreage Available
Young conifer plantation or seedling (0 – 4.9 inch QMD)	434 acres	30 acres	164 acres	164 acres	792 acres
Pole-size conifer (5 – 9.9 inch QMD)	5535 acres	350 acres	659 acres	2491 acres	9035 acres
Early or mid-mature conifer (10 – 19.9 inch QMD)	5053 acres	506 acres	702 acres	1974 acres	8234 acres
Mature or old growth conifer (20+ inch QMD)	3832 acres	247 acres	621 acres	2695 acres	7395 acres
Total	14,854 acres	1,133 acres	2,146 acres	7,324 acres	25,456 acres

Fuel Wood Collecting

The French Creek watershed is adjacent to the communities of Burnt Ranch, Hayden, Big Bar, Big Flat and Del Loma and has traditionally been heavily used by woodcutters as a prime fuel wood collecting area. Woodcutters use the existing road system to access dead and down trees wherever system roads and topography allow.

Access

2.2 What role does the transportation system play in access to the area?

The watershed boundary contains 28 forest service road segments (35 miles), and 7 other public road segments (24 miles). The main use of the transportation system within the watershed boundary is for access to private property, Forest Service trails and other recreational uses.

Rocks and debris falling or rolling onto the road surface are a common occurrence that has been exacerbated by the 2006 and 2008 wildfires. There has also been an increase in hazard trees (a tree is considered hazardous if it has defects that may cause a failure resulting in property damage, personal injury or death) (USDA Forest Service. 2003. Pacific Southwest Region Hazard Tree Awareness) along roadsides due to the recent wildfire events.

The road system has a poorly known level of maintenance needs that affects access for recreational users as well as for resource managers and firefighters, and contributes to erosion and sediment delivery problems in the watershed.

Issue #3: Erosional Processes

3.1 What mass wasting processes are inherent within the watershed?

Geology and Geomorphology

The analysis area is located within the western Paleozoic and Triassic Belt of the Klamath Mountain geomorphic province. From east to west the rock units within this belt are the North Fork terrane, the eastern and western Hayfork terrane, the Rattlesnake Creek terrane, the Ironside Mountain Batholith (IM) and various plutonic intrusions. These varied terranes form different morphologies.

Glacial processes of the Pleistocene and early Holocene and *presently active* mass wasting processes have played the largest role in shaping the geomorphology of the area. By far the greatest occurrences of mass wasting features within the analysis area are dormant rotational/translational slides of Pleistocene age. This type of slide is characterized by movement of a coherent mass over a discrete, broadly concave failure surface. Most slides have occurred in association with at least one of the following: serpentinized shear zones, faults, lithologic contacts or especially wet zones such as inner gorges. Internested rotational landslides occur in proximity to perennial and some ephemeral drainages. Such slides commonly creep gradually, but where undercut by a road or drainage will slide out rapidly.

3.2 What soil erosion processes are occurring in the analysis area? What is the soils' sensitivity to erosion?

Soil Resources

Soils within the analysis area have predominantly formed in metasediments, metavolcanics, granitics, and peridotites on mountain sideslopes. Soils formed in metasediments and metavolcanics are generally shallow (less than 20 inches) to moderately deep (20 to 40 inches) loams to gravelly and very gravelly clay loams (Deadwood, Goulding, Marpa, and Neuns soils). Soils formed in granitics (Chaix and Chawanakee series) are located on very steep, mountain sideslopes (60 to 80% slopes) that are shallow to moderately deep gravelly coarse sandy loams (see Table 3-6 for major soil type properties).

Table 3-6. Properties for Major Soil Types

Series	AWC (in/in)	Drain	Rock %	Runoff	Particle Size Topsoil			Perm. (in/hr)	K-Sat (in/h)	Hydro Group
					C	Si	S			
Beaughton	.12-.14	MW	30-60	High	-	-	-	.2-.6	3-9	D
Chaix	.10-.12	W	15-35	Moderate	-	-	-	.6-2	9-33	C
Chawnakee										
Deadwood	.07-.09	W	50-85	High	-	-	-	2-6	33-99	D
Dubakella	.12-.14	W	30-60	Moderate	-	-	-	.6-2	9-33	C
Goulding	.07-.09	W	30-60	High	-	-	-	2-6	33-99	D
Holland	.13-.15	MW	15-35	Moderate	11	27	62	.6-2	9-33	B
Hugo	.14-.16	W	10-25	Moderate	5	25	70	.6-2	9-33	B
Marpa	.12-.14	W	25-50	Moderate	13	63	24	.6-2	9-33	B
Neuns	.09-.11	W	40-65	Moderate	17	31	48	2-6	33-99	C
Weitchpec	.12-.14	W	40-55	Moderate	-	-	-	.6-2	9-33	B

In order to assess the potential risk of a given soil to erode, an erosion hazard rating (EHR) was developed (R-5 FSH 2505.22). The EHR system is designed to assess the relative risk of accelerated sheet and rill erosion. This rating system is based on soil texture, depth, clay percent, infiltration of soil, amount of rock fragments, surface cover (vegetative and surface rocks), slopes, and climate. Risk ratings vary from low to very high with low ratings meaning low probability of surface erosion occurring. Moderate ratings mean that accelerated erosion is likely to occur in most years and water quality impacts may occur for the upper part of the moderate numerical range. High to very high EHR ratings mean that accelerated erosion is likely to occur in most years and that erosion control measures should be evaluated. These ratings assume varying amounts of vegetation cover depending on degree of vegetative management.

Compaction reduces infiltration, increases runoff, which increases erosion hazard ratings and decreases down site water quality. Compaction decreases porosity, which decreases tree root elongation during critical growing period thus stressing the tree and decreasing timber site indexes. To deal with the problems of compaction, scientists from the forest service and Pacific Southwest Experimental Station developed a compaction rating criteria and in 1995 the forest service and Pacific Southwest experimental station soil scientists developed Soil Quality Standards (SQS) to set thresholds for erosion, fertility, and compaction.

Soil fertility evaluation is based on parent material and weathering age. Depending on age and leaching some soils are more fertile for timber production. See Table 3-7 for erosion hazard, compaction rating and fertility rating information for major soil types.

Table 3-7. Major Soil Type Information

Soil Series	Map Units	Depth	Rock Type	Surface Texture	AWC (in)	Fertility Rating	Burn Damage	Compaction Rating	Erosion Hazard (bare soil)
Beaughton	13	S	S	vgl	1-2	v-low	moderate	moderate	moderate
Chaix	19, 20	MD	G	sl	2-3	moderate	high	low	very high
Chawnakee	23, 25	S	G	sl	1-2	low	high	low	very high
Deadwood	32, 33, 35, 36, 37	S	MS	gl	1-2	mod-low	moderate	low	moderate
Dubakella	44, 48	MD	P	gcl	2-4	moderate	moderate	moderate	moderate
Goulding	80, 81, 83, 84, 85, 259	S	MV	gsl	1-2	low	moderate	low	moderate
Holland	98-100, 104 -108, 116-120, 126-7	D	MS	gl	3-4	good	low	high	high
Hugo	131-2, 139-40	D	MS	l	4-7	good	low	high	high
Marpa	175-6, 182,188-9	MD	MV	gl	2-5	moderate	moderate	moderate	moderate
Neuns	203-207, 209, 212, 217-219	MD	MV	vgl	2-5	moderate	moderate	low	moderate
Weitchpec	340-42, 345-46	MD	P	gl	2-4	moderate	moderate	moderate	moderate

Depth Classes:	**Parent Material:**	**Soil Texture:**	**Compaction:**	**Erosion Hazard:**
S = shallow (10-20”) MD = mod deep (20-40”) D = deep (40-60”)	MS = metasediments MV = metavolcanics G = granitic S = serpentine P = peridotite	l = loam gl = gravelly loam vg = very gravelly sl = sandy loam	Low = beneficial Mod = sl. harm High = mod harm	low (<4) moderate (4 -12) high (13-29) very high (>29)

Issue #4: Aquatic Systems

4.1 What is the relative abundance and distribution of anadromous fishes in the watershed? What contributions does the watershed make to the viability of at risk fish stocks?

Anadromous Fish Population Distribution and Trends

The planning watershed is comprised of 2nd to 5th order streams (the Strahler stream order is used to define stream size based on a hierarchy of tributaries) that drain thirteen 6th to 8th-field hydrologic unit code (HUC) watersheds that flow into the Trinity River from the north. All streams originate on National Forest System Lands. Eight of the streams do not support anadromous fish due to their intermittent flow regimes, steep gradients, and/or they are inaccessible due to conditions at their confluence with the Trinity River. The five streams within the planning watershed that currently support anadromous fish

are Don Juan Creek, Big and Little French Creeks, Manzanita Creek and Prairie Creek. Don Juan, Little French and Prairie Creeks have fish ladders at their confluence with the Trinity River.

Anadromous fish species in the planning watershed include Fall-run Chinook salmon, Coho salmon, Winter-run steelhead, Pacific lamprey, and Klamath small scale sucker. The watershed is within the Southern Oregon Northern California Coast Evolutionary Significant Unit (SONCC ESU) for Coho salmon. The SONCC ESU has been listed as Threatened under the Endangered Species Act since 1997. The National Marine Fisheries Service (NMFS) completed the Biological Opinion for the Shasta-Trinity LRMP on March 19, 2004 and its associated activities affecting SONCC Coho salmon. The Opinion also considered the effects of implementing the clarifying provisions relating to the Northwest Forest Plan (NWFP) Aquatic Conservation Strategy (ACS), as described in the Final Supplemental Environmental Impact Statement (FSEIS) issued jointly by the USFS and BLM on October 31, 2003 (the FSEIS and those provisions have since been reversed by court order, and the original intent and scope of the ACS has been reinstated). The Opinion issued by NMFS concluded that proposed actions under the LRMP are not likely to jeopardize the continued existence of the SONCC Coho ESU, nor will they destroy or adversely modify designated critical habitat. Individual biological assessments and consultations with NMFS are still required for specific project types however, to determine the level and intensity of effect(s).

