# 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 New River 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 need for this WA is driven by the recent Big Bar Fire Complex. On August 23, 1999, a large thunderstorm covered a broad area of northern California. Around 1:30 in the afternoon the Big Bar Ranger District had numerous down strikes, resulting in four fires detected by the end of the day. The four fires were: the Onion fire originating near Big Mountain, the Fawn fire originating near Fawn Butte, the Megram fire originating near Megram Ridge, and the Soldier fire also originating near Megram Ridge. On August 27 a fifth fire was detected, the Dees fire, originating near Mary Blaine Mountain.

Fire fighting resources were limited throughout California due to other fire activity in the state. All arriving forces were directed to the Onion fire except for some smoke jumpers who were working on the Wilderness fires. On August 31, the Dees fire was contained by smoke jumpers; the Megram and Soldier fires burned together and became known as the Megram fire. Fire lines were completed around the Onion Fire on September 13 and held the fire at 16,602 acres.

Efforts shifted to the Fawn and Megram fires but fire fighters effectiveness was limited by difficult access in the Wilderness. On September 19, the Megram and Fawn fires burned together and are known collectively as the Megram fire. The Megram fire burned uncontrolled for over 5 weeks until significant rainfall was received on October 27. Mop up and fire suppression rehabilitation activities continued until November 10, when the area became too wet to work in any longer. The final acreage for the Megram fire was 124,998 acres.

The focus of this assessment for these key watersheds will be on 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 (post fire) 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 on the fire-affected lands within these watersheds that are administered by the Shasta Trinity National Forest.

## Coordination with Six Rivers National Forest

The Big Bar Complex burned large areas of both the Shasta-Trinity and Six Rivers National Forests. Both Forests worked on WA's concurrently in response to this disturbance. The Six Rivers WA covered Mill, Tish Tang and Horse Linto Watersheds, while this WA covers the Upper New River and Lower New River watersheds. Forest boundaries follow watershed boundaries through the fire area, facilitating separate WA documents. Some ecosystem processes, such as sedimentation and aquatic habitats are completely contained within watersheds and therefore require little coordination between Forests while others such as late successional/old growth habitat and related species, cross watershed and Forest boundaries requiring more coordination to accurately analyze the effects. Line Officers, Watershed Analysis team leaders and resource specialists coordinated with their respective positions as needed to consistently analyze ecosystem processes.

## Public Participation

One important component of watershed analysis is public input. Public meetings were held in the communities of Weaverville, Big Bar, and Hawkins Bar. The meetings were well attended by individuals representing the full spectrum of interest groups. Information about the severity of the fire, the rehabilitation work accomplished so far and future opportunities was provided. Valuable input about land management activities that may be appropriate to restore the fire area has been gathered.

## 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 LSRA.

# CHAPTER 1
# CHARACTERIZATION OF THE WATERSHEDS

This chapter provides a brief overview of the New River 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 123,137 acres: 57,157 acres in the Upper New River watershed and 65,980 acres in the Lower New River watershed. The New River 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 Denny, Burnt Ranch and Hawkins Bar. The Big Bar Fire Complex of 1999 (henceforth referred to as the 1999 fires) affected large portions of these watersheds; Figure 1-2 shows the fire boundary in relation to the watersheds.

### Climate

The climate of the New River watershed is Mediterranean; hot and dry in the summer with temperatures occasionally above 100$^{o}$F, 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 Geographic Province composed of metamorphic and plutonic rocks. It is part of Irwin's (1960) Western Paleozoic and Triassic subprovince and contains rocks of the Hayfork terrane. The Hayfork terrane is further divided into the Western and Eastern Hayfork subterrane. The Western Hayfork subterranean is expressed in the lower New River watershed where resistant meta-andesites and batholitic granites are competent and sustain very steep headslopes. The Eastern Hayfork terrane is expressed in the upper New River watershed where a mélange of sedimentary and volcanic rocks display less resistance to erosion and form lower gradient hill slopes.

Natural erosion processes in the New River watershed consist primarily of debris slides and debris torrents in upper basin headwaters of major tributary streams, and streamside landslides located along major stream channels.

# 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 New River watershed, 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 New River watersheds include federally listed and Forest Service sensitive species based on our 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 New 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 New River watersheds are sediment and turbidity. Several creeks within the New River 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 New River 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. Coho are uncommon in the analysis area. 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 New River watershed. 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 New River watersheds fall within Management Area 4, Trinity Alps Wilderness, and Management Area 14, the New River/North Fork/Canyon Creek Management Area.

# Land Allocations

Figure 1-3 shows the land allocations within the New River watersheds. Table 1-1 summarizes the land allocations by watershed.

***Table 1-1. Land Allocations in the New River Area***

| Management Area | Acres |
|---|---|
| Wilderness | 78,505 |
| LSR | 37,186 |
| AMA | 5,005 |
| Administratively Withdrawn | 1,430 |
| Other (Private Property) | 1,011 |
| Grand Total | 123,137 |

# Wilderness

A portion of the Trinity Alps Wilderness is within the New River 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 New River watershed area is located within Late-Successional Reverse (LSR) 305. Late Successional Reserve 305 is included in the Six Rivers Forest-wide LSR Assessment approved by the Regional Ecosystem Office in February of 2000. The LSR assessment outlines management strategies to achieve LSR goals and objectives. 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 New River watershed is 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 New River is designated as a Wild and Scenic River from approximately 1000 feet below the confluence of Virgin and Slide creeks to the mouth of the river near Burnt Ranch. 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. Portions of the New River are included in each designation.

# 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

New River is a Tier 1 Watershed. 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. Portions of the Bell-Quinby, Little French Creek and Cow Creek roadless areas are located within New River watersheds (Figure 1-4).

# Human Uses

## Communities

The communities of Burnt Ranch, Hawkins Bar, Denny 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 New River and various creeks. These opportunities include rafting, kayaking, sunbathing, swimming, and fishing. Other opportunities in the area include camping, hiking, 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.

# 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 Upper and Lower New River watersheds. This watershed analysis is focused on management issues related to the Big Bar Fire Complex (1999 wildfires) on the Shasta-Trinity National Forest. Therefore, the issues and key questions all relate to the fire, its effects, and restoration efforts that may be needed to achieve desired conditions.

Because of the level of public interest and the impact of the fire and the importance of Forest's fire recovery effort, the STNF held public meetings in the communities of Big Bar, Weaverville, and Hawkins Bar. The purposes of the meetings were to encourage collaborative participation on the plan-to-project phase of the process, to assist in focusing the analysis of opportunities and possible management practices prior to design, to propose projects, and to initiate the NEPA process. Many interested people attended, sharing their concerns and opinions about fire restoration efforts and the potential future occurrence of other large-scale fires. Advertisements were placed in newspapers of local distribution, including the newspaper of record, the Redding Searchlight (Redding). In addition, approximately 140 letters were sent to individuals and organizations known to have interest in the fire restoration. The issues and key questions in this chapter were developed by the watershed analysis team from direction identified in the Forest LRMP, from coordination efforts with the Six Rivers National Forest's HLMTT Watershed Analysis team, and from the public input provided - including (over 300) written comments.

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

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

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

# Issue #1: Health and Recovery of Vegetation

The 1999 wildfires burned with varying severity throughout these watersheds, with both beneficial and detrimental effects to vegetation. In high severity areas, all or nearly all of the vegetation in the stand was killed. In moderate and low severity areas, the fire primarily consumed shrubs and small diameter trees in the understory. Relatively small patches of overstory tree mortality are apparent. Many understory trees and some overstory trees are likely damaged but cannot be detected at this level of analysis. The eventual affects of moderate and low severity fire to forested areas will become apparent as fire damaged trees die over the next several years. .

The land allocations in these watersheds (the Trinity Alps Wilderness, LSR 305, and AMA lands) provide specific direction regarding vegetation management. Within wilderness, natural ecosystem processes such as fire are to be evident, with minimal human impacts; vegetation manipulation is very limited. In LSRs, vegetation management in general should maintain or enhance late-successional forest conditions and reduce the risk of large-scale disturbance. After stand-replacing events, management should be designed to accelerate or not impede the development of late-successional conditions. In AMA lands, management direction provides for sustained timber harvest to maintain or improve the health and vigor of timber stands consistent with the ecosystem needs of other resources.

**KEY QUESTION 1.1** How did the 1999 wildfires affect conifer forest conditions in areas outside of the wilderness where Forest Plan objectives allow for silvicultural treatments to meet resource objectives? Along Roads? Within the LSR? Within Matrix lands?

**OUTCOME 1.1** Determine vegetative conditions and land allocations that would benefit from vegetation management actions and prioritize actions. Delineate priority treatment areas. Determine the transportation system necessary to facilitate implementation of activities. Determine mitigating measures to minimize adverse environmental impacts.

**KEY QUESTION 1.2** How did the fire affect the plantations within these watersheds? Are there additional areas of timberland that burned and may be considered for reforestation? Should burned plantations be reforested?

**OUTCOME 1.2** Identify plantations/timberland areas that are non-stocked or understocked. Identify areas to restock considering land allocation management objective. Determine site preparation and planting needs.

**KEY QUESTION 1.3** How have fires and human-caused activities altered plant communities and lead to changes in plant species of concern? What are the abundance and distribution patterns of invasive weeds?

**OUTCOME 1.3** Identify plant populations and plant communities with restoration needs. Determine invasive weed treatment priority.

**KEY QUESTION 1.4** Has the fire increased the risk of pest infestation?

**OUTCOME 1.4** Identify areas where infestation has potential for epidemic pest populations. Determine needs for management actions. Identify method of control.

**KEY QUESTION 1.5** How much of the area has had the vegetation, primarily the trees, killed as a result of the fire? How much additional mortality is expected?

**OUTCOME 1.5** Identify the high intensity burn areas in terms of foliage consumption. Use mortality modeling developed from similar wildfire incidents to predict additional vegetation mortality.

## Issue #2: Terrestrial Wildlife Habitat and Species

The 1999 wildfires affected wildlife habitat associated with a wide variety of terrestrial species. Negative effects to late-successional and old-growth (LSOG) conifer habitats is a major concern because late seral stage forests can take 100-plus years to develop and much of the fire occurred within a late-successional reserve (LSR). The LSR network is the foundation for maintaining viable populations of species associated with LSOG habitat such as the northern spotted owl, Pacific fisher, American marten, etc. Additionally, areas between "protected" late-successional areas (e.g., LSRs) must provide adequate connectivity habitat conditions. That is to say, species associated with LSOG must be both capable and willing to move between LSOG areas.

Species associated with earlier seral stages and non-conifer vegetation types (e.g., grass, shrub and hardwood types) are not considered an issue at this time because early seral stage and grass/shrub/hardwood habitat recovers relatively quickly after disturbance and can be quickly "created" should the perceived need arise in the future.

**KEY QUESTION 2.1** Did the fire create areas that no longer provide suitable conditions for species associated with LSOG habitat?
**OUTCOME 2.1** Identify areas of previous or potential LSOG where canopy closure has been reduced below 40 percent over areas of greater than 10 contiguous acres.

**KEY QUESTION 2.2** Does LSOG habitats comprise 15 percent or greater of capable land in the Upper and Lower New River fifth order watersheds?
**OUTCOME 2.2** Provide an analysis and map of LSOG conditions within the two watersheds.

**KEY QUESTION 2.3** Did the fire create areas that no longer provide connectivity habitat?
**OUTCOME 2.3** Identify areas of previous or potential connectivity habitat where stand conditions have been reduced below an average of 11 inches dbh and 40 percent canopy closure and identify any resulting connectivity gaps.

**KEY QUESTION 2.4** Did the fires affect habitat conditions within the territories and home ranges of spotted owl activity centers that lie within the analysis area?
**OUTCOME 2.4** Analyze habitat conditions related to spotted owl activity centers within the analysis area.

**KEY QUESTION 2.5** Is the amount of LSOG within LSR 305 within the recommended management range as a result of the fires?
**OUTCOME 2.5** Compare the amount of remaining LSOG within the New River Portion of LSR 305 with the RMR presented in the forest-wide Late-Successional Reserve Assessment completed by the Six Rivers National Forest.

## Issue #3: Fire, Fuels, and Air Quality

Fire is a major disturbance factor within the Upper New River (UNR) and Lower New River (LNR) watersheds, as evidenced by the 1999 wildfires. Human health impacts, mainly related to severely degraded air quality, were significant enough to warrant a federal and state declaration of emergency. Visibility impacts were also severe locally and noticeable for hundred of miles. These fires burned with varying severity. *(*As used here, severity refers to the level of survival of overstory trees. High severity is where nearly all overstory trees were killed. Low severity is where most overstory trees survived. Moderate severity is intermediate with mortality interspersed with survivors.*) Patterns of severity left by the fires appear to be within expected range of variation for the natural fire regime of this type of forest (e.g., Taylor and Skinner 1998). Large patches of high severity* are mostly associated with south and west slopes and near ridgetops. Other areas are mixtures of low and moderate severity. These patterns were often maintained in the past by frequent fires of low-moderate intensity that were often limited in extent by topographic structure and previous burn patterns. However, after many decades of fire suppression (probably half a century or more) fuel continuity promoted a large, though not necessarily severe, wildfire. The primary concern is with the continuity of dead vegetation that will become fuel for subsequent fires over the course of the next few years. Obviously, on sites experiencing high severity a large flux of dead vegetation will be added to the fuel mosaic over the next decade. In areas of low and moderate severity, though the overstory often survived, understory vegetation (shrubs, smaller trees) was killed and will be added to the available fuel component over the next few years. Subsequent fires may find enhanced fuel continuity and fuel accumulations at a spatial scale such that a greater percentage is likely to burn at higher intensity and affect diversity of vegetation patterns and the ability to provide effective wildfire protection to local communities.

**KEY QUESTION 3.1** Will the continuity of fuel conditions developing over the next few years as a result of these fires likely promote more widespread moderate-high severity fire and adversely affect diversity of vegetation pattern?
**OUTCOME 3.1** Determine areas where fuel conditions increase the likelihood of large, high severity burn patches and decrease the survivability of overstory trees during future wildfires.

**KEY QUESTION 3.2** Will continuity of fuel conditions developing over the next few years as a result of these fires likely promote or hinder achieving LRMP goals and objectives as a consequence of future wildfires?
**OUTCOME 3.2** Determine areas where fuel conditions promote or hinder LRMP goals and objectives.

**KEY QUESTION 3.3** What is the degree of threat from future wildfires to local communities as a result of the fires?
**OUTCOME 3.3** Determine the degree of threat to local communities resulting from the recent change in vegetation (fuels) condition.

**KEY QUESTION 3.4** How have the fires affected air quality impacts from future wildfires?
**OUTCOME 3.4** Describe likely air quality impacts related to current conditions and future fires.

# Issue #4: Erosional Processes and Aquatic Systems

## *GEOLOGY, HYDROLOGY and SOIL RESOURCES*

Erosion processes have formed much of the current topography of the watershed. These processes have and will continue to play a *major* role in shaping the landscape of the watershed. In the past century floods and fire have also played a large role in accelerating these erosion processes. In the period between 1944 and 1980 debris flows due to weather events have reshaped hillslope topography and scoured stream channels. In 1999 wildfires burned a large extent of the watershed. The full extent of fire impacts in the watershed is still unknown. There is a need to determine the full distribution, causes, and impacts associated with erosion and mass wasting processes in the watershed and determine effects on the objectives of the Aquatic Conservation Strategy.

**KEY QUESTIONS 4.1** What mass wasting processes are inherent within the watershed? What effects are evident within the watershed as a consequence of the 1999 wildfires? What management actions, if any, would protect soil and watershed resources?

**OUTCOMES 4.1** The short-term outcome is to reduce sediment delivery as a consequence of the 1999 fires, existing roads, highly erodible soils and unstable areas. This is accomplished through an understanding of the predominant erosional processes acting upon the watershed, the identification of active features, the delineation of priority treatment areas and implementation of appropriate techniques to protect riparian and soil resources. The long-term goal should be to maximize soil and watershed protection accomplished through a *comprehensive* study of erosion and sedimentation processes within the watershed.

**KEY QUESTION 4.2** What soil erosion processes are occurring in the analysis area? What is the soils' sensitivity to erosion? What effects did the wildfires have on soil erosion processes in managed and undisturbed areas? Where have the fires caused increased soil erosion and what is the magnitude of that increase?

**OUTCOME 4.2** Identify areas with: a) past management activities (roads, harvest); b) moderate and high wildfire burn intensities; c) high and very high erosion hazard potentials; and d) wildfire induced water repellency. Identify and describe appropriate management actions and mitigation measures that will minimize detrimental affects of wildfire and past management activities.

**KEY QUESTION 4.3** What are the processes that influence soil productivity in the analysis area? How has the wildfire affected soil productivity?

**OUTCOME 4.3** Identify areas where soil productivity is most affected by wildfires. Identify and describe appropriate management actions and mitigation measures that will minimize detrimental affects of wildfire and past management activities.

**KEY QUESTION 4.4** What effect did the 1999 wildfires have on the Hydrology of the New River Watershed?

**OUTCOME 4.4** Identify changes in flow characteristics that may increase risk of flooding or damage to other resources. Identify changes in turbidity, suspended sediment, and water temperature resulting from the fire.

## ***RIPARIAN and AQUATIC SYSTEMS and SPECIES***

Riparian areas are sensitive ecological components of a watershed. They are an important link between upland and aquatic areas, and provide important habitat for many species. Riparian areas within the New River area have been subjected to both natural and human-caused disturbances, including the 1999 wildfires.

Streams in the Pacific Northwest have adapted through centuries of disturbances that have adversely affected water quality and aquatic habitat in the short term, but have renewed and sustained aquatic ecosystems over the long term. The degree to which water quality and aquatic habitats have been altered from reference conditions, affecting the long-term viability of aquatic species, is a principle concern.

**KEY QUESTIONS 4.5** 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 4.5** Trends of anadromous fish populations and their distribution. Understanding of the importance of existing fish stocks in the New River watershed to the Trinity Basin.

**KEY QUESTIONS 4.6** How did the Big Bar Fire Complex affect critical habitat components (including water quality) for the maintenance, protection and recovery of anadromous fish populations? Has the fire created additional risks for aquatic species and habitats?

**OUTCOME 4.6** Identification of possible management actions or practices needed to facilitate the recovery or protection of habitat for riparian and aquatic species.

**KEY QUESTIONS 4.7** Did the1999 wildfires affect the riparian reserves ability to meet the Aquatic Conservation Strategy objectives? What possible management actions or practices are needed to facilitate the protection and recovery of riparian reserves?

**OUTCOME 4.7** Quantification of fire effects on riparian reserves. Identification of possible management practices to protect or recover riparian reserves.

# Issue #5: Access and Travel Management

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

**KEY QUESTION 5.1** What role does the transportation system play in access to the area? Are there areas such as the released Roadless Area that would benefit from increased or decreased access?

**OUTCOME 5.1** Identify roads of concern to local and extended users. Assess current condition of roads. Develop the Access Travel Management (ATM) plan for the New River Watershed for determination of the transportation system necessary to facilitate implementation of future activities for the watershed.

**KEY QUESTION 5.2** What are the trail conditions? What actions can be taken for trail restoration? Should trails be closed until they are safe for public travel?

**OUTCOME 5.2** Identify the level of trail maintenance that will protect the natural resources and provide for public safety. Determine the management practices that will restore the recreation opportunities and provide for public safety.

# Issue #6: Human Uses, Values, and Expectations

## ***HERITAGE RESOURCES***

Located within these watersheds are sites and landscapes of spiritual importance to local American Indian tribes. These areas are still in use today and are important in helping to maintain these traditional practices today and into the future. Several sites found within this watershed could be considered eligible to the National Register of Historic Places. Consequently, management actions undertaken within the watershed may affect these properties. Also, within the watershed many areas have not been surveyed for archaeological resources. These areas will need to be surveyed prior to any ground disturbing projects are undertaken.

**KEY QUESTION 6.1** What can be done to maintain the landscape surrounding heritage sites to help preserve their visual and atmospheric elements?
**OUTCOME 6.1** Identify management activities necessary to maintain those elements necessary to preserve the integrity of these traditional spiritual areas. These actions will utilize input from consultation with Native American tribes as well as from various resource specialties such as fuels, silviculture, and botany.

**KEY QUESTION 6.2** What is the range of management actions anticipated within the wilderness and non-wilderness areas of this watershed that may affect archaeological properties?
**OUTCOME 6.2** Heritage work needs to be undertaken before proposed actions are initiated to identify known and unknown archaeological properties that may be eligible to the National Register. If impacts are anticipated to eligible sites, necessary management actions need to be identified and carried out.

## ***LOCAL COMMUNITY ECONOMIES***

Trinity County roads and schools have historically been dependent upon Forest's receipts (i.e., 25 percent of the total receipts). Local employment, primarily in the timber industry, has been dependent on Forest-provided activities and outputs to maintain community stability.

**KEY QUESTION 6.3** What fire restoration efforts might contribute to local economies? Will the roads and schools within the community benefit from the values from any salvaged timber?
**OUTCOME 6.3** Identify opportunities that may support local economies.

## ***RECREATION***

The New River watershed has historically been known for its outstanding recreation opportunities. New River is a designated Wild and Scenic River, and has been used for fishing, rafting, and kayaking. Hunting is also a very popular activity in the New River area. Hiking, backpacking, camping, and equestrian use are common recreation activities in the New River portion of the Trinity Alps Wilderness.

**KEY QUESTION 6.4** What are the major recreation resources and uses of the watersheds? What condition are these resources in?
**OUTCOME 6.4** Identify historic and current recreation areas. Identify potential recreation opportunities. Determine management practices that will restore or improve the recreation opportunities.

**KEY QUESTION 6.5** How did management activities related to fire suppression affect the wilderness? Should wilderness areas be left alone? Should firefighting impacts be mitigated?
**OUTCOME 6.5** Determine treatment and mitigation techniques, if any, to naturalize fire control lines and helispots.

## ***RESEARCH NATURAL AREAS (RNAs) – i.e. "Learn from the Burn"***

The Forest Plan evaluated thirteen areas for their contribution towards the regional allocation of RNAs to reflect a variety of ecosystems/vegetation types to be preserved for research. Eight areas were allocated to RNAs. The selection and establishment of research natural areas within the National Forest System primarily emerges from continuing land and resource management planning and associated environmental analyses (FSM 1920 and FSM 1950).

It is the responsibility of the Regional Forester and Pacific Southwest Research Station Director to establish a Regional research natural areas committee to determine needs for research natural areas within the Region and each National Forest. An RNA regional needs assessment was completed, and areas on the Shasta-Trinity National Forest were designated for RNA establishment through the Forest Planning process (ROD April 28, 1995) to meet those needs.

Selections of RNAs were in locations that best represented the ecological conditions needed to complete the natural area system in areas where conflicting uses are minimal (FSM 4063.2). Lands within the Big Bar Fire Complex did not qualify for consideration for RNA establishment; however, other areas that met the need for RNA establishment were considered and land allocations made by the ROD for the STNF LRMP 4/28/95. The need to establish an additional RNA to study fire effects within the fire area does not appear to be warranted since over 50,920 acres of the 79,706 acres of the fire on the Shasta-Trinity NF are within lands allocated as the Trinity Alps Wilderness where natural physical and biological processes are currently allowed to prevail without human intervention (and available for study).

# CHAPTER 3

# CURRENT CONDITIONS

This chapter describes the current conditions of the various physical, biological, and human ecosystem elements in the New River 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. Vegetation

### *1.1 CURRENT CONIFER FOREST CONDITIONS*

The New River watersheds are dominated by mixed conifer timber stands, primarily consisting of Douglas fir. The vegetative condition of the New River watersheds has been altered from pre-fire conditions. The degree of the alteration is directly related to the fire intensity of the individual areas affected. Fire intensities varied throughout the area. Individual trees were killed in a mosaic pattern in low and moderate intensity areas. Entire stands of trees were killed in all of the high intensity areas and in some instances, entire stands of trees were killed in moderate intensity areas.

