North Fork Trinity River
East Fork North Fork Trinity River
and
Canyon Creek
Watershed Analysis

Introduction

The Purpose of Watershed Analysis

Watershed analysis (WA) is a procedure used to characterize the human, aquatic, riparian, and terrestrial features, conditions, processes and interactions (collectively referred to as "ecosystem elements") within a watershed. Watershed analysis is an important component of the Aquatic Conservation Strategy (ACS) along with Riparian Reserves, Key Watersheds, and watershed restoration. It provides a systematic way to understand and organize ecosystem information. In doing so, watershed analysis enhances our ability to estimate direct, indirect and cumulative effects of our management activities on ACS objectives and guide the general type, location and sequence of appropriate management activities within the watershed.

Watershed Analysis is required in Key Watersheds, such as the North Fork Trinity River and Canyon Creek Watersheds; prior to determining how proposed land management activities meet ACS objectives. In planning for ecosystem management and establishing Riparian Reserves to protect and restore riparian and aquatic habitat, the overall watershed condition and the array of processes operating there need to be considered. Watershed condition includes more than just the state of the channel and riparian area. It also includes the condition of the uplands, distribution and type of seral classes of vegetation, land use history, effects of previous natural and land-use related disturbances and distribution and abundance of species and populations throughout the watershed.

Watershed analyses are conducted by a team of journey-level specialists who follow the six-step process outlined in "*Ecosystem Analysis at the Watershed Scale – Federal Guide for Watershed Analysis*". This process is issue driven.

Focus of This Watershed Analysis

The focus of this assessment for these key watersheds is watershed function and vegetation condition as they relate to water quality, fisheries, wildlife habitat, fuel loading and soil productivity. The WA will provide information on the current condition in these watersheds as well as the desired condition based on the Land and Resource Management Plan (LRMP) and the Late-Successional Reserve Assessment (LSRA). This watershed analysis will focus lands within these watersheds that are administered by the Shasta Trinity National Forest.

Format of the Document

This document is organized into six chapters.

Chapter 1 – Characterization of the Watershed: This chapter provides a brief overview of the dominant physical, biological and human processes or features of the watershed that affect ecosystem functions or conditions. It includes the most important land allocations, Forest Plan objectives and regulatory constraints that influence resource management in the watersheds. The watershed context is used to identify the primary ecosystem elements that will be analyzed in detail.

Chapter 2 – Issues and Key Question: This chapter provides the key elements of the ecosystem that are most relevant to the management questions or objectives, human values, or resource conditions within the watersheds. These issues and key questions are developed by the team, considering input received from the public.

Chapter 3 – Current Conditions: This chapter addresses the dominant physical, biological and human processes or features of the watershed that affect ecosystem functions or conditions 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 Reference Conditions: This chapter explains how ecological conditions have changed over time because of natural disturbances and human influence. Reference conditions are developed for subsequent comparison with current conditions over the period that the system developed and with key management plan objectives.

Chapter 5 – Synthesis and Interpretation: This chapter compares current and reference conditions of specific ecosystem elements and explains significant differences, similarities or trends. It also discusses the interrelationships among ecosystem components to ensure that management recommendations are based on interdisciplinary considerations.

Chapter 6 – Key Findings and Recommendations: This chapter brings the results to conclusion, focusing on management recommendations that are responsive to ecosystem processes identified in the preceding synthesis and interpretation. Specifically, it summarizes the opportunities to resolve issues and move from existing conditions to the desired conditions identified in the Forest Plan or this Watershed Analysis.

Chapter 1 - Characterization of the Watersheds

This chapter provides a brief overview of the North Fork Trinity River, East Fork North Fork Trinity River and Canyon Creek (NFCC) watersheds in terms of the dominant physical, biological and human processes that affect ecosystem function or condition. These processes will be covered in detail throughout this analysis.

Physical Setting

Location

The watershed analysis area encompasses approximately 138,339 acres: 67,908 acres in the North Fork Trinity River watershed, 29,541 acres in the East Fork North Fork Trinity River watershed and 40,890 acres in the Canyon Creek Watershed. The North Fork Trinity and Canyon Creek watersheds are located in northwestern Trinity County, California, on the Trinity River Management Unit of the Shasta-Trinity National Forest (Figure 1-1). Nearby communities, include Junction City and Helena.

Climate

The climate of the NFCC watersheds is Mediterranean; hot and dry in the summer with temperatures occasionally above 100oF, and cold and wet in the winter with temperatures often below freezing. Winter storms are usually brought in from the Pacific on south to southwesterly winds. Snow frequently accumulates above 4,000 feet elevation during the winter months. Elevations between 3,000 feet to 4,000 feet are frequently subjected to rain on snow events. Mean annual precipitation varies between 70 inches in the upper portions of the watershed to nearly 40 inches at the lower end. About 90 percent of the precipitation falls between October and April, with snow usually remaining at higher elevations through May or June.

Geology and Landforms

The analysis area lies within the Klamath Mountains Geomorphic Province encompassed within two highly diverse geologic terranes; the Hayfork Terrane on the west and the Salmon Hornblende Schist on the east. In areal extent, the latter forms the larger portion of the analysis area. Predominant rock types include: phyllites, metavolcanics, hornblende schist, gabbro, granite, ultramafics, landslide and fluvial deposits.

The predominant geomorphic processes within the analysis area include glaciation and mass wasting. The latter is currently active, and is characterized by slides (deep-seated and debris) debris flows and avalanches across the entire analysis area.

Terrestrial System

Fire and Fuels

Wildfires are a critical component in the development and maintenance of western ecosystems, especially within the forests dominated by Douglas fir in the northern Klamath Mountains. Forests are shaped by distinct ecological processes that are driven largely by climate and topography. Historically, frequent low-

intensity wildfires played a major role in determining the dispersion and succession of tree stands in the interior west.

The most extensive and serious problem related to the health of national forests in the interior west is the over-accumulation of vegetation, which has caused an increasing number of large, intense, uncontrollable, and catastrophically destructive wildfires.

Vegetation

The North Fork and Canyon Creek watersheds, like most of the area in the central part of the Forest, is dominated by conifer forests and mixed conifer/hardwood forests, with an interspersion of alder stringers and mountain meadows. White fir and red fir dominate on upper elevation sites. Interspersed throughout the high country are mountain meadows, alder stringers, and riparian areas. The mid and lower slope positions throughout the area are dominated by Douglas fir and tanoak. Steep rocky slopes covered by canyon live oak are also scattered throughout the area.

The primary disturbance agents in these watersheds have been fire, logging, flood, wind, insects and disease, mining, and recreation. Fire has by far had the greatest effect in shaping the vegetation seral stages of the area.

Plant Species of Concern

Habitats for species of concern include mid- to late-seral forests, rock outcrops, perennial riparian areas, and tree canopy openings. There are no documented populations of Sensitive or Survey and Manage plant species within the analysis area, primarily because of the lack of historical surveys. There is suitable habitat for several Forest Service Sensitive, endemic, and Survey and Manage plant and fungi species throughout the area.

Wildlife Species

Wildlife species known to occur within the North Fork and Canyon Creek watersheds include federally listed and Forest Service sensitive species based on current records. Designated Spotted Owl Critical Habitat Unit CA-30 overlays the Late-Successional Reserve (LSR) portion of the analysis area. Bald eagles (*Haliaetus leucocephalus*, federally threatened) occasionally forage along the North Fork Trinity River. However, there are no known bald eagle nest sites or winter roost sites within the area. Known occurrences of Forest Service sensitive species include the Pacific fisher (*Martes pennanti*), American marten (*Martes americana*) and California wolverine (*Gulo gulo luscus*). An active peregrine falcon (*Falco peregrinus anatum*, Forest Service sensitive) nest site lies just south of the analysis area and falcons no doubt forage in the area. No known occurrences of survey & manage or protection buffer wildlife species lie within the analysis area, although habitat for these species is present.

Aquatic System

Water Quality

The important water quality parameters that most influence the beneficial uses for the North Fork and Canyon Creek watersheds are sediment and turbidity. Several creeks within the North Fork and Canyon Creek watersheds are used as domestic water sources for residents of the area.

The Trinity River is listed as sediment limited by Environmental Protection Agency (EPA) under the Clean Water Act section 303(d) and the North Fork and Canyon Creek watersheds are included within the Maximum Daily Load (TMDL) listing.

Fish Species

The fishes include anadromous spring and fall Chinook salmon, summer and winter steelhead trout, coho salmon, and resident rainbow trout and brook trout. The Southern Oregon Northern California Coastal (SONCC) Coho salmon have been listed as threatened under the Endangered Species Act (ESA). All stream areas accessible to anadromous fish have been listed as critical habitat. Recreational fishing for resident fish is allowed on selected streams, but no angling for salmon and steelhead is allowed within the North Fork and Canyon Creek watersheds. Due to the long-term overall decline of Chinook and steelhead runs, the Pacific Southwest Region of the Forest Service has put them on a regional sensitive species list to help ensure that Forest Service activities do not result in a trend towards listing them under the ESA.

Land Allocations and Management Direction

Planning direction for the Shasta Trinity National Forest is covered in the 1995 Shasta-Trinity National Forest Land and Resource Management Plan (LRMP). The LRMP incorporated the direction in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl, or ROD, as it is commonly known.

Management Direction

The Shasta-Trinity National Forest is divided into 22 management areas. The LRMP defines desired future conditions and management prescriptions within each management area. The NFCC watersheds fall within Management Area 4, Trinity Alps Wilderness, and Management Area 14, the New River/North Fork/Canyon Creek Management Area.

Land Allocations

Table 1-1 summarizes the land allocations for these watersheds.

North Fork Trinity River Watershed

Management Area	Acres
Wilderness	66,644
LSR	911
Matrix	81
Administratively Withdrawn (AWA)	0
Other (Private/BLM)	272
Total	**67,908**

East Fork North Fork Trinity River Watershed

Management Area	Acres
Wilderness	18,850
LSR	4,189
Matrix	287
Administratively Withdrawn	1,471
Other (Private/BLM)	4,744
Total	**29,541**

Canyon Creek Watershed

Management Area	Acres
Wilderness	27,707
LSR	3,826
Matrix	1,978
Administratively Withdrawn	0
Other (Private/BLM)	7,379
Total	**40,890**

Wilderness

A large portion of the Trinity Alps Wilderness is within the North Fork and Canyon Creek area. Wilderness areas are managed according to the Wilderness Act of 1964, the California Wilderness Act of 1984, and regulations pursuant to those acts and the Forest Service Manual. The Wilderness area is managed to preserve the integrity of the wilderness resources.

Late-Successional Reserve (LSR)

A portion of the North Fork and Canyon Creek watershed area is located within Late-Successional Reverse (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.

Adaptive Management Area (AMA)

A portion of the Lower North Fork and Canyon Creek watersheds are within the Hayfork Adaptive Management Area. The emphasis of this AMA is development, testing, and application of forest management practices, including partial cutting, prescribed burning, and low impact approaches to forest harvest, which provide for a broad range of forest values, including commercial timber production and provision of late-successional and high quality riparian habitat.

Administratively Withdrawn Area (Wild and Scenic River)

The North Fork Trinity River is designated as a Wild and Scenic River from the Hobo Gulch Campground downstream to the confluence with the main Trinity River. There are three separate designations on Wild and Scenic Rivers: recreation, scenic, and wild. Each designation carries a unique set of standards that regulate activities on federal lands within .25 miles of the river. The North Fork Trinity River is designated as a wild river.

Aquatic Conservation Strategy Components

Riparian Reserves (RR)

Riparian Reserves are designated under the ACS for all permanently flowing streams, lakes, and wetlands as well as intermittent and ephemeral channels. Riparian Reserves are present along stream channels throughout the analysis area, and occur across all land allocations. Riparian Reserves are to be managed to provide benefits to riparian associated species, improve travel and dispersal for many terrestrial animals and plants, and provide for habitat connectivity within the watershed. The Riparian Reserves also serve as corridors to connect Late Successional Reserves.

Tier 1 Key Watershed

North Fork and Canyon Creek watersheds are Tier 1 Watersheds. Tier 1 Key Watersheds serve as refugia for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. This category recognizes the presence of habitat for threatened or endangered species, the importance of the watershed for maintaining anadromous fish stocks, and carries with it the requirement that watershed analysis be completed prior to implementing significant projects.

Key Watersheds are not a land allocation or designated area, but overlay land allocations and place additional management requirements or emphasis on activities in these areas.

Roadless Area

The 1984 California Wilderness Act released 29 inventoried RARE II roadless areas to be managed for multiple-uses other than wilderness on the Shasta-Trinity National Forest. Released Roadless areas are not a land allocation under the Forest Plan, but have been allocated to various land designations.

Human Uses

Communities

The communities of Junction City, Helena and dispersed neighbors are within the influence of the analysis area. The main industries are service, tourism associated with recreation, forest products, local branches of state, county, and federal agencies.

Transportation System

The transportation system in the analysis area is made up of roads and trails that provide access for motorized and non-motorized vehicles, livestock, and foot traffic. The road system in this watershed consists of a county road, arterial routes, several collector routes, and a series of local spur roads. The major routes (arterial and collectors) are part of the transportation network that links the analysis area to State Highway 299.

Recreation Resources

Outdoor recreation in the area consists of a variety of opportunities, many of which occur along waterways such as the North Fork Trinity River and Canyon Creek and various creeks. These opportunities include hiking, rafting, kayaking, sunbathing, swimming, and fishing. Other opportunities in the area include camping, backpacking, mountain biking, picnicking, hunting, scenic driving, OHV, cross-country skiing, and wildlife observation. A small contingent of outfitter/guides provides guided hunting, rafting, and wilderness pack trips.

Minerals and Mining

The development of the modern suction dredge brought about a new era in mining in the 1970s. Suction dredging has become the most popular method of mining in the last thirty years these watersheds. From the earlier 1970s to 1985 several dozen dredging operation were active in each of the three watersheds. With the designation of the Trinity Alps Wilderness in 1985 and corresponding withdraw of mineral entry and the decrease in gold prices from the highs of the 1980s the number of operations has declined markedly in Canyon Creek and the East Fork and almost disappeared in the North Fork of the Trinity River.