Restoration is one of the primary components of the NWFP ACS and documented restoration on the Shasta-Trinity National Forest from 1994 to 2001 included construction of 244 in stream habitat structures, decommissioning of 112 miles of road and restoration of 1,980 acres of upland habitat. Data was not available for in stream passage, riparian habitat, or road improvements but significant work has been completed since 2001 to improve passage to historic spawning and rearing habitat (NMFS, 2004). The Trinity River Hatchery is one of three artificial propagation programs that are considered part of the ESU and NMFS determined that these artificially propagated stocks are no more than moderately divergent from the local natural populations. A draft federal recovery plan has been completed and is currently in review (CDFG completed the State Recovery Plan in February 2004). The SONCC Coho salmon ESU has declined in abundance over the past several decades due to the loss of, and damage or change to, the natural environment including water diversions, forestry, agriculture, mining, urbanization and modification and destruction of estuaries. Sedimentation from historic and current extensive and intensive land use activities is recognized as a primary cause of habitat degradation. Most of the primary producing rivers in the range of the ESU were designated as impaired (primarily due to sediment and water temperature) under the Clean Water Act by the EPA, including the 2001 Trinity River TMDL for sediment. Limiting factors, and their level of threat to the ESU, include the loss of large woody debris recruitment in riparian areas (high), channel structure and complexity (moderate to high), stream substrate and flow, water temperature and fish passage (moderate). Several priority recovery actions for the ESU include: conducting focused freshwater habitat restoration in anadromous salmonid streams (e.g., erosion control, bank stabilization, riparian protection and restoration, and reintroduction of large woody debris); improving forestry practices including riparian protections, road construction, and road

maintenance; treating priority fish passage barriers; and screening all water diversion structures.

Chinook salmon are infrequently observed within the planning watershed due to low stream flows that prevent migration during the early fall months. Coho salmon migrate later in the year and can usually migrate upstream into and within tributaries by late November or early December. Steelheads migrate upstream during the winter and early spring months and lamprey migrate in the spring. Juvenile fish of all species can be observed at any time throughout the limit of anadromy within the planning watershed, with juvenile steelhead being the most abundant. The condition of anadromous fish abundance and distribution for the five streams will be addressed at the 5th- 7th field subwatershed level. Unless otherwise noted, all survey work was conducted by the Weaverville Fisheries Crew (Trinity River Management Unit, Weaverville Ranger District).

Big French Creek

Big French Creek is a medium sized (10 cubic feet per second (cfs) summer base flow) 5th-order perennial tributary that flows in a southerly direction for approximately 12 miles before entering the Trinity River. A 6th-field HUC, it is the largest sub-watershed within the planning watershed at 25,000 acres. Anadromous fish have access to approximately 4.5 miles of stream habitat before bedrock falls prevent upstream passage. Big French Creek supports Chinook and Coho salmon and winter-run steelhead.

Adult Chinook are only observed during years when early fall rains create suitable migration conditions as low flows generally prevent anadromous access until mid to late November. A December 1990 spawning survey for Chinook that was conducted within the lower 3.22 miles resulted in the identification of three redds. No live fish or carcasses were located however so it is undetermined whether these were Chinook or Coho redds. Annual spawning surveys have been performed in the lower two miles of Big French Creek for both Chinook and Coho from 2001 through 2004 and in 2006. Adult counts have ranged from zero to two fish for Chinook salmon and a spawning Coho has not been documented. The low spawning numbers do not necessarily represent an accurate picture of utilization, as only the lower two miles are surveyed at weekly intervals. In addition, Chinook and Coho are prone to migrate and spawn during higher flows when the creek has increased turbidity and visibility is limited. Juvenile Chinook and Coho salmon presence in Big French Creek has been verified using direct observation techniques from 2001 through 2009. Spawning surveys for steelhead have not been performed by USFS personnel. The only indication that steelhead spawn in this creek is the presence of steelhead fry during summer surveys, the most abundant juvenile fish species observed during these surveys. Fish stocking records from the California Department of Fish and Game indicate that Big French Creek was planted with steelhead on eight separate occasions between 1931 and 1944.

Chinook salmon will spawn in Big French Creek, as evidenced by the survey data, but not every year. Spawning Coho salmon have not been documented; only juvenile Coho have been observed during summer surveys and no enumeration has been made of the juveniles. Based on the best available information, the spawning adult Chinook and

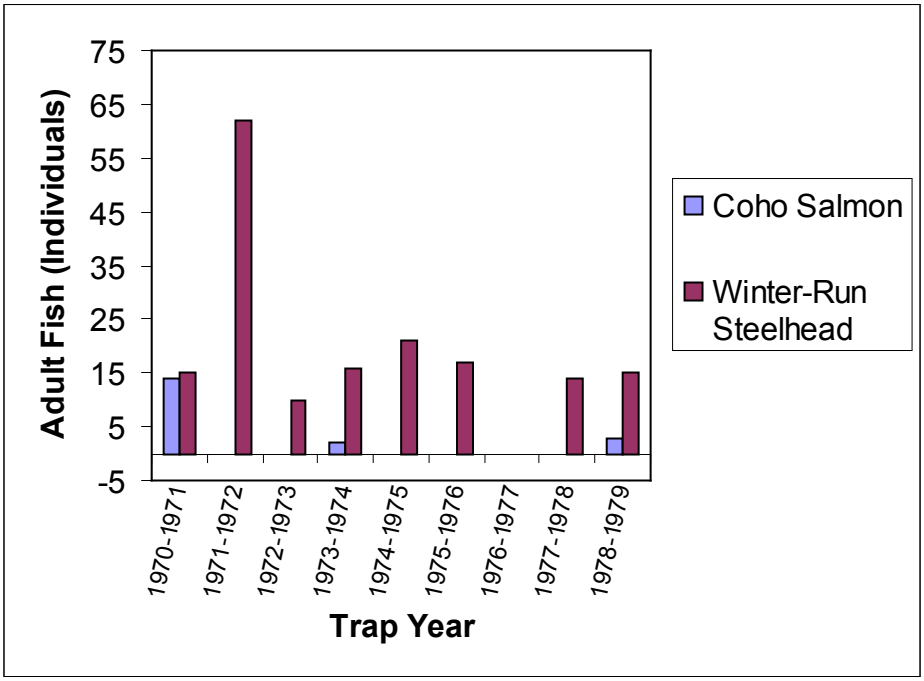
Coho salmon populations in Big French Creek are considered depressed. USFS personnel have not documented spawning surveys for steelhead in Big French Creek but based on the abundance of juvenile steelhead observed during summer surveys, the population of adult spawners is considered stable. As a relatively undisturbed wilderness watershed, Big French Creek serves as an index stream for steelhead and it should not be subject to any habitat modification projects for comparison purposes with more intensively managed streams.

Manzanita Creek

Manzanita Creek is a small (1.0 cfs summer base flow) perennial tributary that flows in a southerly direction for approximately 6.5 miles before entering the Trinity River. Anadromous fish have access to approximately 3.6 miles of stream habitat before a 12-foot waterfall prevents upstream migration. Manzanita Creek supports Chinook and Coho salmon and Winter-run steelhead.

The Humboldt State University California Cooperative Fishery Unit initiated a project in 1970 to study salmonid habitat. A component of this investigation was to ascertain anadromous adult fish escapement into Manzanita Creek. Data was primarily derived through the operation of an upstream migrant trap, electrofishing and visual surveys. This project was conducted from October through April over the course of four years starting in 1970. Following completion of the project, the weir remained operational until 1979. The results are presented in Figure 3-4. For three of the nine years the trap was operational, adult Coho and steelhead were observed migrating upstream. This study represents the most comprehensive data, regarding adult escapement into Manzanita Creek, currently available.

Figure 3-4. Adult Coho escapement in Manzanita Creek, October 1970 – April 1979



Annual presence/absence surveys for juvenile Coho and steelhead have been conducted during the summer months since 2004. Juvenile Coho and steelhead have been observed using direct observation techniques every year but no attempt to quantify the juvenile Coho population has been made. Based on the best available information, the population of adult spawning Coho salmon in Manzanita Creek is considered intermittent and the population of adult spawning steelhead is considered stable and robust.
The Weaverville USFS Fisheries field crew has routinely performed annual presence/absence surveys for juvenile Coho during the summer months since 2004. Juvenile Coho have been identified using direct observation techniques every year. No attempt to quantify juvenile Coho populations was made however.

Based on the information above, the population of adult spawning Coho salmon in Manzanita Creek is believed to be intermittent. The population of adult spawning steelhead is believed to be stable and robust.

Little French Creek
Little French Creek is a small (1.5 cfs summer base flow) perennial tributary that flows in a southerly direction for approximately 5.5 miles before entering the Trinity River. Anadromous fish have access to approximately 1.5 miles of stream habitat before a 4-6 foot high boulder waterfall prevents upstream migration. Several smaller natural barriers to upstream migration exist downstream during low flows, but during high migration flows, the barriers are passable. Little French Creek supports Winter-run steelhead. Neither Chinook nor Coho salmon have been documented and USFS personnel have not conducted spawning surveys. Juvenile steelheads have been observed during summer surveys, but not in high densities. In the last 34 years, at least three attempts have been made to improve fish passage through the State Route 299 culvert on Little French Creek, located approximately 70 feet upstream from the confluence with the Trinity River. In 1975 and 1976, removable wooden baffles were installed in the 10-foot wide concrete arch culvert and a wooden Denil fish ladder with rubble masonry pools was constructed. Following completion of the retrofit, CDFG seeded steelhead upstream (999 individuals from Mad River Hatchery stock). The fish ladder sustained major damage from both the Trinity River and Little French Creek during the floods of 1977-78 and 1982-83 and was repaired each time. In 2001, Caltrans collaborated with CDFG and NMFS, to re-construct a fishway at the confluence. Adult steelheads were observed within the upper pools of the fishway and upstream of the culvert after the project was completed.

Based on the best available information, the population of spawning adult steelhead in Little French Creek is considered at-risk. This is primarily due to the migration barrier that precluded adult passage at the Highway 299 culvert prior to 2001. Surveys for the presence of spawning steelhead would be required to determine abundance and utilization since the 2001 barrier modification.

Don Juan Creek
Don Juan Creek is a small (2.5 cfs summer base flow) perennial tributary that flows in a southerly direction for approximately 3.5 miles before entering the Trinity River. Anadromous fish have access to approximately 0.5 miles of habitat before a series of bedrock waterfalls prevent further upstream migration. Steelhead are believed to be the

only anadromous fish utilizing the stream based on the presence of steelhead fry, although spawning steelhead have not been documented. Chinook and Coho salmon have not been observed.

Stocking records from the CDFG indicate that the creek was also planted in 1975 (999 individuals from Mad River Hatchery stock). A fish ladder was constructed at the mouth in 1985 to facilitate upstream passage of anadromous fish through the Highway 299 culvert and the ladder is functional for all species and age classes during 100% of migration flows. Based on the best available information, the population of adult spawning steelhead in Don Juan Creek is considered small, but stable.