**Table 3-1. Burn Intensities by Vegetation within the New River Watersheds**

| Vegetation | High Intensity Burn | Moderate Intensity Burn | Low Intensity Burn | Unburned Area | Total Acreage |
|---|---|---|---|---|---|
| Hardwood, brush, or private land | 5,887 ac. | 3,198 ac. | 3,581 ac. | 6,198 ac. | 18,864 ac. |
| Shrub, forb, or seedling | 205 ac. | 167 ac. | 268 ac. | 800 ac. | 1,440 ac. |
| Pole-size conifer | 3,040 ac. | 2,022 ac. | 2,277 ac. | 4,870 ac. | 12,209 ac. |
| Early or mid-mature conifer | 8,251 ac. | 10,492 ac. | 14,720 ac. | 17,741 ac. | 51,204 ac. |
| Mature or old growth conifer | 4,525 ac. | 7,081 ac. | 13,992 ac. | 13,822 ac. | 39,420 ac. |
| Total | 21,908 ac. | 22,960 ac. | 34,838 ac. | 43,431 ac. | 123,137 ac. |

Table 3-1 displays the acreages by vegetation type affected by the fires in 1999. The current vegetation condition of these displayed acreages does not reflect the altering effect of the fires (e.g. the 3,040 acres of pole-size conifer burned in high intensity has been killed by the fires, resulting in 3,040 less acres of pole-size conifer than is shown in the listed total acreage of 12,209).

### *In Low to Moderate Intensity Fire Areas:*

In general, low to moderate intensity fire is beneficial to most plant species, rejuvenating growth in many cases. High intensity fire often kills individual plants leaving no potential for regeneration. Perennial plants with thicker bark, including trees, will often survive fire with little indication of injury other than loss of previously dead branches or basal fire scars. Over an entire landscape, some pockets of high intensity fire kill are normal and will accentuate species richness and structural diversity and movement of forested areas toward old-growth conditions. Most of the high intensity burn in the new river watersheds was restricted to scattered small or medium size pockets, creating a healthy mosaic of effects to vegetation.

The majority of the fire area on the Shasta-Trinity National Forest (72% of total fire acres) burned with moderate to low intensity fire. The effects of low to moderate intensity fire on vegetation include rejuvenation of perennial plant growth, reduction or elimination of dead plant tissue, and release of minerals and nutrients for new plant growth. Typically, tops are killed, but plants begin regeneration from roots or residual stem tissue by the next growing season. Elimination of litter and duff encourages release of dormant seeds in the seed bank, especially those that require a fire stimulus for germination. Regeneration is often visible as abundant sprouting of shrubs and perennials or as a noticeable flush of grasses, wildflowers, and other annual plants not seen in many previous years. Pioneer or early-seral species occupy bare spaces, increasing plant diversity and subsequent diversity of habitat/forage for wildlife and other biological organisms.

Within 2-5 years of a moderate burn, plant growth will typically be more lush and vigorous than prior to the burn and most fire-dependent shrub species will have attained stature equal to or in excess of that seen before the fire. Release of understory competition will encourage greater growth in any conifers that survived the fire. Within 20-50 years, vegetative diversity will decrease as pioneer species drop out and conifers and larger shrubs occupy the formerly burned area.

### *In High Intensity Fire Areas:*

Some species respond favorably to high intensity fire and seem to require it for viability, such as aspen in the intermountain west. Many other species, including those within the fire area, do not survive high intensity fire and will be killed completely, leaving openings in the forest. Over 90% of the existing conifers in these areas are expected to be dead, or will die over the next 3 to 4 years. Using infrared aerial photography and a limited amount of field reconnaissance, a preliminary identification of approximately 3300 acres of commercial-sized timber stand replacing wildfire activity has been observed outside of the wilderness area. Timber volume occupied within these killed stands is estimated at 30 million board feet. There may have been an additional 10 million board feet of timber killed on an individual tree or small group basis. The resultant openings will eventually be regenerated with nearby seeds blown in or carried by wind, water, and mobile organisms.

Heavily blackened soils may be too hot for seedlings of some species to become established for a period of time. Hydrophobic soils, when coupled with a lack of litter, duff, or organic matter, further reduce soil water holding capacity. Soil temperatures can increase and inhibit seed germination where canopy cover is lost in gaps. Underground mycorrhizal and bacterial organisms, essential to most species regeneration, can be lost from the site. If hot enough, even the underground seed bank may not be viable, although this seldom occurs. Severely burned sites often require a period of amelioration until the addition of needle litter, breakup of the soil crust, and creation of shaded micro sites can alter the character of blackened soils.

Recovery of plant establishment and vegetative diversity will take longer to occur where fire intensity is high. Tree growth will have to start from seed and will take longer because of competition from faster growing shrub species such as manzanita and tanoak. Shrub fields may occupy some areas for decades if habitat was marginal prior to the fire. Sites where conifer establishment is desired will require conifer planting within the next 2-4 years. Several species of brush and hardwoods should sprout during the spring of 2000.

### *Within Roadless Areas:*

The vegetation condition within the Released Roadless Areas is displayed in the following table:

**Table 3-2. Burn Intensities by Vegetation within the Released Roadless Areas**

| Vegetation | High Intensity Burn | Moderate Intensity Burn | Low Intensity Burn | Unburned Area | Total Acreage |
|---|---|---|---|---|---|
| Hardwood, brush, or private land | 518 ac. | 734 ac. | 1,380 ac. | 1,471 ac. | 4,103 ac. |
| Shrub, forb, or seedling | 50 ac. | 38 ac. | 47 ac. | 39 ac. | 174 ac. |
| Pole-size conifer | 188 ac. | 225 ac. | 487 ac. | 244 ac. | 1,144 ac. |
| Early or mid-mature conifer | 868 ac. | 1,474 ac. | 3,327 ac. | 3,116 ac. | 8,785 ac. |
| Mature or old growth conifer | 1,707 ac. | 2,485 ac. | 7,541 ac. | 1,382 ac. | 13,115 ac. |
| Total | 3,331 ac. | 4,956 ac. | 12,782 ac. | 6,252 ac. | 27,321 ac. |

Table 3-2 displays the acreages by vegetation type affected by the fires in 1999. The current vegetation condition of these displayed acreages does not reflect the altering effect of the fires. The Released Roadless Areas include most of the LSR and part of the AMA areas.

The information displayed in Table 3-2 was derived from infrared (IR) and color aerial photo interpretation (from IR and color photos taken after the fires were controlled), from data collected in the BAER Report, and from field reviews of the area (the field reviews have been limited to areas visible from roaded areas as of the writing of this WA). This information indicates a loss of 3,331 acres of vegetative cover, a “moderate loss” of vegetation from 4,956 acres, and an “underburning” and “patchy” loss of vegetation within 12,782 acres within the Released Roadless areas of the New River watersheds.

### *Along Roads:*

The Megram and Onion Fires created many dead and dying trees standing in close proximity to access roads. Damaged trees include merchantable-sized conifers, sub-merchantable-sized conifers, and hardwoods that will deteriorate and fall, either whole or in part, and pose a threat to human safety and to road facilities. Most of the roads within the New River are in the category maintenance levels 3, 4, and 5. The roads are open all year around with the exception of Forest Service Road 3N04. Road 3N04 is gated for seasonal traffic closed from October thru April.

In March of 2000, all roads open to the public within the fire complex were surveyed. The survey included County Road 403 (Denny Road), and Forest Roads 5N04, 5N04C, 5N05, 5N06, 7N04, 7N15, and 7N28. Approximately 890 trees were identified as hazards under the Six Rivers NF method (however, more trees are expected to meet the hazard tree definition as mortality becomes increasingly evident as the dry summer weather approaches).

**Table 3-3. Road Hazard Ratings by Number of Hazard trees per mile**

| Hazard Rating | Hazard trees/mile | Miles within Hazard Rating |
|---|---|---|
| Extreme | Greater than 100 | 2 miles |
| High | Between 51 and 100 | 3 miles |
| Medium | Between 11 and 50 | 12 miles |
| Low | Between 1 and 10 | 10 miles |
| Unidentified | Less than 1 | 23 miles |

### *Within the LSR Areas:*

The vegetation condition within the Shasta-Trinity National Forest portion of the LSR Areas is displayed in the following table:

**Table 3-4. Burn Intensities by Vegetation within the LSR Areas**

| Vegetation | High Intensity Burn | Moderate Intensity Burn | Low Intensity Burn | Unburned Area | Total Acreage |
|---|---|---|---|---|---|
| Hardwood, brush, or private land | 573 ac. | 533 ac. | 1,526 ac. | 2,042 ac. | 4,674 ac. |
| Shrub, forb, or seedling | 168 ac. | 99 ac. | 172 ac. | 556 ac. | 995 ac. |
| Pole-size conifer | 361 ac. | 575 ac. | 931 ac. | 1,160 ac. | 3,027 ac. |
| Early or mid-mature conifer | 1,166 ac. | 1,514 ac. | 3,896 ac. | 3,161 ac. | 9,737 ac. |
| Mature or old growth conifer | 2,013 ac. | 3,069 ac. | 9,799 ac. | 3,872 ac. | 18,753 ac. |
| Total | 4,281 ac. | 5,790 ac. | 16,324 ac. | 10,791 ac. | 37,186 ac. |

Table 3-4 displays the acreages by vegetation type affected by the fires in 1999. The current vegetation condition of these displayed acreages does not reflect the altering effect of the fires.

The information displayed in Table 3-4 was derived in the same matter as that identified for Table 3-2. This information indicates a loss of 4,281 acres of vegetative cover, a "moderate loss" of vegetation from 5,790 acres, and an "underburning" and "patchy" loss of vegetation within 16,324 acres within the LSR areas of the New River watersheds.

### *Within AMA Areas:*

The vegetation condition within the AMA Areas is displayed in the following table:

**Table 3-5. Burn Intensities by Vegetation within the AMA Areas**

| Vegetation | High Intensity Burn | Moderate Intensity Burn | Low Intensity Burn | Unburned Area | Total Acreage |
|---|---|---|---|---|---|
| Hardwood, brush, or private land | 30 ac. | 70 ac. | 96 ac. | 302 ac. | 498 ac. |
| Shrub, forb, or seedling | 21 ac. | 24 ac. | 96 ac. | 153 ac. | 294 ac. |
| Pole-size conifer | 23 ac. | 36 ac. | 193 ac. | 371 ac. | 623 ac. |
| Early or mid-mature conifer | 106 ac. | 168 ac. | 943 ac. | 1,390 ac. | 2,607 ac. |
| Mature or old growth conifer | 7 ac. | 30 ac. | 542 ac. | 404 ac. | 983 ac. |
| Total | 187 ac. | 328 ac. | 1,870 ac. | 2,620 ac. | 5,005 ac. |

Table 3-5 displays the acreages by vegetation type affected by the fires in 1999. The current vegetation condition of these displayed acreages does not reflect the altering effect of the fires.

The information displayed in Table 3-5 was derived in the same matter as that identified for Table 3-2. This information indicates a loss of 187 acres of vegetative cover, a "moderate loss" of vegetation from 328 acres, and an "underburning" and "patchy" loss of vegetation within 1,870 acres within the AMA areas of the New River watersheds.

## *1.2 CURRENT PLANTATION CONDITIONS*

A total of approximately 1,800 acres of established conifer plantations are within the fires that occurred on the Shasta-Trinity National Forests. These plantations are comprised mainly of Douglas fir with some plantations having predominantly Ponderosa pine. The stocking densities vary from 250-700+ trees/acre, ages of the plantations vary from 4-35 years, the size class of the plantations range from seedlings to pole-size (8-10 inch DBH) trees. The dominant hardwood species found within the majority of the plantations are tree form tanoak, big leaf maple, and madrone. The brush species occurring in some plantations are deerbrush, and snowbrush.

The damage to these plantations varied from severe to very light with little apparent damage to the trees. Utilizing an infared map, the burn intensity map prepared by the Burned Area Emergency Rehabilitation (BAER) team, and a cursory field review, it is estimated that approximately 750 acres of the existing 1,800 acres were subject to a moderate to high intensity burn. It is anticipated that mortality will be very high to existing conifers/hardwoods within these 750 acres of plantations.

Additional mortality is anticipated within plantations subject to low to moderate burn intensity. This is due to the fire damage to the cambium layer and/or root systems of individual trees. Weakened trees are unable to adequately conduct moisture and nutrients between the crown and roots, predisposing the individuals to attack from insects and/or disease. Some plantations burned at high intensity will be planted in 2000 without additional site preparation.

## *1.3 CURRENT CONDITIONS OF PLANT SPECIES OF CONCERN*

### *Known Populations of Species of Concern:*

There are no known federally Threatened or Endangered plant species on the Shasta-Trinity National Forest. There are no known Forest Service Sensitive plant populations within the analysis area. Two populations of Heckner's lewisia (*Lewisia cotyledon var. heckneri*) are found along the New River, but this species was removed from the Shasta-Trinity Sensitive Species list in 1998 because of commonness and lack of significant threats. There are no documented populations of any Survey and Manage vascular plant, bryophyte, or fungi species, but surveys for non-vascular plant and fungi species were initiated less than 2 years ago under the Northwest Forest Plan.

Seven plant species of concern are found in adjacent watersheds, including Shasta pincusion (*Chaenactis suffrutescens),* mountain and Brownie's lady's-slipper (*Cypripedium montanum, C. fasciculatum*), Canyon Creek stonecrop (*Sedum paradisum*), Heckner's lewisia (*Lewisia cotyledon* var*. heckneri*), Tracy's penstemon (*Penstemon tracyi*), and Oregon bensoniella (*Bensoniella oregona*). All species, except Oregon bensoniella (*Bensoniella oregona*), occupy habitat that is found within the analysis area. A significant number of populations of mountain and Brownie lady's-slipper are located on three geographic sides of the New River watershed, indicating a very high probability of finding both of these species within the analysis area.

### *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 & 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 New River Watersheds**

| Species | Habitat |
|---|---|
| Shasta pincusion<br>Canyon Creek stonecrop<br>Rough raillardella (Raillardiopsis scabrida)<br>Red Mountain catchfly (Silene campanulata var. campanulata) | Rocky slopes or talus, rock outcrops, stabilized stream terraces |
| Oregon willow herb (Epilobium oreganum) | Perennial wet seeps, springs, fens, meadows |
| Pickering's ivesia (Ivesia pickeringii)<br>Veiny arnica (Arnica venosa)<br>Red Mountain catchfly | Wet, grassy openings or dry openings with little vegetative competition or surrounding litter |
| Brownie lady's-slipper<br>Mountain lady's-slipper<br>English Peak greenbriar (Smilax jamesii)<br>Kenwood Marsh checkerbloom (Sidalcea oregana)<br>Red Mountain catchfly<br>Robust false lupine (Thermopsis robusta) | Montane forest, riparian-influenced or not |
| Scott Mountain sandwort (Minuartia stolonifera) | rocky openings on ultramafic soils |

**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<br>Mountain lady's-slipper<br>Candystick | Vascular plant | Montane forest, riparian-influenced or not |
| Pacific fuzzwort (Ptilidium californicum) | Bryophyte/liverwort | Cooler montane forest |
| Bondarzewia mesenterica<br>Otidea leporina<br>Otidea onotica<br>Otidea smithii<br>Polyozellous multiplex<br>Sarcosoma mexicana<br>Sowerbyella rhenana | Fungi | Late-seral conifer forest with coarse, woody debris and forest floor litter |

Proximity to the Pacific coast and a Mediterranean climate has the biggest influence on plant species distribution within the watershed. Over 90% of the watershed is occupied by mid-elevation montane forest, with a significant part of that being classified as mid to late-seral depending on the disturbance history. Riparian areas are abundant throughout. Both of these characteristics provide potential suitable habitat for the majority of species listed in the tables above. The remainder of the analysis area is composed of specialized habitats found in rocky areas, serpentine outcrops and woodlands, grassy slopes, and riparian areas.

The analysis area is in good ecological condition for the most part and habitat for plant species is fairly stable with minimal threats. Most of the habitat within the Upper New River subwatershed is protected from ground disturbance by wilderness designation, but currently experiences some limited impacts from recreational use (hiking, backpacking, horse packing). Impacts from grazing, urban development, and logging have been restricted to the area surrounding the few established roads in the Lower New River subwatershed because of steep terrain and limited accessibility. Invasive weed species have been introduced and established along existing roadways, trails and trailheads, but the proximity to plant species of concern is unknown.

The 1999 fires covered a broad geographic area, but it did not affect habitat of plant species of concern to a significant degree. The majority of the fire area burned with low or moderate intensity, resulting in beneficial effects to most plant communities in the short term. The predicted number of fire-killed trees over the next few years poses an increased threat of future larger-scale fires, with potential for more serious damage to habitat for plant species of concern than would be experienced where fire has been a regular part of the environment over the last 100 years. Specialized habitats, such as rocky slopes, seeps and springs, and dry openings were relatively unaffected due to lack of fuels to carry fire and probably would be unaffected in future fires of any size or intensity.

### *Invasive Weeds:*

Prior to the 1999 fires, most invasive weeds were introduced by motor vehicles along major travelways (County Road 402) or by people and pack animals using trails. Highest concentrations of weed populations have been observed at the New River and East Fork Trailheads, camps along the Brushy Mountain ridgeline, Old Denny, Jake's Upper and Lower Camps, and Mary Blaine Meadows.

**Table 3-8. Invasive Weeds Within the Watersheds**

| Species | Significant Concentration | Noxious Weed Designation |
|---|---|---|
| Dalmation toadflax | Highway 299 roadside & recreation areas | Federal List "A" |
| Bull thistle | New River trailhead<br>East Fork trailhead<br>County Road 402 | None |
| Klamath weed | all roadsides | None |
| Yellow starthistle | 1999 Big Bar FC fire camp | None |
| Dyer's woad | Highway 299 roadside<br>County Road 402 | None |

Fire suppression activities (dozer and hand fireline construction) increased habitat for invasive weeds - but not to a significant degree. All firelines within the wilderness area were hand constructed and very little dozer-constructed line was built outside of the wilderness within the analysis area, significantly reducing new habitat for weeds.

The New River Watershed experienced heavy use in the 20$^{th}$ century, especially from hydraulic mining, dredging, and hard rock mining along most riparian channels throughout the analysis area. Along with substantial ground disturbance, topsoil was removed in mining activities, which reduced the ability of native plant communities to regenerate, and left suitable habitat for introduction and establishment of invasive weeds. Some stabilization of these areas has occurred where mining activities have stopped, but the loss of topsoil will discourage restoration of native communities far into the future.

### *1.4 CURRENT RISK OF PEST INFESTATION*

Injured or stressed conifers will be killed by a variety of borers and bark beetles over the next 3 or 4 years. There has never been a documented bark beetle outbreak in California that could be attributed to a burn. There may be some concerns over individual dwarf mistletoe infestations, or certain root diseases at the project level, but these are not a factor at the watershed level.

### *1.5 CURRENT MORTALITY EXPECTATIONS*

The area mapped low burn intensity covers 34,838 acres, or 43% of the burned area on the Shasta-Trinity NF. These areas contain a mosaic of burn intensities that range from unburned to total aboveground mortality of woody vegetation. These areas appear similar to hundreds of thousands of acres burned on the Shasta-Trinity and Klamath NFs during the 1987 fires. Based on response of the vegetation under similar conditions, an area-wide estimate of mortality is that approximately one-third of the woody stems will be dead or will die over the next 3 to 4 years. After the mortality, the low intensity burn areas will generally still be stocked above historic levels, and will not be resilient, sustainable stands.

## 2. Wildlife

### DEFINITIONS AND ASSUMPTIONS:

**Late-Successional and Old-Growth Habitat (LSOG)** is defined as forest stands usually 180-220 years old with moderate to high canopy closure; a multi-layered, multispecies canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags, heavy accumulations of wood, including large logs on the ground. (FEIS, Pacific Northwest Plan)

This analysis utilized the Shasta-Trinity Land and Resource Management Plan (LRMP) database and the new Spotted Owl Baseline Habitat Database (jointly developed by the U.S. Forest Service and the U.S. Fish and Wildlife Service). The new owl baseline information is based upon the LRMP database and takes into account such things as tree growth since 1975, timber harvest and fire loss of habitat, elevation, aspect, site capability, and the latest information about where owls occur. For this analysis LSOG is divided into **three categories** described below and in Table 3.9.

- **HIGH QUALITY LSOG** is synonymous with spotted owl nesting and roosting habitat and is assumed to provide relatively high quality conditions for other species associated with LSOG.

- **LOWER QUALITY LSOG** is synonymous with spotted owl foraging habitat and is assumed to provide some benefit to other species associated with LSOG having somewhat sparser canopy closure, simpler vertical structure, and a lower decadence level.

- **CAPABLE** habitat is not currently LSOG but has the capability of growing into LSOG in the future.

**Table 3.9.** LSOG habitat definitions related to the Shasta-Trinity National Forests LRMP database.

| | | | | |
|---|---|---|---|---|
| | **High Quality (spotted owl nesting and roosting habitat)** | | | |
| Elevation (feet) | Vegetation type | Size Class/ Canopy Closure | Aspect | Site Class |
| 0-6,000 | Douglas-fir, mixed conifer, ponderosa pine, white fir, red fir | 3G; 4N&G; 5N&G; 6N&G | all | all |
| 0-4,500 | Douglas-fir, mixed conifer, ponderosa pine, white fir | 2G; 4P; 5P | N, NE, E, W, NW | all |
| | **Lower Quality (spotted owl foraging habitat)** | | | |
| 4,500-6,000 | Douglas-fir, mixed conifer, ponderosa pine, white fir, red fir | 2G, 3N, 4P, 5P | N, NE, E, W, NW | all |
| 0-4,500 | Douglas-fir, mixed conifer, ponderosa pine, white fir | 3N | all | all |
| 0-4,500 | Douglas-fir, mixed conifer, ponderosa pine, white fir | 3P | N, NE, E, W, NW | all |
| | **Capable (not included in vegetation, size, and canopy criteria listed above)** | | | |
| 0-6,000 | Douglas-fir, mixed conifer, ponderosa pine, white fir, red fir | Plantations, 2P/N&G, | | Site class 1,2, and 3 for ponderosa pine |

**CONNECTIVITY HABITAT** is defined as conifer forests that have at least 40 percent overall canopy closure and an average tree diameter at breast height (dbh) of 11 inches (Thomas et al, 1990). For this analysis both high and lower quality LSOG are assumed to provide this habitat.

**FIRE INTENSITY** was assessed and mapped at three broad levels of intensity briefly described below.

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

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

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

## *2.1 LSOG HABITAT LOSS*

High intensity (and to an unknown degree, moderate intensity) fire reduced the amount of LSOG habitat in the watersheds (see Tables 3.10 and 3.11). . High quality LSOG was reduced from approximately 48,990 acres to 42,513 acres fire and lower quality LSOG was reduced from approximately 21,260 acres to 18,019 acres due to high intensity fire

**Table 3.10.** Lower New River Watershed Late-Successional/Old-Growth Habitat related to Burn Intensity (acres).

| LSOG Habitat | Burn Intensity | | | | |
|---|---|---|---|---|---|
| | High | Moderate | Low | Unburned | Total |
| High Quality | 1,985 | 4,041 | 10,243 | 12,364 | 28,633 |
| Lower Quality | 484 | 839 | 2,234 | 5,859 | 9,416 |
| Capable | 635 | 558 | 1,176 | 3,934 | 6,303 |

**Table 3.11.** Upper New River Watershed Late-Successional/Old-Growth Habitat related to Burn Intensity (acres).

| LSOG Habitat | Burn Intensity | | | | |
|---|---|---|---|---|---|
| | High | Moderate | Low | Unburned | Total |
| High Quality | 4,492 | 5,072 | 6,578 | 4,215 | 20,357 |
| Lower Quality) | 2,757 | 3,122 | 3,849 | 2,116 | 11,844 |
| Capable | 2,002 | 1,077 | 684 | 714 | 4,477 |

Small forest openings are an important component of LSOG habitat, indicating that many of these burned areas still provide some value to species associated with LSOG forests. For example, areas where 40 percent or greater canopy closure remains (and areas with new openings of 10 acres or less) likely provide some value for species associated with these forests (ROD pg C-14). Therefore, only areas where canopy closure was reduced below 40 percent in areas over 10 contiguous acres within at least capable LSOG are considered as not providing value to LSOG associated species. Table 3.12 lists areas of high intensity fire within at least capable LSOG habitat that occur in patches of greater than 10 contiguous acres. This likely underestimates large burn patches due to close but not contiguous burned areas (areas separated by only a few meters are not considered “contiguous” in a GIS analysis) and loss due to moderate intensity fire.

| **Table 3.12.** Large (>10 contiguous acres) openings in LSOG habitat created by high intensity fire. These areas do not likely provide value to LSOG related species. | | | | | | |
|---|---|---|---|---|---|---|
| **LSOG Habitat** | **Total Acres** | **Watershed** | | **Land Allocation** | | |
| | | **Lower New River** | **Upper New River** | **LSR** | **CRA (wilderness)** | **AMA** |
| **High Quality** | 4,601 | 1,541 | 3,060 | 1,549 | 3,031 | 21 |
| **Lower Quality** | 2,371 | 405 | 1,966 | 316 | 1,997 | 58 |
| **Capable** | 1,926 | 548 | 1,378 | 479 | 1,433 | 14 |
| **Total Acres** | 8,898 | 2,494 | 6,404 | 2,344 | 6,461 | 98 |
| Note: Watershed and Land Allocations overlap. | | | | | | |

## *2.2 CURRENT PERCENT OF EACH WATERSHED IN LSOG CONDITIONS*

The distribution of old-growth stands throughout the landscape is an important component of ecosystem diversity, and plays a significant role in providing for biological and structural diversity across the landscape. Isolated remnant old-growth patches are ecologically significant in functioning as refugia for a host of old-growth dependant species, particularly those with limited dispersal capabilities that are not able to migrate across large landscapes of younger stands. To that end, 15 percent of federal lands within each fifth order watershed that are capable of growing to LSOG condition should be retained in those conditions. Both watersheds are currently well above this threshold when unburned or low intensity burned high quality LSOG are included (52% for the Lower New River and 29% for the Upper New River).