Chapter 2 - Issues and Key Questions

The purpose of this chapter is to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, and resource conditions within the NFCC watersheds.

Six issues critical to the future management of this watershed were identified. They are:

- Issue #1: Human Uses, Values, and Expectations
- Issue #2: Access and Travel Management
- Issue #3: Erosional Processes
- Issue #4: Aquatic Systems
- Issue #5: Terrestrial Wildlife Habitat and Species
- Issue #6: Fire, Fuels, and Air Quality
- Issue #7: Plant Communities

The following is a broader description of each issue accompanied by key questions pertaining to the issue.

Issue #1: Human Uses, Values, and Expectations

Recreation

Key Question 1.1 What are the major recreation resources and uses of the watersheds? What is the condition of these resources?

Outcome 1.1 Identify historic and current recreation areas. Identify potential recreation opportunities. Determine management practices that would restore or improve recreation opportunities.

Minerals

Key Question 1.2 What was the historic level of mining in these watersheds and where was it located? What is the current level of mining in these watersheds and where are the activities located?

Outcome 1.2 Identify historic mining locations and impacts. Determine management practices that would restore or otherwise improve areas impacted by mining.

Heritage Resources

Key Question 1.3 What are the ranges of management actions anticipated within the wilderness and non-wilderness areas of this watershed that may affect archaeological properties?

Outcome 1.3 Heritage work needs to be undertaken before proposed actions are initiated to identify known and currently unknown archaeological properties that may be eligible to the National Register. Identify areas to protect and determine appropriate protection measures.

Wood Products

Key Question 1.4 Are there areas with timber harvesting opportunities that would contribute to ecosystem management objectives?

Outcome 1.4 Identify areas for applying timber management practices that would result in a benefit to ecosystem management.

Key Question 1.5 Are there existing fuel wood opportunities within the watersheds? Are there areas that fuel wood opportunities may be developed?

Outcome 1.5 Identify areas that may be opened to fuel wood gathering or areas that fuel wood projects may be developed.

Issue #2: Access and Travel Management

Access within and thru the watersheds is important to both the people living within the boundaries of the watersheds and for people who use this area for recreational and business purposes.

Key Question 2.1 What are trail conditions? What actions can be taken to provide access to the wilderness and protect the natural resources? Should some trails be closed and abandoned from the trail transportation system?

Outcome 2.1 Identify the level of trail maintenance necessary to protect the natural resources, and provide recreational opportunities in the wilderness. Determine management practices that would protect the natural resources, and provide trail access for recreation. Identify trails that could be abandoned and removed from the system.

Key Question 2.2 What role does the transportation system play in access to the area? Are there areas that would benefit from increased or decreased access?

Outcome 2.2 Identify roads of concern to local and extended users. Assess current condition of roads. Identify road management projects that would restore or otherwise improve the road system.

Issue #3: Erosional Processes

Geology, Hydrology, and Soil Resources

Key Question 3.1 What mass wasting processes are inherent within the watershed? What management actions, if any, would protect soil and water resources.

Outcome 3.1 Identify predominant mass wasting features, the delineation of priority treatment areas and appropriate techniques to protect riparian and soil resources.

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, the delineation of priority treatment areas and appropriate techniques to protect riparian and soil resources.

Issue #4: Aquatic Systems and Species

Key Question 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?

Outcome 4.1 Identify trends of anadromous fish populations and their distribution. Increase understanding of the importance of existing fish stocks in the watersheds to the Trinity Basin. Identify priority treatment areas and appropriate techniques to protect and/or improve fish habitat.

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 these watersheds?

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

Issue #6: Fire, Fuels, and Air Quality

Key Question 6.1 What is the degree of threat from wildfires to local communities? How can the Fire Safe Council recommendations be implemented to reduce the treat of wildfires to local communities?

Outcome 6.1 Determination of the level of threat to local communities and identification of projects to reduce the threat. Identify fuels management projects that would reduce the threat of wildfires to local communities.

Issue #7: Plant Communities

Key Question 7.1 How have human-caused activities altered plant communities and lead to changes in plant species of concern?

Outcome 7.1 Identify plant populations and plant communities with restoration needs.

Key Question 7.2 What are the abundance and the distribution patterns of invasive weeds?

Outcome 7.2 Determine invasive weed treatment priorities.

Chapter 3 - Current Conditions

This chapter describes the current conditions of the various physical, biological, and human ecosystem elements in the NFCC watersheds relevant the issues and key questions identified in Chapter 2. The information provided here will provide a more detailed analysis of the watersheds than did the characterization in Chapter 1.

1. Human Uses, Values, and Expectations

1.1 Current Recreation Resources and Uses

The Canyon Creek Watershed is the most popular and heavily traveled destination in the Trinity Alps Wilderness Area. The mixed deciduous/conifer forest at the trailhead gradually transitions into impressive old growth stands of Douglas fir, Cedar, Sugar Pine, and Ponderosa Pine. The trail to the spectacular granite faces in the upper reaches of the watershed features a spectacular array of waterfalls, swimming holes, meadows, and lakes, and attracts more recreational use than any backcountry locale in the Trinity Alps. Thirty-two percent of the total user days for the entire Wilderness Area are recorded in the main arm of the Canyon Creek Watershed. Many glaciated valley hiking destinations in the Pacific Northwest are characterized by wide valleys leading toward peak or lake destinations. Canyon Creek has the peaks and valleys, but very few wide sections along its nine trail miles to the furthest lakes. The only realistic camping areas are often quite literally on the banks of water features. Consequently, most of its 104 campsites are located within 100’ of a lake, stream, or trail.

The “Limits of Acceptable Change” (LAC) (Stankey et al. 1985) process provides a framework for determining the range of social and resource conditions acceptable in wilderness settings to ensure that high quality wilderness opportunity is provided. LAC data was collected by Wilderness Rangers in 1992 and used for preparation of the Draft Wilderness EIS. While the information is somewhat dated, it is still useful to display wilderness condition and user behavior.

Many areas in Canyon Creek are exceeding their LAC in their transition opportunity class in the categories of Campsite Disturbance, Soil Bared from Use, Amount of Development, Damaged Trees, and Social Trails. Canyon Creek is now hosting 200 to 300 backpackers on major holiday weekends (Memorial Day, 4th of July, Labor Day, and Columbus Day). Canyon Creek's usage figures average around 25,000 user days per year. By contrast, usage up the North Fork of the Trinity River and the East Fork of Canyon Creek is far less.

The most complete data (1992) show 104 campsites in the Canyon Creek watershed. Usage for July 4, 2000 was typical of current usage on a summer holiday weekend. The parking lot was full, with vehicles parked all along the road to Ripstein Campground (100 vehicles total). The total visitor count for the weekend was 286 persons (256 were overnight backpackers comprised of 75 individual parties). Those 75 parties had only 104 campsites from which to choose, or 1.4 choices per party.

Half of all the campsites along the creek corridor and all the sites around the lakes are already within sight and earshot of at least one other site. A comment Wilderness Rangers are increasingly hearing from backpackers is that "camping in Canyon Creek has become a lot like car camping".

The number of backpackers on peak weekends exceeds the number of developed sites. On busy weekends, campers often cannot locate pre-existing and appropriately sized campsites, especially in

desirable locations. They then choose new camping spots, clear the area of rocks and vegetation, establish a fire-ring, and spend several days at the site.

The campsite multiplication that occurs in the North Fork and the East Fork is generally within acceptable limits. The lower overall usage in these areas (which decreases the chances for re-occupation), coupled with Wilderness Patrol restoration efforts, has so far kept these areas within the standards for their LAC opportunity class.

The impact of high usage is evident in the lack of available firewood at the lakes in all three watersheds. The problem is particularly pronounced in Canyon Creek above the Boulder Lakes Trail junction. A tremendous spike in usage that commenced some eighteen years ago (after a Sunset magazine article about Canyon Creek) accelerated wood consumption. Campers are now resorting to cutting living vegetation, breaking up large deadfall with rocks, and felling the dead and dying trees that remain

With diligent patrolling, the Canyon can continuously sustain a high human throughput (usage fans out over four miles of creek front and is not as “destination” orientated as many watersheds in the Alps). When usage spikes beyond a critical point however, no amount of patrolling can mitigate the consequences of campsite multiplication and trampled vegetation. Apart from the opening weekend of hunting season, the North Fork of the Trinity rarely experiences such “Usage Flood Events”. The East Fork Canyon Creek, due to its low usage, does not have this problem. In the North Fork Trinity River, the area from Low Gap up to Grizzly Lake has some of these problems, but difficult access helps to discourage over-usage.

1.2 Current Mining Activity

Canyon Creek

The most heavily mined and altered watershed of the three drainages remains the most active for amount and types of Operations and the most sensitive to public concerns due to the large number of residents and access corridor to the Trinity Alps Wilderness’s most popular destination. There are no valid mining claims within the Wilderness portion of the Canyon Creek Watershed.

The historic hydraulic mining impacted approximately seven hundred acres of the watershed by denuding vegetation and the loss of several million yards of soil. Of the seven hundred acres, one hundred eighty acres lies with the riparian areas of the watershed. The majority of the 700 acres has stabilized and forty percent have adequately vegetated with conifers, mainly Ponderosa Pines.

The thirty lode or hard rock mines in the Canyon Creek watershed are setting ideally in all but one case, that being the Masson & Thayer Mine on the Big East Fork of Canyon Creek. Since the early part of the 1980s, the claimant of record has open up three existing adits, side casting one hundred yards of material on steep unstable slopes and moved in forty tons of mining and milling equipment. At present, the access to the Masson & Thayer is limited to foot traffic due to the removal of two condemned bridges over Bear Creek, limiting claimants activity to assessment work.

In the last thirty years Canyon Creek has averaged three to five open pit (Bench) mining operations yearly, although at present there are no active Plans of Operations, there are however two in the environmental analysis phase and five in rehabilitation. Of the five open pit operations under rehabilitation, there is twenty-one acres of vegetation to reestablish eight acres of which are in the riparian zone.

Mining related occupancies are decreasing in the Canyon Creek drainage. At present, there are only two mining related occupancy in the Canyon Creek watershed, one of which is in the process of removal.

There are however numerous sites of previous human habitation that are associated with mining. A dozen of these sites have impacted vegetation, and are located mainly in the riparian zones. Several of sites have mining debris, occupancy debris, and vegetation that is in some cases is inhibiting establishment of native riparian vegetation.

Suction dredging in Canyon Creek has been on the decline since the mid 1980s. The 2001 dredging season saw five known dredges operating in Canyon Creek, none of which required seasonal occupancy.

East Fork of the North Fork Trinity River

The East Fork North Fork Trinity River watershed saw extensive lode or hard rock mining scattered throughout the entire drainage. Hydraulic mining was limited to scattered narrow bench gravel deposits along its reaches, the East Fork was impacted least of the NFCC watersheds. There are no valid mining claims remaining within the Wilderness Boundaries of the East Fork watershed.

The Enterprise and Lone Jack mining groups of the East Fork are the only lode claims under a Plan of Operations in the Trinity River Management Unit. At this time, sampling and exploration of the underground workings are the limit of this operation. The rest of the two-dozen lode mines are setting idle with no prospects for opening.

Field review of the East Fork revealed six hydraulic operations of approximately thirty-five acres total surface bench gravels mined in the watershed, most all of which lie within the riparian zones. The establishment of vegetation is proceeding slowly.

It has have been several years since the East Fork has seen an open pit operation, the last bench grave operation was located on the Chinses Placer Mining Claim, which closed operations in the late 1980s. At present, there are no proposals to conduct open pit operations in the East Fork watershed.

The East Fork has two mining occupancies, both seasonal at this time, and an additional seasonal occupancy proposed. East Fork as with Canyon Creek contains numerous abandoned residential occupancies that require rehabilitation.

The East Fork suction dredge activities have remained stable with five dredges operating between the North Fork Confluence and the Wilderness Boundary.

North Fork Trinity River

Within the Wilderness Boundaries of the North Fork watershed, there remains one patented and five unpatented mining claims. Over two hundred mining claims have been declared abandoned and void from 1985 to present.

Sixty five percent of the hydraulic mining that took place in the North Fork watershed was concentrated in the Grizzly and Rattlesnake Drainages, with a couple operations between Hobo Gulch and the East Fork of the North Fork. Of the ten operations known approximately fifty-five acres were impacted, thirty-five acres are located in the riparian zones. These impacted areas are stable and healing slowly.

Of the three major lode mines established in the North Fork watershed, all are grouped in the Rattlesnake Drainage.

Mining related occupancies in the North Fork consists of an authorized structure to be built for equipment storage on the RHM # 1 claim as approved in the Plan of Operations, and abandoned equipment structures from mining operations prior to establishment of the Wilderness in 1985.

Suction dredging in the North Fork is limited to the authorized plan for the RMH # 1 patented claim; and one operation on North Fork below the East Fork confluence outside the Wilderness boundary.

1.3 Current Heritage Property Status

Heritage Management over the last 25 years has focused primarily within the areas where land management activities have occurred. Most of the archaeological work has been undertaken to meet section 106 requirements for timber sales, road construction and special use permit projects. Consequently, only portions of the NFCC watersheds have been surveyed for archaeological properties.

Much of these watersheds are located within the Trinity Alps Wilderness. The main undertakings generating Heritage management work have been associated with trails, recreational sites, minerals, and special uses. The project driven Heritage work and related archaeological survey coverage has focused mainly along the major trail systems. Some additional work has been conducted in other areas.

Current Archaeological Properties

Previous work within these watersheds has identified 51 archaeological properties, which have been assigned a site numbers. Of these sites, 47 are historic and four are prehistoric. Some of the archaeological properties were evaluated for eligibility to the National Register of Historic Places. Four sites were determined “eligible” for inclusion to the National Register of Historic Places, and 19 were determined “not eligible”. The remaining 28 sites have not been evaluated. There are additional known historic properties within these watersheds, but they have not been recorded.

Historic properties within these watersheds have been impacted over the years by a series of factors. Ongoing timber and mining activities have posed ongoing management work to avoid or mitigate adverse effect to sites. However, of worse consequence is the effect of dispersed camping, illicit surface artifact collecting, and looting excavation of sites by the public. This activity is made easy by the road systems running up the Canyon Creek and North Fork Trinity River Watersheds. The effect of Forest Service land management on these sites has been well mitigated and associated surveys have enhanced our knowledge of the prehistory/history of the area. The effects of illegal artifact collecting and uncontrolled dispersed camping are areas needing attention, but are limited by budget and manpower shortfalls.