Prairie Creek
Prairie Creek is a small (1.0 cfs summer base flow) perennial tributary that flows in a southerly direction for approximately 2.7 miles before entering the Trinity River. Anadromous fish have access to approximately 0.5 miles of habitat before the stream passes through private property, preventing any further surveys and habitat analysis (access restricted since 1972). Steelhead are believed to be the only anadromous fish utilizing the stream based on the presence of steelhead fry, although no spawning steelhead have been observed. Chinook salmon and Coho salmon have not been observed. A fish ladder is located at the mouth that facilitates passage of adult and juvenile anadromous fish during 100% of migration flows for all species and age classes.

4.2 What is the current condition of in stream habitat to support anadromous and resident fish and other aquatic organisms? What trends in stream condition are apparent compared to historic and desired future conditions? What is the current condition of in stream habitat expressed in terms of landscape disturbance, particularly wildfire?

Fish habitat and stream surveys have been performed periodically since the mid 1970's for all streams that contain anadromous fish in the planning watershed. The following is a synthesis of the available data for each stream. Unless otherwise noted, all survey work was conducted by the Weaverville Fisheries Crew (Trinity River Management Unit, Weaverville Ranger District).

Big French Creek
The lower 10 miles of the stream were surveyed in 1972 and again in 1980 using USDA-Forest Service Stream Survey Form R5-2600-16. Three Stream Condition Inventories (SCI) were performed within the lower 2 miles between 1996 and 2007. Fish habitat and productivity were rated good to excellent throughout the surveyed sections.

The upper reaches of Big French Creek demonstrate Rosgen A2 channel morphology. Rosgen A2/A3 channels are characterized with slopes of 4-10%, a dominant bed material of boulders, entrenchment values less than 1.4 and width to depth values less than 12 (Rosgen,1996). The lower reach has a B2/B3 channel morphology. B2/B3 channels are characterized with slopes of 2%-4%, a dominant bed material of boulders and cobbles, entrenchment values of 1.4 – 2.2 and width to depth values greater than 12. Entrenchment and width to depth values in the lower reach were determined to be 1.3 -1.6 and 15 -22, respectively. These values are within the expected range for B2/B3 channels. The large

woody debris (LWD) component was not properly functioning during all SCI work due to a lack of woody debris exceeding 16 inches in diameter. No LWD assessment was made during the earlier surveys. Maximum pool depth was also not properly functioning. Three out of ten pools measured during the 2007 SCI had depths greater than 3 feet. Based on all collected data, average pool depth has decreased from 4.5 feet in 1996 to 2.8 feet in 2007. The pebble counts from the 2001 and 2007 SCI also show a decrease in fine sediment and an increase in cobbles. The aggradation trend in the lower reaches may be attributable to the 1997 winter flood and fire activity in 2003 and 2006. Fine sediment levels within pool habitats have remained below 15% over the last 10 years. The earlier survey data estimated stream shading at an average 70-80% throughout the surveyed sections. Recent SCI data shows stream shading has decreased from 90% in 1996 to 68.5% in 2007. Presumably, this decrease is also due to the fire activity within the watershed. The riparian canopy is composed mainly of Douglas-fir (*Pseudotsuga menziesii*), canyon live oak (*Quercus chrysolepis*), white alder (*Alnus rhombifolia*), and big leaf maple (*Acer macrophyllum*). A spur road along the lower 0.5 miles negatively impacts riparian canopy. This short, native surface road bisects the riparian zone to access an unimproved campsite where wood cutting and illegal dumping often occur. All surveys indicate that water quality is excellent. Water temperature monitoring shows temperatures remain below the 68° thermal threshold for anadromous fish throughout the summer. Chemical analyses of water samples also show no irregularities. The aquatic invertebrate analysis shows that the diversity and number of individuals observed are positively correlated with the stream's size.

Although there are some habitat elements that are not properly functioning, the overall habitat quality in terms of sustaining and increasing anadromous fish utilization is considered functional. Juvenile and adult Coho, Chinook and steelhead have unimpeded access to Big French Creek, it provides thermal refugia during critical summer months and sufficient spawning gravel is present. Significant trends for Big French Creek are the decrease of LWD, the filing of pools, and a decrease in stream shade components.

Manzanita Creek

Manzanita Creek has been formally surveyed five times since 1980. The 1980 survey was completed by a private contractor within the lower 6 miles in order to complete a larger assessment of the effects of prescribed burning operations on aquatic habitats (OTT, 1980). USFS personnel, for the Trinity River Restoration Program's Technical Coordinating Committee, completed habitat typing in 1990 within the lower 1.4-mile reach. SCI surveys were conducted from the confluence with the Trinity River to 4,100 feet upstream in 1996, 2001, and 2008.

Fisheries habitat was rated as good and productivity rated as excellent during all of the Stream Condition Inventories and the 1980/1990 studies. The stream channel's morphology is classified as a Rosgen A2 although the lowest section of the creek verges on classification as a B2 channel due to decreasing channel slope. Rosgen A2 channels are characterized with slopes of 4-10%, a dominant bed material of boulders, entrenchment values less than 1.4 and width to depth values less than 12 (Rosgen,1996). Entrenchment values and width to depth values for the lower reach of Manzanita Creek are higher than expected for an A2 channel, and more closely parallel those values found

within a B-type channel. This is probably due to the fact that most of the recent survey work has been done in the lower reaches of the stream where the channel is in transition from an A2 to a B2 channel. LWD is lacking in quantity and quality and recruitment is low. LWD counts have decreased from 86 pieces/kilometer to 58 pieces/kilometer during the last 10 years. This trend may be offset however by the expectation that the 2008 fires will increase the recruitment potential for LWD. The 2008 SCI did indicate that the fires have already contributed considerable amounts of LWD to the channel and the recruitment potential has increased, as many downed trees are located upslope of the stream channel. Pool quantity and maximum pool depth are two habitat elements that are not properly functioning. Manzanita Creek is dominated by run and step run channel habitat and is lacking in pool habitat overall (USFS, 1990). The average maximum pool depth is 2 feet. This value is low and should be at least 3 feet to provide for adequate pool quality. The amount of fine sediment in pool habitats has remained virtually unchanged since the initial 1996 SCI and is presently 4.8%, well below the 15% threshold for a not properly functioning pool. The 1980 study showed that limited prescription burning on adjacent ridges resulted in no measureable effect(s) on fine sediment levels within the creek. Pool quantity has increased over the last 10 years but the frequency is still only one pool every 15.9 bankfull widths; much lower than the accepted standard of one pool every 3-7 bankfull width (Leopold, L. B., et al, 1964). Stream bank stability ratings were measured as 29% stable, 65% vulnerable, and 6% unstable within the survey reach (SCI 2008). Previous surveys measured bank stability at 75-85% stable (SCI 2001, SCI 1999). The current trend towards decreasing bank stability is likely attributed to the recent wildfire and associated suppression activities. Riparian trees affected by high severity fire have died and fallen downslope and trees cut within the riparian zone during fire suppression efforts have also rolled downslope, decreasing the stream bank stability but contributing to LWD recruitment. Stream shading provided by riparian vegetation has decreased from 97% in 1996, to 81%, in 2001, and finally to 70.7% in 2008. This loss of canopy shading is likely attributed to the fire(s) that burned portions of the riparian zone in 2008. The riparian canopy is composed mainly of Pacific madrone (*Arbutus menziesii*), white alder (*Alnus rhombifolia*), big leaf maple (*Acer macrophyllum*), and Pacific dogwood (*Cornus cornuta*). Water quality remains excellent for the Manzanita Creek drainage despite the recent fires. Water temperature monitoring shows that water temperatures remain below the 68° thermal threshold for anadromous fish throughout the summer. Chemical analyses of water samples also show no irregularities. The aquatic invertebrate analysis shows that the diversity and number of individuals observed is indicative of a healthy stream this size. Manzanita Creek currently has one water diversion, totaling approximately 0.1 cfs for domestic use in the private section near the mouth.

Although there are some habitat elements that are not properly functioning, the overall habitat quality in terms of sustaining and increasing anadromous fish utilization is considered functional. Significant trends for Manzanita Creek are the decrease of LWD and the loss of stream shading; however the 2008 fires may lead to an increase in LWD recruitment.

Little French Creek
Little French Creek habitat was assessed in 1972, 1974, 1980, and 1999. The entire channel length has been classified as having an A2/A3-type channel morphology. Rosgen A2/A3 channels are characterized with slopes of 4-10%, a dominant bed material of boulders and cobbles, entrenchment values less than 1.4 and width to depth values less than 12 (Rosgen,1996). The creek flows through a steep walled canyon with almost vertical walls.

The 1999 SCI reported 59 pieces of LWD/ kilometer. This value is somewhat suspect as the LWD criteria were not defined in 1999 and the original data is not accessible for review. A LWD assessment was not made during the earlier surveys but it can be inferred, from the lack of notation in the early habitat surveys, that LWD was not a major component of in stream habitat. No LWD trend is apparent based on the surveys completed. The pool to riffle ratio measurements show that there is nearly a 1:1 ratio, indicating an abundance of pools. Pool frequency appears to be stable and unchanging. Average maximum pool depth is 1.5 feet, below the preferred minimum depth of 3.0 feet. The 1980 and 1999 surveys do not report fine sediment within the channel but excess fine sediment was noted during the first two surveys. The sediment source was identified as landslides located on private property and it is believed that channel processes mobilized the fine sediment into the mainstem Trinity River prior to the 1980 survey. The 1980 survey noted bank instability such as excessive cutbanks on an old road that paralleled the stream, steep banks, steep side slopes, and in-channel logging debris. Stream shading values have been consistently high during all surveys, ranging from 70-90%. The riparian canopy is composed mainly of Douglas-fir (*Pseudotsuga menziesii*), white alder (*Alnus rhombifolia*), big leaf maple (*Acer macrophyllum*), Pacific dogwood (*Cornus cornuta*), and Pacific yew (*Taxus brevifolia*). Water quality was measured as excellent. Water temperature monitoring shows that water temperatures remain below the 68° thermal threshold for anadromous fish throughout the summer. Aquatic invertebrate analysis also shows that the diversity and number of individuals observed is considered fair for the stream size and the predominant species observed is the caddis fly (*Trichoptera* spp.).

The overall anadromous habitat quality of Little French Creek is best described as fair. The creek is small and has been impaired by sediment, although it appears the current trend is towards reduction of fine sediments within the channel. The overall habitat quality in terms of sustaining anadromous fish utilization (primarily steelhead) is considered functional.