## *2.3 CURRENT CONNECTIVITY HABITAT CONDITIONS*

Connectivity is a measure of the extent to which the landscape pattern of the late-successional and old-growth ecosystem provides for biological and ecological flows that sustain LSOG associated species. Connectivity does not necessarily mean that LSOG areas have to be physically joined in space. However, conditions between LSOG areas must be compatible with the movement of LSOG associated species, such that they are both capable of moving through these habitats and included to do so

High intensity fires removed approximately 9,718 acres of connectivity habitat throughout both watersheds leaving 29,429 acres within the Upper New River watershed (80% of capable land) and 35,580 acres within the Lower New River watershed (80% of capable land). Within the Upper New River connectivity to the north and northeast into the Klamath National Forest is largely limited due to naturally steep harsh growing sites with resulting sparse vegetation, and two pre-existing connectors to the west onto the Six Rivers National Forest have been eliminated by high intensity fire. One connector between the Upper and Lower watersheds has been eliminated due to high intensity fire. Connectors to the east within both watersheds and to the south and east within the Lower New River remain largely intact. The most substantial gaps created by the 1999 fires occur in the interior of the Upper New River watershed. Overall, connectivity appears to remain adequate. Again, field inspection will likely reveal additional connectivity lost to fire. Over the next few growing seasons fire damaged trees will begin to die in these areas and effects to habitat will become more apparent.

## *2.4 CURRENT NORTHERN SPOTTED OWL TERRITORIES AND HOME RANGES*

The fires had a negative effect on a number of species associated with LSOG such as the northern spotted Owl. Seven spotted owl activity centers lie within the WA analysis area. Habitat conditions related to fire intensity associated with these spotted owl territories (0.7 mile radius around the activity center) and home ranges (1.3 mile radius around the activity center) are presented in Figures 3.1 and 3.2. Included is the “take threshold” established by the U.S. Fish and Wildlife Service; the viability of owl activity centers below this level are considered questionable. Activity centers 403, 404, 502, 503, and 504 lie within LSR 305.

**Figure 3.1. Spotted Owl (0.7 mile radius) Territory Nesting/Roosting Habitat and Burn Intensity**

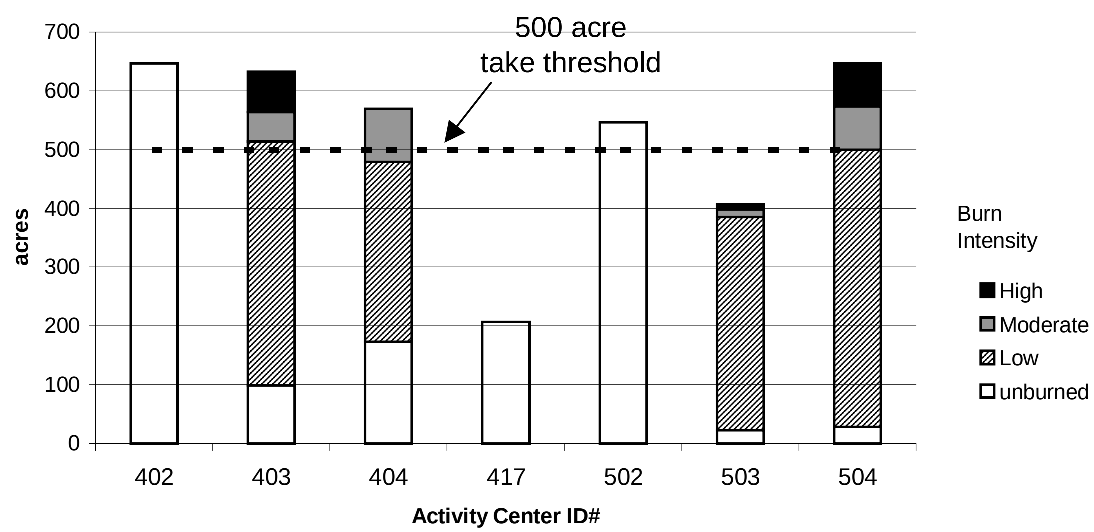
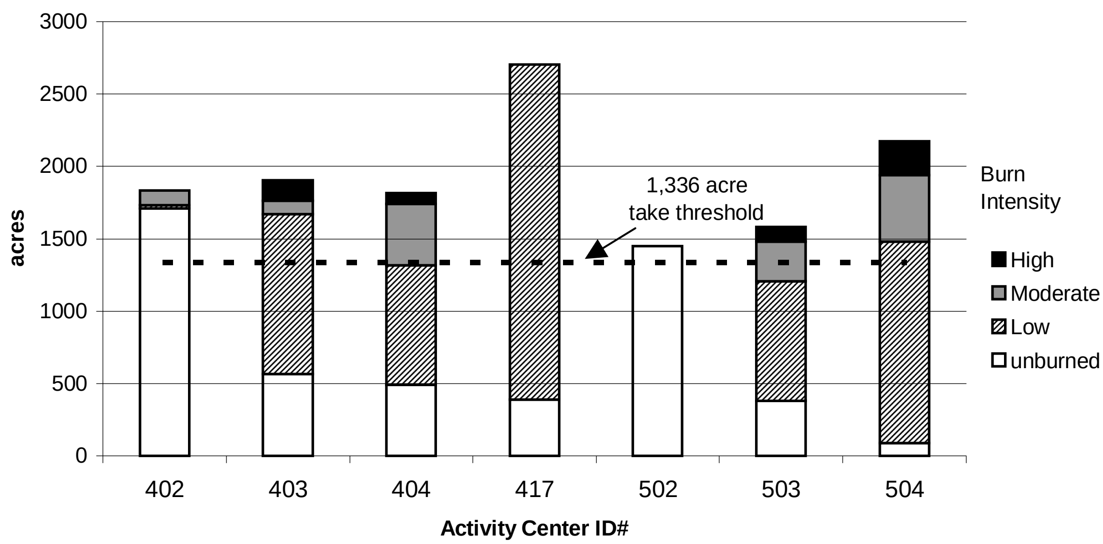


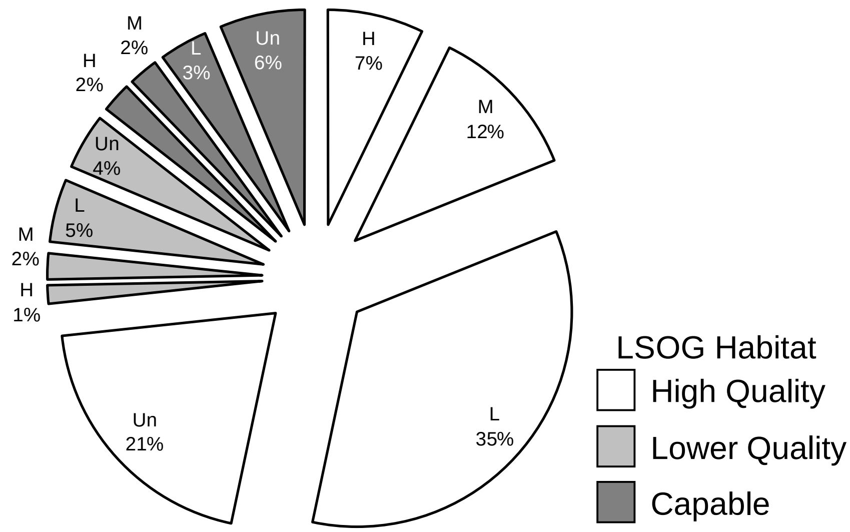
**Figure 3.2. Spotted Owl (1.3 mile raduis) Home Range Nesting Roosting/Habitat and Burn Intensity**




## *2.5 RECOMMENDED MANAGEMENT RANGE OF LSOG IN LSR 305*

The portion of LSR 305 that lies within the WA analysis area appears to be within the recommended management range (RMR) for LSOG conditions. The Six Rivers National Forest completed a Forest-wide Late-Successional Reserve Assessment (LSRA, April 1999) in which the RMR for LSOG conditions within LSRs was established (LSRA Table 4-2, page 4-5). The main vegetation series within the New River portion of LSR305 is the tanoak series. The RMR for this series ranges from 50 to 69 percent (combining the late mature and old-growth seral stages). The New River portion of the LSR currently contains approximately 56 percent of capable land in high quality LSOG conditions if only unburned areas and areas burned at low intensity are included (Figure 3.3). The definition for high quality LSOG and late mature/old-growth are assumed to be comparable for this level of analysis. Note that this analysis does not include the entire LSR 305. Much of this LSR lies to the west of this analysis area on the Six Rivers National forest where the fires generally burned more intensity. The Watershed Analysis completed by the Six Rivers National Forest for their portion of the fire indicates that the overall LSOG condition for LSR 305 is below the RMR.

**Figure 3.3. LSR 305 LSOG Habitat and Burn Intensity (High, Moderate, Low & Unburned)**




Percentages are based upon the 26,177 acres within the LSR that are capable of growing to LSOG conditions.

# 3. Fire, Fuels, and Air Quality

## *3.1 CURRENT MODERATE/HIGH FIRE INTENSITY POTENTIAL (HAZARD)*

The next fire within the New River watersheds is expected to burn with intensity dependent upon the fire fuels remaining from the 1999 wildfires. Under most conditions, a wildfire within the low intensity areas will most likely burn again as low intensity.

In moderate and high intensity areas, the short-term (within the next 5 years) fire intensity potential is expected to be of mixed intensity depending upon the accumulation of dead fuels. In many of these areas there will be more available dead and down fuels as killed shrubs and small trees become available fuel.

In moderate and high intensity areas, the long-term (within 7-25 years) fire intensity potential is expected to increase. Vegetation killed by the fire will be more readily available fuel for the next fire. The long-term expectation for fuel loading is closely matched with the Fire Return Interval of 8 to 15 years.

## *3.2 CURRENT FUEL CONDITIONS*

Some of the fire-killed trees will begin to fall by the year 2001, adding approximately 20 to 60 tons of extra fuel per acre. The amount and arrangement of the added fuel will set up some areas for a stand replacement fire.

It is estimated that the 10 to 20 percent of the fire area classified as high-intensity has experienced a stand-replacing event.  There appears to be an additional 15 to 25 percent classified as moderate intensity where at least 50 percent of the forest overstory has been killed.  The remaining portion of the fire area may be classified low fire affects.

The short and long-term fuel conditions have been most affected in areas of moderate and high intensity burning.  Low intensity burns affected fuel conditions in similar ways as prescribed fire - reducing much of the surface fuel loads without considerable mortality of large plants (trees).

The short term (3-5 years) effects of the fire would be one of reducing surface fuels in low intensity areas and killing up to 23 percent of the overstory vegetation.  Moderate intensity burn areas more completely consumed surface fuels and mortality of the vegetation would be higher. Larger diameter trees will be standing dead material with a mixture of dead brush and smaller trees in the understory.  In High intensity burn areas most of the vegetation has be killed with little to no ground fuels remaining.

Based on the 1995 Risk Hazard Analysis, it is estimated that at least 23 percent of overstory vegetation on 20 - 60 percent slopes has been killed.  Areas of higher mortality would be expected to be associated with areas of greater concentrations of dead and down fuels.

There have not been any activity fuels generated except those fuels resulting from the suppression actions.  Much of this fuel was used to rehab fire lines to reduce erosion.

### *3.3 CURRENT WILDFIRE THREAT TO COMMUNITIES*

Communities within the burn areas will have a short-term reduction in the threat from another wildland in areas adjacent to a moderate or high intensity burn area.  Low intensity burn areas adjacent to communities will also provide a short-term reduced wildfire threat.

### *3.4 CURRENT AIR QUALITY IMPACTS POTENTIAL FROM WILDFIRES*

Air quality will continue much as it has been in the recent past.  Most fires will continue to be suppressed quickly resulting in little smoke.  Occasionally large fire events will occur, most likely as a result of multiple lightning strikes, that will result in greater production of smoke a significant air quality deterioration as was seen during the Big Bar Complex.

Currently, there is not a long-term fuels management plan for the burn area.  It will be necessary to complete a fuel analysis before beginning a fuels management plan.  The first step would be the development of an accurate Risk Hazard Analyses so that priority areas can be determined.

## 4a.  Geology

### *4.1 CURRENT MASS WASTING PROCESSES*

Glacial processes of the Pleistocene, early Holocene, and present day mass wasting processes have played the largest role in shaping the geomorphology of the area.  (A map displaying these mass wasting processes is available in the geology report archived at the Weaverville Ranger District. This map is difficult to reproduce and is not generally available with copies of this Watershed Analysis report).

Glacially formed landscapes are found only within the uppermost reaches of the analysis area. The glacial processes, which formed these, were active during Pleistocene time. Today however, rockfalls, avalanches and debris torrents dominate these landscapes.

Primary local characteristics, which contribute to mass wasting are the following in the order of local importance: percent slope, geomorphic location, bedrock type and geologic structure. In many instances, such as in wet areas adjacent to draws and inner gorges and slopes greater than sixty-five percent, the processes which contribute to mass wasting are presently active. This is especially true in the northernmost portions of the analysis area such as within Eight Mile, Eagle, Slide and Virgin Creek sub-watersheds. Debris slides dominate within the meta-andesite of the Hayfork terrane and the Ironside Mountain Batholith and in the areas associated with these watersheds. Internested rotational/translational landslides and earthflows are found within the Hayfork terrane such as along the west side (east-facing slopes) of the New River.

Earthflows can be found along perennially wet areas of the southern portion of the analysis area. Sediment is usually transferred to the fluvial system near the distal end of the earthflow where channels have developed. Channel stability in the form of bank failure, active headcuts, and lateral gullies is common at the distal portion of most earthflows. Earthflow movement rates are sometimes rapid enough to cause channel abandonment and migration on an annual basis.

During the mapping process for this analysis area the slope stability hazards of the mass wasting features were stratified through photo-interpretation techniques according to their activity or potential to become active. Briefly stated, the mapping indicates an upper watershed whose area is covered by active mass wasting features. This condition existed before the fire and has been exacerbated by post fire conditions.

# 4b. Soils

## *4.2 CURRENT SOIL EROSION PROCESSES*

Surface erosion involves the removal and downslope 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. Wildfire is probably the single most important natural factor in the erosion history of the analysis area because it alters or removes soil cover (forest floor) and increases erosion above undisturbed rates over very large areas.

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. The amount of soil reaching a channel is dependent on slope steepness, soil cover, and connectivity of erosion source to a channel.

### *Soil Sensitivity to Surface Erosion*

The distribution of soil erosion hazard (sensitivity to surface erosion) is estimated by the EHR rating system. This system classifies soil into four hazard classes: Low, Moderate, High, and Very High. Table 3-13 displays the acres of the four soil erosion hazard classes within the analysis area.

**Table 3-13 Soil Erosion Hazard Potentials**

| Watershed | Low hazard | Moderate Hazard | High Hazard | Very High Hazard |
|---|---|---|---|---|
| L New River | 2,347 acres | 7,938 acres | 46,729 acres | 8,894 acres |
| U New River | 955 acres | 32,562 acres | 23,505 acres | 135 acres |

### *Effects of the 1999 Wildfires on Erosion Processes*

Fire is a natural part of forest ecosystems. The effects of fire on soil erosion result from the removal of soil cover which exposes mineral soil to raindrop impact and overland flow. Severely burned areas typically experience higher rates of soil erosion (sheet, rill and dry ravel), increased runoff, loss of the forest floor, loss of site nutrients and fire-induced hydrophobicity in granitic terrane soils above 4500 feet elevation. Lightly burned areas typically experience small increases in soil erosion, slightly increased runoff, loss of part of the forest floor, and loss of a portion of site nutrients. Litter and needle fall immediately post-wildfire have increased soil cover in these lightly burned areas.

There are approximately 2,126 acres of these hydrophobic soils in the analysis area with most of these soils in the Upper New River watershed. Soil erosion from burned areas decreases significantly over time (3 to 5 years) as soil cover increases.

Table 3-14 displays surface erosion values for burned acres, road acres, harvest acres and undisturbed acres for post-wildfire conditions. The fire and harvest acres represent short-term increases that will dramatically decline in three years (2002) and approach undisturbed conditions in 5 to 10 years. Road and undisturbed acres typically produce a constant volume of sediment unless a major landscape-altering event occurs.

**Table 3-14 Estimated Surface Soil Erosion For Post-Wildfire Conditions (1999-2000)**

| Watershed | Burned Area Surface Erosion ($yds^3$) | Road Erosion ($yds^3$) | Harvest Erosion ($yds^3$) | Undisturbed Erosion ($yds^3$) | Total Erosion ($yds^3$) | Total Estimated Delivered sediment ($yds^3$) |
|---|---|---|---|---|---|---|
| L New River | 66,446 | 3,578 | 320 | 680 | 71,024 | 12,000 |
| U New River | 152,176 | 322 | 0 | 132 | 172,630 | 25,800 |

These increased erosion volumes are 94% (L New River) and 99% (U New River) – resulting from the 1999 wildfires. This data indicates that wildfire is the single most soil erosion-causing event to occur in these watersheds.

### *Where Fire Caused Increased Surface Erosion is Occurring*

It is important to identify where on the landscape wildfire caused increased soil erosion is occurring. Table 3-15 combines erosion hazard groups (EHR) with wildfire burn severities. Map #1 (in Appendix) displays high and very high soil erosion hazard groups that burned with moderate and high burn severities. It is important to note that increases in surface soil erosion do not equate directly to impacts to aquatic habitat since affected soils may be located in localized sites, on upper slopes, or on ridge tops. The highest erosion production will be for high and very high EHRs that burned with moderate and high burn severities. Table 3-15 shows that 33% of Lower New River and 40% of Upper New River watersheds are in these burned EHR classes.

**Table 3-15 Distribution and Interaction of EHR Groups with Wildfire Burn Intensity**

| Watershed | EHR Group | Burn Intensity Low | Burn Intensity Moderate | Burn Intensity High |
|---|---|---|---|---|
| L New River | Low | 3% | 0.7% | 0.1% |
| | Moderate | 0.1% | 0.1% | 0% |
| | High | 44% | 23% | 5% |
| | Very High | 19% | 5% | 0.2% |
| | Total | 66% | 29% | 5% |
| | | | | |
| U New River | Low | 0.5% | 0.3% | 0.02% |
| | Moderate | 29% | 11% | 18% |
| | High | 29% | 7% | 4% |
| | Very High | 0% | 0% | 0% |
| | Total | 59% | 18% | 22% |

### *Magnitude of Increased Surface Erosion*

Table 3-16 compares average pre-and post-wildfire erosion rates ($yds^3$/acre). The data provides comparative effects of the wildfire in the New River watershed. The Upper New River watershed had more of the watershed burned with higher burn severities (Table 3-14) as well as more acres burned. The magnitude of increase in Upper New River watershed erosion is much more dramatic when compared to the Lower New River watershed. The data suggests that the wildfire is having a greater effect on watershed processes in Upper New River than in Lower New River. This implies that the healing or recovery process may be slower in Upper New River.

**Table 3-16 Average Pre- and Post-Fire Surface Erosion Comparisons**

| Watershed | Pre-Fire Erosion Rates ($yds^3$/acre/year) | Post-Fire Erosion Rates ($yds^3$/acre/year) |
|---|---|---|
| L New River | 0.077 | 2.20 (29-fold increase) |
| U New River | 0.024 | 3.05 (127-fold increase) |

## *4.3 CURRENT SOIL PRODUCTIVITY*

### *Processes that Influence Soil Productivity*

Soil productivity is a measure of a soil's ability to supply water and nutrients to vegetation. This ability to grow vegetation also depends on the interaction of the below ground soil flora and fauna with the nutrient rich forest floor (duff mat and fine litter) and above ground vegetation.

Changes in soil productivity occur naturally and from forest management practices. The only real decline in soil productivity occurs when soil displacement happens, when soil is lost by accelerated surface erosion or when soil is detrimentally compacted. These long-term changes require 50 to 1000 years to recover, depending on the intensity of impact.

### *Effects of the 1999 Wildfires on Soil Productivity*

Fires that consume the forest floor have the greatest potential to impact soil productivity due to increased soil erosion and nutrient removal. In the 1999 wildfires, the forest floor (litter and duff layers) was completely consumed in the moderate and high burn intensity areas. The consumption of the forest floor can result in a loss of 150 to 500 pounds of nitrogen per acre (Miller et al., 1976). The complete removal of the litter and duff layers by wildfire can have a significant effect on the nitrogen availability and uptake by forest vegetation as well as the soil fauna that converts unavailable nitrogen to available nitrogen. Currently, the 1999 wildfires have created a nitrogen deficit on these burned soils. Data in Table 3-15 indicates that at a minimum, 34% of Lower New River and 40% of Upper New River soils have lost a significant portion of their available nitrogen source.

# 4c. Hydrology

## *4.4 FIRE EFFECTS ON HYDROLOGY*

The effects of the 1999 wildfires on the vegetation, soil ground cover, potential for surface erosion, and subsequent sedimentation of streams in the New River watershed depend on the intensity of the fire across the landscape. Effects of the fire on hydrology are based on the entire New River watershed area (Including the East Fork) of 149,374 acres.

**Table 3-17. Burned Area by Fire Intensity Level**

| | High Intensity | Moderate Intensity | Low Intensity | Total |
|---|---|---|---|---|
| Wilderness | 17,440 ac. | 16,842 ac. | 16,644 ac. | 50,926 ac.* |
| Non-Wilderness | 4,468 ac. | 6,118 ac. | 18,194 ac. | 28,780 ac.** |
| Totals | 21,908 ac. | 22,960 ac. | 34,838 ac. | 79,706 ac. |

* Does not include 56,257 acres of the watershed outside of the fire perimeter.
** Does not include 13,411 acres of the watershed outside of the fire perimeter.

Although the fire burned over 53% of the total New River watershed, the portion of the watershed that burned at moderate and high intensity was, overall, relatively low. The resulting effects on hydrology are therefore expected to be low overall. Many climatic and local variables are involved that may produce erosion and sedimentation on a local level. Field observations at the time of preparation of the BAER report found no specific areas where erosion control efforts would be successful. All of the areas burned at a high intensity investigated were determined to be too steep to make erosion control measures practical or effective.

**Table 3-18. Percent of Watershed Area by Fire Intensity – New River Watershed**

| | | | |
|---|---|---|---|
| Wilderness | 16% | 16% | 68% |
| Non-Wilderness | 11% | 15% | 74% |
| Watershed Total | 15% | 15% | 70% |

The 10-year recurrence interval storm, with a 24-hour duration was chosen for the watersheds affected by the Big Bar Complex. Large winter storms with duration of 1-3 days have the greatest potential to cause peak flows in the Coastal Ranges of Northern California. Much of the area burned by the fire is located between 3,000 – 5,000 feet in elevation. These elevations are vulnerable to rain-on-snow events. Rain-on-snow events have been responsible for many of the large floods that have occurred in the coastal mountains during the past 100 years. The 10-year, 24-hour rainfall event was determined to be 5.71 inches. The value was derived from rainfall depth-duration frequency data for California (California Department of Water Resources, 1982). The value was based on 39 years of rainfall data collected at Hoopa.

**Table 3-19. Post-fire design flows expressed in cubic feet per second for 2- and 10-year recurrence intervals**

| Watershed | | Post-Fire 2 year Recurrence Interval Flow (cfs) | Post-Fire 10 year Recurrence Interval Flow (cfs) |
|---|---|---|---|
| Upper New River | 19,227 | 4835 | 11,889 |
| Lower New River | 10,932 | 7204 | 15,011 |
| Totals | 30,159 | 12,039 | 26,900 |

These figures show only about a **five percent** increase in both the 2 year and 10 year interval storm flows due to the effects of the fire in the New River watershed. These kinds of flow increases are not likely to affect stream channel stability or the populations of aquatic organisms in the stream system of the watershed.