In more remote areas of the watersheds, archaeological sites found have not been impacted to the same degree. Past activities such as grazing, mining, and settlements have affected sites. However, most of this activity has decreased over the last 50 years. Because access to some sites is from foot trails impacts from the public is much less. This may change if recreational use increases in this area.

1.4 Current Timber Harvesting Opportunities

Most of the land within the three watersheds considered in this analysis is within the Trinity Alps Wilderness area. Consequently, timber harvesting opportunities are limited to within the 2,346 acres of Matrix (AMA) land and incidental timber harvesting within the 8,926 acres of Late Successional Reserve to protect and/or enhance habitat for old-growth dependent species.

Within Matrix lands, forest stands suitable for timber harvesting opportunities include 4N/G stands that may be considered for a final harvest and 3N/G/P stands that may be suitable for an intermediate harvest.

1.5 Current Fuelwood Opportunities

Fuelwood opportunities are limited to roaded areas outside of the LSR. Local residents use the road system to collect dead-and-down wood material whenever it becomes available. The steepness of the terrain limits the fuelwood opportunity to a narrow corridor immediately adjacent to area roads. Residual

woody material generated from timber harvesting is available for fuelwood gathering following a commercial timber sale.

2. Access and Travel Management

2.1 Current Trail Conditions

Condition surveys have been performed on the majority of the trails in the NFCC watersheds. Current trail conditions range from very good to extremely poor. Many of the trails are adequate to travel, and have minimal impact to the natural resources. Most of the trails suffer from a lack of maintenance, with several that are impassable. The lack of maintenance creates resource damage with erosion and user built routes around obstacles that haven't been cleared.

Recurrent maintenance is essential to provide access, and to protect the natural resources from user-created impact and erosion. Some trails need restoration work to bring them up to a maintainable standard. Trail maintenance management objectives are for resource protection, Health and Safety, protection of the investment, and user convenience, in that order of priority. The primary technique for erosion control is an outsloped trail tread, and the abundant use of water-bars. The frequency of maintenance is established by assigned maintenance levels, with some trails maintained annually and some maintained every third year.

The Canyon Creek watershed has four separate trails, with a combined mileage of 19.8 miles. The North Fork Trinity River watershed has 15 trails with 86.2 miles. The East Fork North Fork Trinity River watershed currently has no system trails.

Trail classes are general categories of physical trail design, and indicate degree of development and constructed features. Trail class 1 (Primitive/Undeveloped) has minimal to non-existent constructed features, and obstructions are common. Trail class 2 (Scramble/Hiker) has constructed features of limited size, scale, and number, with obstacles present and blockages cleared only to define the route and protect resources. Trail class 3 (Developed Hiker/Equestrian) has trail bridges as needed, and constructed features are common and substantial. Obstacles are infrequent.

Number	Name	Maintenance Level	Trail Class	Mileage
09W22	East Fork Lake	2	3	4.6
09W23	Bear Gulch	1	1	2.8
10W02	Boulder Cr. Lakes	3	2	2.5
10W06	Bear Creek	3	3	5.1
10W08	Canyon Creek	4	3	7.3
11W02	Moliter-Cold Spring	1	1	5.1
11W03	Bob's Farm	3	3	4.2
11W04	Morrison Gulch	3	3	3.2
11W05	Rattlesnake Creek	3	3	7.6
11W05.1	Rattlesnake Creek	2	2	1.7
11W05A	Bear Valley Meadow	1	1	1.0
11W06	Whites Creek	3	3	5.2
11W07	Backbone Creek	2	3	3.0
11W08	China Spring	3	3	1.2
11W12	Raymond Flat	2	3	6.0
11W13	Waldorf	2	3	6.0
11W40	Backbone Ridge	2	2	3.2
12W01	North Fork	3	3	17.5
12W01.1	Grizzly Scramble	2	2	1.0
12W01A	North Fork - Low	3	3	0.9
12W09	Green Mountain	3	3	20.9

2.2 Current Road System

There are approximately 36 miles of Forest Service system roads, 23 miles of County Roads, and 27 miles of 4X4 and developed Bureau of Land Management roads. The road density per square mile for all the above roads is approximately 0.2-mile/square mile. Approximately 5.5 miles of Forest Service system roads were decommissioned in the early 1990's.

Forest Roads	Watershed	Length	Mant. Level
33N67	CC	2.9	2/2.0 1/.9
33N67A	CC	0.2	1
35N52Y	CC	1.9	2
35N47Y	CC	6.2	3
35N49Y	CC	2.3	2/0.3 1/2.0
35N48Y	CC	1.4	2/0.2 1/1.2
35N35Y	CC	1.3	2/0.1 1/1.2
35N35YA	CC	1.1	1
35N56Y	CC	0.1	3
35N50Y	CC	0.2	4
34N14	EF	1.4	2
34N14B	EF	0.2	1
35N20	EF	3.3	2
34N07YB	EF	1	2
34N07YC	EF	0.1	2
34N07Y	EF/NF	12	3/9.9 2/2.1
34N07YA	NF	0.2	3
36N04Y	NF	0.1	3

County Roads	Watershed	Length	Mant. Level
CO 401	CC	13.4	4
CO 421	EF	7.7	4
CO 413	CC	0.3	4
CO 420	CC	1.2	4

BLM Roads	Watershed	Length	Mant. Level
4X4 roads	all	10.5	n/a
Developed	all	16.5	n/a

3. Erosional Processes

3.1 Current Mass Wasting

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. Mass wasting is active throughout the analysis area especially in the northern half.

Glacially formed landscapes are found only within the higher reaches of the analysis area. The glacial processes, which formed these, were active during Pleistocene time and helped to carve out the present topography. Presently these landscapes are dominated by mass wasting processes such as rockfalls, rock debris flows/avalanches and landslides. The latter processes are continuing to transport large amounts of glacially derived rock debris to the lower reaches of the watershed. This process of transport is a continuing natural process but is currently most active during periods of extreme climatic events.

Primary local characteristics, which contribute to mass wasting are the following in the order of importance: percent slope, geomorphic location, bedrock type and geologic structure.

3.2 Current Soil Erosion

Surface erosion involves the removal and down slope transport of soil particles from the soil surface by sheet or rill erosion and dry ravel. Soil erosion rates change through time due to natural and human-caused events.

The critical factors determining soil erosion rates are soil detachability, slope steepness, amount of soil cover and rainfall intensity. These rates can vary from 0.018 yds^3/acre to over 29 yds^3/acre (Laurent, 1996) depending on differences in these individual erosion factors. The majority of eroded material moves only a short distance before it settles out due to changes in landscape conditions and soil cover. This erosion/deposition process is a continuing process that occurs with each subsequent precipitation event. A single precipitation event can move and deliver hundreds of cubic yards of material to channels and at other times, many precipitation events are required to deliver a similar volume of soil material to channels. The amount of soil reaching a channel is dependent on slope steepness, soil cover and connectivity of erosion source to a channel. Soil erosion processes common to the Klamath Mountains has been more fully described and documented by Laurent (1996).

4. Aquatic Systems and Species

4.1 Current Anadromous Fish Populations And Distribution

Canyon Creek, the East Fork North Fork Trinity River, a tributary of the North Fork Trinity, and the North Fork Trinity River are fourth and fifth order anadromous streams entering the Trinity River from the north. The headwaters of all three streams originate in the Trinity Alps Wilderness and run southward through mountainous terrain characteristic of the region. These streams flow through moderate gradient, less than 4% (USDA Forest Service, 1988), in well-contained Rosgen channel types A and B. The Rosgen A and B channel types serve to act predominantly as transport channels which function to deliver bedload to downstream reaches (Rosgen, 1996).

Information on juvenile salmonid use of these streams is very limited and for other species of fish is non-existent. A 1988 study compared the three streams for total numbers of salmonid juveniles and the average density of fish in the entire stream. The study concluded that Canyon Creek was primarily a steelhead stream with moderate use by Chinook. The East Fork of the North Fork is primarily a steelhead stream with moderate coho and Chinook use. The North Fork Trinity River was classified primarily as a

steelhead stream with moderate use by Chinook with no coho or Chinook juveniles being found above the confluence with the East Fork of the North Fork of the Trinity River. There is no reported use of any tributaries to these streams by Chinook or coho juveniles although no formal investigation has been performed to verify this (USDA Forest Service, 1988).

Snorkel counts of adult spring run Chinook and summer run steelhead have been conducted since 1978. General trends show declining runs until the early 1990's and steady or improving numbers since then. Figure 3-1 shows the snorkel counts of adult spring run Chinook and summer steelhead for Canyon Creek from 1978 to 2000. "ND" indicates no data, where no count was made for that species/year.

Figure 3-1.

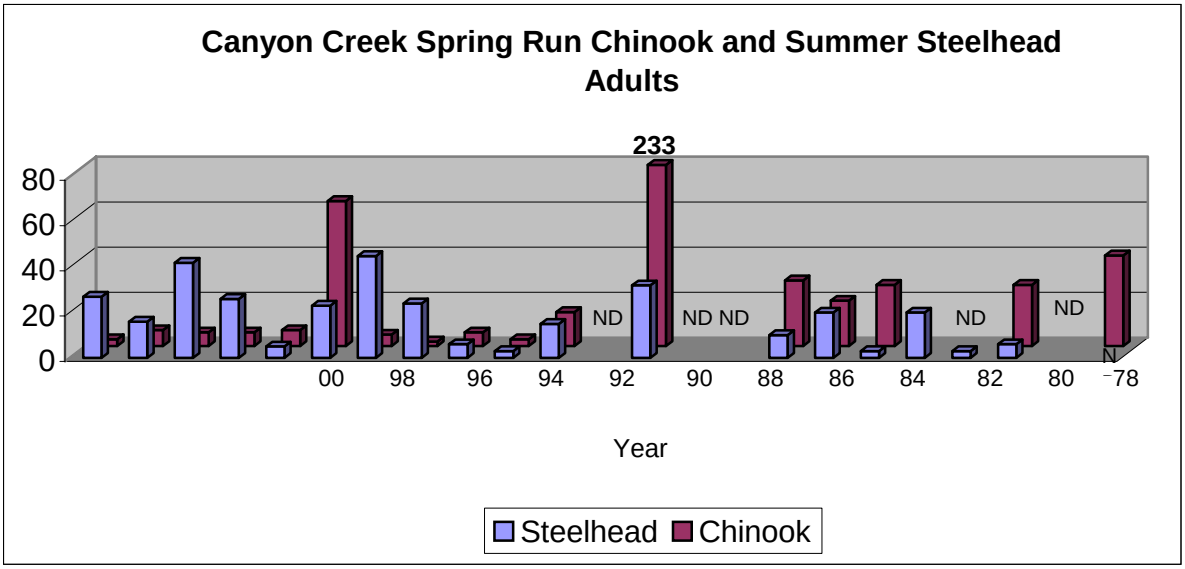


Figure 3-2 represents the snorkel counts of spring run Chinook for the North Fork Trinity and East Fork of the North Fork Trinity River, which have been combined for monitoring purposes. "ND" indicates no data, where no count was made for that year.

Figure 3-2.

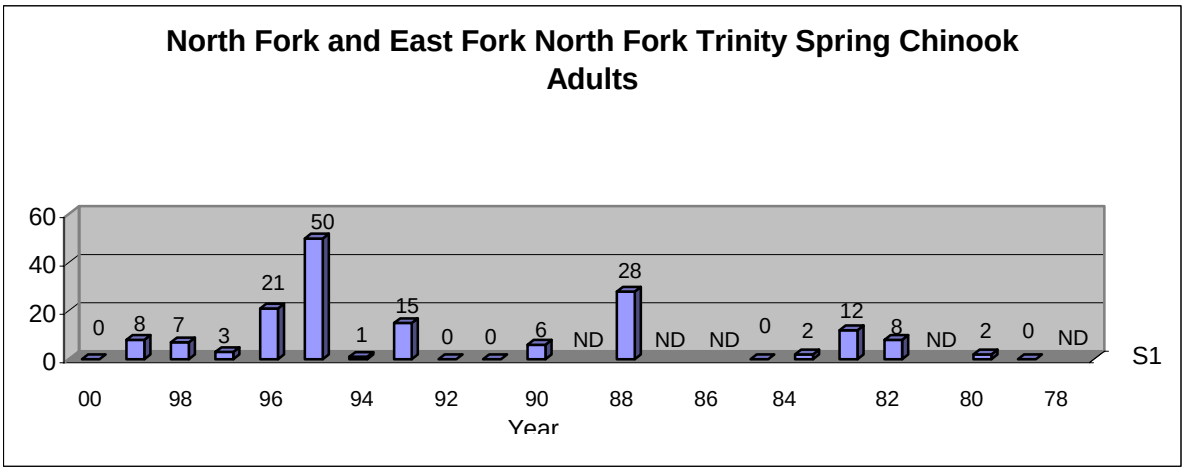
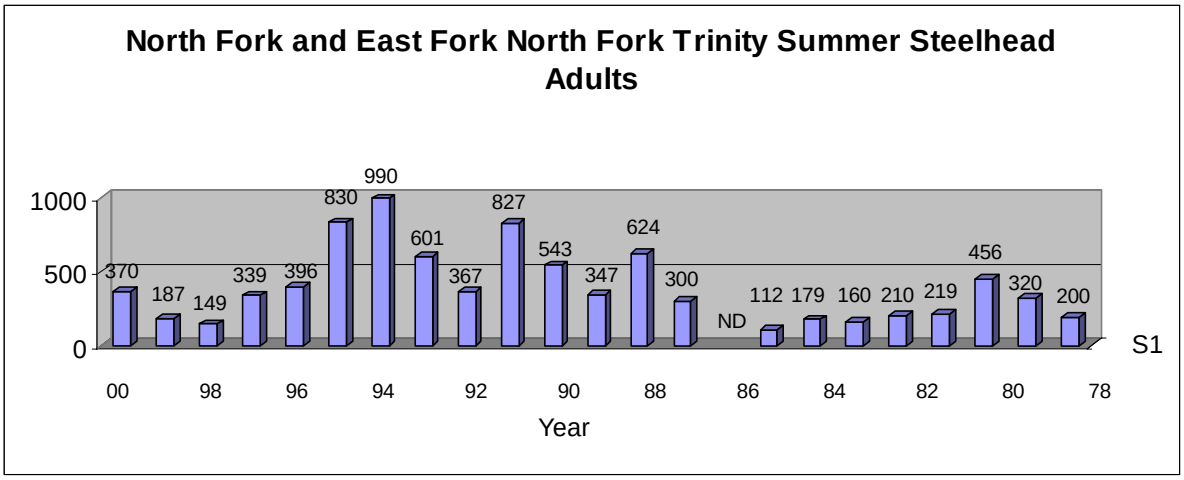


Figure 3-3 represents the snorkel counts for the North Fork Trinity and the East Fork of the North Fork Trinity River, which have been combined for monitoring purposes, for summer run steelhead adults. “ND” indicates no data, where no count was performed for that year.