Don Juan Creek
Don Juan Creek was surveyed in 1972, 1974, and 1985. The 1972 survey was a cursory assessment for fish barriers and limited habitat data was obtained. The 1974 and 1985 surveys were conducted using USDA-Forest Service Stream Survey Form R5-2600-16. Fish habitat and productivity has been rated as fair to good in the lower reach, which extends 0.5 miles upstream of the Trinity River confluence. Fish habitat in the upper reach, which extends 1.1 miles upstream, has been rated poor to fair. The lower reach is classified as an A2/A3 type channel morphology. A2/A3 channels are characterized with slopes of 4-10%, a dominant bed material of boulders and cobbles, entrenchment values

less than 1.4 and width to depth values less than 12 (Rosgen,1996). The upper reach is classified as an A2a+/A3a+ type channel morphology. Rosgen A2a+/A3a+ channels are located in areas of very high relief topography and are characterized with streambed slopes >10%, a dominant bed material of boulders and cobbles, entrenchment values <1.2, and width to depth values <12 (Rosgen, 1996). No formal LWD assessment was made during the surveys but three log jams, with trees up to 36 inches in diameter, have been observed in the first 0.5 miles. The pool to riffle ratio for the lower and upper reaches are 1:2 and 1:3, respectively. This deviation from the preferred ratio of 1:1 may be attributed to the 1964 flood that altered and diminished the riffle pool sequence in some Northern California streams (Stewart and LaMarche, 1967; Kelsey, 1977, p. 283). It is anticipated that the pool to riffle ratio will slowly return to the preferred ratio of 1:1 as channel processes stabilize and approach equilibrium. Stream bank and channel stability were measured as stable within the lower reach and unstable in the upper reach due to the active natural erosion of approximately 50% of the stream banks. Stream shading was measured at 70-90% during both surveys. The riparian canopy is composed primarily of Douglas-fir (*Pseudotsuga menziesii*), white alder (*Alnus rhombifolia*), Pacific madrone (*Arbutus menziesii*), and oak (*Quercus* spp.). Water quality is considered properly functioning. Water temperature monitoring has shown that water temperatures remain below the 68° thermal threshold for anadromous fish throughout the summer. Aquatic invertebrate analysis has shown a high quantity of individuals but diversity is lacking and dominated by caddis flies (*Trichoptera* spp.). Don Juan Creek currently has two water diversions totaling approximately 0.3 cfs for domestic use in the private section near the mouth.

The overall anadromous habitat quality of Don Juan creek is best described as fair. The unbalanced pool to riffle ratio limits the quality of spawning habitat. In addition, there are limited spawning gravels as the channel substrate is composed of large cobbles and boulders. The unstable upper reach also limits the quality of and access to spawning and rearing habitat. No habitat trends are apparent based on the limited collected data.

Prairie Creek

Prairie Creek was surveyed in 1980 using USDA-Forest Service Stream Survey Form R5-2600-16 and no other documented surveys have occurred. The survey was conducted within the first 0.5 miles up to a\ private property where further upstream access is not allowed. No current condition or trend information is available due to the lack of data.

Fish habitat and productivity within the lower 0.5 miles was rated as fair. The stream channel morphology is described as a Rosgen B3 type channel. B3 channels are located in areas of moderate relief topography and characterized by slopes of 2% – 4%, a dominant bed material of cobbles, entrenchment values of 1.4 – 2.2 and width to depth values greater than 12 (Rosgen, 1996). A formal LWD assessment has not been conducted and LWD was not notated in the 1980 report. The pool to riffle ratio was measured at 1:1; normal for a stream of this size and type. Channel stability was rated as good with several features of instability noted, including steep banks, steep side slopes, and unstable channel obstructions. Stream shade was measured at 90% and white alder (*Alnus rhombifolia*), big leaf maple (*Acer macrophyllum*), and Pacific dogwood (*Cornus cornuta*) were the primary riparian species. The current water quality is unknown as

long-term water temperature monitoring and water quality analysis have not occurred. Water temperature was measured in 1980 at 56°F with no turbidity. Aquatic invertebrate analysis shows the quantity of individuals to be fair but diversity lacking and dominated by caddis flies (*Trichoptera* spp.).

The habitat quality for anadromous fish is difficult to assess based on the limited existing information. The 1980 survey did rate spawning and juvenile rearing habitat as fair.

Summary

Within the planning watershed, Chinook and Coho salmon have shown a relatively decreasing population trend over the last 20 years while steelheads have remained stable. The 2008 wildfires may affect fish abundance and distribution in the short term due to inputs of sediment but sediment levels are still below a level of having a significant impact on spawning success. Given the planning watershed's relatively undeveloped character, sediment input from roads is not expected to increase in the future. Increased inputs of large woody debris from the result of the 2008 fires may cause debris jams in channels and increased channel instability, but it is unlikely that total barriers would develop. LWD recruitment will improve overall in stream habitat and complexity.

4.3 What is the current watershed condition expressed in terms of landscape disturbance? What trends in watershed condition are apparent compared to historic and desired future conditions?

The French Creek watershed was analyzed in 2009 for the Downriver Community Protection Project Environmental Analysis (DRCPP EA). Cumulative watershed effects (CWE) analysis at a variety of scales was performed using the Equivalent Roaded Area (ERA) model, which is an indicator of watershed disturbance. Across the DRCPP CWE analysis area, disturbance levels at all watershed scales roughly doubled from fire effects between 2005 and 2009. Within the French Creek watershed, this trend is reflected, although not all subwatersheds were affected equally. In the past few decades, the degree and frequency of fire disturbance has increased, and the proportion of overall watershed disturbance attributable to fire has increased from 40% or less of the total to 60% or greater on average (Levitan 2009). It is apparent that wildfire disturbance in the Trinity River watershed has increased in recent years beyond the range of historic disturbance cycles, and that associated increases in soil erosion hazard and risk of mass wasting are likely to accelerate negative trends in watershed condition. These trends are counter to the stated Forest goals for water resources to:

- Maintain or improve water quality and quantity to meet fish habitat requirements and domestic use needs (LRMP, page 4-6).

- Maintain water quality to meet or exceed applicable standards and regulations (LRMP, page 4-6)."

The state of the road network with respect to hydrologic connectivity to streams, and the potential for stream crossings to erode or fail, affecting water quality, is a poorly known factor that has implications for watershed condition, as well as for access if crossing

failure makes roads impassable. In 1991, a Watershed Assessment Report was prepared for the Forest Service that covered the Big French Creek watershed (Pacific Watershed Associates 1991). The report consisted of a sediment source inventory and erosion control plan. The assessment identified 128 sites with potential for treatment that would potentially prevent 31,800 cubic yards of sediment delivery in the New River and Big French Creek watersheds.

Project records from 1992 and field review in 2009 of an area covered by this assessment indicate that some work, mostly stream crossing upgrades, was conducted in the early 1990's. It does not appear that much of the recommended work, including road decommissioning, was completed. The present status of the assessed sites is not well known, and the condition of the assessment area some 18 years later is of interest. It is recommended that a sediment source inventory focused on the road network in the French Creek planning watershed be conducted, and a Roads Analysis that weighs uses, needs, benefits and risks of system and unclassified roads within the watershed be completed.

4.4 How do landscape disturbances, particularly wildfire, influence watershed and stream condition? How would landscape treatments such as vegetation manipulation influence the effects of disturbance and trends in watershed and stream condition?

Wildfire, particularly moderate and high severity fire, has a high likelihood of increasing erosion rates well above natural background levels. Loss of soil cover from consumption by fire, loss of root strength and loss of evapotranspiration from vegetation mortality, and increased efficiency of runoff from burned watersheds all contribute to greater rates of rainsplash detachment and erosion, longer slopes where surface runoff gains more erosive energy, and greater areas of saturation that contribute to peak stream flows and decreased slope stability. More efficient runoff and voluminous sediment delivery, particularly large inputs from severe storm events, impacts streams, fills pools and erodes banks. Increased peak flows may either scour woody debris and channel forms, simplifying channel structure, or deliver large quantities of woody debris and sediment from high-energy upper tributaries that may then reside in the channel system for long periods (decades to centuries), affecting form and function in a variety of ways. Long-lasting effects from extreme events such as the 1964 flood are apparent in higher-order channels throughout northern California, and additional disturbance as caused by wildfire is likely to increase the magnitude of these long-lasting impacts.

Vegetation manipulation to reduce fuels and potential fire spread will have relatively minor effects in terms of overall landscape disturbance. The treatments proposed for the DRCPP, for instance, will on average increase disturbance levels at the HUC8 watershed scale, which is the most local scale where effects would be the least diluted, by about 2% over the existing disturbance level. This degree of disturbance, if properly mitigated by appropriate project design standards and Best Management Practices (BMPs), is not likely to detectably affect watershed condition or stream condition, or negatively impact beneficial uses of water such as domestic water supply or aquatic habitat. In comparison to the doubling of watershed disturbance from recent fires, these effects would be

negligible, even in the short term, and especially in the long term and in the context of reducing the risk of landscape-scale fire.

Issue #5: Terrestrial Wildlife Habitat and Species

From 2000-2008 there have been approximately four wildfires either within or along the perimeter of the planning watershed that have affected wildlife habitat associated with a wide variety of terrestrial and aquatic species. Fires include the 2000 Megram, 2003 Loma, 2006 Bar and 2008 Iron Complexes. Negative effects to late-successional and old-growth (LSOG) conifer habitats are a concern because LSOG forests can take 100-plus years to develop. Although only 861 acres of the planning watershed is allocated as LSR, wilderness encompasses 33,649 acres, or 54 % of the watershed. The LSR and wilderness network is the foundation for maintaining viable populations of species associated with LSOG habitat such as the northern spotted owl, Pacific fisher, American marten and Northern goshawk. Maintaining fish and wildlife species indigenous to wildernesses with emphasis on preserving threatened, endangered, and sensitive species is a Level 1 standard and guideline (LRMP, p. 4-29). Management within wilderness emphasizes maintaining the natural ecosystem, including the retention of old-growth vegetation for wildlife species that require late seral stage conditions. In addition, Adaptive Management Areas (comprising 28,739 acres or 47% of the planning watershed) are also managed for maintaining and improving wildlife habitat. Species associated with earlier seral stages and non-coniferous vegetation types (e.g., grass, shrub and hardwood types) are not considered an issue at this time because early seral stage and grass, shrub, hardwood habitat recovers relatively quickly after disturbance. Additionally, species associated with LSOG habitat must be capable of moving between areas exhibiting LSOG conditions and require adequate habitat connectivity conditions.