# 4d. Riparian and Aquatic Systems and Species

## 4.5 *FISH ABUNDANCE AND DISTRIBUTION*

Adult summer steelhead were surveyed by the USFWS in early November in the New River from Quimby Creek to the mouth. Two hundred ninety six (296) adult fish and 12 half-pounders were counted. Over the last ten years, 57% of the total population of steelhead in the New River has been counted in this reach, allowing this year's survey to be extrapolated to estimate the total number of steelhead at 538 fish. Eighteen Chinook were also counted in the survey. The New River and its tributaries have an estimated 50 miles of holding, spawning, and rearing habitat of special importance to summer, fall, and winter steelhead Figure (3-4).

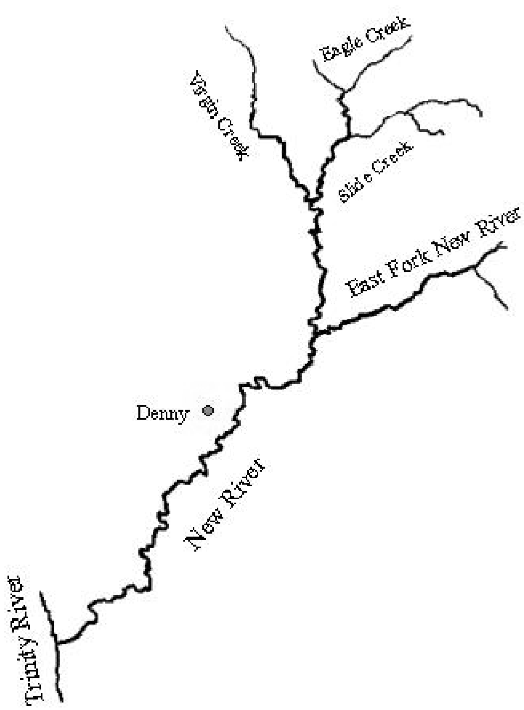



Figure 3-4. Stream reaches in the New River watershed accessible to anadromous salmonids.

## *4.6 FIRE EFFECTS TO AQUATIC HABITAT*

Aquatic and riparian resources were lightly impacted from the 1999 wildfires in the New River watershed, however site specific impacts at the subwatershed scale did occur. High and moderate intensity burns were mostly limited to small ephemeral and intermittent drainages in upland areas that are adapted to frequent fires. In general, high and moderate intensity burns only affected small reaches of the larger perennial streams in the fire analysis areas. No fire-related impacts to aquatic and riparian resources were apparent in areas that burned at low intensities.

The greatest potential impacts to riparian and aquatic resources were associated with erosion from fire lines. Extensive rehabilitation of fire lines, safety zones and water developments has mitigated the risks of increased hillslope erosion, turbidity and stream sedimentation. Short-term direct effects include changes in water chemistry with increased levels of nitrogen and phosphorus and increased turbidity and fine sediment with the onset of the wet season. Long-term changes include increased levels of woody debris and increased stream flow.

## *4.7 FIRE EFFECTS TO RIPARIAN RESERVES*

Riparian Reserves, as defined by the Northwest Forest Plan and Shasta-Trinity Land and Resource Management Plan, are derived by buffering fish-bearing streams and non-fish-bearing perennial, intermittent and ephemeral streams, as well as unstable lands. They are a key part of the Aquatic Conservation Strategy. Riparian Reserve widths are delineated during implementation of site-specific projects based on analysis of the critical hillslope, riparian, and channel processes and features. It is important to note that the modeled Riparian Reserves are not based on site-specific criteria, but are modeled with the prescribed interim widths by buffering perennial streams 300 feet on each side and intermittent streams, 100 feet on each side. These riparian reserves are based on a crenulated stream coverage, which extends the stream network shown as blueline streams on USGS maps into topographically defined indentations. Actual Riparian Reserves widths may be much wider.
The full effects of the 1999 fires on riparian reserves have yet to be verified; however, some inferences can be made from aerial photo analysis and preliminary ground visits. The fire covered extensive headwater areas of the New River. Table 3-20 summarizes the extent of riparian reserves affected by burn severity.

**Table 3-20. Burn Severity within Interim Riparian Reserves**

| Watershed | | | | % of Total Riparian Acres |
|---|---|---|---|---|
| Upper New River | High | 612 | 1207 | 18 |
| | Moderate | 557 | 2239 | 28 |
| | Low | 689 | 3071 | 37 |
| | None | 335 | 1416 | 17 |
| | **TOTAL** | **2193** | **7932** | **100** |
| | | | | |
| Lower New River | High | 350 | 487 | 6 |
| | Moderate | 802 | 935 | 12 |
| | Low | 1812 | 2683 | 31 |
| | None | 2591 | 4705 | 51 |
| | **TOTAL** | **5555** | **8810** | **100** |

Based on the data above, Riparian Reserves within the Upper New River Watershed have proportionally more acres impacted by the fire. Site visits to Riparian Reserves suggest that the burn severity may be over estimated for many channels. During severity mapping many stream channels are too small to delineate areas of lower severity and are therefore lumped into burn classes of the surrounding areas. Many Riparian Reserves burn at lower severity due to modified microclimates in the vicinity.

# 5. Access and Travel Management

## *5.1 CURRENT TRANSPORTATION SYSTEM ROLE*

The role of the transportation system is to meet the access needs identified to manage resources within the affected area. The existing system has met the needs identified for past management activities. However, an Access Travel Management (ATM) plan must be developed to identify the roads required to meet the resource management needs of future activities within the New River watersheds.

Road density is low throughout the New River watersheds – which is consistent with management direction and Tier 1 key watershed objectives for this area (refer to Table 3-21). There is no known unacceptable resource damage from road location or design within the watersheds.

The main use of the transportation system on the west side of the watershed is for access to private property and to the community of Denny. There is recreational traffic to the three trailheads in the area. Most recreation traffic is in the fall months of the year during hunting season. There has been a small amount of small timber salvage operations logging traffic thru this area in the past few years.

On the east side of the watershed, including the Ironsides and Big Mountain areas, the main use of the transportation system is for recreation going to two main trails accessing the wilderness. Similar to the west side, the main use period on the east side is during the fall for deer hunting access. Over the past few years there have been a few small salvage timber sales in the area. Another use is access to Ironsides Fire Lookout by forest visitors and Forest Service personnel during fire season.

During the 1999 wildfires, the road system was used for fire suppression access. Portions of road were used as a fire control line. Other portions of road were completely burned over with fire consuming all vegetation on both sides of the road surface. Many trees were fire-killed along the roads' edges, leaving a future transportation safety problem.

Rocks and debris falling or rolling onto the road surfaces are a common occurrence that has been exacerbated by the 1999 wildfires. Maintenance needs are expected to increase over the foreseeable future (10 years) due to fire effects.

**Table 3-21**
**Road Density within the New River Watersheds:**

| Watershed | | | | Forest System Road Miles Per SQ. Mile |
|---|---|---|---|---|
| Lower New River | 102.98 | 112.12 * | 1.09 * | 0.78 |
| Upper New River | 89.31 | 9.39 | 0.11 | 0.11 |

* This includes all private, County, and Forest System Roads.

Within the Lower New River Watershed, the 112.12 miles of road includes:
… 19.32 miles of Shasta-Trinity National Forest Service Level 3 Maintenance Roads
… 45.03 miles of Shasta-Trinity National Forest Service Level 2 Maintenance Roads
… 16.30 miles of Shasta-Trinity National Forest Service Level 1 Maintenance Roads

The remaining 31.47 miles of road within the Lower New River Watershed are County, private, and Six Rivers National Forest roads.

Within the Upper New River Watershed, the 9.39 miles of road includes:
… 2.28 miles of Shasta-Trinity Forest Service Level 3 Maintenance Roads
… 4.41 miles of Shasta-Trinity Forest Service Level 2 Maintenance Roads
… 2.40 miles of Shasta-Trinity Forest Service Level 1 Maintenance Roads

## *5.2 CURRENT TRAIL CONDITIONS*

During the final stages of the fire, a survey was performed on most of the trails that were affected by the fire. The description of the post-fire trail condition is based primarily on field observation and the assumption that significant sloughing will occur during the winter storms and spring rains.

The trail conditions depend on site specific factors, including: where duff and forest litter was burned off; where the soil type was predominately sensitive decomposed granite; and where the trail crossed steep side slopes (where the sloughing and tread loss will be the most severe). Where the landscape has a different mixture of soil types and degree of sideslope, the result will be differing levels of trail damage. The areas of moderate to high intensity fire is expected to result in the greatest amount of blowdown, root wad holes, and burned out stump holes. Areas of low intensity fire will be characterized by less serious impacts to the trails.

Restoration work is expected to proceed at the earliest opportunity. Planned restoration work includes clearing windfall trees, reshaping trail treads, installing drainage facilities, and repairing root wads and stump holes. The current condition of the trails is dangerous and the trails may need to be closed to public travel until repair work is completed and the hazards eliminated.

# 6a. Heritage Resources

## *6.1 CURRENT LANDSCAPE SURROUNDING HERITAGE SITES*

Heritage Management over the last 25 years has focused primarily on the Lower New River watershed where the majority of the 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, most of the archaeological field survey acreage has been completed in this part of the watershed.

The Upper New River area of this watershed is largely within the Trinity Alps Wilderness. The main undertakings generating Heritage management work have been trails/recreation, minerals, and special uses. This Heritage work and related archaeological survey coverage has focused mainly along the major trail systems. Additional work has been done in the Old Denny mining area through special Forest Service Region 5 funding programs.

## *6.2 CURRENT ARCHAEOLOGICAL PROPERTIES*

This work identified forty-two prehistoric and historic archaeological properties with assigned site numbers. However, eleven of these have no completed site records. Six of the sites in this total have been determined eligible to the National Register of Historic Places. Thirteen of these sites with records have been determined not eligible to the National Register of Historic Places. Twelve of the sites with records have not had their eligibility formally determined. The site record for the Old Denny area has been completed. However, part of this project included a determination of eligibility for this property. This determination is still being worked on. There are also thirty-one sites noted in Forest Service files that have not been given a site number or formally recorded. These locations are potential sites needing field verification.

Four areas that currently are used or had spiritual importance to American Indian tribes utilizing this area are located within the watershed. These are Ironside Mountain, Trinity Summit/Devils's Backbone, Big Mountain, and the Happy Camp Mountain areas. Any suggested management actions coming out of this watershed analysis will need to be looked at regarding how those actions may affect American Indian tribe sites. This will require consultation with local Indian groups and interested parties.

The recent fire within the watershed may have affected several of the noted, but unrecorded, sites within the wilderness. Assessment of damage was not completed for these locations during fire suppression activities or Burned Area Emergency Rehabilitation (BAER) phase. However, BAER funding has been obtained to do assessment work within the wilderness for the Big Bar/Megram area of the fire. This work will be done in the year 2000 summer field season.

In the Lower New River part of the watershed for the Onion Fire, several of the sites adjacent to or within the fire perimeter were monitored or flagged for avoidance during fire suppression activities and rehabilitation. No adverse damage was found from fire suppression on these sites. No need for Heritage work was determined during the BAER phase for the Onion Fire.

# 6b. Local Community Economies

## *6.3 CURRENT CONTRIBUTION TO LOCAL ECONOMIES*

The Forest Service pays out 25% of its annual revenues collected from timber sales, grazing, recreation, minerals, and land uses to states in which National Forests lands are located to help finance roads and school budgets. The payments have declined dramatically since 1989 due to decreased timber harvest over the past decade. It is important to note that the final payments to some states (California, Oregon and Washington) are computed under a provision of the Omnibus Budget Reconciliation Act of 1993. Section 13982 of the Act provides for payments to States for fiscal year 1999 of 70% of the five-year average for fiscal years 1986-1990 for those National Forests affected by the Northern Spotted Owl decision. If based solely on actual receipts, payments would be down. Currently, the Administration has been working with Congress to try to stabilize future payments to counties and schools.

Any timber sale has the potential to generate revenues to the County, and the amount of the revenue would be dependent upon the value of the sale. In salvage sales time is very critical. That is, the longer it takes to plan, prepare, and offer a sale, the greater the impact to the sales' value because of the deterioration of the fire killed trees especially in the smaller diameter classes. As trees deteriorate, the economic viability of projects lessen. Time to implement project activities may not only affect County receipts, but it may also require the need to use appropriated funds to remove any hazards or to accomplish other restoration projects.

# 6c. Recreation and Wilderness

## *6.4 CURRENT RECREATION RESOURCES AND USES*

The majority of the recreation resources in the New River watershed were surveyed after the fire. Some fire recovery rehab work was done on the recreation resources in the fall and early winter.

The New River is a designated Wild and Scenic River and it is one of the main recreation resources in the New River drainage. The New River drainage also contains approximately 100,000 acres of the Trinity Alps Wilderness, with 3 trailheads and 115 miles of trail. Also included within the New River watersheds are the Denny Campground, many popular dispersed camping sites, and forest roads. The recreation uses in the New River watersheds are hunting, rafting, kayaking, auto touring, sightseeing, camping, hiking, backpacking, and equestrian use. Fishing in New River is under closure by the California Department of Fish and Game. The travel and camping inside the burned area is limited at this time due to safety of travel (see trails).

The condition of the developed recreation resources varies from site-to-site. The developed sites had extensive use during fire suppression activities. The stock stanchions at the New River and East Fork New River trailheads are old but unserviceable after the fire. The New River trailhead vegetation was removed down to soil - radically changing the character of the facility. Fire suppression rehabilitation work was completed at Denny Campground. The trail to the river from the Denny Campground has not yet received rehabilitation work. Denny campground still does not meet Meaningful Measures Standards.

## *6.5 CURRENT WILDERNESS CONDITIONS*

A field review of a significant portion of the fire area was performed at the end of the fire. The description of the post-fire wilderness conditions is based on first hand observation.

The fire suppression activities of clearing vegetation for firelines, remote camps, safety zones and helispots have altered the character of the wilderness. There are areas of unnatural staubs and stumps, slash piles/windrows, and limbed trees on and/or adjacent to trails, helispots and campsites. There are large openings where “safety zones” were developed. Remote camps have large campfire rings and chainsaw camp furniture. There are areas where the fireline is near trails or campsites and unnatural vegetative openings are clearly visible. Landscape views show a range from fire killed brush and timber to mosaics of green and burned vegetation. Hazard trees adjacent to travelways and developed sites may exceed the acceptable “inherent risks” within the wilderness.

# CHAPTER 4

# REFERENCE CONDITIONS

This chapter describes the changes in ecological conditions resulting from the Big Bar Fire Complex fires as well as from human influences and natural disturbances other than the 1999 fires. 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. Vegetation

### *1.1 REFERENCE CONIFER FOREST CONDITIONS*

Based on written information and historic photographs from nearby watersheds, as well as personal communication from PSW Fire Researcher Carl Skinner, the stands in the New River drainage were probably more open prior to 1850 due to a shorter fire return interval. According to Research Paper PNW-RP-491, Old Growth in Northwestern California National Forests, by Beardsley and Warbington, old growth Douglas-fir/tanoak has 13 trees per acre that are at least 30 inches in diameter. The number of the larger trees per acre is thought to be only slightly higher today than in the 1850 era. However, the understory vegetation in the 1850 era was likely sparser due to wildfire activity.

The Forest-wide LSR Assessment prepared by the Six Rivers National forest in April 1999 includes discussion of LSR 305, which is located on both the Six Rivers and Shasta-Trinity National Forests. This assessment also indicates that the individual stands, including the New River watersheds, were probably more open in the past – but included more large patches of late mature and old growth conifer stands. Areas that received repeated logging activity have experienced a decrease in the greater than 1,000-acre patch size for late mature and old growth conifer stands.

Research estimates on fire periodicity indicate an average of 8 to 13 years between fires. Prior to 1850, the fires burned without significant human-influence in regards to fire suppression. Frequent low intensity fires largely sculpted the resultant vegetation. In the 1900's, wildfires have been "managed" by fire suppression on National Forest lands, resulting in smaller individual fires which allowed for more acreage to remain unburned for longer periods of time. The resultant stands are thought to have an average of more trees per acre, more understory vegetation, and more fuel loading than existed prior to 1850. In terms of the historic range of variability, the area burned in the 1999 fires is expected to have been at the extreme end of the historic variability scale in terms of trees per acre, density of understory vegetation, and fuel loading.

The portion of the fire on the Shasta-Trinity National Forest outside of the Trinity Alps Wilderness had potential for timber management subject to management prescriptions described in the LMP. Of the 30,918 non-wilderness acres burned, approximately 24,000 acres were commercial-sized (size class 3 and 4) mixed conifer stands. An additional ~2,500 acres were smaller sized conifer stands. The predominant species was Douglas fir with lesser amounts of (in decreasing order) ponderosa pine, sugar pine, incense cedar, and white fir. The area could be generalized as a mature conifer forest on steep terrain. Timber management activities had been limited primarily to the southern portion of the fire along the established road system.

***Table 4-1. Acreages within Vegetation Types – Before the 1999 fires***

| Location | | | | Early or mid-mature conifer | Mature or old growth conifer | Total |
|---|---|---|---|---|---|---|
| New River Watersheds | 18,864 | 1,440 | 12,209 | 51,204 | 39,420 | 123,137 |
| Released Roadless | 4,103 | 174 | 1,144 | 8,785 | 13,115 | 27,321 |
| LSR Area | 4,674 | 995 | 3,027 | 9,737 | 18,753 | 37,186 |
| AMA Area | 498 | 294 | 623 | 2,607 | 983 | 5,005 |

Table 4-1 displays the vegetation types that existed in the analysis area prior to the 1999 fires. The acreages displayed include the results of vegetative management activities such as site conversion and timber harvesting. These vegetative management activities began in 1955 and include 360 acres of regeneration units in the Upper New River watershed and 3020 acres within the Lower New River Watershed. Timber stands selected for harvest were typically from the mature or old growth conifer vegetative type.

## *Within Roadless Areas*

The vegetative condition within the Released Roadless Areas had not significantly been affected by timber harvesting activities due to the lack of access by conventional harvesting systems. Although the LRMP identified the areas identified in the 1979 RARE II Study as “released” for multiple use management, these areas remained essentially unmanaged in regards to vegetation. However, as previously identified, the vegetation changed from the pre-1850 era due to the suppression of wildfires. As displayed in Table 4-1, approximately 50% of the Roadless acreage within the New River watersheds was in the mature or old growth category prior to the 1999 fires.

## *Along Roads*

Most of the roads within the New River area have been managed as category maintenance levels 3, 4, and 5. These roads have been open all year around with the exception of Forest Service Road 3N04. Road 3N04 has been gated for seasonal traffic, closed from October thru April. All of these roads have had roadside hazard trees removed for safety hazards within the past three years.

### *Within the LSR Areas*

The vegetative condition within the LSR Areas had been affected by timber harvesting activities to a measurable degree. Of the 37,186 acres of LSR within the watersheds, 2,265 acres (6%) of the area had been harvested. Prior to management direction that identified these areas as LSR, the steep slopes and lack of access limited timber management activities to conventional harvesting systems. However, as previously identified, the vegetation changed from the pre-1850 era due to the suppression of wildfires. As displayed in Table 4-1, approximately 50% of the LSR acreage within the New River watersheds was in the mature or old growth category prior to the 1999 fires.

### *Within AMA Areas*

The vegetative condition within the AMA Areas had been affected by timber harvesting activities to a larger degree than the previously mentioned areas. Of the 5,005 acres of AMA within the watersheds, 1,115 acres (22%) of the area had been harvested. Prior to management direction that identified these areas as AMA, timber management activities were evident, starting in 1950's. The larger patches of mature or old growth conifer vegetation were targeted for timber harvest, resulting in fewer areas of contiguous late-seral habitat. Approximately 20% of the AMA areas included mature or old growth conifer vegetation prior to the 1999 fires, as displayed in Table 4-1. The vegetation between the harvested stands changed from the pre-1850 era due to the suppression of wildfires. The vegetation within the harvested areas was planted to a mixture of Douglas fir and ponderosa pine under an even-aged management silvicultural treatment.

## *1.2 REFERENCE PLANTATION CONDITIONS*

A total of 3,380 acres of established conifer plantations were included within the watersheds, with approximately 1,800 plantation acres affected by the 1999 wildfires. These plantations were comprised mainly of Douglas fir with some plantations having predominantly Ponderosa pine. The stocking densities varied from 250-700+ trees/acre with ages of the plantations varing from 4- 35 years. The size class of the plantations ranged from seedlings to pole-size (8-10 inch DBH) trees. The principal hardwood species found within the majority of the plantations were tree-form tanoak, big leaf maple, and madrone. The brush species occurring in plantations were deerbrush and snowbrush. Some of the plantations were overstocked with high hardwood/brush densities, while others had moderate to high inter-tree competition with a low hardwood/brush competition levels.

## *1.3 REFERENCE CONDITIONS OF PLANT SPECIES OF CONCERN*

### *Sensitive, Endemic, and Survey and Manage Species*

Fire exclusion in the analysis area has played a large role in altering plant communities, and presumably habitat for plant species of concern, expressing itself in both increases and decreases of suitable habitat. Stand densities have increased in forested communities, increasing competition for resources and decreasing sunlight to the forest floor, and potentially reducing habitat for Pickering's ivesia and veiny arnica. Increases in stand density may have reduced available water in seeps, springs, and fens, reducing habitat for Oregon willow herb, but the degree of reduction is uncertain. The absence of fire has increased shade and forest-floor litter and duff, both required habitat components for lady's-slipper orchids and all Survey and Manage fungi. Pacific fuzzwort is a slow-growing bryophyte species and lack of fire may benefit it.

Heavy ground disturbance occurred in the early part of the $20^{th}$ century from mining in riparian areas, flats, and benches, and later in the century from marijuana cultivation in accessible flats and benches. Most or all of this activity has ceased in the analysis area, allowing stabilization to commence, but total restoration could take centuries in the more heavily impacted sites. Significant ground disturbance from mining occurred in most riparian channels and it is likely the habitat for Shasta pincushion has decreased where more recent flooding has not occurred. Marijuana cultivation in flats and benches may have reduced habitat for Oregon willow herb, if wet seeps were drained to improve cultivation.

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 any Oregon willow herb populations, but it is likely that Native Americans used the same areas to the same degree in reference periods. Invasive weeds may be getting introduced in feed brought in for pack animals. Where meadows, seeps and springs do not occur on serpentine soils, the presence of Oregon willow herb is unlikely.

Serpentine barrens and outcrops are found throughout the analysis area. Most are small, but some past management activities have focused on these areas because of the typically level terrain and lack of vegetation. Occupation by rare plant species, particularly Scott Mountain sandwort, is unknown at this time, but any disturbance by trail or road construction has fragmented any possible populations.

Difficult terrain, lack of access, and wilderness designation have reduced the amount of logging and road construction taking place within the analysis area. The decrease in habitat for species occupying montane forest is not great in relation to other, more accessible portions of the Shasta-Trinity National Forest, and can mostly be attributed to disturbances other than timber harvest. Decreases in habitat from reference periods for species occupying montane forest are probably not significant.

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.

### *Invasive Weeds*

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 also began to rise.

Fire suppression activities in the 1999 Big Bar Complex Fire, specifically movement of vehicles and machinery into the fire area from outside areas, may have introduced or expanded populations of invasive weeds into the analysis area. As vehicles and machinery moved from other high fire event sites (Siskiyou County, Shasta County, etc.), it is possible that weeds were carried on those vehicles. Dyer's woad is prominent in Siskiyou County in forested areas, as is yellow starthistle and ailanthus in Shasta and Trinity counties. There is abundant habitat within the analysis area for all of these weeds. Vehicle traffic was restricted to outside of the wilderness area, reducing the occurrence of introductions there.

### *1.4 REFERENCE RISK OF PEST INFESTATION*

Conifers injured by fire would have been susceptible to attack by bark beetles or borers. In addition to lightning strikes and windthrow, fires were one of the factors that helped maintain resident populations of native bark beetles and borers. Periodic drought and beetle attack killed some conifers in stands that escaped the thinning effects of frequent burning.