Figure 3-3.



All three streams, and especially the North Fork Trinity River, are important for maintaining stocks of genetically pure, wild fish. California Department of Fish and Game records show that the East Fork of the North Fork Trinity was stocked with rainbow trout as early as 1944. It is likely that Canyon Creek and the North Fork Trinity were also stocked around this time. Several lakes in the watersheds continue to be stocked on a one to three year rotation. It is possible that some of the fish from these lakes migrate into the streams that drain them and could make their way to the anadromous portions of the watersheds.

Currently the only fishing allowed on any of these streams is the non-anadromous portion of Canyon Creek located above the middle falls approximately four miles above the wilderness boundary. Fishing pressure on this section of stream was deemed by the California Department of Fish and Game to be heavy enough that special regulations for the number of fish kept were imposed (2001 Sport fishing regulations).

Canyon Creek

Canyon Creek is a fifth order previously damned anadromous watershed draining 79,400 acres. The Federal Government (Forest Service and Bureau of Land Management) manages 92% of the watershed with 75% of this land being located in the Trinity Alps Wilderness. A power-generating dam, which had a functioning but ineffective fish ladder, was removed in the 1940’s (USDA Forest Service, 1943). Twenty-six tributaries enter Canyon Creek of which Bear Creek, Clear Gulch, and Little East Fork Creek have a very limited potential for anadromous fish use.

East Fork North Fork Trinity

The East Fork of the North Fork of the Trinity River, a tributary to the North Fork, is an un-damned fourth order anadromous stream draining 54,966 acres that originates in the Trinity Alps Wilderness. Twelve tributaries drain into this stream, of these the East Branch of the East Fork of the North Fork, Indian Creek, and Yellow Jacket Creek could possible be utilized by anadromous fish. In 1989, Forest Service personnel categorized the stream as stable without the aggradation problems found in Canyon Creek. This report also summarizes that the stream lacks the ideal amount of cover. It is likely that the

investigators based this observation on the relative lack of large woody debris and did not take into account cover provided by water turbulence, boulders, and ledges. Because of the Rosgen A and B stream classification, where materials tend to be flushed, large woody debris in the East Fork of the North Fork would not be expected to remain long in the system (Rosgen, 1996).

North Fork Trinity River

The North Fork Trinity River is a fifth order anadromous stream draining 97,398 acres. 90% of the watershed is National Forest with 95% of this being in the Trinity Alps Wilderness. While a dam was reported to have been on the river, no literature could be found supporting this. Any dam was likely to have been for logging operations and would likely not have survived each seasons high flow events (personnel communication, minerals, USDA Forest Service, 2001). Thirty tributaries enter the North Fork of which six are potentially anadromous and one, the East Fork of the North Fork is known anadromous habitat.

5. Terrestrial Wildlife Habitat and Species

5.1 Current LSOG Amount And Condition

The distribution of late-successional and old growth (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 reserves (e.g., LSRs and Wilderness) can be ecologically significant in functioning as refugia for a host of old-growth associated species, particularly those with limited dispersal capabilities. LSOG stands provide areas of relatively high quality habitat for dispersing individuals (e.g., northern spotted owl, fisher, marten, etc.).

Approximately 80,138 acres within the three watersheds are capable of producing LSOG habitat. Currently, 13,852 acres or 17.3% of this capable land is forested in relatively high quality LSOG. An additional 30,034 acres or 37.5% is forested in relatively moderate quality LSOG). The North Fork Trinity provides the best (i.e., highest percentage and least fragmented) LSOG conditions, followed by the East Fork North Fork and then the Canyon Creek Watersheds. Table 3-1 displays the successional stage distribution and relative LSOG quality within the three watersheds.

ROD 15% LSOG Standard and Guideline
“Provide for retention of old-growth fragments in watersheds where little remains”

The intent of this standard and guideline is stated in the first paragraph of the S&G on page C-44; e.g., to protect ecologically significant patches and fragments of old-growth habitat that provide refugia for old-growth associated species (memorandum from the Regional Ecosystem Office dated October 24, 1997). Our discretion to retain a variety of stand ages to meet the intent of the S&G should be applied before federal forest lands reach the 15 percent level of late-successional forest. Management discretion and options to select stands for retention and protection within a watershed only exist prior to late-successional forest reaching the 15 percent level. Old-growth stands would be retained and protected to meet the S&G in most instances; however, based on an assessment, younger (i.e., mature) stands could be retained while older stands could be harvested (memorandum from the Regional Forester dated September 14, 1999).

Currently, all three watersheds meet this S&G when both late-successional dense and mid-successional dense stands are included. The North Fork Trinity and East Fork North Fork meet the S&G using only late-successional dense stands. Table 3-1 presents the percent of federal forest land within each watershed segregated by successional stage and relative LSOG quality.

Table 3-1. Current Late-Successional and Old-Growth Conditions. Presented are acres of each successional stage (relative LSOG habitat quality) along with the percentage of total federal forest land each represents.

Successional stage (relative LSOG quality)	Watershed			TOTAL
	North Fork Trinity	East Fork North Fork	Canyon Creek	
Late-successional dense (high quality LSOG)	9,445 (19.6%)	1,895 (15.2%)	2,512 (12.9%)	13,852 (17.3%)
Mid-successional dense (moderate quality LSOG)	17,394 (36.1%)	5,405 (43.3%)	7,235 (37.2%)	30,034 (37.5%)
Late-successional open (marginal foraging & connectivity)	1,888 (3.9%)	251 (2.0%)	204 (1.0%)	2,343 (2.9%)
Mid-successional open (marginal foraging & connectivity)	11,313 (23.5%)	4,304 (34.5%)	7,263 (37.3%)	22,880 (28.6%)
Early-successional (no current LSOG value)	8,157 (16.9%)	618 (5.0%)	2,254 (11.6%)	11,029 (13.8%)
Total (federal forest land)	**48,197**	**12,473**	**19,468**	**80,138**

Connectivity

The distribution of LSOG habitat is somewhat fragmented within the three watersheds. The most functional east-west connectors lie in the headwaters of the North Fork Trinity Watershed. This watershed also provides the most functional north/south connectors. Shrub fields dominate many south and southwesterly aspects especially within the North Fork East Fork and Canyon Creek watersheds (often as a result of the 1987 fires). The North Fork Trinity and the lower western portion of the East Fork North Fork provide the largest contiguous blocks of moderate to high quality LSOG.

Habitat Conditions (using the Spotted Owl Baseline database)

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 one species (the spotted owl) known to be associated with old-growth forests in the area

Table 3-2 displays the acres of nesting/roosting, foraging (NRF) and remaining areas capable of developing into NRF habitat within the assessment area. Related to the LMP-90 database: nesting/roosting habitat includes the 4N/G stands and the most of the 3G stands while foraging habitat includes the remaining 3G, 3N and roughly 30% of the 3P and 50% of the 2G stands.

Table 3-2. Current Spotted Owl Habitat Conditions using the Spotted Owl Baseline database.

Owl Baseline Habitat	Watershed			Total
	North Fork Trinity	East Fork North Fork	Canyon Creek	
Nesting/Roosting	20,494	4,318	5,328	30,140
Foraging	9,104	3,878	4,449	17,431
Capable	5,439	687	2,447	8,573
Total	**35,073**	**8,883**	**12,224**	**56,144**

Conditions Specific to LSR RC-333 and Owl CHU CA-31

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 LSR RC-333. Table 2.46 in the LSR Assessment presents acres of spotted owl habitat within CHU CA-31.

6. Fire, Fuels, and Air Quality

6.1 Current Wildfire Threat to Local Communities

Fire History

The Shasta Trinity National Forest Fire History database has recorded fires between 1911 and 1999. The database may not be complete. It only records fire that Forest Service personnel suppressed. Fires not recorded in the database are those that either went out naturally or went unreported to the Forest Service. Over 80 years of recorded fire, from 1918 to 1999, exhibits a total of 375 fire starts; 161 lightning caused fire starts and 60 human caused. There are 154 fires listed in the database as “miscellaneous” causes, these are more than likely natural caused fires. The categorization of fires within the sub watershed is in Table 3-3. The largest documented catastrophic fire event for the watershed occurred in August through September of 1987.

Canyon Creek has 147-recorded fires. The North Fork has 149-recorded fire and the East Fork or the North Fork of the Trinity River has 79-recorded fires. Human caused ignitions occur most often in the Canyon Creek drainage, 32-recorded fires; the other two watersheds have 14 each.

Table 3-3

Ignition Sources	Canyon Creek			East Fork of the North Fork			North Fork		
	No. of Fires	**Average Fires per Year**	**Percentage of All Fires (375)**	**No of Fires**	**Average Fires per Year**	**Percentage of All Fires (375)**	**No of Fires**	**Average Fires per Year**	**Percentage of All Fires (375)**
Lightning	52	.6	13.8	37	.5	9.9	72	.9	19.2
Human	32	.4	8.5	14	.2	3.7	14	.2	3.7
Miscellaneous	63	.7	16.8	28	.3	7.5	63	1.2	16.8
Total	**147**	**2**	**39.1**	**79**	**1**	**21.1**	**149**	**2**	**39.7**

The Trinity Alps Wilderness is presently a “contain and control” fire management zone. Contain and control” means, suppress all fires at the smallest possible size for the least expense. A crucial factor in suppressing wilderness fires occurs when suppression resources are limited because of multiple fires at either the forest or regional levels. Trinity Alps Wilderness will have a lower priority for suppression resources when there are multiple fires threatening urban interface, communities, or other high value resource areas, i.e. private and federal timberlands.

The struggle for limited suppression resources as happened twice in the last twenty years. Lightning storms ignited multiple fires throughout California in August of 1987 and August of 1999. Seven fires from the 1987 lightning storm burned 36,427 acres in the watershed. These fires burned until fire-fighting resources released from other fires took direct suppression action. A similar event occurred 1999, in the adjacent watershed, the Big Bar Complex also burned with limited suppression action until higher priority fires were controlled.

Large Fires

Recorded fire history indicates 37 fires greater than 100 acres occurred between 1931 and 1989. Total acreage burned in large fires is 62,322. Table 3-4 summarizes the number of large fire by ignition source (the caused of the fire), the acres burned by cause, the percentage of cause relating to the total number of fires within the watershed, and the acres express in percentages of the watershed burned by large fires burned.

Eleven large lightning fires burned approximately one third of the NFCC watershed between 1931 and 1989. These eleven lightning fires occurred in the northern portions of the watershed. Nineteen human caused fires burned approximately ten percent, and occurred in the southern portion, along State Highway 299 and in the Canyon Creek drainage. Seven “unknown origin fires are recorded, meaning the exact cause could not be determined, but more likely they were natural events. They too, were in the northern portion of the analysis area.

Table 3-4. Large Fire History

Ignition Source	Number of Fires	Acres Burned	Percentage of Watershed Burned
Lightning	11	40,589	33
Human	19	13,399	10
Miscellaneous	7	8,336	.07
Totals	**37**	**62,324**	**43.07**

Urban interface areas are present throughout and adjacent to the watershed. The community of Junction City and Helena are located in the southern portion of the watershed, along state highway 299. Numerous residences are also located within the Canyon Creek drainage. Most of these residences are year round while others are recreational in nature. All recorded human caused fires have been either in these urban interface areas or along roads and trails, with the majority of human fire starts near the Junction City area.

Hazardous Fuels

In the field of fire and fuels management "Risk" is a wildfire causative agent, such as lightning, chainsaws or campfires. Risk management would eliminate or reduce sources of firebrands (intense heat sources). "Hazard" is a rating assigned to a fuel complex that reflects its susceptibility to ignition, the wildfire behavior and severity it would support, and/or the suppression difficulty it represents. A fuel complex is defined by kind, arrangement, volume, conditions, and location. Hazard ratings are generally

subjective, ranging from very low (green grasses and conifer litter) to extreme (cured grass and heavy slash). A fuels reduction program can pursue one or both of two strategies: risk management; or hazard management.

Hazard risk analysis is the process of determining the estimated fire behavior of a given land base. It incorporates into the analysis such features as aspect, slope, fuel model, and weather conditions. The output of the analysis is rated by considering flame length and rate-of-spread. Areas with low rate-of-spread would most likely have a slow burning fire, low rate-of-spread, and short flame lengths. Areas of high ratings would most likely have fast moving fires with flames reaching well into the overstory canopies.

The Hazard and Risk Analysis indicates the NFCC Watershed as having all ratings high, medium and low ratings. There are multiple sections managed by the Department of Interior (BLM) and portions of private property that there was no data available to determine a hazard rating. Table 3-5 displays the Hazard Rating for the entire analysis area.

Table 3-5. Hazard Analysis for Analysis Area

Hazard Rating	Acres	Percentage
High	35552.4	25.7
Moderate	18813.7	13.6
Low	70136.4	50.7
Undetermined	13833.5	10

Communities Risk

The risk of fires to communities within the watershed is primarily from human caused fires. Fires starting along State Highway 299 have resulted in several large fires in the southern portion of the analysis area. These fires have been contained before entering areas highly populated i.e. Junction City, and Canyon Creek.

The human caused fire along the 299 corridor have been high severity burns lasting one to three burn periods and are often wind driven. They are often contained at ridge tops and drainages. Human caused fires in the Canyon Creek drainage have regularly contain at small acreages (less than 100 ac.) They too are along the road or at the trailheads for wilderness user.