5.1 What is the amount and condition of Late Successional Old Growth (LSOG) habitat within the watershed?

Late-Successional and Old-Growth Habitat (LSOG) is defined as forest stands usually 180-220 years old with moderate to high canopy closure; a multi-layered, multispecies canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground (FEIS, Pacific Northwest Plan). The distribution of LSOG stands throughout the landscape is an important component of ecosystem diversity and plays a significant role in providing for biological and structural diversity. LSOG patches outside of late successional reserves and wilderness can be ecologically significant in functioning as connectivity habitat and refugia for a host of old-growth associated species, particularly those with limited dispersal capabilities. These stands provide areas of relatively high quality habitat for dispersing individuals such as the Northern spotted owl, Northern goshawk, fisher, and marten.

This analysis utilized the Spotted Owl Baseline Habitat Database, based upon the Forest Plan database. LSOG is divided into three categories described below and in Table 3-8.

High Quality LSOG is synonymous with high and moderate quality spotted owl nesting and roosting habitat. It is also assumed to provide relatively high and moderate quality conditions for other species associated with LSOG.

Lower Quality LSOG is synonymous with spotted owl foraging and connectivity habitat. It is also assumed to provide some benefit to other LSOG species, having sparser canopy closure, vertical structure, and a lower decadence level.

Capable habitat is not currently LSOG but has the capability of becoming LSOG in the future.

Table 3-8. LSOG habitat definitions from the Spotted Owl Baseline Habitat Database

	Size Class/ Canopy Closure	Vegetation Type	Site Class
High Quality: High & Moderate Nesting/Roosting	4N/G & 3G	Red & White fir & Douglas fir	All
Lower Quality: Foraging & Connectivity	3N & 4P; 3P; 2P/N/G	Red & White fir, Douglas fir & Ponderosa pine	All
Capable	4S; 3S; 2S; 1G / Plantations	Red & White fir, Douglas fir & Ponderosa pine	Site class 1, 2 & 3 for Ponderosa pine

The U.S. Forest Service and the U.S. Fish and Wildlife Service jointly developed the "1999 Spotted Owl Baseline" habitat database to address current habitat conditions specific to the spotted owl. This database uses the LMP-90 database and takes into account such things as tree growth since 1975, site productivity, elevation, and aspect. This information is included to give an indication of habitat conditions related to the spotted owl as it is known to be associated with old-growth forests. Table 3-9 displays the acres of high and moderate nesting/roosting habitat; foraging and connectivity habitat; and remaining areas capable of developing into these habitats within the watershed.

Table 3-9. Spotted Owl Habitat & LSOG Conditions in the French Creek Watershed

LSOG Quality	Acres	Percent of Watershed Area
High Quality	**11,698**	**19%**
High Nesting/Roosting	8,992	
Moderate Nesting/Roosting	2,705	
Lower Quality	**19,652**	**32%**
Foraging	5,476	
Connectivity/Dispersal	14,176	
Capable	**12,200**	**28%**

Approximately 70% of the planning watershed (43,550 acres) is either within High or Lower Quality or Capable LSOG habitat. Of this amount, 12,200 acres (28%) is capable of producing LSOG habitat and currently, 11,132 acres of this capable land is forested in relatively high to moderate quality LSOG. Given that 56% of the watershed is designated

as wilderness and LSR, the probability that habitat would be degraded below levels prescribed in the LRMP is very low with the exception of catastrophic stand replacing fires as disturbance from future silvicultural practices and road maintenance would be low.

Conditions Specific to LSR and Critical Habitat

The planning watershed lies within three Late Successional Reserves (Table 3-10 below). Two were assessed by the Shasta-Trinity National Forest (Corral RC-332 and Canyon Creek RC-333) and the other was assessed by the Six Rivers National Forest (New River RC-305). These LSRs, along with Trinity Alps Wilderness and the designated critical habitat units, make this the largest reserve complex in the Klamath Mountains Province.

Table 3-10. Late Successional Reserves within the French Creek Watershed

LSR Name	Total LSR Acres	LSR Acres in Planning Watershed
RC-332 (Corral)	78,634	686
RC-333 (Canyon Creek)	18,138	160
RC-305 (New River)	96,600	15
	193,372 Acres	**861 Acres**

Portions of the Corral LSR were formerly a Habitat Conservation Area under the ISC (Interagency Scientific Committee) strategy. The intent of the ISC designation was to provide habitat for an area that would support 20 pairs of spotted owls in the future. Table 3-11 displays the total acreage of each LSR capable of supporting LSOG habitat and acres of suitable owl habitat.

Table 3-11. LSOG Habitat in LSRs of the French Creek Watershed

LSR Name	Acres Capable of Supporting LSOG	Acres Currently Supporting LSOG	Suitable Owl Habitat as a Percent of Capable Owl Habitat
RC-332 (Corral)	72,274	10,510	77%
RC-333 (Canyon Creek)	13,380	2,651	90%
RC-305 (New River)	93,400	54,500	82%

The portions of LSRs RC-332, RC-333 and RC-305 that lie within the planning watershed appear to be within the recommended management range for LSOG conditions. The Shasta-Trinity National Forest Forest-wide LSR Assessment (approved on August 26, 1999) describes historic and current habitat conditions, establishes desired conditions, and presents management recommendations for achieving those conditions within RC-332 and RC-333. Tables 2.31 and 2.46 in the STNF LSR Assessment present

the acres of spotted owl habitat within and overlapping 1992 (legacy) critical habitat units CA-30, CA-31 and CA-34. The assessment for LSR RC-305 was conducted by the Six Rivers National Forest (LSRA, April 1999) and includes the recommended management range for LSOG conditions (LSRA Table 4-2, page 4-5). Much of the RC-305 lies to the west of the planning watershed on the Six Rivers National Forest and most of RC-332 and RC-333 lie to the south and northeast of the watershed, respectively.

Critical habitat for the northern spotted owl was originally proposed within the Federal Register on May 6, 1991 (56 FR 20816-21016) and a Final Rule was published on January 15, 1992 (57 FR 1796-1838; USDI 1992). This rule was superseded by a new final rule published on August 13, 2008 that became effective September 12, 2008. The re-designation modified the boundaries of the Critical Habitat Unit (USDI 2008b). The French Creek Watershed analysis area is within one of the 2008 designated critical habitats known as "Western-Klamath/Siskiyou Mountains" Critical Habitat Unit (CHU) CA-24, which is approximately 219,300 acres in size. Within the planning watershed, there are 281 acres of this CHU which represents only 0.13% of the entire Western-Klamath/Siskiyou Mountains CHU.

The 2008 designation of critical habitat lists five physical and biological features that provide essential life history requirements of the species:

1) Food, water, air, light, minerals, or other nutritional or physiological requirements.
2) Cover or shelter.
3) Sites for breeding, reproduction, and rearing of offspring.
4) Habitat that is protected from disturbance or are representative of the historic geographical and ecological distributions of a species.
5) Space for individual and population growth, and for normal behavior.

Primary Constituent Elements (PCE) of Critical Habitat includes the following:

1) Moderate to high tree canopy closure (e.g. 60-80 percent).
2) Multi-layer, multi-species canopy of overstory trees greater than 30 inches dbh.
3) Snags greater than 20 inches dbh and large live trees with various deformities (e.g. large cavities, broken tops, mistletoe infections, and other platforms.
4) Large accumulations of fallen trees and other woody debris on the ground.
5) Large patches of brush/shrubs within nesting, roosting, and foraging.

The planning watershed is also within the 1992 version of designated critical habitat and includes portions of CA-30 (694 acres), CA-31 (2,971 acres) and CA-34 (4 acres) for a total of 3,669 acres. This represents ~3.56% of the entire CHU complex (103,150 acres combined). Most of the 2008 critical habitat designation is nested within the larger 1992 critical habitat. In addition to the revised final 2008 critical habitat designation, the planning watershed is also within a Managed Owl Conservation Area or MOCA. The CMOCA-45 is located within the planning watershed and correlates to the Trinity Alps Wilderness Area within the planning watershed (refer to Figure 3-5 below).

Connectivity prior to 2006 and 2008 Fires
Connectivity habitat is defined as conifer forests with an overall 40 percent canopy closure at the minimum and an average tree DBH of 11 inches (Thomas et al, 1990). The distribution of connectivity habitat is somewhat fragmented within the watershed. The most functional north-south and east-west connectors lie in the wilderness portion and within the northeastern segment between the New River and North Fork/East Fork North Fork/Canyon Creek watersheds. Connectivity habitat (14,176 acres) accounted for 23% of the planning watershed area prior to the 2006 and 2008 fires.

5.2 Did the 2006 and 2008 fires created areas that no longer provide suitable conditions for species associated with LSOG habitat?

Fire intensity was assessed at three broad levels briefly described below and based on the Soil Burn Severity data for the 2006 Bar Complex and the 2008 Vegetation Burn Severity data for the Iron Complex wildfires.

- **HIGH INTENSITY** fire likely killed most above ground woody vegetation and thus removed LSOG conditions from those areas

- **MODERATE INTENSITY** fire affected LSOG conditions to varying degrees that cannot be reliably determined at this time. Field inspection will likely reveal additional LSOG areas lost to fire. Additionally, over the next few growing seasons fire damaged trees will begin to die in these areas and affects to habitat will become more apparent.

- **LOW INTENSITY** fire likely had little overall or lasting effect to LSOG habitat.

High intensity (and to an unknown degree, moderate intensity) fire did not significantly reduce the amount of LSOG habitat in the watershed (see Tables 3.12 and 3.13 below). High quality LSOG was reduced from approximately 11,698 acres to 10,510 acres and lower quality LSOG was reduced from approximately 19,652 acres to 17,919 acres due to high and moderate intensity fire. This represents a less than 10% reduction in both high and lower quality LSOG habitat. Capable habitat was reduced from 12,200 acres to 11,109 acres due to high and moderate intensity fire, representing a 9% reduction in capable habitat.

Table 3-12. French Creek Watershed Late-Successional/Old-Growth Habitat related to 2008 Vegetation Burn Severity (29,801 acres of a total 38,935 acres assessed)

	Burn Intensity				
LSOG Habitat	High	Moderate	Low	Unburned	Total
High Quality	438	750	2,092	5,629	**8,908**
Lower Quality	902	831	2,959	8,425	**13,118**
Capable	588	523	1,912	4,753	**7,776**
TOTAL	***1,928***	***2,103***	***6,963***	***18,807***	***29,801***

Table 3-13. French Creek Watershed Late-Successional/Old-Growth Habitat related to 2006 Soil Burn Severity Intensity (6,300 acres of a total 11,239 acres assessed)				
LSOG Habitat	Burn Intensity			
	High	Moderate	Low	Total
High Quality	173	359	1,890	**2,421**
Lower Quality	336	661	2,109	**3,105**
Capable	128	128	517	**773**
TOTAL	***636***	***1,148***	***4,516***	***6,300***

Small forest openings are an important component of LSOG habitat, indicating that many of these burned areas still provide some value to species associated with LSOG forests. For example, areas where 40 percent or greater canopy closure remains (and areas with new openings of 10 acres or less) likely provides some value for species associated with these forests. Therefore, only areas where canopy closure was reduced below 40 percent in areas over 10 contiguous acres within at least capable LSOG are considered as not providing value to LSOG associated species. Table 3.14 below lists areas of high and moderate intensity fire within at least capable LSOG habitat that occur in patches of greater than 10 contiguous acres. This likely underestimates large burn patches due to close but not contiguous burned areas (areas separated by only a few meters are not considered "contiguous" in a GIS analysis) and loss due to moderate intensity fire.