### *1.5 REFERENCE MORTALITY CONDITIONS*

One of the earliest published references to mortality conditions in California is contained in Miller, J.M. and F.P. Keen. 1960. Biology and Control of the Western Pine Beetle, A Summary of the First Fifty Years of Research. USDA Misc. Publ. 800. J.M. Miller prepared a summary of all bark beetle control projects carried out in California from 1912 to 1922. Because stand structure was more open at that time, the definition of an outbreak was different from what might be expected today. A total of 38 projects treated 25,242 trees containing 29,015,000 board feet on 560,430 acres. The mortality in these “outbreak” areas from 1912-22 contained an average of 0.45 trees with 51.7 board feet per acre.

Current background mortality on the Shasta-Trinity NF is considered to be approximately 0.5 trees with 59.55 board feet per acre (LMP). If considered in absolute amounts, the historic outbreaks were approximately the same as the current background mortality. Mortality levels recorded during the 1975-1979 drought in northern California were approximately 2.1 trees containing 1523.8 board feet per acre.

## 2. Wildlife

Prior to relatively effective fire suppression starting around the turn of the century, LSOG habitat, as defined 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. Recent (i.e., pre-fire) reference conditions can be determined from the information presented in Chapter 3 (i.e., look at total acres rather than the acres segregated by burn intensity).

# 3. Fire, Fuels, and Air Quality

The Klamath Mountains have one of the highest frequencies of lightning strikes in the United States, resulting in more natural caused fires than most areas in California. Fire has been an important ecological force in the Klamath Mountain ecosystems for thousands of years. Nearly all vegetated areas of the Klamath Mountains require fire as an important element of the ecosystem. Mediterranean climate, with cool, wet winters and dry summers, predisposed much of the Klamath Mountains to conditions that would carry fire annually. As a result, before the mid-1800's many of the plant communities experienced fire at least once and often a number of times during the life spans of the dominant plant species.

In California's Mediterranean climate, decomposition rates are low, limited by low temperatures in the winter and inadequate moisture in the summer. Neither historically nor now, however, has decomposition been the primary remover of biomass in the Klamath Mountains.

In pre-settlement forest, most biomass ultimately was burned by frequent low to moderate intensity fires. High intensity fires more than a few acres in size were unusual (Kilgore 1973; Skinner and Chang 1996). Across much of the landscape, dead biomass on the forest floor was kept at low levels. Most small understory trees were killed and subsequently consumed by fire. Larger trees would have likely survived fires and were consumed at some point after their death by subsequent fires. It seems likely that relatively few downed logs reached advanced stages of decay before being consumed by fire.

The relative roles of fire and biomass removal has changed drastically as fire suppression was initiated early in the century. The amount of biomass consumed by fire dropped sharply, as did annual burned acreages. Fuels that would have been killed and later removed with frequent low intensity fire began to increase throughout the landscape.

## *3.1 MODERATE/HIGH FIRE INTENSITY POTENTIAL (HAZARD):*

Large fires have occurred within the New River watersheds within the last 500 years. The expectation of intensity from the large fires before the post-1850 fire suppression efforts began was that 5 to 10 percent of the burned area would have burned at high hazard levels, 10 to 20 percent would have burned at moderate hazard levels, and the remaining area would have burned at low hazard levels.

Fire suppression efforts have been generally effective in keeping wildfires relatively small. As fire suppression became more effective, less acres where naturally treated by frequent low intensity burns. Fuel availability was increased as fires were suppressed. Areas of intensity increased as fire was removed for the landscape.

## *3.2 REFERENCE FUELS CONDITIONS*

There has been almost no treatment of natural fuels within either of these watersheds, especially within the Trinity Alps Wilderness. Where treatment of fuels was accomplished, it resulted from either timber or salvage sale operations where the logging slash was classified as "activity fuels". Treatment of fuels outside of designated timber sale units or outside of timber sale boundaries was not accomplished.

Small areas of fuelbreak construction have been accomplished. The fuelbreak construction that has been accomplished on the Shasta Trinity National Forest has been through timber sale activity.

### *3.3 REFERENCE WILDFIRE THREAT TO COMMUNITIES:*

Pre-European communities within the New River watershed area had less of a threat from catastrophic wildfires than exists currently due to the lesser presence of communities and the lower fuel loadings within the forest.

### *3.4 REFERENCE AIR QUALITY IMPACT FROM WILDFIRE:*

Fires in the past were of mixed intensity, with mostly low and moderate intensity fires and little high intensity burning occurring. Since fires were more frequent, less fuel was generally available per acre. Thus, these fires may have produced less smoke per acre during burning. Though less fuel per acre may have been available to burn, the greater number of acres burning in any given year probably would have overwhelmed any benefit of lower fuel loading in terms of overall smoke produced. As a result, reference air quality conditions were probably much reduced from typical current conditions for much of the time during the dry season.

Since the beginning of fire suppression the amounts of smoke experienced by inhabitants of the area has probably been greatly reduced from reference conditions. The advent of rapid suppression reduces the affect of smoke by extinguishing fires quickly. Fires burning for shorter periods produce less smoke. Likewise, short-duration prescribed fires that help to reduce fuels and fire hazard produce short-duration air quality reduction when compared to large, uncontrolled wildfires such as the 1999 wildfires.

## 4a. Geology

### *4.1 REFERENCE MASS WASTING PROCESSES*

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**.** Mass wasting features occur over the entire watershed area.

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 only to a small extent relative to natural occurrences. The land use activities that have had the largest impact have been mining, fire, timber harvest, and road construction.

Between 1850 and 1900 land-use activities introduced by European settlers began to influence natural processes in the watershed. One of the earliest activities was mining. Gold deposits near Old Denny were discovered around 1883. For the most part these operations were small and tended to produce little. The district was active until about 1920, when the town of Old Denny was abandoned.

An analysis of 1980 vintage aerial photos shows the area in the Eight-mile, Virgin Creek, Soldier, Six-Mile, Quimby and their tributaries to have significant increases in mass wasting activities over those depicted on 1944 vintage aerial photos. Increases in mass wasting activities take the form of landslide and debris torrents along inner gorges with subsequent sedimentation along the upper reaches of these creeks.

The cause for this increase in activity is probably the increased precipitation in the water years of ’55, ’64, ’and 72. The incidence of rain on snow is expected to be the primary mass wasting influencing factor since the areas of the East Fork of the New River and south of the latitude of Denny do not show discernible difference in mass wasting over this same time period. No other cause (such as geologic parent material) is readily obvious. Neither appreciable human nor fire activity is discernable in this particular area during this time period.

A review of the 1998 aerial photos shoes extensive recovery of riparian habitats evidenced by a return or riparian vegetation within these zones. Many landslide scars were also seen as to have re-vegetated.

# 4b. Soils

## *4.2 REFERENCE SOIL EROSION PROCESSES*

Prior to European incursions into the analysis area, Native Americans occupied the area. Their use of these lands probably had minor impacts on soil erosion processes. Soil erosion rates for undisturbed conditions varied from 0.001 to 0.024 $yds^3$ /acre/year for granitic terrane soils and 0.001 to 0.028 $yds^3$ /acre/year for metamorphic terrane soils.

Table 4-2 shows Universal Soil Loss Equation (USLE) estimated total soil erosion volumes, rates and estimated volumes of delivered sediment for undisturbed conditions. Most of this mobilized material would not have reach intermittent or perennial channels as indicated by the estimated delivered sediment volumes. Delivered sediment rates were low because the watersheds are in a natural condition. The erosion hazard ratings would be mostly low because the intact litter/duff layer is protecting the soil from erosion forces.

**Table 4-2. USLE Estimated Surface Soil Erosion for Undisturbed Conditions**

| Watershed | Total Surface Erosion ($yds^3$ /year) | Average Erosion Rate ($yds^3$ /acre) | Estimated Delivered Sediment ($yds^3$ ) |
|---|---|---|---|
| L New River | 1,271 | 0.019 | 25 |
| U New River | 1,026 | 0.018 | 21 |

### *Soil Sensitivity to Surface Erosion*

The data in Table 4-3 shows USLE estimated total soil erosion rates for conditions, as they existed in 1998-99, prior to the 1999 wildfires. Erosion from roads and harvested areas are included in this data.

Table 4-3 USLE Estimated Surface Soil Erosion for Pre-Wildfire Conditions (1998-99)

| Watershed | Total Surface Erosion ($yds^3$ /year) | Average Erosion Rate ($yds^3$ /acre) | Estimated Delivered Sediment ($yds^3$) |
|---|---|---|---|
| L New River | 5,133 | 0.077 | 103 |
| U New River | 1,350 | 0.024 | 27 |

The surface erosion values ($yds^3$ /year) are 4 and 1.3 times higher than undisturbed conditions for Lower New River and Upper New River, respectively (Table 4-4). These values will continue to change as harvested areas regain their soil cover. Delivered sediment rates are low because the watersheds are neither highly roaded nor managed. The erosion hazard ratings would be mostly low because the intact litter/duff layer is protecting the soil from erosion forces.

Table 4-4 Comparisons of Undisturbed and Pre-Wildfire Surface Erosion

| Watershed | Undisturbed Erosion Rates ($yds^3$ /acre/year) | Pre-Wildfire Erosion Rates ($yds^3$ /acre/year) |
|---|---|---|
| L New River | 0.019 | 0.077 (4-fold increase) |
| U New River | 0.018 | 0.024 (1.3-fold increase) |

## *4.3 REFERENCE SOIL PRODUCTIVITY*

Soil productivity has been affected on 1,800 acres of productive forested lands. Approximately 360 acres and 1,440 acres in the Upper New River and Lower New River watersheds, respectively, were harvested and converted to plantations. This represents 0.6% of the Upper New River watershed and 2% of the Lower New River watershed that lie within the analysis area.

These management activities would have had various degrees of affect on soil productivity. The more common affect would be the consumption of the forest floor by prescribed fire and increased soil erosion. The ability of the site to provide plant available water would remain the same, except in those areas where tractor logging caused soil compaction (reduction in macro porosity).

Changes in available nitrogen would have decreased due to loss of fine organic matter from the soil surface and through erosion of nutrient rich surface soil. Natural ecological processes, such as re-vegetation with nitrogen-fixing brush species, would have restored nitrogen to these impacted sites, depending on the length of time since harvest.

# 4c. Hydrology

## *4.4 REFERENCE HYDROLOGICAL CONDITIONS*

Based on the information available the following estimates of changes in stream flows from pre-fire to post-fire were made for the Upper New River watershed and the Lower New River watershed. The assumptions and methodology are also provided.

### *Hydrologic Design Flow Estimates*

The pre-fire design flow was calculated for each watershed according to methodology developed by Waananen and Crippen, 1977. The parameters of watershed area, mean annual rainfall, and altitude index were used as follows: Upper New River (89.4 sq. mi.) has a mean annual rainfall of 65 inches, and an altitude index of 3.58. Lower New River (103.0 sq. mi.) has a mean annual rainfall of 60 inches with an altitude index of 1.61. The estimated runoff for two- and ten-year recurrence intervals is shown in the table below.

**Table 4-5. Pre fire design flows expressed in cubic feet per second for 2 and 10 year recurrence intervals**

| Watershed | Pre-Event 2 year Recurrence Interval Flow (cfs) | Pre-Event 10 year Recurrence Interval Flow (cfs) |
|---|---|---|
| Upper New River | 4528 | 11,136 |
| Lower New River | 6973 | 14,529 |
| Totals | 11,501 | 25,665 |

# 4d. Riparian and Aquatic Systems and Species

## *4.5 REFERENCE FISH ABUNDANCE AND DISTRIBUTION*

The New River is an undammed fifth-order tributary to the Trinity River. Fishes of the New River include summer, fall, and winter–run steelhead (*Onchorhynchus mykiss*); resident rainbow trout (*O. mykiss*); speckled dace (*Rhinichthys osculus*); Klamath small-scale sucker (*Catostomus rimiculus*); Pacific lamprey (*Lampetra tridentatus*); spring and fall chinook (*O. tshawytscha*) and a few Coho salmon (*O. kisutch*). Historic run size is not well documented for the New River drainage.

The summer Steelhead is the primary anadromous fish found in the New River. There are small runs of spring and fall Chinook and coho are rarely found. Estimates by California Department of Fish and Game indicate the number of wild summer steelhead in California range from 1,500 to 4,000 fish. New River summer steelhead counts over the past decade have ranged from 307 to 804 fish making it one of the larger populations in California. Population trends for summer steelhead in the New River have been strong over the last 20 years (Figure 4-1) making the New River important to the persistence of the summer Steelhead in the Trinity basin and statewide.

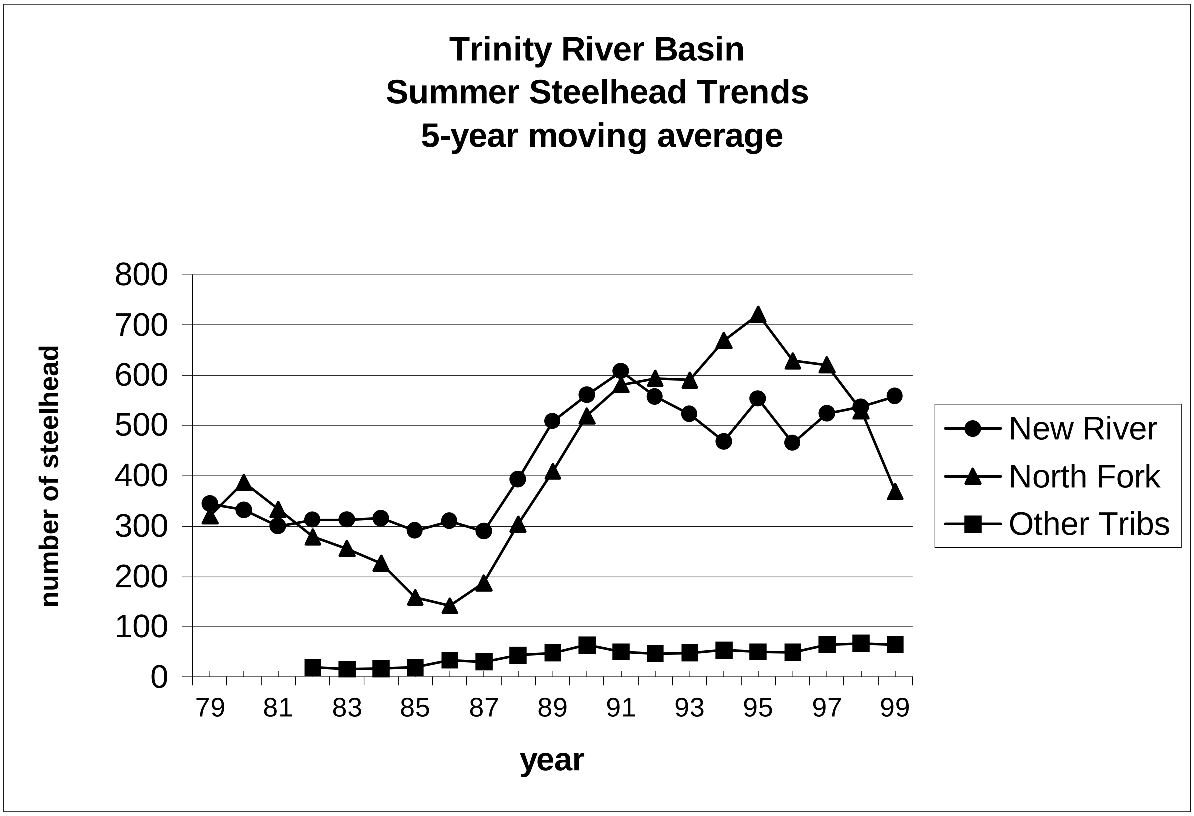



**Figure 4–1. Summer Steelhead trends in the Trinity River Basin 1979 – 1999.**

## *4.6 REFERENCE ANADROMOUS HABITAT*

The upper New River watershed including the East Fork was designated Wilderness in 1984. Most tributaries to the New River were surveyed in the 1970's and 1980's with instream and riparian habitat characterized as good to excellent. Historically the New River watershed has experienced a high level of mining activity that has increased the level of fine sediment present.

## *4.7 REFERENCE RIPARIAN RESERVES*

The condition of riparian and aquatic habitats in the analysis area has varied through time, primarily because of channel changes caused by mass wasting and sedimentation during major floods. In the first few decades after a major flood, there would be numerous fresh landslides adjacent to channels, considerable secondary erosion from landslide scars, widespread accumulation of sediment and debris in most stream channels, and increased exposure of the channel due to loss of riparian cover. This would have caused elevated water temperatures,

reduced aquatic habitat quality, and reduced stream productivity for salmonids. During longer and more stable recovery periods, large conifers would have dominated riparian areas, provided dense shade, and occasional inputs of large woody debris to the channel. A large proportion of the aquatic habitat would have been highly suitable for salmonids, with cool water temperatures and complex instream structure. Erosion, sediment production and sediment transport would have been roughly in balance over the watershed, providing abundant clean substrate for spawning and rearing of salmonids.
Most channels within the New River watersheds had surveys performed in the 1970's and 1980's. Visual observations recorded by surveyors indicated that most channels had riparian areas intact and properly functioning

# 5. Access and Travel Management

## *5.1 REFERENCE TRANSPORTATION SYSTEM ROLE*

The transportation system dates back to the 1932 when CO. Road 402 was constructed to the community of Denny. On the east side of the watershed, there was a jeep trail that went up to Ironsides Mountain and the China Peak areas.

In 1952, after a fire in the Jim Jam area, roads were constructed to reach the fire salvage. Shortly afterwards, in the late 1950's, the timber market started to increase and roads were constructed up to the New River Trailhead area and the Miller Place. By the late 1960's the existing transportation system was completed. The majority of the timber harvesting was completed in the 1970's, with some small sales for salvage and other small sales going on into the 1980's.

Access into the Ironsides and Big Mountain areas started into the 1960's and was completed in the 1970's. Timber harvest continued through the 1980's with the last large timber sale being completed in 1992.

Throughout the time that the transportation system was being constructed for timber harvest and access to wilderness trailheads, there has been some sort of road closure plan used - either seasonally closed or year long closure. The mainline roads are left open year long but are generally closed in the winter by snow.

The majority of the roads within the 1999 wildfires were used for some sort of fire suppression - either direct fire fighting, mopping up, and/or fire suppression access.

## *5.2 REFERENCE TRAIL CONDITIONS*

The trail transportation system is a remnant of the trail network that once existed in the New River watershed. The original trails were game and aboriginal routes. Miners and settlers developed some of those routes and built new trails. The Forest Service maintained the main trails for fire access and administrative use. Some trails were abandoned and dropped from the trail transportation system in the 1970's. The system has remained intact since then with refinements accomplished during the Trinity Alps Wilderness management plan process in the early 1990's. At that time, the trails were classified as primary, secondary, or scramble hiker, and were assigned maintenance levels. Primary trails were main access trails to a well-known destination. Secondary trails were either connectors of primary trails or a trail to a destination. Scramble hiker trails were trail designed for testing hiking skills and limited access to most horse packing visitors. The maintenance level of the trial determined the frequency and extent of maintenance. All of the trails in the New River watershed were primary or secondary trails, and maintained either annually (maintenance level 3) or every third year (maintenance level 2).

In the New River watershed, trail maintenance was sometimes deferred during the early 1980's due to marijuana cultivation and the hostile nature of the growers. In 1985, the New River Project began with increased Forest Service presence and a focus on trail maintenance increased. Both the New River and East Fork New River trailheads were reconstructed, and two trail bridges were replaced on the East Fork New River trail. The backlog of trail maintenance has been a perennial problem in the New River area

After the December 1995 windstorm and extremely heavy old growth blowdown, the Forest received emergency funding and was granted a power tool waiver to clear the trails. In 1997 the Lipps Camp, Soldier Creek, and a 17-mile segment of the Salmon Summit trail were restored. 1997 and 1998 were El Nino and La Nina storm damage years, and the Department of Labor funded Trinity Occupational Training crews to clear the New River, Virgin Creek, Slide Creek, Eagle Creek, Battle Creek, Emigrant Creek, Milk Camp, Pony Creek, East Fork New River, and Jim Jam trails. The result was that while there was a chronic backlog of trail maintenance, the trails in the New River watershed were maintained to Regional standards and were in reasonably good condition prior to the 1999 wildfires.

# 6a. Heritage Resources

## *6.1 REFERENCE LANDSCAPE SURROUNDING HERITAGE SITES*

The prehistoric period within the New River Watershed started around 7,000 to 8,000 years ago. At this time, the harsh late Pleistocene glacial/alpine conditions were starting to subside allowing hunter-gatherer groups to move into mountainous areas. A second factor for this was the loss of many Pleistocene mega-fauna that early man in North America relied on. With the passing of these animals, humans needed to find other ecological landscapes to utilize. This was possibly made more urgent by the gradual drying of western North America - shifting vegetation communities into higher elevations. Consequently, people moved into the mountains to take advantage of this change. Local evidence for such early high elevation utilization comes from discoveries on South Fork Mountain located approximately 30 miles south of this watershed. Archaeological evidence from many different sites along this long ridgeline point to a 7000 to 8000 year initial period of occupation that suggests this early movement of American Indian groups into mountainous areas.

Around 5000 to 4000 years ago the climate started to moderate. Vegetation communities started to shift down to lower elevations. Human populations in the Trinity/Klamath Mountain area continued to increase and various cultural groups started to migrate into the northwest part of California.

The prehistoric period lasted up to around 1700 to 1800 when contact with Spanish culture may have occurred through trade goods. Actual contact with Europeans occurred sometime between 1800 and 1850.

The initial Euro-American contact period can be dated in this part of California from the 1830's up to the 1850's. This was mainly contact with fir trappers and the initial gold exploration by white miners.

After 1850 the American Indian cultures in the area ceased to be a major influence on the landscape. Euro-American mining, settlement, and agriculture became the primary factors affecting the landscape in the New River and throughout the Trinity/Klamath Mountain region.

### *6.2 REFERENCE ARCHAEOLOGICAL PROPERTIES*

It is from the historical contexts discussed above that the archaeological properties in the watershed must be set within. Their significance is the measure of historical and anthropological information they can provide to help in our understanding of these contexts. Any future undertakings based upon the recommendations of this watershed analysis must be looked at to determine if they may create effects impacting adversely this information potential.

## 6b. Local Community Economies

### *6.3 REFERENCE CONTRIBUTION TO LOCAL ECONOMIES*

Local economies influenced by the management of National Forest lands within the New River watersheds were dependent upon the timber sale activities that occurred within the area. Logging and roadbuilding became a significant influence on the local community economy in the 1950's. Before that time, timber sale activities were relatively minor and goldmining was likely the major economy-influencing factor. Payments to Trinity County as a result of the 25% receipts on National Forest lands were relatively frequent due to the timber sale program from the 1950's to around 1990. Since that time, payments from timber sale receipts have been declining due to the decreased emphasis on timber sale activities.

## 6c. Recreation and Wilderness

### *6.4 REFERENCE RECREATION RESOURCES AND USES*

The recreation resources in the New River watershed prior to the fire included are the New River, Trinity Alps Wilderness, trails and trailheads, Denny Campground, dispersed camping, and forest roads. The pre-fire recreation uses were hunting, fishing, rafting, kayaking, auto touring, sightseeing, camping, hiking, backpacking and equestrian use. However, fishing is under a California State Fish and Game closure to protect anadromous fish.

Denny campground did not meet Meaningful Measures Standards. The toilets at the New River and East Fork New River trailheads were new in 1998. The stock stanchions at these trailheads were serviceable yet near the end of their life expectancy. The vegetation at the New River trailhead was a pine plantation with mature brush.

## *6.5 REFERENCE WILDERNESS CONDITIONS*

The western portion of the Trinity Alps Wilderness was characterized by pristine old- growth conifer forest mixed with conifer woodland and south-facing brush fields. There were many vista locations with landscape views of large mature timber stands and brush fields. The terrain is very rugged, with steep ridges rising out of deep canyons. A trail system provided access to many ridges and drainages. The rivers and streams were renowned for their outstanding water quality and fisheries. The New River watershed had relatively low recreation use and great opportunity for solitude. The wilderness would have been described as having a virtualy unmodified natural environment.

# CHAPTER 5

# INTERPRETATION OF ECOSYSTEM CONDITIONS

This chapter describes the changes in ecological conditions within the New River 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. Vegetation

Although fire is a natural event that affects successional development, the large scale and intensity of the Big Bar Complex fires appears to be outside the historic range of variability for fires in the Klamath Mountains (Skinner, personal communication). Fire suppression over the last century has altered natural successional patterns, lengthening the interval between fires and thus creating higher fuel levels than expected in a “natural” system. These unusually high fuel levels led to an atypically high percent of high intensity stand-replacing fire.