7. Plant Communities

7.1 Current Populations of Plant Species of Concern

There are no known Federally Threatened or Endangered plant species on the Shasta-Trinity National Forest. There are nine known Forest Service Sensitive plant populations within the analysis area. Three other previously Sensitive plant species are found within the watershed, but these species were removed from the Shasta-Trinity Sensitive Species list in 1998 because for various reasons including lack of significant threats. There are no documented populations of any Survey and Manage vascular plant, bryophyte, lichen, or fungi species.

Potential Suitable Habitat within the Analysis Area

Difficult access, steep terrain, and lack of active management has minimized the amount of survey work in the analysis area, and most, if not all, known populations have been found incidental to recreational use. It is likely that suitable habitat for many Sensitive, Endemic, and Survey and Manage plant species

exists based on known populations within the local geographic area, plant association maps, soil and geology maps, and observations made in the analysis area. Plant species of concern that have potential for suitable habitat within the watershed area are listed in Tables 3-6 and 3-7.

Table 3-6. Sensitive and Endemic Species with potential for Suitable Habitat within the Canyon Creek, North Fork Trinity, and East Fork North Fork Trinity Watersheds

Species	Habitat
Shasta pincushion (*Chaenactis suffrutescens*) Canyon Creek stonecrop (*Sedum paradisum*) Rough raillardella (*Raillardiopsis scabrida*) **Red Mountain catchfly (*Silene campanulata* var. *campanulata*)**	Rocky slopes or talus, rock outcrops, stabilized stream terraces, serpentine or not
Oregon willow herb (*Epilobium oreganum*) Wilkins' harebell (*Campanula wilkinsiana*)	Perennial serpentine wet seeps, springs, fens, meadows
Red Mountain catchfly	Wet, grassy openings or dry openings with little vegetative competition or surrounding litter
Brownie lady's-slipper (*Cypripedium fasciculatum*) Mountain lady's-slipper (*Cypripedium montanum*) English Peak greenbriar (*Smilax jamesii*) Red Mountain catchfly Scott Mountain fawn lily (*Erythronium citrinum* var. *roderickii*)	Montane forest, riparian-influenced or not

Table 3-7. Survey and Manage Species with Suitable Habitat within the Watersheds

Species	Life Form	Habitat
Bug-on-a-stick (*Buxbaumia viridis*)	Bryophyte/moss	Perennial seeps, springs, streams
Brownie lady's-slipper Mountain lady's-slipper	Vascular plant	Montane forest, riparian-influenced or not
Pacific fuzzwort (*Ptilidium californicum*)	Bryophyte/liverwort	Cooler montane forest
Botrychium spp.	Bryophyte/moss	Wet meadows

The analysis area is lies within four subsections of the Klamath Mountains Ecological Section of California (USDA, 1994), primarily within the Trinity Alps and North Trinity Mountains subsections. Granitic and ultramafic outcrops dominate and soils are frigid and cryic outside of lower riparian areas. A significant portion of the watershed analysis area is within the Trinity Alps Wilderness and is dominated by metamorphic/granitic or ultramafic (serpentine) soils at elevations above 4000 feet (ranging from 1600 to 8400). High elevation alpine outcrops are frequent, with subalpine habitats dominated by red fir, mountain hemlock, and foxtail pine. Riparian areas, wet meadows and seeps are abundant throughout the analysis area.

The portion of the analysis area outside of the Trinity Alps Wilderness is occupied by low to mid-elevation mixed conifer and pine forest that contains little suitable habitat for Sensitive or Survey and

Manage species due to it's hotter, drier habitat. Much of the area from China Springs and Dedrick south has been homesteaded or mined in the last 150 years and is dominated by annual grasses which are more susceptible to wildfire and frequent burning. Although natives shrubs and trees are present, a large portion of the habitat has converted from native forbs and perennials to introduced annual grasses and other species.

The wilderness portion of the analysis area is in good to pristine ecological condition for the most part and habitat for plant species is stable with minimal threats. Most of the habitat within the three watersheds is protected from ground disturbance by wilderness designation, but currently experiences some limited impacts from recreational use (hiking, backpacking, horsepacking). Impacts from grazing, mining, urban development, and logging have been restricted to the area surrounding the few established roads in the three watersheds because of steep terrain, limited accessibility, and currently wilderness designation.

7.2 Current Abundance and Distribution of Invasive Weed Species

Invasive weed species have been introduced and established along existing roadways, trailheads and some trails. Although providing very little competition to Sensitive species for suitable habitat at this time, as number of weeds increase, populations could be displaced. The most recent large scale, low-to-moderate intensity fire burned one-third to one-half of the Canyon Creek Watershed (southern portion) in 1987.

Most invasive weeds have been introduced by motor vehicles along major travel ways (County Road 401) or by people and pack animals using trails. No formal surveys have been completed to date on invasive weed occurrence, but interest and available funding is increasing. Informal observations by wilderness users indicate the presence of non-native species is increasing. Most weed species are found outside of the wilderness area, particularly along Canyon Creek and Hobo Gulch roads, but population numbers and densities are increasing within the wilderness with increased visitor use. Canyon Creek trail is one of the most popular trails within the Alps and it receives extensive use annually from March to October. Visitations often occur from outside of Trinity County, increasing the risk of importing new invasive species.

Species	Habitat	Concentration Area	CA State Weed Designation
Dyers woad (*Isatis tinctoria*)	Roadsides, openings, sandy/loose soils	Hobo Gulch trailhead	CDFA B & C rated
Bull thistle (*Cirsium vulgare*)	Wet meadows, forest, openings	Canyon Creek trailhead Canyon Creek Meadows Bear Wallow Meadow Grizzly Meadow	CalEPPC List B
Ailanthus/Tree of Heaven (*Ailanthus altissima*)	Roadsides, open areas, riparian areas	Canyon Creek Road County Road 421 Hobo Gulch Road	CalEPPC List A-2
Yellow starthistle (*Centauria solstiasis*)	Openings, roadsides	Canyon Creek Road County Road 421	CDFA B & C rated
Dalmation toadflax (*Linaria genistifolia* ssp. *dalmatica*	Roadsides, rock outcrops, openings	Canyon Creek Road Hobo Gulch Road	CDFA A rated
Scotch broom (*Cytisus scoparius*)	Roadsides, openings	Canyon Creek Road	CDFA B & C rated
Klamath weed (*Hypericum perforatum*)	Roadsides, forest, openings	All roads in analysis area	CDFA B & C rated

Bull thistle is being seen in increasing quantities in wet meadows. It is spreading into the wilderness from points of introductions, such as trailheads and roadways. High concentrations of invasive weeds of concern are found outside the wilderness within the three watersheds. These species have been introduced primarily by motor vehicles using the Hwy 299 corridor and have established and spread from there. The most significant concentrations lie within the portion of the analysis area outside of wilderness.

There are two populations of dyer's woad within one mile of the Hobo Gulch trailhead. This highly aggressive weed has spread down Highway 3 south from the Scott Valley. Without treatment, this weed will spread further into the Trinity Alps Wilderness where suitable habitat is abundant.

Chapter 4 - Reference Conditions

These descriptions pertain to the issues and key questions identified in Chapter 2. The information provided here will be used in Chapter 5 for comparison with relevant management plan objectives.

1. Human Uses, Values, and Expectations

1.1 Reference Recreation Resources and Uses

It was not until the discovery of gold in Canyon Creek in 1851 that the upper reaches of these three watersheds began to withstand significant human impact. The Canyon Creek area had the largest gold deposits and consequently sustained the heaviest impacts. By the 1890's, the town of Dedrick (just below the current Canyon Creek trailhead) supported a population of 1500 persons. The lack of good roads meant the establishment of several large horse-packing operations to supply the miners. By the 1920's, with gold mining in one of its cyclical declines, these packers were also beginning to develop a significant 'Tourist' trade.

In 1926, the Federal government designated 132,000 acres (containing large sections of these three watersheds) as the Salmon Trinity Alps Recreation Area.

1.2 Reference Mining Activity

The three NFCC Watersheds have a common and parallel mining history. In the 1850s, the first miners followed these drainages working the gold bearing placer gravels in and adjacent to the stream channels. Gold being the principal mineral sought and found, although platinum, silver, and quicksilver were also recovered as a by-product of these endeavors. The early day miners employed shovel, pan, rocker-box, or short sluice box and with the construction of small dams to divert the stream; small portions of streambed were worked. These operations had very little effect on the present day conditions of the watersheds.

Later tunnels or drifts were dug (also called coyote holes) to work and test the placer deposits on the higher terraces, and benches. Many of these drifts remain open and create a public hazard.

With the development of hydraulic mining, ditches and flumes were constructed where feasible, to provide water for hydraulic mining of these same placer deposits. The hydraulic mining operations are the most extensive and visible effects of mining in the three watersheds. These hydraulic operations accrued in pockets throughout all three drainages, with the most extensive loss of soil and vegetation occurring in Canyon Creek drainage. Over forty of these operations were initiated in Canyon Creek from Dedrick to the confluence with the Trinity River. Other areas heavily affected were Rattlesnake and Grizzly Creeks of the North Fork Trinity River where ten operations worked primarily in the riparian areas along these streams. The East Fork's narrow steep canyon's allowed for only a hand full hydraulic operations. Hydraulic mining accrued continually for three quarters of a century with peaks and valley tied to economic trends and finally ending with the outlawing of hydraulic mining in 1948.

In the 1880s, lode or hard rock mines were developed to recover gold mainly from quartz. The majority of these operations were established in the two drainages of Big and Little East Forks of Canyon Creek. There have been over thirty of these operations worked with varying success. The East Fork of the North Fork produced approximately twenty-four lode mines one of which is still active (Enterprise Mine). The North Fork of the Trinity River has seen but a hand full of load mines, the most productive of these were located in the Rattlesnake Drainage.

With the end of World War II and the advent of efficient modern mechanized equipment, mining in these drainages proceeded using open pit mining on the scattered placer benches that had not been mined prior to the War. These mining claims were now accessed using dozer to build approximately thirty plus miles of roads to the scattered mining sites throughout the three drainages. The longest of these access roads ran up the North Fork of the Trinity from Hobo Gulch Campground to Browns Mine on Rattlesnake Creek. Most of these roads however where less than a mile long and came off existing county or forest system roads and accessed placer benches down along the main drainages with the exception of the roads accessing the Chloride, Globe, Ellen, and Browns Ranch Mines.

The development of the modern suction dredge brought about a new era in mining in the 1970s. Suction dredging has become the most popular method of mining in the last thirty years these watersheds. From the earlier 1970s to 1985 several dozen dredging operation were active in each of the three watersheds. However, in 1985 with the designation of the Trinity Alps Wilderness, and corresponding withdraw of mineral entry and the decrease in gold prices from the highs of the 1980s the number of operations has declined markedly in Canyon Creek and the East Fork and almost disappeared in the North Fork of the Trinity River.

1.3 Reference Heritage Property Status

Prehistory

Use of the analysis area prehistorically centered around North Fork Trinity River and Canyon Creek. Prehistoric sites in this area could represent over 5,000 years of human settlement. Human occupation of these watersheds can be divided into several phases. The first would be the prehistoric, which can be divided further into two general periods. The earliest period extends from approximately 5,000 to 2,000 years ago. The people of this time were the ancestors of the Chimariko and Shasta tribes. They spoke languages belonging to the Hokum phylum. Linguistic and archaeological studies suggest these were the first American Indian people to inhabit these watersheds.

In the next prehistoric phase Wintu people, Penutian phylum speakers moved into the area taking over much of the earlier cultures territory. These later peoples through peaceful or forceful means reduced the earlier tribal territory. This period lasts from approximately 2,000 years ago to the present.

During the prehistoric phase, human subsistence was centered in these watersheds around the fisheries and oak woodland resources. In addition, hunting and gathering was carried out at higher elevations particularly along the ridgelines. The principal landscape effects caused by the Native peoples were by the use of fire. This tool was used for improvement of plants used for subsistence, improving forage conditions for deer, and for hunting. Combined with natural fire activity the landscape in this area was assumed more open. Timber stands were less dense with not as much dead and down material.

Historic

The time period from 1820 until 1850 was the initial contact phase with Euro-Americans. In this phase, the local tribes started receiving information and some trade goods from English, Russian, Spanish and American fur trading interest. The only documented expedition through the Trinity County area during this period is the Jedediah Smith party. It was during this time that the indigenous peoples started to suffer from the first contact with non-Indian people. Though unintentional, a malarial disease was introduced to Northern California by the Hudson’s Bay Company, which decimated Indian tribes throughout the Sacramento River Valley. It can be inferred that the disease, which was spread by mosquitoes, moved westward into the Trinity Mountains.

The initial gold discovery phase occurred from 1850 to 1860. During this time, Euro-Americans moved into this area in large numbers and started to displace the native peoples from their traditional lands. Along with the mining, timber cutting, large settlements, and grazing were started. At this time the Native subsistence patterns were largely stopped and replaced by Euro-American extraction activities.

During the 1860's to 1880's, gold mining became more organized and large scale. The non-Indian population grew and native population continued to decline. In addition, Chinese started to come into the area to rework older mining claims and take employment with mining companies. The principal communities in the area along with local governmental structures were more firmly established. In these watersheds, timber extraction increased to help support the mining activity, building, and heating. In addition, mining continued to grow with larger placer and hydraulic operations starting.

From 1880 to 1914, the initial gold rush frenzy had subsided and mining started to take on a more industrial aspect. Large hard rock, placer, and hydraulic enterprises were started which required substantial financing. During this time, more agricultural undertakings were being started. Farms and ranches were being established to provide food to the local mines and larger towns.

From 1914 to 1930, the mining subsided especially the large enterprises, which started to run into cash flow problems. This was caused by a number of factors one is the impact of World War I, which caused mineral prices to fall. Although, gold could be found through most of the Trinity Mountains there was no single large mother-lode vein containing enough to support a large industrial operation over several decades.

During the depression years, 1930 through 1941 gold mining operations increased again, especially small ones. Most of this mining was more for subsistence than in the hopes of gaining wealth. The hard economic times forced many people back into the mountains where hunting, fishing and gardening could provide food for survival. Gold mining helped to provide some hard cash for those items that could not be gathered or grown. The cutting of timber was for building and heating.