Table 3-14. Acres of LSOG Habitat Reduced below 40% Canopy in areas >10 acres

LSOG Habitat	Total Acres
High Quality	155
Lower Quality	421
Capable	296
Total Acres	**872**

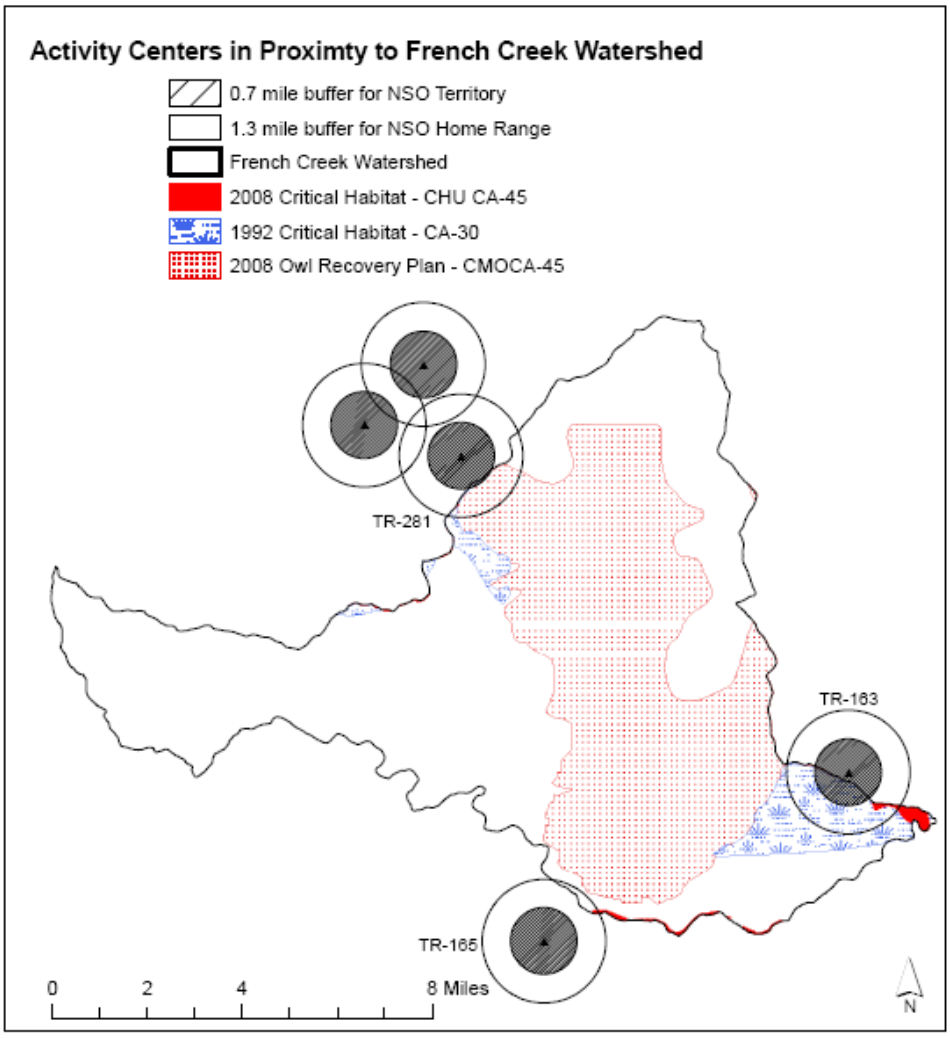
High intensity fires removed approximately 992 acres of connectivity habitat throughout the watershed, leaving 13,184 acres. Within the watershed, connectivity to the north into the Klamath National Forest is largely unlimited due to the Trinity Alps Wilderness Area. Connectors to the east, west and south within the watershed also remain largely intact. Overall, connectivity appears to remain adequate. Again, field inspection will likely reveal additional connectivity lost to fire. Over the next few growing seasons, fire damaged trees will begin to die in these areas and effects to habitat will become more apparent.

The distribution of LSOG stands throughout the landscape plays a significant role in providing for the biological and structural diversity across the landscape. Isolated remnant old-growth patches are ecologically significant in functioning as refugia for a host of old-growth dependent species, particularly those with limited dispersal capabilities that are not able to migrate across large landscapes of younger stands. To that end, 15 percent of federal lands within each fifth order watershed capable of growing to LSOG condition should be retained in those conditions. The French Creek Watershed is currently well above this threshold when unburned or low intensity burned high quality LSOG is included (28% pre fires and 19% post fires).

5.3 Did the 2006 and 2008 fires affect habitat conditions within the territories and home ranges of spotted owl activity centers that lie within or adjacent to the planning watershed?

The 2006 and 2008 fires had a negative effect on a number of species associated with LSOG such as the northern spotted owl. There are no designated spotted owl activity centers that lie completely within the planning watershed, however portions of two activity center territories and home ranges and one activity center home range are within the watershed boundaries. Territories and/or home ranges for TR-281, TR-163 and TR-165 lie within the watershed (refer to Figure 3-5 below).

Figure 3-5. Spotted owl activity center territories and home ranges in French Creek Watershed analysis area with legacy and 2008 CH and 2008 MOCA.



Habitat conditions related to fire intensity associated with these spotted owl territories (0.7 mile radius around the activity center) and home ranges (1.3 mile radius around the activity center) are presented in Tables 3-15 and 3-16 below. The ability of the home range and territory to sustain the viability of owl activity centers below the "take

threshold" of 500 acres (established by the U.S. Fish and Wildlife Service) is considered questionable. Two of the activity centers are well below the 500 acre "take threshold" from high and moderate intensity fire effects to vegetation. Activity Center TR-163 is approximately 52 acres over the threshold however from the 2006 Bar Complex fires. This reduction in habitat is primarily within the 1.3 mile home range (444 acres) as affected habitat within the 0.7 mile owl territory is approximately 108 acres. The home range and territory for TR-163 was not affected by the 2008 Iron Complex fires and it is expected that affected habitat will recover over the next 20 to 30 years.

Table 3-15. Spotted owl 0.7 mile Territory Fire Effects Analysis

Activity Center	LSOG Habitat	Average of Moderate to High Burn Intensity Range
TR-281	High Quality LSOG	1.94
	Lower Quality LSOG	0.41
	Capable	1.58
		3.93 Acres
TR-165	High Quality LSOG	0
	Lower Quality LSOG	0
	Capable	0
		0 Acres
TR-163	High Quality LSOG	60
	Lower Quality LSOG	48
	Capable	0
		108 Acres

Table 3-16. Spotted owl 1.3 mile Home Range Fire Effects Analysis

Activity Center	LSOG Habitat	Average of Moderate to High Burn Intensity Range
TR-281	High Quality LSOG	64
	Lower Quality LSOG	94
	Capable	0
		158 Acres
TR-165	High Quality LSOG	0
	Lower Quality LSOG	4
	Capable	13
		17 Acres
TR-163	High Quality LSOG	223
	Lower Quality LSOG	203
	Capable	17
		444 Acres

Chapter 4 - Desired Conditions

This chapter describes the desired conditions of resources within the French Creek watersheds. The ecological conditions and management objectives pertain to the issues and key questions identified in Chapter 2. The information provided here will be used in Chapter 5 for identification of possible management actions.

Issue #1: Fire and Fuels

Forest-wide Forest Land and Resource Management Plan goals related to fire management include:

- Page 4-4. Achieve a balance of fire suppression capability and fuels management investments that are cost effective and able to meet ecosystem objectives and protection responsibilities.

- Page 4-4. Restore fire to its natural role in the ecosystem when establishing the Desired Future Condition of the landscape.

- Page 4-17. Activity fuels that remain after meeting wildlife, riparian, soil and other environmental needs will be considered surplus and a potential fire hazard. The amount and method of disposal will be determined in the ecosystem analysis.

- Page 4-17. Natural fuels will be treated in the following order of priority: (1) public safety; (2) high investment situations (structural improvements, power lines, plantations, etc); (3) known high fire occurrence areas; and (4) coordinated resource benefits, i.e., ecosystem maintenance for natural fire regimes.

- Page 4-18. Plan and implement fuel treatments emphasizing those treatments that will replicate fires natural role in the ecosystems.

- Page 4-18. Consider fuelbreak construction investments when they compliment Forest health/biomass reduction needs, very high and extensive resource values are at risk and to protect Forest communities.

- Page 4-44. Treatment of fuels created by project activities will be determined during ecosystem management planning.

- Page 4-13. Activities such as burning, which are under the Forests' control, will be coordinated with affected landowners and control agencies.

There is specific direction in the Forest Fire Management Plan that addresses fire management units within the French Creek analysis area. A Fire Management Unit (FMU) is a land management area defined by a unique set of management strategies, objectives and attributes (e.g. constraints, values at risk, fuel types). There are four Fire Management Units within the analysis area:

1. The Late Successional Reserve FMU objectives are focused on protection of habitat values from high severity fire and minimizing damage from suppression activities.
2. In the Wildland Urban Interface FMU the focus is on prevention and aggressive suppression of wildland fire to protect private property and infrastructure. Cooperative efforts to reduce fire hazard through treatment of fuels is also a primary objective.
3. The General Forest FMU includes the full range of management responses to wildfire including managing natural ignitions for resource benefits. Management objectives also include treating fuels to reduce the risk of stand replacing fires and protect Forest investments such as plantations and campgrounds.
4. The Wilderness FMU is the largest within the analysis area. Objectives focus on permitting lightning caused fires to return to its natural role when not in conflict with public safety, and play their natural ecological role within the wilderness.

Issue # 2: Human Uses and Values

Wood Products

Timber Harvest

The desired condition of the mixed conifer timber stands within the French Creek watershed is specific to the management prescription identified in the LRMP. The desired condition within the Matrix lands that include wildlife management emphasis, commercial wood products emphasis, and roaded recreation emphasis (totaling 28,739 acres) could be benefited by reforestation and timber harvest opportunities designed to provide the desired conifer forest conditions on Forest Service land.

Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. Therefore, the 861 acres of conifer stands within the French Creek watersheds would be best served as representing the mature or old growth conifer stand condition. Roads to access any timber harvest opportunities such as thinning, silvicultural treatments, or salvage harvesting consistent with LSR Standards and Guidelines would be maintained to allow for access.

Fuel Wood Collecting

The desired condition for fuel wood opportunities is an area managed for fuel wood supply and access. Periodic timber sales and fuels reduction projects with cull and non-merchantable wood products available to the public for fuel wood would benefit fuel wood collection opportunities. In addition, a well-developed transportation system with road surfaces armored to allow for wet weather access would provide needed access to both timber sale generated wood and annual “dead and down” fuel wood collection opportunities.

Access

The desired condition is to implement road management objectives to provide for user safety and resource protection. A small portion (861 acres) along the eastern and south-west boarders of the watershed has been designated LSR Lands, prescription VII. A total of 24,324 acres has been designated as Matrix Lands. Prescription III, Roaded Recreation contributes 1,485 acres, prescription VI, Wildlife Habitat Management 7,324 acres, and prescription VIII, Commercial Wood Products Emphasis 2,416 acres.

Previous management direction has provided guidance for some networks and local roads to be closed seasonally to protect resources such as: Erosion/Water Quality, Wildlife/Road Density and security.

During the 2008 wildfires, portions of the road system w used for fire suppression access. Portions of the road were used as a fire control line. Other portions of the road were completely burned over with fire consuming all vegetation on both sides of the road surface. Many trees were fire-killed along the roads' edges, leaving the potential for future transportation safety problems.

Issue #3: Erosional Processes

Geological and Soil Resources

The desired future condition of the French Creek Watershed Analysis area is to maintain or improve watershed condition and meet water quality objectives. The actions needed to accomplish the desired conditions are summarized in Chapter 5.

Issue #4: Aquatic Systems

Shasta –Trinity National Forest LRMP and NWFP ACS goals and objectives related to aquatic systems management include the following Forest goals:

- Page 4-4 Provide for the protection, maintenance, and improvement of wild trout and salmon habitats.
- Page 4-5 Maintain or improve riparian habitat.
- Page 4-6 Maintain or improve water quality and quantity to meet fish habitat requirements and domestic use needs.

Forest Standards and Guidelines related to aquatic system objectives include:

- Page 4-18 Develop an in stream flow assessment program to determine fish needs and to protect the integrity of fish habitat in selected streams.
- Page 4-25 Projects on National Forest lands should not increase the ERA above the proportional share (depending on land ownership) of the TOC unless, as part of the project, existing ERAS will be reduced or the ERA recovery factor will be improved. Watersheds that are over TOC, regardless of ownership, will not be

further impacted unless they can be improved with appropriate mitigation measures.

- Page 4-25 Implement Best Management Practices (BMPs) for protection or improvement of water quality, as described in "Water Quality Management for National Forest System Lands in California," for applicable management activities. Determine specific practices or techniques during project level planning using information obtained from on-site soil, water, and geology investigations.
- Page 4-25 Identify and treat areas with a degraded watershed condition in a cost-effective manner and according to beneficial use priorities. High priority items include domestic use, anadromous fish habitat, and sensitive species habitat. Improvement activities will be designed to meet Management Area objectives.
- Page 4-25 Give full recognition to the tendency for erosion, mass land movement, and severe watershed damage potential when implementing vegetation management and related land management activities.
- Page 4-58 Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives.
- Page 4-53 Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
- Page 4-53 Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.
- Page 4-53 Maintain and restore the sediment regime under which aquatic ecosystems evolved.
- Page 4-143 Upgrade the surfacing on the Forest's arterial road system.
- Page 4-143 Emphasize anadromous fisheries habitat management.

Large Woody Debris (LWD)
The desired LWD condition for streams contained within the analysis area is 40 pieces per mile and maintaining recruitment potential from the adjacent riparian reserves. LWD criteria are defined as those pieces >16 inches in diameter and >50 feet in length

Water Quality
Desired conditions include an abundance of cool(<68°F), well oxygenated water that is present at all times of the year, free of excessive suspended sediments and other pollutants that could limit primary production and benthic invertebrate abundance.

Fine Sediment
The desired condition for in stream fine sediments is to have <15% fines in spawning habitat and cobble embeddedness <20%.

Pool Quantity and Quality
Pools should occur every 4-7 channel widths and a subset of these pools should be >3 feet deep.

Channel Width to Depth (W/D)
Desired conditions is to have W/D ratios <12 for 'A' type channel morphologies and W/D ratios >12 for 'B" type channel morphologies.

Streambank Stability
Desired conditions are to have >90% stability ratings, on average, and <10% actively eroding banks.

Stream Shading
Desired conditions are to have adequate shade to maintain suitable water temperatures and preserve the riparian microclimate.

Issue #5: Terrestrial Wildlife Habitat and Species

The desired future condition is to protect and enhance conditions of late-successional and old-growth ecosystems, which serve as habitat for late-successional and old-growth related species including the Northern spotted owl, Northern goshawk, and Pacific fisher. Habitat for Threatened, Endangered a and Sensitive species should be maintained and/or enhanced in consistency with individual species recovery plans. 15% of the LSOG within the watershed should be retained as should riparian reserves to assure that dispersion habitat requirements for the northern spotted owl and other late-successional dependent species are met and sustained.

Forest Standards and Guidelines related to Terrestrial Wildlife Habitat and Species objectives include:

- Page 4-14 Provide connecting travel corridors for wildlife species, particularly late-successional dependent species, by using Riparian Reserves and silvicultural prescriptions.
- Page 4-14 Over time, provide the necessary number of replacement snags to meet density requirements as prescribed for each ROD allocation and/or management prescription. Live, green culls and trees exhibiting decadence and/or active wildlife use are preferred.
- Page 4-29 Manage habitat for neotropical migrant birds to maintain viable population levels.
- Page 4-30 Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.
- Page 4-30 Manage and protect potential peregrine falcon sites for future occupancy.
- Page 4-30 Require Limited Operating Periods adjacent to active goshawk nesting sites until the young have fledged.

Chapter 5 - Management Options to Meet Desired Conditions

This chapter identifies possible management actions that would move the current condition identified in Chapter 3 closer to the desired condition identified in Chapter 4. Actions identified here are for a specific resource element and need to be taken in context with other resource needs. The presence of an opportunity in this chapter does not constitute a decision that must be implemented; they are specific areas that resource specialists wish to bring to the line officers attention. Not all opportunities are feasible and some may be mutually exclusive. The line officer is responsible for deciding which action may be taken forward and analyzed as "proposed actions" in a NEPA analysis.

Issue #1: Fire and Fuels

The Trinity County Fire Safe Council has completed a Community Wildfire Protection Plan (CWPP) for Trinity County. A CWPP enables a community to plan how it will reduce the risk of wildfire. The plan is developed through collaboration with federal, state and local government entities, identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment as well as recommends measures to reduce structural ignitability throughout the at-risk community.

Overall, the preferred treatments identified in the Down River (analysis area falls within the Down River Fire-Safe Division identified by the Trinity County Fire Safe Council) meetings were shaded fuel break maintenance and construction, stand and plantation thinning and general fuels reduction. Controlled burning as a method was proposed here more often than in other meetings which may have to do with the large areas of inaccessible terrain near the Trinity Alps Wilderness Area. When participants ranked priority projects, the fuels reduction efforts at Henessy Road and Cedar Flat South ranked highest along with the proposal to treat the blow down on Green Mountain. Shaded fuel break construction, plantation thinning and general fuels reduction were the most favored treatments.

Additional opportunities exist to develop firelines from the 2008 wildfires into permanent fuelbreaks. The Forest Service may provide additional support to private land efforts through assisting in grant efforts, treating adjacent federal lands and providing technical expertise.

Issue # 2: Human Uses and Values

Wood Products

Issue 2.1 – Timber Harvest and Fuel Wood Collecting

- Use commercial timber sales to meet both wood product needs and vegetation needs of other resources (e.g. fuels objectives or wildlife habitat objectives).

- Improve the road transportation system to provide maximum access within resource constraints. Surface the road surfaces with gravel or shale to allow for wet weather public access.

Issue 2.2 – Access

- Improve arterial road surfaces to meet resource access needs and provide user safety and comfort.

- Develop and maintain a sign plan for access control and regulation of vehicle use of collector routes.

- Rehabilitate and restore OHV impact areas and user-created trails. Provide access control in those areas designated for roaded recreation by maintaining safety signage, road barriers/gates and approved vehicle use entry points.

- Improve road stream crossings to improve water quality and to prevent erosion thereby maintaining existing infrastructure investment. Maintain signing at dispersed camping sites to protect natural resources.

- Analyze road uses and benefits versus risks to human values and watershed and stream condition. Prioritize roads for maintenance, upgrades, stormproofing, closure and/or decommissioning.

Issue #3: Erosional Processes

Geological and Soil Resources

Issue 3.1 – Mass Wasting

- Avoidance of land disturbing activities is probably the most practicable scheme for large dormant landslide areas.

- Any on-site erosion and sediment control measures that increase infiltration and subsequently soil moisture should not be used on slopes that have a high probability of landslide failure.

- Channel cleanout should be performed on *strategic* areas. Because channels, culverts or basins designed to contain a given volume of debris will become blocked by an irregular mass of trees or other debris unless removed, resulting in an overtopping or destruction of the structure and diversion of the flow.

- For larger intermittent and perennial channels, more significant measures may need to be employed. In alluvial channels, there may be a need to try to establish some local base levels and sediment catchments in order to control lateral cutting and bed load transport of sediment, especially within gutted channels. Measures

such as log and rock check dams, bank stabilization, head cut structures, planting of riparian vegetation and placement of large organic material can all be used to aid channel stabilization. These measures could most appropriately be employed along tributary streams underlain by granitics.

- For bedrock-controlled channels, artificial structures may not be as important or practical as in alluvial type channels (since these are usually avalanche chutes for debris flows). However, structures may be necessary in gutted channels where sediment is now available for transport. Structures may be feasible in certain reaches of these channels, which will aid in sediment stabilization, help restore or maintain pool habitat and provide needed cover. Planting riparian vegetation may also contribute to sediment stabilization and will also help provide shading for critical reaches.