The Forest LRMP provides overall vegetation management direction for the Forest. The desired vegetation condition for the New River watersheds area is further described in the Desired Future Condition (DFC) section of Management Area (MA) direction within the Trinity Alps Wilderness (MA #4) and the New River/North Fork/Canyon Creek (MA #14) MAs identified within the LRMP. Most of the area that may be available to receive vegetative management activities would be managed to maintain and enhance late-successional and “Old-Growth” forests and aquatic ecosystems within the Late-Successional and Riparian Reserve. Vegetation management objectives specific to the fire restoration within the New River watersheds are:

1. Protect remaining mature and old growth stands from catastrophic loss.
2. Facilitate the movement of early and mid mature low and moderate burn intensity acres into the late mature seral stage.
3. Manage vegetation along roads and trails to provide for user safety and to protect natural resources.
4. Implement practices designed to maintain or improve the health and vigor of timber stands, including plantations.

## *1.1 CHANGES IN CONIFER FOREST CONDITIONS*

**Table 5-1. Acreages of Vegetative Cover Change - Burned during the 1999 fires**

| Location | | | | Early or mid-mature conifer | Mature or old growth conifer | Total |
|---|---|---|---|---|---|---|
| New River Watersheds | 6,142 (33%) | 238 (17%) | 3,304 (27%) | 10,897 (21%) | 6,670 (17%) | 27,251 (22%) |
| Released Roadless | 730 (18%) | 56 (32%) | 252 (22%) | 1,346 (15%) | 2,574 (20%) | 4,958 (18%) |
| LSR Area | 723 (15%) | 181 (18%) | 526 (17%) | 1,640 (17%) | 3,122 (17%) | 6,192 (17%) |
| AMA Area | 51 (10%) | 30 (10%) | 40 (6%) | 188 (7%) | 42 (4%) | 351 (7%) |

Table 5-1 displays the change in vegetation types that existed within the New River Watersheds before the 1999 fires. The acreages displayed within each vegetation type are the acreages of vegetative cover that have been lost due to the fire intensities that occurred within the stands. To determine vegetative cover lost, estimates used included 85% mortality within high intensity burn areas, 30% mortality within moderate intensity burn areas, and 5% mortality within low intensity burn areas (these percentages are presented as averages since variability within burn intensity mapping is based within a range and not one set percentage). The percentages displayed within the table are the lost portions of the vegetative cover within the location. For example, 3,304 acres of pole-size conifer represents 27% of the 12,209 acres of pole-size conifer that existed in the New River watersheds prior to the 1999 fires.

### *Within Roadless Areas*

Currently, President Clinton’s Roadless Initiative EIS is in process with a decision expected as early as December 2000. This EIS along with the Forest LRMP will provide direction for the DFC of vegetation condition within the Roadless areas. Along with the issue concerning the existence of roads within the Roadless areas, the social and ecological values that will guide the management of these areas will affect the DFC of vegetation condition. As displayed in Table 5-1, nearly 5,000 acres of the Roadless Areas within the New River watersheds have resulted in a loss of vegetative cover. Vegetative management objectives within the Roadless areas will emphasize providing and protecting the older seral stages. Therefore, management practices that promote restoration of vegetative cover on the 5,000 acres and benefit the older seral stages would contribute toward meeting watershed management objectives.

### *Along Roads*

The Forest LRMP Standards and Guidelines provide direction to cut trees for protection of forest users along roads open to the public. The roads in the New River area have historically had the roadside trees identified as a threat to user safety or to natural resources removed. The current condition of the roads has fire-killed trees adjacent to travel corridors, including roads and trails. Therefore, management practices that promote user safety by removing the identified hazards would contribute toward meeting management objectives.

### *Within the LSR Areas*

The Forest LRMP incorporates Standards and Guidelines from the ROD which identifies management direction to manage the LSR areas to protect and enhance conditions of late-successional and old growth forest ecosystems. As displayed in Table 5-1, over 6,000 acres of vegetative cover was lost to the 1999 wildfires, including over 3,000 acres of mature or old growth conifer vegetation. Therefore, management practices that enhance the recovery of these 6,000 acres and promote development of late-succesional and old growth ecosystems would contribute toward meeting management objectives within the New River watersheds.

### *Within AMA Areas*

Within the AMA (Matrix Lands), LRMP direction is to manage suitable lands on a sustained yield basis with stands ranging generally from 5 to 40 acres in size. Forest stands would range from tree seedling to mature forests, while maintaining some structural diversity. Forest stand densities would be managed at levels to maintain and enhance growth and yield to improve and protect forest health and vigor recognizing the natural role of fire, insects, and disease and other components that have a key role in the ecosystem. As displayed in Table 5-1, about 350 acres of vegetative cover were lost to the 1999 wildfires. Additional areas of tree mortality are apparent in areas not reflected in the projection of vegetative cover change. In order to meet the objectives of maintaining the health and vigor of timber stands, providing specified amounts of course woody debris, emphasizing green-tree and snag retention, and providing for retention of old growth fragments in wateheds where little remains, management practices that enhance the recovery of these 350 acres and promote development of these identified vegetative conditions would contribute toward meeting management objectives within the New River watersheds.

## *1.2 CHANGES IN PLANTATION CONDITIONS*

There were approximately 1800 acres of conifer plantations affected by the 1999 wildfires. Field reviews indicate that approximately 750 acres of plantations were lost to the wildfires and burnout activities used in the fire suppression effort. Reforestation of the lost plantations would contribute toward meeting previous management commitments of maintaining and improving the health and vigor of plantations.

## *1.3 PLANT SPECIES OF CONCERN / INVASIVE WEEDS*

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. The 1999 Big Bar Complex Fire probably had little impact on rare plant species of concern, but the generation of fuels from fire-killed trees could increase the future potential for increased-intensity fire events. 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.

### *Invasive weeds*

Invasive weed species have been observed within the analysis area, both inside and outside the Trinity Alps Wilderness. Observations have been casual and more/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 smaller and first 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 1999. Establishment of these species could greatly increase population size and distribution already present before 1999. Surveys are also needed along major trails and routes that join Highway 299 and the analysis area (particularly County Road 402), as this is the major route of introduction and spread of weeds.

### *1.4 PEST INFESTATION*

Additional tree mortality will become evident because of the fire. Many trees were injured by the fire. Some trees appear dead immediately. Other trees appear alive, but have severe cambial injuries that will result in mortality. There are usually several species of bark beetles and borers which breed in conifers that are dying. These beetles will be abundant while there is a plentiful source of damaged conifers, but this situation will not become an outbreak or epidemic. Trees will continue to die for about 3 or 4 years after the fire (until 2002 or 2003). This is due to the length of the life cycle of some of the longest-lived species of borers. By the year 2004, it will be difficult to make any association between the fire and any subsequent mortality.

## 2. Wildlife

### 2.1 CHANGES IN AREAS PROVIDING VALUE TO SPECIES ASSOCIATED WITH LSOG

One hundred eighty (180) areas, totaling 8,898 acres, were identified where canopy closure was reduced below 40 percent over 10 contiguous acres within at least capable LSOG habitat. These areas likely no longer provide value to LSOG associated species. Fifty-six of these areas, totaling 2,344 acres, lie within LSR 305. The LSR network is the foundation for maintaining viable populations of species associated with LSOG habitat such as the northern spotted owl, Pacific fisher, American marten, etc. LSR 305 is currently below the recommended management range for LSOG acres. Hardwood (mainly tanoak) competition and extreme levels of woody material on the ground could considerably delay the reestablishment of conifer forest and the development of LSOG conditions. Further, the fuel levels within and surrounding these areas will remain excessive and the probability of repeated stand replacing fires prior to the development of LSOG conditions would remain high. Therefore, management actions aimed at protecting and speeding the development of LSOG conditions within these areas is appropriate.

### *2.2 CHANGES IN 15% THRESHOLD WITHIN EACH WATERSHED*

High intensity fires did not reduce the amount of LSOG within either the Upper or Lower New River Watersheds below the 15 percent threshold. Additional losses of LSOG may become apparent as trees within areas burned at moderated or low intensity die over the next few years. Therefore, monitoring aimed at detecting future losses of LSOG habitat is appropriate to assure that the 15 percent threshold is being met.

### *2.3 CHANGES IN CONNECTIVITY HABITAT*

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

### *2.4 CHANGES IN HABITAT WITHIN SPOTTED OWL TERRITORIES AND HOME RANGES*

High intensity fires reduced nesting and roosting (NR) habitat below the take threshold for two spotted owl activity centers within the watersheds. One activity center was below the threshold prior to the fires. Additional losses of NR habitat may become apparent as trees within areas burned at moderated or low intensity die over the next few years. Therefore, monitoring aimed at spotted owl occupancy and reproductive status is appropriate to track the short and long-term affects of the fires and possible management actions (especially within LSR 305). Management actions aimed at improving habitat conditions for individual owls is not appropriate at this time because owls have or will no doubt reshuffle locations in response to the fire effects.

### *2.5 CHANGES IN LSOG HABITAT WITHIN LRS 305 IN RELATION TO THE RECOMMENDED MANAGEMENT RANGE (RMR)*

High intensity fire reduced LSOG habitat within LSR 305. Overall (i.e., including the Six Rivers portion), the amount of LSOG within this LSR is below the RMR. Refer to section 2.1 above.

## 3. Fire, Fuels, and Air Quality

### *3.1 CHANGE IN MODERATE/HIGH FIRE INTENSITY POTENTIAL (HAZARD)*

Fire burned frequently in Pre-European periods - usually burning with low to moderate intensity and without human intervention. The Pre-European period did not have large amounts of biomass present as fuel loadings in the forest. Forest stands of trees had relatively open understories of small diameter trees and brush. There were large openings between concentrations of fuels. Repetitive burning would have created more openings with less biomass throughout the forest.

The role of fire and biomass removal changed drastically as fire suppression was initiated early in the 1900's, resulting in changes in fire intensity potential. Fire exclusion created changes in the ecosystem. Available suppression resources were able to contain and control fires rapidly, confining fires to small areas. Repeated containment of fires resulted in increased amounts of biomass throughout the forest. Where Pre-European period fires removed or reduced the amount of biomass and standing dead woody material from relatively large acreages, 20th century suppression actions stopped the fires from burning biomass and standing dead woody material except on isolated relatively small acreages. Under successful fire suppression, fire severities were low – but the fire intensity potential was increasing due to the buildup of forest fuels and the increase in understory vegetation.

The 1999 wildfires were not rapidly suppressed due to two factors: lack of suppression resources in the very early stages of the fires (since suppression resources were committed elsewhere) and increased amount of biomass available to carry fire. Fire intensity potential was likely at the highest hazard level that has existed in the New River watersheds. This hazard level estimate does not indicate that the entire area was subject to a moderate or high intensity fire: rather, it indicates that the hazard level was relatively higher than it has been in a historic sense.

Future fires are expected to result in greater fire intensities than were experienced in the 1999 wildfires due to the increased dead fuels available to carry the fire. Areas where moderate intensities burns occurred have dead standing fuels mixed with live vegetation. As subsequent wildfires burn into the dead biomass, stands of vegetation will be burned as opposed to the individual trees that burned in 1999. Areas that burned in low intensity in the 1999 fires will have lesser amounts of dead fuels than either moderate or high areas, but will be moved toward the conditions of moderate burns in the next fire. High intensity areas will remain high because to the amount of dead from the last fire. The Rock and Stein fires (which have similar fuel types and similar fire histories) are examples of this change in burn intensities from previous fires.

A comparison between what occurred in the 1999 wildfires and what is predicted through the Risk Hazard Analysis is displayed in the following table:

**Table 5-2. Estimated Burn Intensities from Fire Models used in Risk Hazard Analysis. (Shown as percentage of land within the watersheds).**

| Intensity | Pre-European | 1999 Wildfires | In 2002-2005 | In 2007-2020 |
|---|---|---|---|---|
| High | Less than 5% | 17.8% | 10-15% | 25-35% |
| Moderate | 5-15% | 18.6% | 10-15% | 20-35% |
| Low | 10-95% | 28.3% | 30-45% | 15-20% |
| Unburned | | 35.3% | | |

Table 5-2 displays the differences between a predicted burn in the New River Watersheds and the actual fire. The actual burned area percentages displayed are not significant since a fuel “model” is an estimating tool and not an absolute indicator of areas affected. However, the trend shown by the percentages displayed on Table 5-2 is useful in predicting the change and resultant impacts relative to burn intensities.

The model indicates that there would have been less acreage of high intensity fire burned in a wildfire in the Pre-European era (less than 5% of the area or less than 6200 acres) than what actually burned in the 1999 fires (17.8% or 21,908 acres). The high intensity areas burned in this era are presumed to have been on the upper 1/3 of southern- and eastern-facing slopes. Individual fire sizes within the watersheds were generally less than 10 acres – stopping at ridge tops and/or areas without sufficient ground fuels to carry a fire (frequent fires eliminated fuel continuity).

For estimating purposes, the areas affected in years 2002-2005 and 2007-2020 assume that no fuel treatments are done following the 1999 fires. The expected short-term fire intensity resulting from a wildfire (shown as years 2002-2005) indicates that a wildfire would burn at generally less intensity than what occurred in the 1999 wildfires. However, the long-term fire intensity impact of a wildfire (shown as years 2007-2020) is expected to be a higher intensity fire than was experienced in 1999.

## *3.2 CHANGE IN FUEL CONDITIONS:*

As discussed in the change in fire intensity potential above, the fuel conditions have changed from the Pre-European era times of generally open forest stands with mostly light fuels to the pre-1999 wildfire condition of considerable understory vegetation and heavier fuel accumulations. The post-1999 wildfire condition has generally more understory vegetation than Pre-European times, but somewhat less than existed immediately before the 1999 wildfires. However, the most dramatic change is the increase in standing dead trees (snags). These snags will eventually fall and create very heavy fuel loading conditions that will predispose the areas with these heavy fuels to high intensity burns – and carry high intensity fires into adjacent stands.

The Forest LRMP lists the following as direction for the areas within the New River watersheds:

- Restore fire to its natural role in the ecosystem when establishing the Desired Future Conditions of the landscape (LMP 4-4: 10).

- Achieve a balance of fire suppression capability and fuels management investments that are cost effective and able to met ecosystem objectives and protection responsibilities. (LMP, 4-4: 11).

- Activity fuels that remain after meeting wildlife, riparian, soil, and other environmental needs will be considered surplus and a potential fire hazard. The amount and method of disposal will be determined in the ecosystem analysis. (LMP, 4-17: 8.c)

- Consider fuelbreak construction investments when they compliment Forest health/biomass reduction needs, where very high and extensive resource values are at risk, and to protect Forest communities. (LMP, 4-18:8.f)

## *3.3 CHANGE IN WILDFIRE THREAT TO COMMUNITIIES*

The change in wildfire threat to communities is analogous to the change of fire intensity potential. That is, increases in fire intensity are directly proportional to the increases in wildfire threat. As displayed in Table 5-2, fire intensity was relatively low in Pre-European times. The change in fire intensity and, likewise, wildfire threat is related directly to fuel buildups. Also, the threat is directly related to the amount of community properties within the New River Watersheds and adjacent lands. There will be more fuel buildups and more community properties in the long-term (say, in the year 2020) than anytime in the past – assuming no fuel treatments and a continued increase in the wildland-urban interface.

The short-term effect of the fires is a reduction of wildfire threat to private land holdings within the forest boundary. The long-term effect of the fires is an increase in catastrophic wildfire threat to private lands within the New River Watersheds and adjacent private lands.

### *3.4 CHANGE IN AIR QUALITY IMPACTS POTENTIAL FROM WILDFIRES*

Air quality (smoke) impacts from wildfires have changed over time. In the Pre-European era, adverse air quality impacts related exclusively to wildfire were likely greater than in the 1900-1998 era due to the longer duration of individual wildfires. In the time that the 1999 wildfires were burning, the air quality impacts were probably as severe as have ever occurred within the airshed influenced by the fires. In the era after the 1999 wildfires, the expected air quality impacts are directly related to the expected increase in fire intensity over the long term. Short-term effects of smoke impacts are difficult to determine. If all fires are contained and controlled quickly, adverse air quality impacts would not be significant. When the duration of a fire becomes weeks or longer, adverse air quality impacts become a public nuisance and a human health hazard. Long duration fires most often occur in areas where fire intensity levels are high and where fire suppression is ineffective (which may be due to landscape constraints where the fire ignition occurs or due to availability of fire suppression forces).

## 4a. Geology

### *4.1 CHANGES IN MASS WASTING*

Until the fires of 1999 and especially in the last decade, the area had been in a process of recovery from natural and human induced mass wasting occurring earlier in the twentieth century. Compared to even a decade ago vegetation treatments were occurring on fewer acres. Clearcutting and road construction had been significantly reduced and standards and guidelines offered resource protection for soil quality including compaction, erosion, productivity, and for riparian areas. Highly unstable areas (mostly in the wilderness) had been identified and guidelines developed to prohibit management activities within these areas. This trend may have reversed due to the fires of 1999.

The two factors affected by fires, which contribute to slope instability, are tree mortality leading to loss of root support and increases in surface runoff and groundwater. Since shallow mass wasting features such as small translational slides and debris slides rely on root support for stability, root support is critical in certain zones of larger landslide complexes. Tree roots often limit seasonal slide movement to relatively low rates due to the roots interlocking laterally, providing some shear strength. Loss of root support on some of these landslide features will result in increased instability over the next few years as the root masses decompose and lose their strength. Increased groundwater levels may also be significant in contributing to mass wasting adjacent to inner gorges where large areas above it are denuded of vegetation. Dormant earthflows and rotational landslides can be anticipated to become active in the affected areas (mostly in the northern reaches of the watershed previously described in chapter 3).

Mass movement events in the fire area may be most commonly manifested however as debris flows, torrents or avalanches due to the severe slope. The debris-bulking ratio (ratio of volume of debris to volume of water) has been shown to increase from 2 to 15 times following some fires (Rowe et al. 1954; Sinclair and Hamilton 1955)

# 4b. Soils

## *4.2 CHANGES IN SOIL EROSION*

Past management activities, such as roads and timber harvesting have contributed small amounts of surface soil derived sediment to the New River watershed. This situation changed with the wildfires. The 1999 wildfires are now responsible for 94% to 99% of the sediment entering the stream system in the analysis area (Table 3-14). Surface erosion is the largest contributor of eroded sediment in the analysis area now and in the near future with mass wasting increasing in importance as a sediment source as root strength decreases with time. Table 5-3 shows soil erosion by burn intensity. The moderate and high burn intensity areas, which totally consumed the forest floor, are responsible for 77% and 83% of the current soil erosion in Lower New River and Upper New River watersheds, respectively.

Table 5-3 Soil Erosion Distribution by Burn Intensity

| Watershed | Low Burn Intensity ($yds^3$) | Moderate Burn Intensity ($yds^3$) | High Burn Intensity ($yds^3$) |
|---|---|---|---|
| L New River | 15,432 (23%) | 38,704 (58%) | 12,310 (19%) |
| U New River | 23,325 (17%) | 42,132 (30%) | 75,719 (53%) |

## *4.3 CHANGES IN SOIL PRODUCTIVITY*

The removal of the litter/duff layer has significantly increased soil erosion and altered soil nutrient cycling processes that negatively affects soil productivity. The Forest's LRMP provides direction to protect soil productivity. Long-term impairment of soil productivity can occur in several ways: through soil compaction, loss of organic matter, loss of CWD and accelerated surface erosion. The soil's DFC is to have properly functioning soils that reflect the various ecological types existing in the analysis area

# 4c. Hydrology

## *4.4 CHANGE IN HYDROLOGICAL CONDITIONS*

Hydrology of the watershed shows relatively small changes due to the low intensity fires and fuel types that resulted in a lack of widespread hydrophobic soils. Water quality parameters of flow timing, turbidity, and temperature are not expected to change significantly or negatively affect beneficial uses. Some increases in runoff will be expected for a period of years due to reduced evapotranspiration. The timing of flows may be shifted slightly with higher runoff early in the year and lower base flows later in the summer. The risk of fire induced flooding is low. Although surface soil erosion has increased because of the fires, turbidity has remained low, with only short precipitation related pulses.

# 4d. Riparian and Aquatic Systems and Species

## *4.5 CHANGE IN FISH ABUNDANCE AND DISTRIBUTION*

Summer Steelhead, the primary anadromous fish within the New River watershed, has shown an increasing-to-stable population trend over the last 20 years. The 1999 wildfires should not affect fish abundance and distribution in the short term. Inputs of sediment have been increased but sediment levels are still below levels having significant impacts. Increased inputs of large woody debris may cause debris jams in channels but it is unlikely that total barriers would occur.

## *4.6 CHANGE IN ANADROMOUS HABITAT*

Short-term impacts to aquatic habitat appear to be minimal, with out significant amounts of sediment reaching anadromous habitat. Increased inputs of large woody debris will occur over the next several years as fire killed trees fall into stream systems. Over the long-term, channel adjustments will occur and habitat complexity will be increased.

## *4.7 CHANGE IN RIPARIAN RESERVES*

Fire effects to Riparian Reserves vary widely depending on the burn severity within the reserve, the burn severity adjacent to the reserve, and the position on the landscape. Riparian Reserves adjacent to larger perennial streams generally showed minor effects while reserves of dry intermittent channels often burned similar to the surrounding upland habitat. Generalized effects on the Aquatic Conservation Strategy objectives are summarized in table 5-4.

TABLE 5- 4 Effects of fire on ACS objectives

| Aquatic Conservation Strategy Objectives | Changes due to the 1999 Wildfires |
|---|---|
| 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted. | Watershed and lanscape-scale features were simplified due to fire and will remain at risk over the long term (10- 12 years) due to increased fuels build up. |
| 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species. | The wildfires had **little effect** on spacial and temporal connectivity within the watershed. Network connections remain physically and chemically unobstructed. |
| 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. | The wildfires had **little effect** on the physical integrety of the aquatic system. |
| 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individual composing aquatic and riparian communities. | Water quality had and will continue to have effects from the wildfire, however water quality will remain in the range to maintain integrity of the system. |
| 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport. | The sediment regime, while elevated, is within the natural range for the aquatic system. |
| 6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high and low flows must be protected. | Timing and magnitude of flows will be changed slightly by the fire, however changes will likely be less than interannual flow variation in this climate. Sediment, nutrient, and wood routing will be increased over the short term, natural patterns should not be disrupted |
| 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands. | The wildfires will have **minimal effects** on floodplain inundation and water table elevation. |
| 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and wither thermal regulation, nutrient filtering, appropriate rates of surface erosion, band erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability. | The effect of the fires on riparian plant communities is variable, depending on burn severity within the riparian area. Some areas may show negitive effects as large conifers are killed, other areas with light under burn will have healthier vegetation. |
| 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species. | The fire should have **little effect** on populations of native plant, invertebrate, and vertebrate riparian-dependent species at the watershed scale. |

Lightning fire occurrences and traditional burning techniques used by local Native Americans indicate that fire has been and will be a major player in virtually every ecosystem on the Forest. Studies show that fire is a frequent player in riparian areas on the west and east side of the Shasta-Trinity Divide in the Klamath Mountains. Even though riparian fire return intervals are longer and more variable, certain conditions (e.g. long-term droughts, south or west-facing slopes) could make fires behave in a similar fashion to nearby upland sites.

It is important to identify and evaluate key processes and functions operating within riparian areas when assessing potential impacts of land management activities on beneficial uses. Key processes to consider include:

- The likelihood of increasing peak flows at the site;
- The role of large woody debris both in the channel and downstream
- The influence of canopy cover on microclimate
- Stream channel stability and sediment delivery potential
- Unique riparian vegetation that indicates an elevated water table
- Nutrient cycling and retention

Any management strategy applied to burned areas poses some future risk to riparian and aquatic resources. If no fuel reduction projects are implemented, future fire intensity and erosional consequences could be extreme. The elevated fuel conditions will be a long-term liability, whereas treatment to reduce those fuels would only be a short-term impact.

Fuel treatment practices, which include prescribed fire, and fuel removal, can protect Riparian Reserves by reducing excess fuel loadings and breaking up fuel continuity. Fuels management that attempts to isolate an area by only treating outside it could be even more damaging by leaving continuous and higher fuel loadings within the area of concern. This is especially true of Riparian Reserves, which are linear features that go from the bottom of the slope to the top of the ridge often creating a chimney effect in dry intermittent channels.

Projects that are likely to benefit riparian and aquatic habitat fall into several categories:

- Reduction of erosion and sedimentation where feasible.
- Protection of stream corridors from future high severity wildfire at a large scale, especially existing habitat that remains in those reaches that were burned at low severity.