Between 1945 and 1985, the focus shifted from mining to Forest Management and logging. This industry provided many jobs and helped the local communities. However, after 1985 restrictions were placed on timber harvesting, shifts in timber management affected the logging industry. This shift contributed to the economic decrease in this area.

1.4 Reference Timber Harvesting Opportunities

Timber harvest records show that harvesting has taken place within the roaded area of the watersheds since 1962. Removal of individual trees identified as "roadside hazards" or "salvageable volume" (including both dead standing and windthrown trees) has been a management practice throughout the roaded history of the area. In the 1960's, a total of 91 acres of timber was harvested by clearcutting. Subsequently, these acres have been reforested and certified as successfully stocked plantations.

In the 1970's, timber harvesting included a total of 173 acres harvested by clearcutting and were subsequently reforested and certified. The 1980's resulted in 22 acres of clearcutting to meet timber harvest objectives identified in the Forest Plan. In addition, 3 acres of fire-killed timber was harvested and hazard trees were removed from 1 acre within an established Forest Service campground. No timber harvesting has occurred within the watersheds since 1988. In general, the timber harvest opportunities were pursued to manage the timber resource as identified as an objective within the Forest Plan.

1.5 Reference Fuelwood Opportunities

Fuelwood opportunities prior to 1994 were largely unconstrained by forest management rules and regulations. “Free Use” fuelwood permits were available until the 1980’s, allowing anyone with a permit to remove dead and down trees from any area on the National Forest lands outside of the wilderness. In some years, fuelwood collection allowed for permittees to fall and remove dead trees less than 24 inches in diameter. The steep terrain and roaded nature of the landscape were the limiting factors affecting fuelwood opportunities. There was an ever-increasing demand for fuelwood by the local community, and the roaded areas within these watersheds were popular fuelwood collecting areas.

The ROD for the management of habitat for late-successional species in 1994 ended the availability of fuelwood within the LSR portion of these watersheds, with the exception of dead and down woody material physically on a system road.

2. Access and Travel Management

2.1 Reference Trail Conditions

The current trail transportation system is a remnant of the trail network that once existed in the watersheds. The original trails were game and aboriginal routes. The miners and settlers developed some of these routes and built new trails. The early trails were often built for the shortest distance between two features, and had little consideration for grade or steepness.

The early Forest Service developed a trail transportation system of supply routes to mines, lookouts, hunting grounds, and heavy use recreation sites. The emphasis was for establishing way and secondary trails to access more of the country. Primary trails (more than one animal per day) were judged as a lower priority. The objectives were for safe and unobstructed passage for a loaded animal, and for durability. The common construction method was to shape the trail with an inside ditch, and a berm on the outside edge of the trail. The maintenance focus was on getting the trail open and clear for use.

The Canyon Creek drainage had about 15 separate trails that show on the records, with a combined mileage of approximately 93 miles. The North Fork and East Fork of North Fork drainages had some 22 separate trails, totaling approximately121 miles.

Some trails were improved and upgraded for recreational use, i.e. outfitter guides packing recreation visitors to Canyon Creek Lakes, Grizzly Lake, and Papoose Lake. Hunters improved some trails to popular hunting grounds. Some of the trails were abandoned and dropped from the trail transportation system in the 1970’s. The trail transportation system has remained relatively intact since then, but refined during the Trinity Alps Wilderness management plan process in the early 1990’s.

2.2 Reference Road System Conditions

Historically transportation within the NFCC watersheds occurred on trails by foot or with pack stock. Roads construction began in the 1940’s primarily in response to the needs of resource extraction activities. Roads and motorized vehicles provided a faster and more efficient means of transporting supplies for mining and timber harvest operations.

3. Erosional Processes

3.1-3.2 Reference Mass Wasting Features and Erosion

Pre-1850

The landscape of the watershed area has been formed by natural processes occurring over time scales of hundreds of thousands to millions of years. The most recent period of mountain uplift began in the early to mid-Pleistocene, approximately 1.7 –1.5 million years B.P. and continues to the present day.

The present topography of the watershed has been created almost exclusively by a combination of tectonic uplift, mass wasting, fluvial and surface erosion processes. The influence of these processes has been continuous from the beginning of the Klamath Mountain uplift. The extensive role that mass wasting has played in forming the present day watershed is evident on the maps that accompany this report. Mass wasting features occur over the entire watershed area.

The areal extent across the landscape or distribution of mass wasting features across the watershed is believed not to have changed appreciably because of land-use activities following European settlement.

1850-1940

During the past 150 years, land-use activities occurring within the watershed have influenced the rates, frequency, and magnitudes of occurrence of natural processes but apparently only to a relatively small extent relative to natural occurrences. The interactions between natural processes and land-use activities are complex however and do require further study to fully evaluate than is possible within this analysis. The land use activities that have had the relatively largest impact have been mining, fire suppression, timber harvest, and road construction.

Between 1850 and 1900, land-use activities introduced by European settlers began to influence natural processes in the watershed.

1940 to Present

An analysis of 1944 vintage aerial photos shows the area in Canyon Creek to have significant increases in mass wasting activities over those depicted on 1980 vintage aerial photos. These take the form of recent debris flows along the river and active erosion along old hydraulic mines. The area depicted in 1980 shows many of the flow deposits to have flushed downstream with a consequent widening of the river. Revegetation of portions of the mining areas along with decreasing erosion of these areas is also depicted.

4. Aquatic Systems and Species

4.1 Reference Anadromous Fish Populations and Distribution

Investigations of adult use began sporadically in the 1960’s and didn’t become consistent until 1978. Current population levels of wild steelhead and salmon in the Trinity River system average 15 and 20% respectively of their pre-dam levels (USDI FWS, 1983). It is unlikely that declining runs of salmonids in the tributaries to the Trinity River were caused by the building of dams, with the exception of Canyon Creek which was dammed; declining runs were more likely caused by ocean harvest and habitat degradation (Fredrickson, et.al. 1979).

The only historical numbers for fish currently available are for Trinity River tributaries below the dam for Chinook, which show 300 spawners in 1955, 3,500 in 1963, and 100 in 1968. Trinity River Chinook returning to spawn and unable to gain access past the dam construction site likely influence the 1963

number. The 300 fish in 1955 and the 100 in 1968 are in line with what is being produced now in the tributaries. Whether historically there were more fish in the tributaries cannot be known.

Even less information is known about historical conditions of the habitat of these three streams. It is generally accepted that the conditions of the watershed has been degraded over the last 140 years by intense placer gold mining, large flood events (1964), the 1987 fires, and the roads, especially the county road through the Canyon Creek riparian areas (Trinity County Local Interagency Interdisciplinary Team, 1994). Comparisons to 122 transport watersheds (Rosgen channels A and B) that were deemed to be in reference condition show all three streams to be in a non-reference state for all attributes measured except for fines (Region 5 unpublished data, USDA Forest Service, 2000). This suggests that the three streams are in a non-natural state that was likely caused or aggravated by the above manmade or natural influences. However, Canyon Creek is in a relatively young stage of recovery from the last ice age compared to the East Fork of the North Fork or the North Fork Trinity and the processes moving material down the watershed now are primarily geologic in nature (personnel communication, Shasta-Trinity geology, USDA Forest Service 2001).

5. Terrestrial Wildlife Habitat and Species

5.1 Reference LSOG Amount and Condition

Prior to relatively effective fire suppression starting around the turn of the century, “late successional dense” habitat, as described in chapter 3, was likely restricted to northeasterly aspects and the bottom third of slopes on other aspects. The upper two-thirds of southwesterly aspects were likely dominated by much more open (low canopy cover) ponderosa pine (rather than Douglas-fir) forest. Relatively frequent low intensity fires maintained this general pattern; intense stand-replacing fires were rare. Overall, LSOG stands were probably more resistant and resilient to disturbance such as fire than they are today. No reliable information is available related to historic levels of LSOG related species occurrence or relative abundance.

6. Fire, Fuels, and Air Quality

6.1 Reference Wildfire Threat to Local Communities

The persistence of species in Pacific Northwest forests through time is attributed to the vegetation adaptations to fire. If the fire regime is altered, then the capacity for that species to survive in an environment may be eliminated. In pine and mixed-conifer forests, frequent fires result in mineral seedbeds that facilitate establishment of species such as ponderosa pine, sugar pine, and Douglas fir. Fire exclusion, or infrequent fires will favor species such as true firs, incense cedar, and other shade tolerant, fire intolerant species. When high-severity fires occur within ecosystems that have evolved under low-severity fire, ecological effects are well outside the natural range of variability. High-severity fires are outside the natural range of variability today primarily in the extent of area affected by high-severity. Historically there were always patches of high-severity within the areas burned by mostly low-to-moderate severity fires. This gives us our complex stand structures and patch patterns characteristic of the Klamath Mountains.

By continuing to suppress low-to-moderate severity fires, we are managing in a way that insures that the fires that will affect most of the landscape are the high-severity stand replacement type fires. Impacts, from high-severity fires can include soil erosion, loss of soil organic matter and structure, soil cover, mineral nutrients, soil micro-organisms, and hydrophobic soil effects. Off site, effects can include physical, biological and chemical changes in water quality.

Fire has played and will continue to play an important ecological role in the development NFCC ecosystem for thousand of years. The Mediterranean climate, with cool, wet winters and warm, dry summers, predisposes the watershed to conditions that would carry fire annually. Appropriately, much of the vegetation of the watershed exhibits traits that allow survival and reproduction in this environment of regular fires. Substantial research and documentation regarding fire ecology and regimes have demonstrated the importance of fire in the environment.

Fire ecologists refer to the general characteristic of fires found within any specified area of interest as the fire regime. Fire regimes can vary considerably by vegetation and landscape. They offer a convenient way to categorize areas for study and management purposed. Fire regimes are described by the following characteristics: Frequency, rotation, spatial extent, magnitude, and seasonality.

Few fire-history studies have attempted to describe all of the fire-regimes characteristics. Most describe the fire frequencies or fire return intervals (FRI's). This type of data is the easiest and least costly to obtain. Table 4-1 summarizes fire-history for the Klamath Mountains from various published and unpublished sources. From this information, it is apparent the Klamath Mountain region burned on the average at least once between 12 to 15 years and not going more than 50 to 96 years without any fire. The exception is the riparian area. Riparian area may have served natural breaks, dividing one fire area from another. It is interesting to note in "Years Since Last Fire the larger number seem to show a relationship with the advent of fire suppression. (Personal communications & documents from Carl Skinner, PSW Research Lab, Redding, Ca. 1995-96).

Table 4-1

Area and Vegetation	Median FRI's	Minimum FRI's	Maximum FRI's	Years Since Last Fire
Canyon live oak-mixed conifer	13	7	39	5-75
Mixed Conifer Zone Mixed evergreen-tanoak	15	3	50	43-71
Ponderosa pine-mix conifer	11	3	55	35-90
Douglas fir-mixed conifer	12	3	59	5-92
Jeffery pine-white fir	12	4	96	42
Riparian areas	31	7	71	49-102

Anytime a component of a watershed is modified or changed, the whole watershed will function differently. Fire is a major component of the watershed and by attempting to exclude it we are impacting the other components of the watershed, signs of these impacts are now beginning to materialize, what the long-range environmental impacts will be is unknown.

Historically, the frequent, low-severity surface fires typical of this watershed killed only a small percentage of living trees while consuming much of the coarse woody debris; therefore, input rates of coarse woody debris were slow and relatively constant. Fire exclusion and past timber, harvest has resulted in the formation of a dense "midstory" of shade-tolerant conifers and shrubs. The overall increase in surface fuels and the laddering effect of existing vegetation has increased the threat and occurrence of crown fires, where historically they were rare. Though fire regimes have been altered by land use, fires still greatly influence the watershed. Fire exclusion is a powerful form of vegetation manipulation, not likely to result in ecosystem preservation where the historic plant and animal communities were fire-dependent. Through fire exclusion and past management practices we are essentially trying to produce climax communities over the entire landscape, where such situations never occurred historically.

Historically, oak woodlands and grasslands frequently underburned. Whether by Native Americans or lightning ignited fires, results were the killing of competing vegetation in the grasslands and increased the health and productivity in the mature oaks. Frequent fires in oak woodlands and grasslands halt encroaching conifers.

Communities Risk

Junction City or Mill Town, which it was know as in the late 1800, experienced several fires that destroyed large portion of the community.

7. Plant Communities

7.1 Reference Populations of Plant Species of Concern

Despite increased use of wilderness, the majority of the analysis area remains somewhat similar to conditions during reference periods, presumably prior to European settlement. Changes are almost entirely restricted to a few trails, meadows, large riparian corridors, and the portion of the analysis area outside of wilderness. While non-native plant species are presumably present to some degree in all parts of the wilderness, there is no threat to Sensitive or other plant species of concern, except where populations occur in these few localities. Outside of wilderness, the tree and shrub layer is similar in composition to reference periods, but the forb and grass layer has been altered significantly from perennial natives to annual grasses.

Habitat for plant species of concern has not changed significantly within the wilderness since reference periods. The Trinity Alps Wilderness is considered ecological refugia for most of the Sensitive species that have suitable habitat within its boundaries. This was a component of the rationale that led to removal of some species from the Sensitive Species list in 1998, and there is an assumption that future management activities will continue to be limited within the Alps. Human occupation has occurred on only a small portion of the area, particularly on trails, accessible meadows and historic encampments and towns. Aside from a limited degree of fire suppression, natural environmental events (wildfire, flood, windstorms) have been the dominant force of change overall since European settlement.

Many of the meadows within the analysis area have been used since reference periods for recreational camps. Trampling from hikers and pack stock, and grazing from pack animals may have impacted Oregon willow herb populations, but it is likely that Native Americans used the same areas in a similar fashion to some degree in reference periods. Invasive weeds, introduced by backpackers, hikers and pack stock have increased in frequency and abundance.

Plant habitat has been altered moderately to heavily around Upper and Lower Canyon Creek Lakes. Impacts include trampling and soil compaction overall, and complete loss of dead woody material in most areas around the lakes. These impacts have been caused primarily by increased visitor use of the lakes and a desire to include campfires as a part of their wilderness experience. Use patterns are not expected to change in the future without changes in management of the area.