- When planning structures at particular locations it must be remembered that channelized debris flows have enormous amounts of energy. It is nearly impossible to try to stop them in the channel. Virtually all debris flows begin to stop flowing naturally when two conditions are met: (flow becomes nonchannelized on at least one side (2) the stream channel gradient is less that 10-15 degrees. The destructive scouring phase of the flow will not usually extend more than 200 meters past this point. Deposition can occur well beyond this point however, depending on the volume and water content of the flow. Another method of predicting runout is to look at fan deposits from old debris flows. Debris flows out of the same valley tend to have similar volumes and runout distances. Future debris flows usually will not extend far beyond the old fans.

- For roads that are contributing sediment to creeks, consider a regular maintenance program or stormproofing. Stormproofing measures include: armoring the road and drainage ditch, outsloping, enlarging culverts, installing rolling dips and waterbars. Relocation and reconstruction, road closure or decommissioning should also be considered where roads are no longer needed or are needed only in the short term.

- Since the geomorphology and bedrock geology of the Analysis area has been fully mapped this specific information can be used in detailed land management applications:
    - Stratification of the landscape into different erosional regimes (landslide-prone or highly erodible terrain) for a wide variety of purposes, in particular the delineation of riparian reserves.
    - Identification of watershed restoration opportunities and problems.
    - Predicting the distribution of special habitats.
    - Establishing priorities for road decommissioning or long-term road maintenance.
    - Provide recommendations for timber harvest practices.

Issue 3.2 – Soil Erosion

- Reduce erosion hazard ratings to low values throughout the Burnt Ranch and Soldier Creek watersheds.

- Reduce road and roadside erosion and sedimentation into downstream habitats.

- Reduce roaded acres to reduce ERA levels below TMDL levels and improve watershed condition class.

Issue #4: Aquatic Systems

Issue 4.1 – Anadromous Fish Distribution and Abundance

The following actions may be implemented to improve anadromous fish abundance and distribution and meet the desired conditions set forth in the Shasta-Trinity National Forest LRMPm and NWFP ACS objectives.

- Prescribe thinning and burning activities to minimize the threat of wildfire to riparian reserves.

- Monitor the fish passage structures located on streams along Highway 299 to insure upstream migration remains unimpeded, especially for spawning adults.

- Implement small scale rearing programs, using native anadromous stocks, for streams within the planning watershed excepting Big French Creek

- Reintroduce suitable spawning gravel to increase available spawning habitat.

- Add in stream LWD and boulder substrate to promote favorable spawning and rearing cover.

- Continue to monitor spawning activity.

Issue 4.2 – Instream Habitat

The following actions may be implemented to improve instream habitat and meet the desired conditions set forth in the Shasta-Trinity National Forest LRMP and NWFP ACS objectives.

- Prescribe burning and thinning operations adjacent to and within riparian reserves to minimize the threat of wildfire. Any management strategy applied to burned areas poses some future risk to riparian and aquatic resources. If no fuel reduction projects are implemented, future fire intensity and erosional consequences could be extreme. The elevated fuel conditions will be a long-term liability, whereas treatment to reduce those fuels would only be a short-term

impact. Special conditions that would indicate a need to evaluate these riparian areas for fuel treatment include; high and continuous fuel loading both within and adjoining the riparian area, a close proximity to high fire occurrence, and middle and upper slope riparian reserves.

- Replant vegetation in riparian areas that have been affected by fire activity.
- Replant vegetation and place LWD to reduce streambank instability.
- Develop a long term in stream flow assessment program for Big French Creek and Manzanita Creek.
- Introduction and placement of LWD and Boulders to increase habitat complexity and trap coarse sediments within lower Big French Creek.
- Road decommissioning in riparian reserve area of lower French Creek. Forest road 5N20 leads to a primitive campsite and currently bisects the riparian reserve in this area.
- Road resurfacing of the lower 1.2 miles of forest road 5N13 to reduce the risk of fine sediment input to lower Big French Creek.

Issue 4.3 – Watershed Condition

- Implement strategic fuels treatments to stem the spread of landscape-scale fire across multiple watersheds and into riparian reserves. Do so while implementing the ACS objectives, by protecting Riparian Reserves from mechanical disturbance where such disturbance would be detrimental to geomorphic integrity and habitat quality.
- Use the results of sediment source inventory and road system analysis to prioritize and perform road maintenance, upgrades and decommissioning, in order to reduce sediment source areas and sediment delivery potential to area streams.

Issue #5: Terrestrial Wildlife Habitat and Species

The following actions may be implemented to improve terrestrial wildlife habitat and meet the desired conditions set forth in the Shasta-Trinity National Forest LRMP.

- Manage forest land and mature forests to increase LSOG characteristics.
- Treat mature forest stands to reduce the risk of stand replacing fires.
- Reduce the fuel loading, while maintaining the desired snag and log levels identified in the LSRA for LSRs RC-332, RC-333 and RC-305 will add to the likelihood that regenerated stands will survive another fire.

Issue 5.1 – Amount and Quality of LSOG Habitat

Fuel levels within and surrounding LSOG areas in the watershed will remain moderate and the probability of repeated stand replacing fires prior to the development of LSOG conditions would remain high. Therefore, management actions aimed at protecting and speeding the development of LSOG conditions within these areas is appropriate. High intensity fires did not reduce the amount of LSOG within the watershed below the 15% threshold. Additional losses of LSOG may become apparent as trees within areas burned at moderate or low intensity fire levels die over the next few years. Therefore, monitoring aimed at detecting future losses of LSOG habitat is appropriate to assure that the 15% threshold is being met.

Issue 5.2 – Fire Effects on Suitable LSOG Habitat

High intensity fire did not reduce suitable LSOG habitat within the watershed to a level of concern. Additional losses of connectivity habitat may become apparent as trees within areas burned at moderated or low intensity die over the next few years. Therefore, monitoring aimed at detecting future losses of connectivity habitat is appropriate to assure that overall connectivity in the area remains adequate.

Issue 5.3 – Fire Effects on Habitat Conditions within the Territories and Home Ranges of Northern spotted owls

High intensity fires did reduce nesting, roosting, foraging and connectivity habitat for spotted owls within the 1.3 mile home range and 0.7 mile territory below the take threshold for one spotted owl activity center adjacent the watershed. Two activity centers were below the threshold. Additional losses of nesting/roosting habitat may become apparent as trees within areas burned at moderate or low intensity die over the next few years. Therefore, monitoring aimed at spotted owl occupancy and reproductive status is appropriate to track the short and long-term effects of the fires and possible management actions.

References

California Department of Fish and Game. 2004. Recovery Strategy for California Coho Salmon: Report to the California Fish & Game Commission, February 2004.

Cohesive Strategy, 2000. *Protecting People and Sustaining Resources in Fire-Adapted Ecosystems.* The Forest Service Management Response to the General Accounting Office Report GAO/RCED-99-65, October 13, 2000.

Hardy, Colin C. 2005. Wildland fire hazard and risk: Problems, definitions, and context. Forest Ecology and Management 211 (2005) Pg. 73–82.

Frost, Evan J., Sweeney, Rob. 2000. Fire Regimes, Fire History and Forest Conditions in the Klamath-Siskiyou Region: An Overview and Synthesis of Knowledge. Wildwood Environmental Consulting.

Graham, Lara 2009. Fire and Fuels Report. On file with the USDA Forest Service, Trinity River Management Unit, Shasta-Trinity National Forest.

Jasso, Abel 2009. Down River Community Protection Project Geology and Geomorphology. On file with the USDA Forest Service, Trinity River Management Unit, Shasta-Trinity National Forest.

Levitan, Fred 2009. Hydrology Report, Downriver Community Protection Project. On file with the USDA Forest Service, Trinity River Management Unit, Shasta-Trinity National Forest.

National Marine Fisheries Service, Northwest Region. 2004. Endangered Species Act - Section 7 Consultation Biological and Conference Opinion for USDA Forest Service and USDI Bureau of Land Management Land and/or Resource Management Plans in the Northwest Forest Plan Area, 117 pp. March 19, 2004.

Pacific Watershed Associates 1991 New River and Big French Creek Watershed Assessment Report, prepared for Shasta-Trinity National Forest, Big Bar Ranger District.

Rust, Brad 2009. Soils Resource Assessment. On file with the USDA Forest Service, Trinity River Management Unit, Shasta-Trinity National Forest.

Soldier/Burnt Ranch WA 2009. Soldier/Burnt Ranch Watershed Analysis. USDA Forest Service, Trinity River Management Unit, Shasta-Trinity National Forest.

SHF-LSR 1999. Shasta-Trinity National Forest, Forest Wide LSR Assessment. August 26, 1999.

Sugihara, Neil G., Wagtendonk, Jan W. Van, Shaffer, Kevin E., Fites-Kaufman, Joann, Thode, Andrea E. (2006) *Fire in California's Ecosystems*. University of California Press, Berkeley and Los Angeles, California

Taylor, A.H., Skinner, C.N. 2003. Spatial patterns and controls on historical fire regimes and forest structure in the Klamath Mountains. Ecological Applications, 13(3). Pg. 704-719.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. A Conservation Strategy for the Northern Spotted Owl. Report to the Interagency scientific committee to address the conservation of the northern spotted owl. Portland, OR. May 1990. 427 pp.

US Environmental Protection Agency (EPA). 2001. Trinity River Total Maximum Daily Load for Sediment. U.S. Environmental Protection Agency Region IX, 81 pp.

USDI Fish and Wildlife Service. 2008. Final Recovery Plan for the Northern Spotted Owl, *Strix occidentalis caurina.* US Fish and Wildlife Service, Portland, Oregon. 142pp.

USDI Fish and Wildlife Service. 2008b. Federal Register. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Northern Spotted Owl, Final Rule. pp. 47326-47522. August 13, 2008.

USDI Fish and Wildlife Service. 1992. Federal Register. Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Northern Spotted Owl; Final Rule. Vol. 57. No. 10 pp. 1796-1838. January 15th, 1992

USDI Fish and Wildlife Service 1989. Federal Register. Proposed Threatened Status for the Northern Spotted Owl. Proposed Rule. Vol. 54; No. 120 pp. 26666-26677. June 23, 1989.

Trinity County Community Wildfire Protection Plan. August 2005.

USDA Forest Service. 2003. Pacific Southwest Region. Hazard Tree Awareness. www.fs.fed.us/r5/spf/publications/R5HTAwareness.pdf

USDA Forest Service. 1995. Shasta-Trinity National Forests Land and Resources Management Plan.

USDA Forest Service. 2009. Shasta-Trinity Fire Management Plan, June 11, 2009.

USDA Forest Service and Soil Conservation Service. 1980. Soil Survey of Shasta-Trinity Forest Area, California.

Table of Figures and Tables