# 5. Access and Travel Management

## *5.1 CHANGE IN TRANSPORTATION SYSTEM ROLE*

The role of the transportation system has changed from its emphasis on timber harvest activities from the 1960's to the middle 1980's. Currently, the main purpose for the open transportation system is for recreation use, access to private property, and access for fire protection. An Access Travel Management (ATM) plan must be developed to identify the roads required to meet the resource management needs of future activities within the New River watersheds.

The main concern resulting from the effects of the 1999 wildfires is the number of hazard trees above and below the roads. Dead and dying trees are considered a threat to human safety along maintained travel corridors. If salvage operations do not remove the hazard trees along all the roads, regular road maintenance funds would have to finance the removal of these hazard trees. Since road maintenance funds are limited, some roads may have to be closed or signed until additional funds become available to complete the task to provide safe usage for all users.

## *5.2 CHANGE IN TRAIL CONDITIONS*

There is a drastic difference between the post-fire and pre-fire trail conditions. Resource protection and perpetuation of trail in their present locations are primary management objectives for trails, and the post-fire condition will promote erosion and multiple trails with user created reroutes around obstacles. User safety and preservation of the trail investment are also management objectives for trails. The current post-fire condition does not provide for user safety, and the trail investment is in jeopardy.

# 6a. Heritage Resources

## *6.1 CHANGE IN LANDSCAPE SURROUNDING HERITAGE SITES*

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.

## *6.2 CHANGE IN EFFECTS TO ARCHAEOLOGICAL PROPERTIES*

The 1999 wildfires have affected a number of archaeological properties. These are the Old Denny Mining District and the traditional/spiritual archaeological district in the North Trinity Mountain area. The Six Rivers National Forest is carrying out mitigation work in the latter area. For the Shasta-Trinity National Forest the extent of impact from the 1999 wildfires still needs to be assessed in the Trinity Alps Wilderness area.

Recommended undertakings addressing the various management objectives for fuel reduction, LSR protection and enhancement, or salvaging the burned timber will require archaeological survey and potentially mitigation of adverse effects to eligible properties.

# 6b. Local Community Economies

## *6.3 CHANGE IN CONTRIBUTION TO LOCAL COMMUNITY ECONOMIES*

The Forest Service pays out 25 % of its annual revenues collected from timber sales, grazing, recreation, minerals, and land uses to states in which National Forests lands are located to help finance roads and school budgets. The payments have declined dramatically since 1989 due to decreased timber harvest over the past decade. It is important to note that the final payments to some states (California, Oregon and Washington) are computed under a provision of the Omnibus Budget Reconciliation Act of 1993. Section 13982 of the Act provides for payments to States for fiscal 1999 of 70% of the five-year average for fiscals 1986-1990 for those National Forests affected by the Northern Spotted Owl decision. If based solely on actual receipts, payments would be down. Currently, the Administration has been working with Congress to try to stabilize future payments to counties and schools.

Any timber sale has the potential to generate revenues to the County, and the amount of the revenue would be dependent upon the value of the sale. In salvage sales time is very critical, that is, the longer it takes to plan, prepare, and offer a sale, the greater the impact to the sales' value because of the deterioration of the fire killed trees especially in the smaller diameter classes. As trees deteriorate the economic viability of projects lessen which may not only affect County receipts, but it may also require the need to use appropriated funds to remove any hazards or to accomplish other restoration projects.

# 6c. Recreation and Wilderness

## *6.4 CHANGE IN RECREATION RESOURCES AND USES*

The 1999 wildfires have adversely affected recreation resources. The recreational use regarding travel on trails and camping within the fire area will be limited due to safety concerns. The stock stanchions at the New River and East Fork New River trailheads are unserviceable. Vegetation has been removed form the New River trailhead. Rehab is not complete on the river access trail at Denny campground.

The Forest LRMP recreation goal is to provide a variety of high quality outdoor recreation experiences. Developed recreation sites are in the Roaded Natural component of the Recreation Opportunity Spectrum and should meet the Meaningful Measures Standards. To meet the LRMP goals, the physical recreation resources need to be assessed and managed to meet Meaningful Measures Standards.

## *6.5 CHANGE IN WILDERNESS CONDITIONS*

The fire suppression activities of clearing vegetation for fire lines, remote camps, safety zones, and helispots have altered the character of the wilderness. There are areas of unnatural staubs and stumps, slash piles/windrows, and limbed trees on and/or adjacent to trails, helispots and campsites. There are large openings where “safety zones” were developed. Remote camps have large campfire rings and chainsaw camp furniture. A major concern is the adverse impact on areas where the fire line is near the trail or campsites. Landscape views show a range from fire killed brush and timber to mosaics of green and burned vegetation. Safety concerns are above the inherent risks of wilderness with snags and hazard trees.

The Shasta-Trinity National Forest Land Management Plan Chapter 4.F.1.V.A and C, describes Wilderness setting as essentially an unmodified natural environment and emphasis is placed on maintaining natural ecosystems. Under standards and guidelines in the same section management direction is to take appropriate action to rehabilitate or restore the site.

# CHAPTER 6

# KEY FINDINGS &

# MANAGEMENT RECOMMENDATIONS

This chapter summarizes findings from Chapter 5, identifies "Key" Findings (KFs) 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 New River Watersheds were identified in Chapter 2. Key Findings (marked with ❖) are specific resource conditions that are outside of desired ranges and result in management recommendations. Other findings (marked with •) are important but are not outside of desired ranges and do not require a management recommendation.

### 1. Health and Recovery of Vegetation

❖ Management Area objectives are not being met to enhance growth and yield to improve and protect forest health and vigor in forest stands within AMA. (KF #1)

❖ Plantations are not meeting current management objectives for the various established land allocations and management prescriptions. (KF #2)

- Insect activity will increase within the fire area in the next 3 or 4 years, but an outbreak or epidemic is not likely.

- The 1999 wildfires had little impact on rare plant species.

❖ Invasive weed species have been observed within the analysis area, both inside and outside the Trinity Alps Wilderness. (KF #3)

❖ Within the Shasta-Trinity portion of LSR 305, approximately 3000 Acres of Mature and Old Growth Conifer Vegetation were lost in the 1999 Wildfires. (KF #4)

## 2. Terrestrial Wildlife Habitat and Species

- High intensity fires produced areas within LSR 305 that no longer provide value to species associated with LSOG habitat. (KF #4)
- Reducing the fuel loading, while maintaining the desired snag and log levels identified in the LSRA, will add to the likelihood that regenerated stands will survive another fire. (KF #5)

## 3. Fire, Fuels, and Air Quality

- The continuity and level of fuels poses an increased fire hazard across the land-scape of the New River area with a high potential for high intensity re-burn. (KF #5)
- Communities that are surrounded by a fire prone forest will always have a potential threat to life and property. (KF #6)
- Management actions are possible to reduce adverse impacts to air quality related to wildfires. (KF #7)

## 4. Erosional Processes and Aquatic Systems

- Due to effects of the 1999 wildfires, dormant earthflows and rotational landslides can be anticipated to become active in the northern reaches of the watershed.
- Whereas past management activities, such as roads and timber harvesting, contributed (only) small amounts of surface soil derived sediment to the New River watershed, the 1999 wildfires are expected to be responsible for 94% to 99% of the sediment entering the stream system within the fire area.
- The removal of the litter/duff layer has increased soil erosion and altered soil nutrient cycling processes, which negatively affects soil productivity. (KF #8)
- Surface erosion will diminish quickly with the re-establishment of vegetation. However, loss of root strength in fire-killed trees will increase risk of mass wasting over the next 7 to 12 years. (KF #9)
- Water quality parameters of flow timing, turbidity, and temperature are not expected to change significantly or negatively affect beneficial uses. (KF #10)
- Summer Steelhead, the primary anadromous fish within the Tier 1 Key Watershed has shown an increasing-to-stable population trend over the last 20 years. (KF #11)
- Short-term impacts to aquatic habitat appear to be minimal.

- ❖ Some Riparian Reserves may not be fully contributing to ACS objectives. Riparian Reserves adjacent to larger perennial streams generally showed minor effects while reserves of dry intermittent channels often burned similar to the surrounding upland habitat. (KF #12)

## 5. Access and Travel Management

- Resource impacts from roads and road-related access are minimal.

- ❖ There is a potential hazard to the public and Forest employees from fire-damaged trees falling on Forest development roads. (KF #13)

- Road maintenance needs will increase for the next 10 years as a result of rocks and debris falling onto the roads as a result of the 1999 wildfires.

- ❖ The post-fire trail conditions are unsafe and in need of erosion protection. (KF #14)

## 6. Human Uses, Values, and Expectations

- ❖ The extent of fire-related impact to cultural traditional/spiritual areas and heritage resources in the Trinity Alps Wilderness area needs to be assessed. (KF #15)

- Some members of the public support an active rehabilitation effort for the fire area while others feel that natural processes should be allowed to take place.

- ❖ There may be fire restoration management opportunities that could contribute to the local economy (Contracting/partnerships for trail maintenance, fuels management, survey and manage inventories, reforestation, conifer stand thinning, hazard tree removal, salvage sales, monitoring, etc.). (KF #16)

- ❖ Take opportunities to learn from the fire. (KF # 17)

- ❖ Some recreation facilities and remote camps in the wilderness need maintenance and/or rehabilitation. (KF #18)

## Relationship between Key Questions and Management Recommendations

Key questions developed in Chapter 2 were addressed specifically by resource area through Chapters 3, 4 and 5. Proper forest management demands that all resource areas are integrated and managed together. Integration of objectives from the various resource areas allows accomplishment of multiple goals by focusing efforts on the highest priority locations in these watersheds. Because these recommendations and possible management practices are designed to meet multiple objectives, several key findings and associated management recommendations have been combined to emphasize these links and avoid repetition.

| **Issue containing Key Question** | **Key Finding containing Management Recommendations** |
|---|---|
| Issue #1: Health and Recovery of Vegetation<br>Includes Key Questions 1.1 through 1.5 | Key Finding # 1, 2, 3, 4 |
| Issue #2: Terrestrial Wildlife Habitat and Species<br>Includes Key Questions 2.1 through 2.5 | Key Finding # 4, 5 |
| Issue #3: Fire, Fuels, and Air Quality<br>Includes Key Questions 3.1 through 3.4 | Key Finding # 5, 6, 7 |
| Issue #4: Erosional Processes and Aquatic Systems<br>Includes Key Questions 4.1 through 4.7 | Key Finding # 8, 9, 10, 11, 12 |
| Issue #5: Access and Travel Management<br>Includes Key Questions 5.1 and 5.2 | Key Finding # 13, 14 |
| Issue #6: Human Uses, Values, and Expectations<br>Includes Key Questions 6.1 through 6.5 | Key Finding # 15, 16, 17, 18 |

# Management Recommendations for Key Findings

## *KEY FINDING # 1 – Management area objectives are not being met to enhance growth and yield to improve and protect forest health and vigor in forest stands within the AMA. Vegetative management is needed to meet area objectives.*

There are approximately 350 acres of vegetative cover completely burned in the 1999 wildfires and additional burned areas including tree mortality are apparent in areas not reflected in the projection of vegetative cover change. LRMP direction is to manage suitable lands on a sustained yield basis with stands ranging generally from 5 to 40 acres in size. Forest stand densities would be managed at levels to maintain and enhance growth and yield to improve and protect forest health and vigor recognizing the natural role of fire, insects, disease and other components that have a key role in the ecosystem. The AMA is disaggregated into three Management Prescriptions - each with a specific management emphasis. They are: Management Prescription III, Roaded Recreation; Management Prescription VI, Wildlife Habitat Management; and Management Prescription VIII, Commercial Wood Products Emphasis. Where existing conditions are not meeting LRMP management prescription objectives, vegetation management actions may be required to achieve these identified resource objectives.

## *Management Recommendation – Provide silvicultural treatments to burned areas on suitable lands managed on a sustained yield basis within the AMA (responsive to key question 1.1).*

| Possible Management Practice | Notes |
|---|---|
| Intermediate Harvest Options. | Commercial thinning can be employed in younger stands that have not reached culmination of mean annual increment. Sanitation/Salvage may be used to remove older dead, down, dying and high-risk trees that are not expected to survive. |
| Final Harvest Options | This can be accomplished through a variety of options: The removal of all dead trees except those needed for other resource needs. This practice is usually followed immediately by artificial regeneration (planting). Removal of trees, but leaving adequate numbers of live trees suitable for wildlife purposes. These trees will not substantially interfere with the management of newly regenerated (planted) stand. |

## ***KEY FINDING # 2*** *– Burned plantations are not meeting current management objectives for the various land allocations. There is a need to re-stock and/or protect the plantation investment.*

Approximately 1800 acres of conifer plantations were affected by the 1999 wildfires. Field reviews indicated that approximately 750 acres were lost to wildfire and burnout activities used in the fire suppression effort. These plantations are not meeting minimum or desired stocking standards as needed within LSR and/or AMA lands. The plantations will need reforestation and possible thinning to begin stand replacement, improve stand growth, vigor, and health, and speed the recovery to the LSR and AMA lands. In addition, there may be post salvage opportunities in the form of new stand establishment activities (site preparation, planting, release for survival, animal damage control measures, etc.).

## ***Management Recommendation*** *– Provide new stand establishment activities and silvicultural treatments to existing burned plantations within the management area (responsive to key questions 1.2 and 1.4).*

| Possible Management Practice | Notes |
|---|---|
| Site Preparation, Reforestation and Release Activities | Prior to planting some plantations/harvest areas may have great accumulations of down material that would hamper planting operations and possibly seedling survival. Some areas would be site prepared by tractor piling, hand piling, broadcast burning, removal, etc. Reforesting different areas would be dependent upon existing stocking distribution and density, species arrangement, species vigor, and management objectives. Release may be needed to minimize root competition from competing vegetation to increase the availability of moisture and nutrients to the planted seedlings. |
| Release for Growth and Precommercial Thinning | Release for growth is applied to established plantations to increase growth rate of the planted trees by reducing shade from competing vegetation. Root competition may be reduced as well. Thinning is used to improve stocking densities, maintain/enhance growth rates, improve stand health and vigor, and possibly minimize future wildfire damage to existing trees within the plantation. |

## ***KEY FINDING # 3*** *- Invasive weed species are present within the New River Watersheds. It is important to control the spread of undesirable plant species.*

Invasive weed species have been observed within the analysis area, both inside and outside the Trinity Alps Wilderness. Observations have been casual and more/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, and loss of habitat for wildlife.

## ***Management Recommendation*** *– Survey high-risk locations and develop a management strategy (responsive to key question 1.3).*

| Possible Management Practice | Notes |
|---|---|
| Survey and map areas of high risk | New River and East Fork trailheads<br>New River, Virgin Creek, and Slide Creek Trails<br>County Road 402<br>Denny area |

## ***KEY FINDING # 4*** *- High intensity fires produced areas within LSR 305 that no longer provide value to species associated with LSOG habitat. Successful habitat management for LSOG species is dependent upon providing and maintaining an adequate amount of habitat within LSR 305.*

Within the LSR approximately 6000 acres of vegetative cover were lost in the 1999 wildfires. Mature and Old Growth stands comprising approximately 3000 acres or 17% of the total mature/old growth stands within the New River Watershed were lost. Management practices that enhance the recovery of these 6000 acres and promote the development of late-successional and old growth ecosystems would contribute toward meeting management objectives consistent with the Six Rivers NF's Forest-wide LSR Assessment for LSR 305.

LSR 305 is below the recommended management range for LSOG. Shrub and hardwood competition along with dense woody material on the ground (existing and expected in the next 5 to 10 years) will likely delay the re-establishment of conifers on these sites. Additionally, existing fuel loading within and around these areas increase the likelihood of future stand replacing fires.

Criteria for Selecting Treatment Areas:

- The stand has been severely damaged by the fire.

- Canopy closure has been reduced below 40 percent.
- The size of the area below 40 percent canopy closure is a contiguous 10 acres or larger. This includes disturbances smaller than 10 acres when adjacent, and substantially connected to, another recently created opening for which the total area exceeds 10 acres. Adjacent, and substantially connected to means the two parts of the new stand are sufficiently uniform in composition, age, arrangement, and condition to be mostly indistinguishable from each other, and distinguishable from the adjacent forest.
- Burned plantations regardless of patch size.

## ***Management Recommendation*** *- Reforest severely burned areas within LSR 305 to accelerate the development of late-successional and old growth habitat (responsive to key questions 1.1,1.2, 1.4, 2.1, 2.3, 2.5, 3.1, and 3.2).*

| Possible Management Practice | Notes |
|---|---|
| Reforestation | Reforestation and plantation re-establishment through artificial regeneration (planting) of desired conifer species would assist in the speed of the recovery of the LSR. |
| Fuels Reduction. | Delineate, prioritize, and treat high fuel accumulation areas. Treatment may include but not limited to the following types: Salvage sales to remove excess merchantable standing and/or down trees. Service Contracts or Purchaser's requirements to remove, pile, or chip sub-merchantable, live, and dead trees to reduce ladder fuels and high fuel accumulations. |

## ***KEY FINDING # 5*** *- Reducing the fuel loading within LSR 305, while maintaining the desired snag and log levels, will add to the likelihood that regenerated stands will survive another fire. The continued viability of the habitat within LSR 305 is dependant upon minimizing the occurrence of stand replacing wildfires.*

Mature and late successional stands with moderate and low severity burn effects experienced both individual tree and group mortality; mortality in these stands is expected to increase as trees are stressed by cambium and crown loss. Over time, these trees will add significantly to the fuel loading and hazard in the area, far exceeding desired snag, down logs, and fuel levels. Management practices that reduce the threat of catastrophic loss of habitat would contribute toward meeting management objectives consistent with the Six Rivers NF's Forest-wide LSR Assessment for LSR 305.

***Management Recommendation*** *– Reduce the large numbers of snags, logs and other fuels to desired levels to reduce the threat of high intensity re-burn (described in the SRNF LSR Assessment) (responsive to key questions 2.1, 2.3, 2.5, 3.1, and 3.2).*

| Possible Management Practices | Notes |
|---|---|
| Prescribed Fire | Will require successive, landscape area treatments to adequately reduce hazard levels. Should be used in conjunction with fuel breaks, thinning and coarse woody debris removal to reduce fuel loading prior to burning. |
| Hand-Piling and Burning | Use in stands where fuel conditions or other resource conditions prevent a successful prescribed fire (e.g. disturbed sites in the Megram Fire that have excess fuel loading). |
| Mechanical Treatment | Use in stands where fuel conditions or other resource conditions prevent a successful prescribed fire (e.g. disturbed sites in the Megram Fire that have excess fuel loading). |
| Remove merchantable trees killed by fire or insects in early and mid-mature stands within low and moderate burn severity burn | Follow-up with treatments of slash and unmerchantable material using brush disposal and KV funds. |
| Thinning | Commercial and pre-commercial thinning is a management practice that can improve stand health and vigor and hasten its development toward late successional conditions. Fuel management and fire hazard objectives may be met by improving timber stand structures. |
| Reduce concentrations of large fuel in high intensity burn areas through salvage and fuel treatment | Follow-up with treatments of slash and unmerchantable material using brush disposal and KV funds. Reforest using similar practices used in plantation restoration. |

***KEY FINDING # 6*** *- Communities that are surrounded by a fire prone forest will always have a potential threat to life and property. Forest fuels management actions are needed to minimize the threat of catastrophic wildfire damage to adjacent communities.*

Fire will always be a potential threat to life and property in communities surrounded by forest. Threat of fires can be reduced by working in conjunction with the communities and developing areas of modified fuel conditions surrounding them. To be effective, these are likely to be areas characterized by reduced fuels and more open space than the surrounding forest. Frequent prescribed fire will probably be an important part of the suite of treatments used to maintain these low-hazard areas.

***Management Recommendation*** *– Work in conjunction with communities to develop areas of modified fuel conditions surrounding them (responsive to key question 3.3).*

| Possible Management Practice | Notes |
|---|---|
| Prescribed Fire | Successive large area treatments to adequately reduce hazard levels may be required. Treatments should be used in conjunction with fuelbreaks, thinnings, and coarse woody debris removal to reduce fuel loading prior to burning. |
| Hand-Piling and Burning | Use in stands where fuel conditions or other resource conditions prevent a successful prescribed fire (e.g. disturbed sites in the Megram Fire that have excess fuel loading). |
| Mechanical Treatment | Use in stands where fuel conditions or other resource conditions prevent a successful prescribed fire (e.g. disturbed sites in the Megram Fire that have excess fuel loading). |

***KEY FINDING # 7*** *- Management actions are possible to reduce adverse impacts to air quality related to wildfires. In order to meet air quality standards and eliminate adverse air quality effects to the extent possible, management actions are needed to control the amounts of forest fuels and to influence the timing of when fuels are consumed by fire.*

Adverse impacts to air quality occur whenever natural fuels burn. Management actions may be implemented to keep the level below that harmful to human health. Accomplishing multiple short duration burns will reduce the available fuels before a large, long duration wildfire materializes. It is often more efficient to accomplish short-duration prescribed burns for maintenance purposes after some form of mechanical utilization or removal of some of the fuels.

## ***Management Recommendation*** *– Manage fuel treatment to reduce adverse impact to air quality (responsive to key question 3.4).*

| Possible Management Practice | Notes |
|---|---|
| Prescribed Fire | Prescribed fire may be implemented to control timing and duration of smoke. Repeated prescribed fire will reduce available fuels. |
| Mechanical Treatment | Use in stands where fuel conditions or other resource conditions prevent a successful prescribed fire (e.g. sites close to houses or private property). |

## ***KEY FINDING # 8*** *- The removal of the litter/duff layer has increased soil erosion in high intensity burn areas and altered soil nutrient cycling processes, which negatively affects soil productivity. There is a need to provide/enhance soil cover.*

The removal of the litter/duff layer has increased soil erosion and altered soil nutrient cycling processes, which negatively affects soil productivity. The Forest's LRMP provides direction to protect soil productivity. Long-term impairment of soil productivity can occur in several ways: through soil compaction, loss of organic matter, loss of CWD and accelerated surface erosion. The soil's desired condition is to have properly functioning soils that reflect the various ecological types existing in the analysis area.

## ***Management Recommendation*** *– Reduce soil erosion rates and maintain soil productivity (responsive to key questions 4.1,4.2,and 4.3).*

| Possible Management Practice | Notes |
|---|---|
| Increase soil cover | Use appropriate vegetation management practices, including tree planting, seeding, and mitigation measures to meet Soil Quality Standards. |
| Reduce soil erosion | Treat wildfire and management created fuels without significantly elevating current soil erosion rates. |

## ***KEY FINDING # 9** - Surface erosion will diminish quickly with the re-establishment of vegetation. However, loss of root strength in fire-killed trees will increase risk of mass wasting over the next 7 to 12 years. There is a need to provide deep-rooted vegetation on landslide-prone sites quickly to minimize the potential for mass wasting.*

Shallow mass wasting features rely on root support for stability. Root support is critical in certain zones of larger landslide complexes. Tree roots often limit seasonal slide movement to relatively low rates due to the roots interlocking laterally, providing some shear strength. Loss of root support on some of these landslide features will result in increased instability over the next few years as the root masses decompose and lose their strength.

## ***Management Recommendations** - Reforest severely burned areas within the Tier 1 Key Watershed to accelerate the develop-ment of deep-rooted conifers (responsive to key question 4.1).*

| Possible Management Practice | Notes |
|---|---|
| Reforestation | Reforestation and plantation re-establishment through artificial regeneration (planting) of desired conifer species would assist in lowering the risk of mass wasting. |

## ***KEY FINDING # 10 -** Water quality parameters of flow timing, turbidity, and temperature are not expected to change significantly or negatively affect beneficial uses.*

The greatest potential impacts to water quality were associated with erosion from fire lines flow increases due to hydrophobic soils. Extensive rehabilitation of fire lines, safety zones and water developments has mitigated the risks of increased hillslope erosion, turbidity and stream sedimentation. Some direct short-term effects may occur but they are expected to be minimal.

## ***Management Recommendation –** Monitor selected water quality parameters over the long-term (responsive to key question 4.4)*

| Possible Management Practice | Notes |
|---|---|
| Monitor water temperature | Continue water temperature monitoring in tributaries and mainstem New River. |
| Monitor turbidity of selected streams | Turbidity should be monitored on selected streams if a problem is suspected. |

***KEY FINDING # 11*** *– Summer Steelhead, the primary anadromous fish within the Tier 1 Key Watershed, has shown an increasing-to-stable population trend over the last 20 years. There is a need to track fish populations in the 1999 wildfires aftermath to assure wildfire impacts have not negatively affected the Summer Steelhead.*

Tier 1 key watersheds are designated to protect "at risk" stocks of anadromous fishes. The dominant fish within the New River drainage is the Summer Steelhead. Stable populations demonstrate the proper functioning conditions of the watershed.