Stand densities have increased in forested communities, increasing competition for resources and decreasing sunlight to the forest floor. Increases in stand density may have reduced available water in seeps, springs, and fens, reducing habitat for Oregon willow herb, English Peak greenbriar, and mountain and Brownie’s lady-slippers, but the degree of reduction is uncertain. It is unlikely that there have been any changes in habitat from pre-European settlement for Shasta pincushion, Canyon Creek stonecrop rough raillardella, Red Mountain catchfly, or Scott Mountain fawn lily. Habitat for Survey and Manage fungi has likely increased as accumulations of decomposed, woody debris and amounts of overstory shade have increased moisture retention in the soil.

Outside of the wilderness, human occupation and activities have changed habitat significantly since reference periods. Both Canyon Creek and the tributaries of the North Fork of Trinity River have been placer mined extensively, removing topsoil and leaving long stringers of rock tailings along the river. Mining activity has likely reduced suitable habitat for Shasta pincushion along Canyon Creek.

7.2 Reference Abundance and Distribution of Invasive Weed Species

Habitat for invasive weeds has increased since reference periods, as well as the number of populations in the analysis area. Increases in visitor use, ground disturbance and introductions of new exotic weeds have all contributed to greater presence of invasive weeds within the analysis area. While many exotic weeds were introduced at least 100 years ago into the United States (reasonable reference period time), the spread of these weeds took place with increased travel and settlement. Many of these populations did not expand dramatically until the past 30 years, when the frequency of contributing factors began to rise.

Introduced, invasive weeds have been migrating up Canyon Creek from Highway 299. Yellow starthistle and annual grasses brought in by increased vehicle traffic are both highly flammable species that have established dominance along the two major travel corridors, displacing native perennials and grasses. Dalmation toadflax, ailanthus, and scotchbroom are all present along Canyon Creek Road and moving upstream. Combined with the natural chaparral shrub layer and steep slopes along Canyon Creek road, fire hazard has increased substantially. While establishment of invasive weeds has presumably had less effect on plant species of concern outside the wilderness due to lack of suitable habitat, it has altered native plant communities to a much greater degree.

Chapter 5 - Interpretation of Ecosystem Conditions

This chapter describes the changes in ecological conditions within the North Fork Trinity River and Canyon Creek watersheds, including implications for watershed management objectives. 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 6 for identification of possible management actions.

1. Human Uses, Values, and Expectations

1.1 Change in Recreation Resources and Uses

The Canyon Creek Watershed has become the most popular and heavily traveled destination in the Trinity Alps Wilderness Area. Thirty-two percent of the total user days for the entire Wilderness Area are recorded in the main arm of the Canyon Creek Watershed. The tremendous increase in usage occurred some eighteen years ago, after a Sunset magazine article about Canyon Creek.

On busy weekends, campers often cannot locate pre-existing and appropriately sized campsites, especially in desirable locations. They then choose new camping spots, clear the area of rocks and vegetation, establish a fire-ring, and spend several days at the site.

Wilderness managers have attempted to offset this problem with frequent patrols, informing campers about the delicate nature of their campsite, and paying meticulous attention to fire-ring size and garbage cleanup. However, this approach can accomplish only so much, and the heavy usage in recent years has not only multiplied the number of inappropriately located campsites, but has also heightened the impact on legitimate campsites. Some of these sites are continuously occupied by successive groups from Memorial Day to Labor Day.

In Canyon Creek, given its high usage, any newly developed site runs a high risk of being perceived as "an established" site and of being quickly reoccupied. After only four or five occupancies, these sites can require a full day or more of labor to rehabilitate and several years of constant monitoring to revegetate.

The increased use has resulted in visitors campfires consuming down and dead woody material at an unsustainable rate. The lack of lakeside firewood has forced campers to seek their firewood further from lakeside campsites and use larger or green woody material.

This lack of dead and down woody material stands in stark contrast to the amount of woody material found in Canyon Creek’s uppermost meadow. This meadow (6290' elevation) is located one half mile northwest of Upper Canyon Creek Lake (5690' elevation). Despite its location in a narrow Canyon with poor exposure in a sparsely-forested area 600’ higher in elevation than Upper Canyon Creek Lake, this meadow harbors a surprising array of dead vegetation (i.e. branches, small dead trees, pine cones, etc.). This abundance is explained by the fact that very few hikers each year reach this meadow for overnight stays.

1.2 Change in Mining Activity

Changes in mining activity have been primarily driven by changes in technology and access. Early miners were limited to hand tools and accessed areas on foot. As more mineral resources were discovered, larger hydraulic mining operations allowed more area to be worked and more gold to be extracted. Large

mechanized equipment (bulldozers) built roads and allowed open pit mines to become profitable. Modern gold mining in the NFCC watersheds focuses primarily on instream suction dredges with a few open bench mines still in existence or proposed.

1.3 Change in Heritage Property Status

Changes to prehistoric archaeological resources from the reference conditions started from the first historic mining and agricultural activity. American Indian settlements along the major streams were primarily effected. Later road building to access communities, mines, and for Forest Management impacted a number of sites. Historic archaeological properties have been impacted in this century by the same factors.

1.4 Change in Timber Harvesting Opportunities

Timber harvesting opportunities have changed due to changing land allocations within the watersheds. The Trinity Alps area was designated as Wilderness in 1984, eliminating all timber harvesting within that area. Although the wilderness area had not been previously used as a timber harvest area, the opportunity to harvest timber was previously foregone exclusively due to the rugged and unroaded nature of the terrain.

The 1994 ROD resulted in a decreased timber harvesting opportunity within the areas designated as LSR. Although LSR designation does not prohibit timber harvesting, the management objective differs from previous Forest Plan objectives that had a greater emphasis on timber harvesting than does the current emphasis of managing for old-growth habitat. Timber harvest opportunities changed from a timber yield objective to an objective to use timber harvesting as a tool to maintain and enhance old-growth forest ecosystems.

Within the Matrix areas, timber harvesting opportunities still exist. Changes in management standards and guidelines constrain timber harvesting somewhat more so than in previous decades. Management to protect Riparian Reserves and forest habitat have changed from historical practices, resulting in less timber harvesting opportunities to the benefit of these other valued forest resources.

1.5 Change in Fuelwood Opportunities

There has been a decrease in fuelwood opportunities resulting from the forest management land allocation of LSR. Previous to 1994, fuelwood was generally available within the area now designated as LSR - limited only by accessibility of the fuelwood. Since 1994, fuelwood collecting has been prohibited within the LSR.

The wilderness areas have never been available for fuelwood opportunities. However, the demand for fuelwood remains high, resulting in increased utilization of the fuelwood available within the matrix land allocation areas.

2. Access and Travel Management

2.1 Change in Trail Conditions

The change between current and reference trail conditions is manifested in a number of ways. The current management objectives are primarily to protect the resources and provide for safety, where the early trail transportation system was oriented to opening up the countryside and providing access to develop the land. Some guidelines that affect current trail work include:

- Reconstruct trails to solve safety, erosion, and meadow damage problems.

- Maintain trails to assigned trail class and maintenance levels.
- Schedule the correction of health and safety items as first priority.
- Prevent or control erosion.
- Relocate existing trails outside of riparian areas to eliminate or reduce impact to riparian dependant resources.

The early emphasis was toward a relatively higher number of lower standard trails that could access more ground. Today the weight is on fewer trails, generally of a higher standard with more drainage and resource protection structures. The current number and mileage of the trails in the watersheds are greatly reduced from the early system.

The inside ditch and outside berm technique is opposite of today's method of outsloped tread. Decades of weather and washing have degraded the trails over time, and maintenance is more intense today. Funding has likely always driven the work, and the early trail work was performed by fire crews. The current trail crews concentrate primarily on trail repairs, and when maintenance budgets are small, the work is deferred.

2.2 Change in Road System Conditions

The early road system focused on opening mining access with low cost, low standard roads. Later roads were added for timber as well as further mining activity. Private property development and recreational use created a demand for higher standard, paved roads. Road mileage peaked in the NFCC watersheds in the 1980's and has declined due to the establishment of the Trinity Alps Wilderness area and decommissioning of unneeded roads.

3. Erosional Processes

3.1 Change in Mass Wasting Features and Soil Erosion Areas

Natural processes have been the predominant factors directly influencing geomorphic development; with mass wasting being chief among these. Human induced influences of logging, mining and roading activities have indirectly been factors for over one hundred years. Intense impacts began in the early part of last century. The employment of practices without regard for environmental protection during these early years has indirectly contributed to mass wasting and surface erosion with resulting impacts to water quality.

Since the occurrence of these intensive human induced impacts in the early century, the area has been in a process of recovery. It is anticipated that natural processes will remain constant with triggering of mass wasting occurring as a direct consequence of intense storm events.

Compared to even a decade ago, vegetation treatments are occurring on fewer acres. Clearcutting and road construction has also been significantly reduced and mine sites are revegetating. Standards and guidelines offer resource protection for soil quality including compaction, erosion, productivity, and for riparian areas. Highly unstable areas have been identified and guidelines have been developed that prohibits management activities on these areas. Therefore, the risk of water quality degradation through management related mass wasting is expected to be significantly less that in the past.

4. Aquatic Systems and Species

4.1 Change in Anadromous Fish Populations and Distribution

The abundance of Summer Steelhead, the primary anadromous fish within the North Fork Trinity River, has shown wide variation since 1978. However, the average number of fish over the last 15 years (524) is more than double the average of the previous eight years (232). This change in population average may be a result in change of limiting factors on the fish population. Broods prior to 1985, may have been limited by low mainstem flows resulting in consistent low returns. Brood years after 1985 appear to be driven by ocean conditions rather than instream habitat conditions and have high variability, with several very good years. The abundance of summer steelhead in Canyon Creek and the East Fork North Fork remains depressed, possibly as the result of historic dams in the watersheds that extirpated runs of wild fish. Current returns of steelhead may only be strays or remnant populations of historic runs.

The importance of the North Fork and Canyon Creek steelhead populations contribution to the Klamath River system as a whole has increased dramatically since the mid 1980's. From 1978 to 1986, the North Fork and Canyon Creek populations accounted for 16% of the entire Klamath basin summer steelhead run. Due to increasing runs in the Trinity watershed and decreasing populations of summer steelhead in other Klamath tributaries, the North Fork and Canyon Creek populations contributions increased to 42% of total during 1987 to 1997.

Mining has irreversibly altered riparian conditions in Canyon Creek. Channels are still recovering from extensive and intensive mining and may not reach a new equilibrium for decades. Mining activities have altered both the composition of the channel substrate and stream banks. These changes have increased both channel degradation and lateral migration of channels (stream bank erosion) in channels where mining has occurred. As a result, channels are wider and shallower, substrate is less complex, stream bank vegetation is less diverse, the frequency of large woody debris is reduced and the shading value of riparian vegetation has been reduced when compared to reference conditions. Due to the large scale of mining along the anadromous reaches of Canyon Creek, restoration efforts may have only limited effectiveness in the short term.

5. Terrestrial Wildlife Habitat and Species

5.1 Change in LSOG Amount and Condition

LSOG habitat on the upper two-thirds of southwesterly aspects and southerly aspects has likely increased due to effective fire suppression activities. Thus, these drier areas are currently supporting denser conifer stands that in many instances may not be sustainable (i.e., they are at an increased risk to large-scale loss due to intense fire). The increased fire severity in these areas would also threaten LSOG stands on other aspects and slope positions where historic fire intensity was historically relatively low.

6. Fire, Fuels, and Air Quality

6.1 Change in Wildfire Threat to Local Communities

In years prior to organized fire suppression activities fire was the environmental factor that initiated new successions, controlled the species composition and age structure of the forests and produced vegetation patterns upon which animal components of the ecosystem also depended. These fires thinned stands and helped maintain an "open and park-like" forest with an understory of herbs and shrubs. Ponderosa pine seedlings and saplings were thinned out by low-severity fires, and depended on fire to eliminate other competing vegetation. The principal cause of mortality in small trees following fire was crown scorch

rather than damage to the cambium or roots. Vegetation remaining on site after fires had less competition for moisture, giving them more resistance to insect attack and disease.

Forests in the Klamath Mountains that developed under pre-suppression era fire regimes were generally more open and had fire resistant trees such as ponderosa pine, sugar pine, and Douglas fir as the most characteristic dominant trees. Stands contained a diversity of species and age classes but relative densities were lower. Many of the fires were of large extent and would burn for months. As would be expected, there was a good deal of site-by-site variation in terms of fire behavior, periodicity, and effects on associated vegetation. Where fuel buildup and high intensity conditions occurred at the time of burning, small areas of stand replacing fires would occur. Within these newly created openings or gaps, patches of regeneration were established. Within large gaps, fire tolerant (and shade intolerant) species were favored, given proper seedbed conditions. Unburned patches were left throughout the low intensity fire areas, where the fuel profile was discontinuous or the fire burned during poor burning conditions.

Fire suppression activities have led to retarding rates of fire disturbance, which has allowed ingrowths of fire intolerant species, specifically incense cedar and white fir. Many larger pines died out due to competition. Natural regeneration of all species has occurred in greater numbers, further increasing stand densities. Smaller size classes now account for a higher percentage of the total stand. The increasing competition for available light, water, and nutrients creates stress on vegetation, facilitating suppressed growth, lack of vigor and susceptibility to damaging attacks by insects and pathogens. Fire exclusion has created forest patterns of even-age vegetation, which has greater opportunity to develop larger, more severe fires.

Lack of natural levels of fire occurrence over the last several decades coupled with the lack of stand management to improve forest density levels has resulted in a landscape which is prone to catastrophic fire events. This condition threatens the ability to maintain late successional, spotted owl within the analysis area.

Fire regimes in the mixed conifer forest type are far more complex and variable than those of other vegetation types in the Klamath province are. Mixed conifer forests contain ponderosa pine, Douglas fir, white fir, sugar pine, and smaller amounts of other species. Fire frequency is sometimes higher in mixed-conifer forest, than in ponderosa pine forests because of increases in litter production.

Species must possess certain adaptive traits in order to successfully establish, grow, and reproduce in fire-influenced ecosystems. These traits in general can be separated into two categories; those that enhance the survival of the individual and those that enhance the survival of the species. Traits that enhance individual survival include thick bark that protects cambial tissues and sprouting from belowground plant organs. Traits that enhance species survival include fire-stimulated flowering, seed storage on the plant (i.e. serotinous cones) and fire-stimulated germination of dormant seeds in the soil. In addition to genetic traits, age and vigor of individual plants will influence their response to fire. Environmental conditions are also important for survival, such as type of fire, frequency of recurrence, season of burn, fuel consumption, fire intensity, site characteristics (slope, aspect, soil), and associated species.

Community Risk

Human caused fires originate where there is most human activity. As fuels have built up in the forest and human activity increases, the risk of fire to communities has increased. The State Highway corridor is a major influence of human caused fire in the southern portion of the analysis area. Trailheads and forest visitors will remain a major influence in the NFCC watersheds.

7. Plant Communities

7.1 Change in Populations of Plant Species of Concern

The frequency and abundance of plants species of concern is unknown within the analysis area, particularly the portion within the Trinity Alps Wilderness. More information is available on the amount and quality of suitable habitat for specific species so some assumptions can be made. Fire exclusion, historic mining activities, and recreational activities that concentrate in meadows have had the greatest influence on changes between historic reference periods and the present. Knowledge of the distribution, frequency, and abundance of rare plant species is needed to determine where restoration is needed and which management activities might need changing for the benefit of those species. Meadows and serpentine outcrops have the greatest need for survey at this time.

7.2 Change in Abundance and Distribution of Invasive Weed Species

Invasive weed species have been observed within the analysis area, both inside and outside the Trinity Alps Wilderness. Observations have been casual and other species may be present which could present a greater threat to native and rare species diversity. Potential effects of the establishment of invasive, exotic, and noxious weeds include increased fire hazard, loss of native species diversity, loss of income from agricultural uses (reduced crop and livestock yields), and loss of habitat for wildlife and livestock. Control of invasive weeds is best accomplished when populations are small and recently established.

Survey, mapping, and control efforts are needed most within the wilderness portion of the analysis area. The large size of the Trinity Alps Wilderness increases its value as an intact site for native species diversity, wildlife habitat, and potential refugia for rare plant species of concern. There is a high likelihood that invasive weeds were introduced into the analysis area during fire suppression activities in 1987. Establishment of these species could greatly increase population size and distribution already present before 1987. Surveys are also needed along major trails and routes, which join Highway 299 and the analysis area (particularly County Road 401), as this is the major route of introduction and spread of weeds.

Chapter 6 - Key Findings & Management Recommendations

This chapter summarizes findings from Chapter 5, identifies Findings that result in management recommendations, and proposes possible management actions that would contribute to meeting desired conditions. The actions identified as “management recommendations” may then be incorporated into specific “proposed” actions within a NEPA analysis.

Findings by Issue

Six Issues critical to the future management of the NFCC Watersheds were identified in Chapter 2.

Issue #1: Human Uses, Values, and Expectations

Recreation

Finding 1.1

Recreational visitor use has had a dramatic increase in the Canyon Creek watershed and on busy weekends, the number of visitor groups exceeds the number of appropriate campsites. This leads to new campsites being built, often in inappropriate locations, which cause environmental damage.

Management Recommendations 1.1

Two features of this area lend themselves well to a controlled management approach: 1) As a dead-end watershed, it is not connected by maintained trail to other locations in the Trinity Alps Wilderness Area. This feature permits a high degree of accuracy in day-to-day population counts and provides the means to precisely regulate occupancy. 2) Due to the steep-walled nature of the Canyon, virtually every useable (i.e. flat) spot is identified, and most are developed into campsites. A combination of one or more of the following strategies will help to mitigate the current use condition in the Canyon Creek Watershed.

Possible Management Practice	Notes
Complete a capacity study for the Canyon Creek area.	Determine an appropriate number of visitors.
Direct Wilderness users away from the Canyon Creek area.	Use customer contacts, forest web site, and the Wilderness kiosk to encourage better distribution of Wilderness users.
Limit party size to site-appropriate numbers with low visibility signs on site.	Least impact on visitors.
Restrict overnight camping at Canyon Creek’s Lakes.	Decrease use on sensitive lakeside areas.
Rehabilitation Campsites where needed along Canyon Creek and at Canyon Creek’s Lakes.	Use low visibility signs to protect sites from usage during rehabilitation periods and to close inappropriate sites permanently.
Establish quotas for overnight visitor use in the Canyon Creek Watershed.	Most impact on visitors.
Implement a “Fee Demo” project for All Canyon Creek overnight users.	This will decrease use and may help fund rehabilitation activities.

Finding 1.2

Backpackers campfires, associated with high visitor use of the Canyon Creek watershed, have nearly eliminated the availability of dead and down woody material near Canyon Creek and the Lakes. Visitors have begun to break down standing dead and live vegetation for campfires. Dead and down woody material at popular campsites near Grizzly and Papoose lakes is scarce.

Management Recommendations 1.2

A combination of one or more of the following strategies will help to mitigate the current lack of woody material near Canyon Creek and the lakes in the NFCC watersheds.

Possible Management Practice	**Notes**
Within our permit process, emphasize the importance of using only camp stoves at high elevation Lakes and Meadows. Include a specific focus on areas that have little or no woody material.	Least impact on visitors.
Prohibit all campfires at Canyon Creek Lakes, at Grizzly and Papoose Lake in the North Fork of the Trinity River, and at the East Fork Lakes in the East Fork of Canyon Creek between May 20th and September 10th.	Limit campfires during peak visitor periods.
Prohibit all campfires beyond the Boulder Lakes Trail Junction in Canyon Creek, at Grizzly and Papoose Lake in the North Fork of the Trinity River, and at the East Fork Lakes in the East Fork of Canyon Creek.	Most impact on visitors.

Minerals

Finding 1.3

Bench Operations, in the last thirty years Canyon Creek has averaged three to five open pit mining operations yearly, although at present there are no active Plans of 0perations, there are however two in the environmental analysis phase and five in rehabilitation. Of the five open pit operations under rehabilitation, there are twenty-one acres of vegetation to reestablish, eight acres of which are in the riparian zone.

In the Canyon Creek watershed, there are numerous sites of previous human habitation associated with mining. A dozen of these sites have impacted the vegetation and are located in the riparian zones. Several of sites have mining debris and occupancy debris that are in some cases inhibiting establishment of native riparian vegetation.

Management Recommendations 1.3

Continue rehabilitation of mining sites and associated features. Ensure that future mining operations have adequate rehabilitation plans.

Possible Management Practice	Notes
Revegetate open pit mining sites.	Use native vegetation.
Clean up and rehabilitate abandoned residences associated with mining claims.	
Ensure that all future Plans of Operation have proper environmental review, rehabilitation plans and bonding.	

Heritage Resources

Finding 1.4

Many known archeological properties exist in the NFCC watersheds, however surveys have been limited to areas of active management.

Management Recommendations 1.4

Determine the distribution and appropriate protection measures for archaeological properties within these watersheds.

Possible Management Practice	Notes
Survey and map potential sites.	Carry out archaeological survey work in areas not previously surveyed and identify any undocumented archaeological properties within the watersheds.
Determine significance of existing sites.	

Wood Products

Finding 1.5

Timber harvesting and fuelwood opportunities have decreased, but demand remains high.

Management Recommendations 1.5

Treat fuels and manage vegetation to promote LSOG habitat features.

Possible Management Practice	Notes
Pursue timber harvest and fuelwood opportunities within Matrix Lands.	Monitor the timber stand conditions to identify timber harvest opportunities. Monitor for availability of fuelwood.
Use timber harvesting to manage vegetation to oldgrowth habitat needs within the LSR.	Timber stand densities and excessive fuel loadings may need to be reduced to maintain and/or enhance oldgrowth habitat.

Issue #2: Access and Travel Management

Finding 2.1

Trails provide an important travel and recreational resource in the NFCC watersheds.

Management Recommendations 2.1

Provide a safe, maintainable trail system in the NFCC watersheds.

Possible Management Practice	Notes
Maintain trails to assigned trail class and maintenance levels.	Trail maintenance includes both recurrent and restoration maintenance, and recurrent maintenance activities include: Logging out, brushing, tread maintenance, drainage maintenance and signing.
Relocate existing trails outside of riparian areas to eliminate or reduce unacceptable deterioration of riparian dependent resources.	The North Fork Low-Water trail, a segment of the North Fork Trinity trail #12W01, and a segment of the Whites Creek trail #11W06 are located in riparian areas that are eroding as the river meanders, and should be relocated to avoid trail related impacts.
Abandon and decommission trails that are very low use, and where budget constraints have precluded maintenance.	The Bear Gulch trail #9W23 and Moliter-Cold Spring trail #11W02 were both in the 1987 fire area, and both have not received maintenance in the last 10 years. These trails are now impassable and in some places impossible to locate. It is recommended that these trails be abandoned and decommissioned

Issue #3: Erosional Processes

Finding 3.2

Geomorphic and bedrock mapping is available for the watersheds and can be used to promote better management of the watersheds.

Management Recommendations 3.2

Use geomorphology and bedrock mapping in specific land management applications.

Possible Management Uses	Notes
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.	
Establishing priorities for road decommissioning or long-term road maintenance needs.	
Provide the physical context for distribution of stream channel types and associated aquatic habitats, as well as analyzing impacts of sedimentation.	

Issue #4: Aquatic Systems and Species

Finding 4.1

The North Fork Trinity River has abundant and naturally fluctuating populations of Summer Steelhead that contribute heavily to the total Klamath Basin population. Runs of other anadromous fishes are limited. Canyon Creek and the East Fork North Fork Trinity River have depressed runs of summer steelhead, but have some contribution to fall Chinook and coho runs.

Management Recommendations 4.1

Continue to manage Summer Steelhead habitat to maintain important steelhead populations in the North Fork Trinity River. Explore opportunities to expand the summer steelhead population and restore anadromous habitat in the East Fork North Fork Trinity River and Canyon Creek.

Possible Management Practice	Notes
Continue motoring of Summer Steelhead populations and habitat.	Count summer steelhead on a yearly basis to determine long-term trends. Conduct spawning surveys on a yearly basis to determine stream use by Chinook and coho salmon. Resurvey Stream Condition Inventory reaches every 3-5 years to track habitat changes.
Restore mining areas within Canyon Creek.	Explore restoration of mining areas along Canyon Creek to reestablish natural vegetation and bank stability.

Issue #5: Terrestrial Wildlife Habitat and Species

Finding 5.1

Management of forest resources and fire management have reduced the quantity and quality of LSOG habitat in the NFCC watersheds.

Management Recommendations 5.1

Treat fuels and manage vegetation to promote LSOG habitat features.

Possible Management Practice	Notes
Thin plantations to promote development of LSOG conditions.	See Plantation Protection under 6.1
Thin overstocked natural timber stands to promote LSOG conditions.	

Issue #6: Fire, Fuels, and Air Quality

Finding 6.1

The desired condition is to maintain the watersheds in forest and surrounding habitats, in a condition, which is not greatly susceptible to stand replacing fire. Continuous, large parcel of high fire behavior condition should be disrupted. Scattered pockets of fuel accumulations will still be present, more so on the north and east tending slopes than on the south and west tending slopes.

Management Recommendations 6.1

Use a variety of fuels management strategies to treat fuels within the NFCC watershed and promote a healthy forest. Join in partnership the Trinity County Fire Safe Council to implement recommendations.

Possible Management Practice	Notes
Understory Burning	Understory burning can be used to re-introduce low-intensity fire back into the ecosystems within the watershed.
Shaded Fuelbreaks	Overstory trees are thinned to approximately 40% canopy closures and most understory vegetation is removed. Canopies of remaining trees are to provide enough shade to inhibit ingrowth of brush species in the understories.
Fuel buffers adjacent to private land	Protection buffers of varying widths (slope, terrain, and various site-specific conditions will be limiting factors) on which existing vegetation will be manipulated to provide an area similar to shaded fuelbreaks in areas where national forest lands and private lands interface. Private land owners are encouraged to continue the fuel buffers on their lands. (Forest Fire Prevention standards and guidelines will guide projects specifics).
Plantation protection	Thinning of commercial and pre-commercial plantations ("Consider") spacing leave trees 10'x 10' or 12'x 12' to reduce likelihood of crown fires developing and permit mechanized equipment to operate effectively within stands. Consider a 25'x 25' or greater spacing of leave trees in 100' or greater buffers around unit boundaries or along roadsides to act as protection buffer. Pruning of lower limbs on trees >3" in diameter should also be considered.

Issue #7: Plant Communities

Finding 1.2

Plant Species of Concern are present in the NFCC watersheds.

Management Recommendations 1.2

Reduce human impacts to plants species of concern and their habitats.

Possible Management Practice	Notes
Manage campfires at Canyon Creek Lakes to retain ground woody material.	See recommendations 1.1 also.
Restrict the number of overnight visitors to Canyon Creek Lakes to reduce impacts to vegetation.	
Increase public education about visitor impacts to fragile wilderness ecosystems.	

Finding 1.2

Invasive weeds are present and spreading in the NFCC watersheds.

Management Recommendations 1.2

Initiate projects to control populations of invasive weeds and reduce their spread.

Possible Management Practice	Notes
Rehabilitate the three large mine sites along Canyon Creek Road to reduce the spread of weeds	Remove starthistle, mullein, and sweetclover, reseed with native grasses and forbs and reforest with ponderosa pine.
Manually remove aggressive, invasive weeds at high priority sites along Canyon Creek and Hobo Gulch roads. Monitor and retreat annually.	All ailanthus, dalmation toadflax, and scotchbroom plants and all starthistle found in isolated clumps.
Require use of pelletized feed for livestock in the wilderness.	Reduce the threat of importing invasive weeds into the Wilderness.
Manually remove dyer's woad at Hobo Gulch trailhead and 0.75 miles north of trailhead	Eliminate a population spreading up the North Fork trail into the Wilderness.
Perform intensive survey and map invasive weeds along trails and at meadows in the watershed analysis area, with emphasis on the main Hobo Gulch trail, Canyon Creek trail, Bear Wallow Meadow and Grizzly Meadow	

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