***Management Recommendation*** *– Monitor adult Summer Steelhead populations within this Tier 1 Key Watershed (responsive to key question 4.5).*

| Possible Management Practice | Notes |
|---|---|
| Count adult Summer steelhead on a yearly basis. | Adult Summer Steelhead have been counted by direct observation snorkeling for approximately 20 years. |

***KEY FINDING # 12*** – Some Riparian Reserves may not be contributing to ACS objectives. Riparian Reserves adjacent to larger perennial streams generally showed minor effects while reserves of dry intermittent channels often burned similar to the surrounding upland habitat. Management activities may be needed and/or modified to assure long-term protection of Riparian Reserves.

Any management strategy applied to burned areas poses some future risk to riparian and aquatic resources. If no fuel reduction projects are implemented, future fire intensity and erosional consequences could be extreme. The elevated fuel conditions will be a long-term liability, whereas treatment to reduce those fuels would only be a short-term impact.

***Management Recommendation*** *– Design projects within and adjacent to riparian areas to meet and enhance ACS objectives (responsive to key question 4.7).*

| Possible Management Practice | Notes |
|---|---|
| Follow ROD standards and guides for Riparian Reserves. | In some cases, riparian reserves may need to be considered for fuel treatments. Special conditions that would indicate a need to evaluate these riparian areas for fuel treatment include:<br>a) high, continuous fuel loading both within and adjoining riparian area<br>b) close proximity to high fire occurrence<br>c) middle and upper slope position |

## ***KEY FINDING # 13*** *- There is a potential hazard to the public and Forest Service employees from fire-damaged trees falling on Forest development roads. Immediate action is needed to remove the identified hazards and assure safe travel along open roads.*

The number of hazard trees above and below the roads does not meet Forest LRMP transportation safety objectives roads currently and historically open to the public. The amount of open roads may be inadequate for fire suppression or accomplishing vegetative management objectives; however, the amount of road may be meeting the needs of LSR and Roadless management, Riparian Reserve protection, and/or other resource needs.

## ***Management Recommendation*** *– Reduce hazards along forest development roads (responsive to key question 5.1).*

| Possible Management Practice | Notes |
|---|---|
| Hazard tree removal along Level 2, 3, and 4 roads | Reduce the safety threat along area roadways by felling designated hazard trees. Remove and utilize those trees in locations compatible with other resource management goals and restrictions. |
| Road maintenance | Repair, replace, or maintain all damage or wear that activities may cause to road surfaces, cutslopes, fillslopes, culverts, ditches, or other road structures. |
| Develop a multi-resource Access Travel Management (ATM) Plan | The need for hazard tree removal on forest development roads may be reduced or increased depending on the amount and maintenance level of roads under management. |

## ***KEY FINDING # 14*** *- The post-fire trail conditions are unsafe and in need of erosion protection. To meet the demand from forest visitors who use the trail system to access the wilderness, trail maintenance and hazard reduction is required.*

Resource protection and perpetuation of the trail in its present location are primary management objectives for trails, and the post-fire condition will promote erosion and multiple trails with user created reroutes around obstacles. User safety and preservation of the trail investment are also management objectives for trails.

## ***Management Recommendation*** *– Reduce hazards along trail and restore trail to meet management objectives (responsive to key question 5.2).*

| Possible Management Practice | Notes |
|---|---|
| Post signs at trailhead | Sign Trailheads with current information on hazards on and along the trail system. |
| Remove hazards from trail system. | Buck out logs and debris from trail. Clear fire-hardened brush stems from the clearing limits. Dispose of removed material on the downhill side of the trail, and out of drainages and watercourses. |
| Repair trail surface | Dig out slough to restore 18-24” tread width, and reshape with a 10% outslope to shed water. Groom the back slope of loose material. Dispose of excess material on the downhill side of the trail, and out of drainages and watercourses. Install Water-bars to control runoff and prevent erosion. Armor Stream crossings so that trail traffic does not erode stream banks. Place compacted rock and mineral soil fill material into cavities and craters to restore tread and eliminate hazards. |

## ***KEY FINDING # 15*** *- The extent of fire-related impact to cultural traditional/spiritual areas and heritage resources in the Trinity Alps Wilderness area needs to be assessed. There is a need to protect cultural sites and maintain strong working relationships with local American Indian tribes.*

The 1999 wildfires have affected a number of archaeological properties. These are the Old Denny Mining District and the traditional/spiritual archaeological district in the North Trinity Mountain area.

***Management Recommendation*** *- Determine, if possible, the effects of the 1999 wildfire on archaeological properties within the Upper New River portion of the watershed (responsive to key question 6.1).*

| 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 watershed that may have been damaged by the 1999 fires. This would primarily be within the wilderness portion of the watershed. |

***KEY FINDING #16*** *– There may be fire restoration management opportunities that could contribute to the local economy (Contracting/partnerships for trail maintenance, fuels management, survey and manage inventories, reforestation, conifer stand thinning, hazard tree removal, salvage sales, monitoring, etc.). There is a need for rapid management response to expedite fire restoration activities.*

It is difficult to predict how much fire recovery efforts would contribute to the local economy. This is dependent upon what recommendations are implemented, where and when they are implemented, and who does the implementation. The potential benefits that may be derived could be from a commercial operation that results in receipts to the County, or contractual operations with local contractors providing assistance in hazard tree removal, salvage sales, reforestation/thinning activities, fuels reduction, and survey and manage species inventories. Should a timber sale result from land resource management needs, the value of the sale will decrease as time passes due to the deterioration of the fire-killed timber. Receipts from timber sold may directly benefit both County receipts and additional fire restoration activities.

## ***Management Recommendation*** *– Provide fire restoration and recovery opportunities that may contribute to local economies. (Responsive to key question 6.3)*

| Possible Management Practice | Notes |
|---|---|
| Roadside Hazards and Timber Salvage Sale Opportunities | Possible management practices associated with this opportunity include preparation and award of timber sales that would remove roadside hazard trees and trees that were either killed or damaged beyond recovery. |
| Post-Salvage Opportunities | Possible management practices associated with this opportunity are site preparation, planting, release for survival, and thinning contracts. |
| Plantations, Fuel Reduction, and Survey & Manage Opportunities | Possible management practices associated with this opportunity are planting, release for survival, thinning, removal of high concentrations of fuels, slash treatment needs, and possibly prescribed fire. This may include activities to reduce fire induced short-term negative impacts to roads, stream channels, and trails. Finally, Survey & Manage contracts within the Watershed area may be needed. |

## ***KEY FINDING # 17*** *- Take opportunities to learn from the fire.*

There are numerous opportunities to learn from the 1999 wildfires. These opportunities can be built as learning objectives into project design. They also can be met through developing partnerships with County, State, and Federal Agencies, Tribal Governments and Educational Institutions.

## ***Management Recommendation*** *– Seek research opportunities within project proposals and with partners.*

| Possible Management Practice | Notes |
|---|---|
| Develop Research Agreements | Seek research opportunities with educational institutions, graduate students, PSW, PNW, the Joint Fire Science Program, local communities, the Trinity County Fire Safe Council, Tribal Governments, etc. |
| Provide for monitoring associated with fire restoration projects | Design learning objectives into fire restoration projects and other project proposals. |
| Identify “control” areas | Use untreated burned areas as a control and for monitoring and research projects to compare with treatment areas. |
| Develop study areas evaluating fire effects on a variety of species | Pursue research opportunities within riparian areas impacted by the fire for neo-tropical birds, amphibians, and survey and manage species. |
| Develop a Northern Spotted Owl study within the LSR | Pursue research opportunities on northern spotted owl utilization of habits burned by varying degrees of fire severity. |

***KEY FINDING # 18** - Some recreation facilities and remote camps in the wilderness were extensively used during fire suppression efforts and need maintenance and/or some rehabilitation. There is a need to maintain the approved improvements within the wilderness to rehabilitate wilderness resources and to avoid the potential adverse impacts of user-created improvements, which may not be consistent with opportunity class standards.*

Fire lines in the wilderness that are visible from trails and campsites need to be naturalized. The impacts of fire suppression activities in the wilderness should be mitigated in order to meet wilderness management guidelines.

***Management Recommendation** – Restore recreation facilities to a level that meet management objectives (responsive to key question 6.5).*

| Possible Management Practice | Notes |
|---|---|
| Complete fire suppression rehab activities | Restore wilderness attributes altered by fire suppression activities such as remote campsites and fire rings, helispots, and fire lines that may be mistaken for trails. |
| Repair damaged recreation structures | Repair any recreation structures such as SSTs or Developed Recreation Sites (i.e. re-vegetate) that may have been damaged by the fire or suppression activities. |
| Educate public on fire rehabilitation efforts, closures, projects, etc. | Develop information on fire rehabilitation efforts for posting at trailhead bulletin boards, around town, and at forest offices. Establish web pages about the fire rehabilitation efforts, projects, recovery status, closures, etc. on the Forest’s web site for public access and information. |

The following possible management practices would benefit the recreation and tourism opportunities in the area. These are lower priority actions than those dealing with the immediate effects of the fire and its impacts and are considered as opportunities.

***Additional Possible Management Practices***

| Possible Management Practice | Notes |
|---|---|
| Improve trailhead facilities | Improve trailhead facilities including signing, bulletin boards, corrals, and parking. Consider visitor use and impacts to resources warrant an SST (toilet). Consider opportunity for turnaround loop for parking for easier access/staging for stock use. |
| Install facility signs | Install facility signs at all facilities. |
| Assess Denny Campground facility | Facility analysis to determine campgrounds future status and maintenance needs to achieve Meaningful Measures standards. |

# *Appendix A*
# *Summary of Public Comments*

**Salvage**
Salvage damaged (burned) timber
Don't salvage any timber
Salvage promotes fire intensity
Salvage logging causes environmental harm
Use helicopter logging
Salvage logging increases fire hazard
Salvage logging will have positive impacts on the watershed
Clear cut all timber in the burn
Salvage logging will not hurt the watershed
Salvage logging will have negative impacts on the watershed
Salvage only the high intensity burn areas
Salvage fire lines
Salvage sparingly
**Revegetation**
Replant burned area
If seeding is necessary use only native seed
No reseeding in burned area
Replant with indigenous (tree) species
Replant burned plantations
**Hazard Trees**
Remove hazard trees
Do not remove hazard trees
Hazard tree removal has been abused in the past
Fell hazards only along frequently traveled roads
Clearly define hazard trees
Do not remove hazard trees on level 1 and 2 roads that are not maintained
If hazard trees are fell have them processed locally
**Roads**
Leave access roads
No new roads
Close roads that were opened
Decommission roads
Reassess the road system
No action should be taken in roadless areas until the roadless EIS is complete

**Social**

Provide local employment / economic benefit
Do something (manage the forest)
Educate people
Provide fuel wood opportunities for seniors, needy families, and public
Public comment is important
Logging hurts the local economy
Provide commercial fuel wood opportunities
Field trips are needed
Health and safety is highest priority
Emphasize sustainable forest diversity and stability instead of economics

**Fire / Fuels**

Treat the fuels
If we do nothing future fires will be worse
Use control burns (prescribed natural fire)
Fire breaks are needed
Fires perform useful functions
Forest Service should not build fire breaks
Treat fuels outside of fire area
Fighting efforts increased detrimental impacts to forest health
Forest Service should develop a community fire protection plan

**Watershed Analysis - Planning**

WA timeframes are too short
Develop a comprehensive fire management plan
The Forest Service must wait at least a year before completing the WA.
The WA must include a assessment of fire fighting impacts
Include Native American Elders from the Hoopa, Karok, and Yurok tribes in the planning
The Six Rivers and ShastaTrinity National Forests must Coordinate on Watershed Analysis
The WA must include a assessment of cumulative watershed effects
There is a lack of cooperation between Six Rivers and ShastaTrinity National Forests
WA needs to focus on economic opportunity and cost of restoration
WA needs to display what will happen if activities are delayed
WA should include a physical and economic feasibility analysis for prioritization of projects

**Studies / RNA**

Establish a fire process research area
Don't need any studies
Study fire effects in Wilderness area only
Study a variety of treatments

**Wilderness**

Support trail clearing / maintenance
Leave wilderness area alone
Close trails until they are safe for travel

**Burned Area Emergency Rehabilitation / General restoration**

There is no need for restoration

**Air Quality**

Future fires will have greater air quality impact

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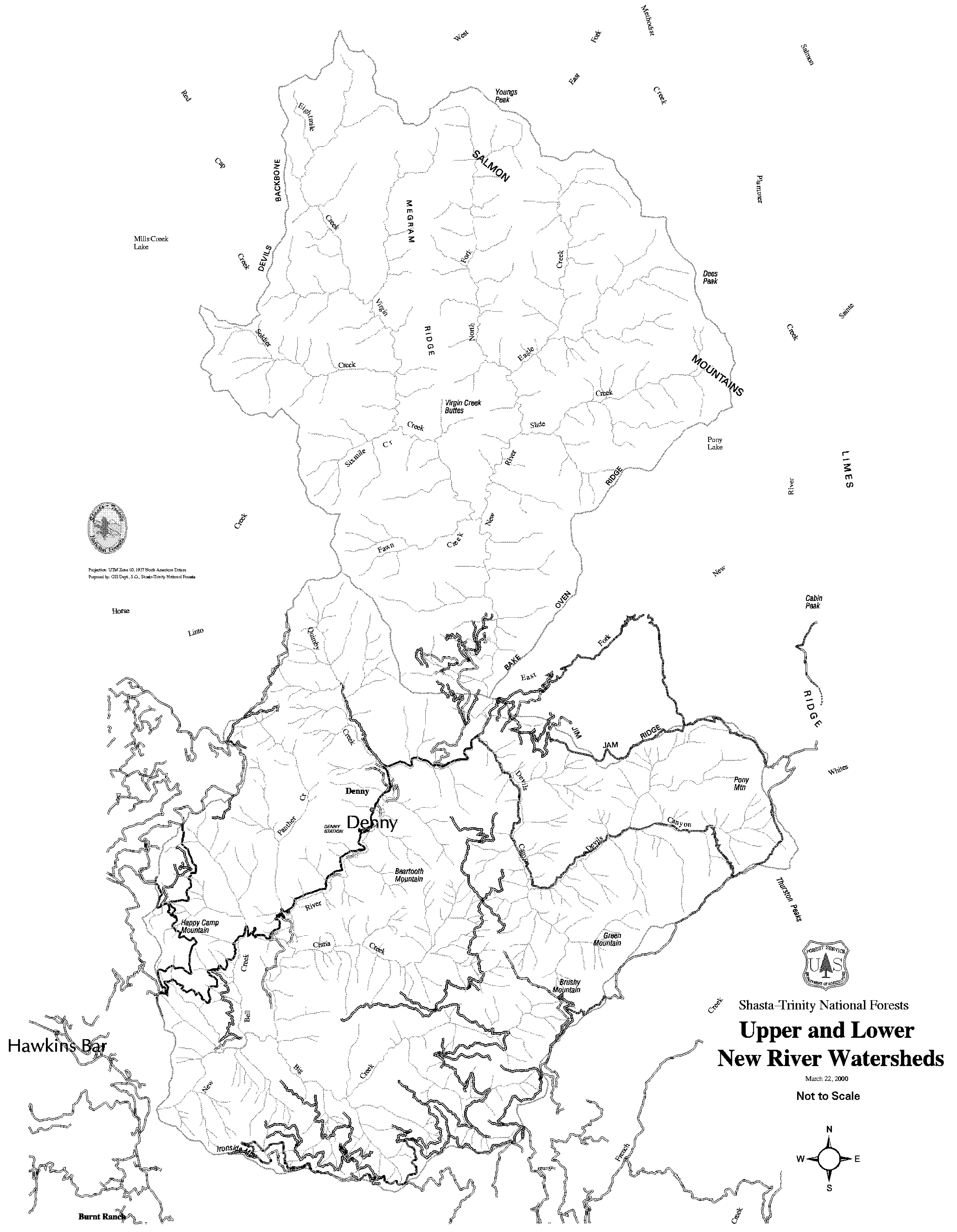
# *Figure 1-1 Vicinity Map of New River Watersheds*



# Figure 1-2 Fire Boundary in Relation to the New River Watersheds

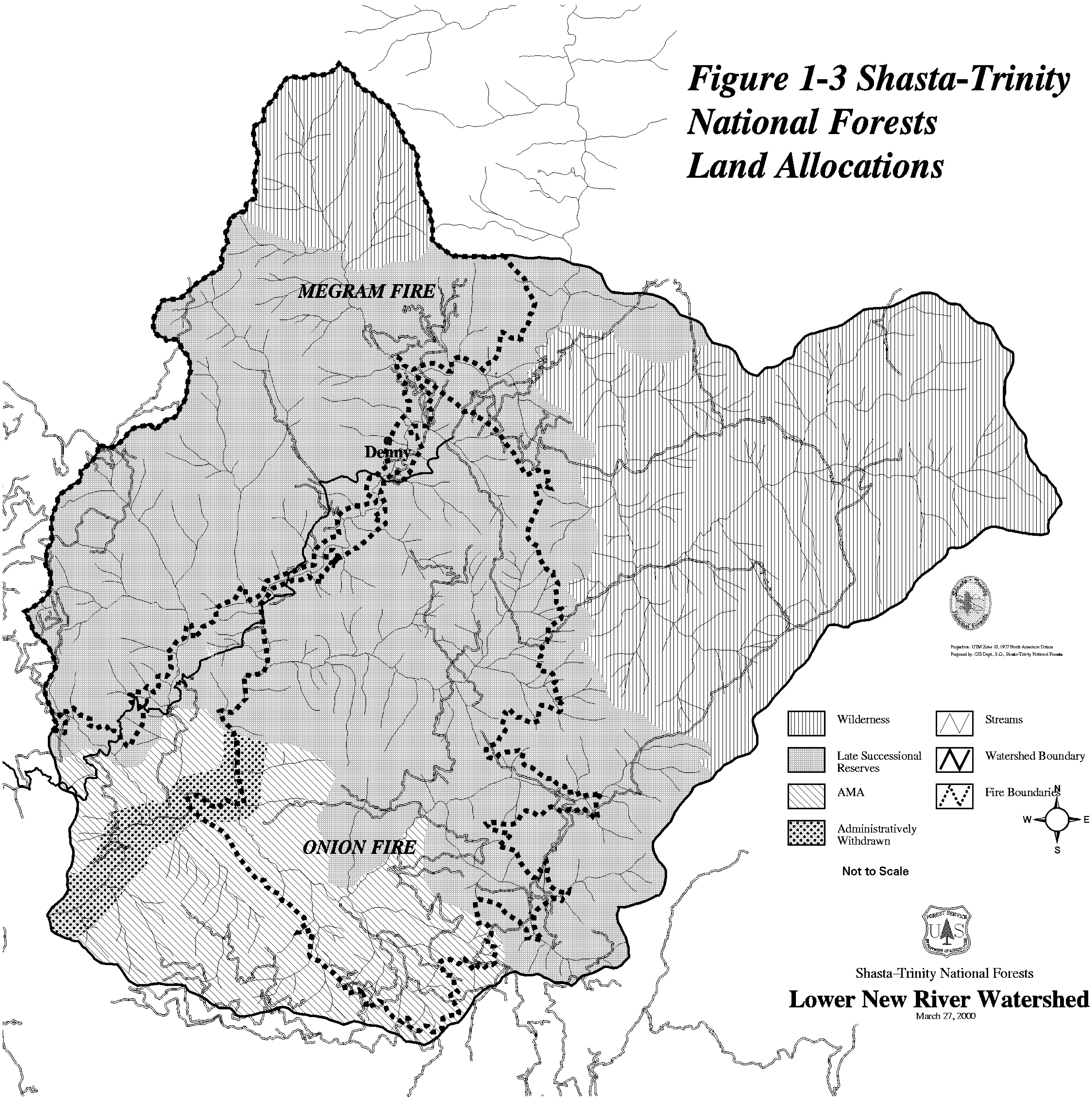


Figure 1-3 Shasta-Trinity
National Forests
Land Allocations
MEGRAM FIRE
Denny
ONION FIRE
Projection: UTM Zone 10, 1927 North American Datum
Prepared by: GIS Dept., S.O., Shasta-Trinity National Forests
Wilderness
Late Successional Reserves
AMA
Administratively Withdrawn
Streams
Watershed Boundary
Fire Boundaries
N
W
E
S
Not to Scale
Shasta–Trinity National Forests
Lower New River Watershed
March 27, 2000

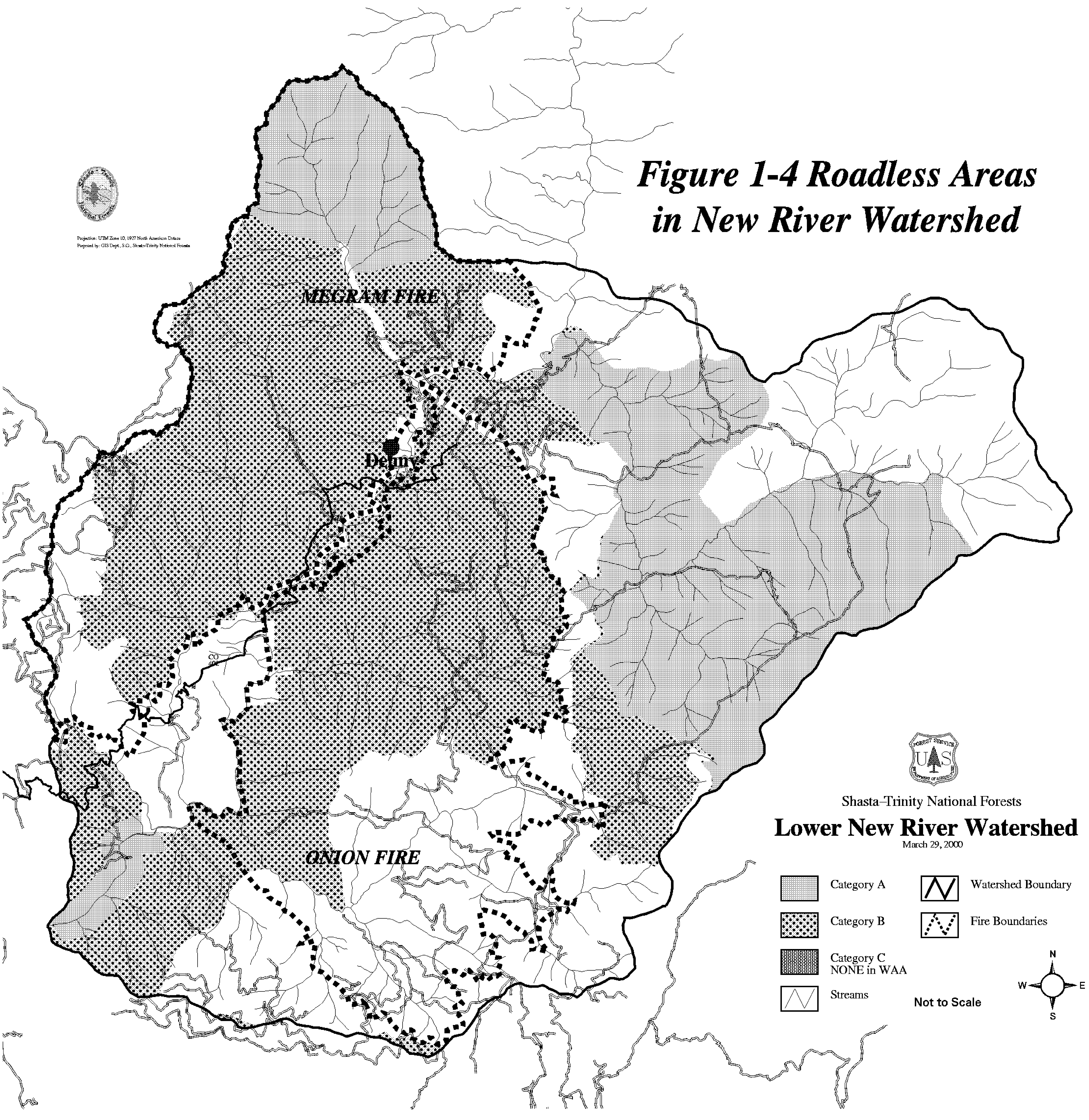
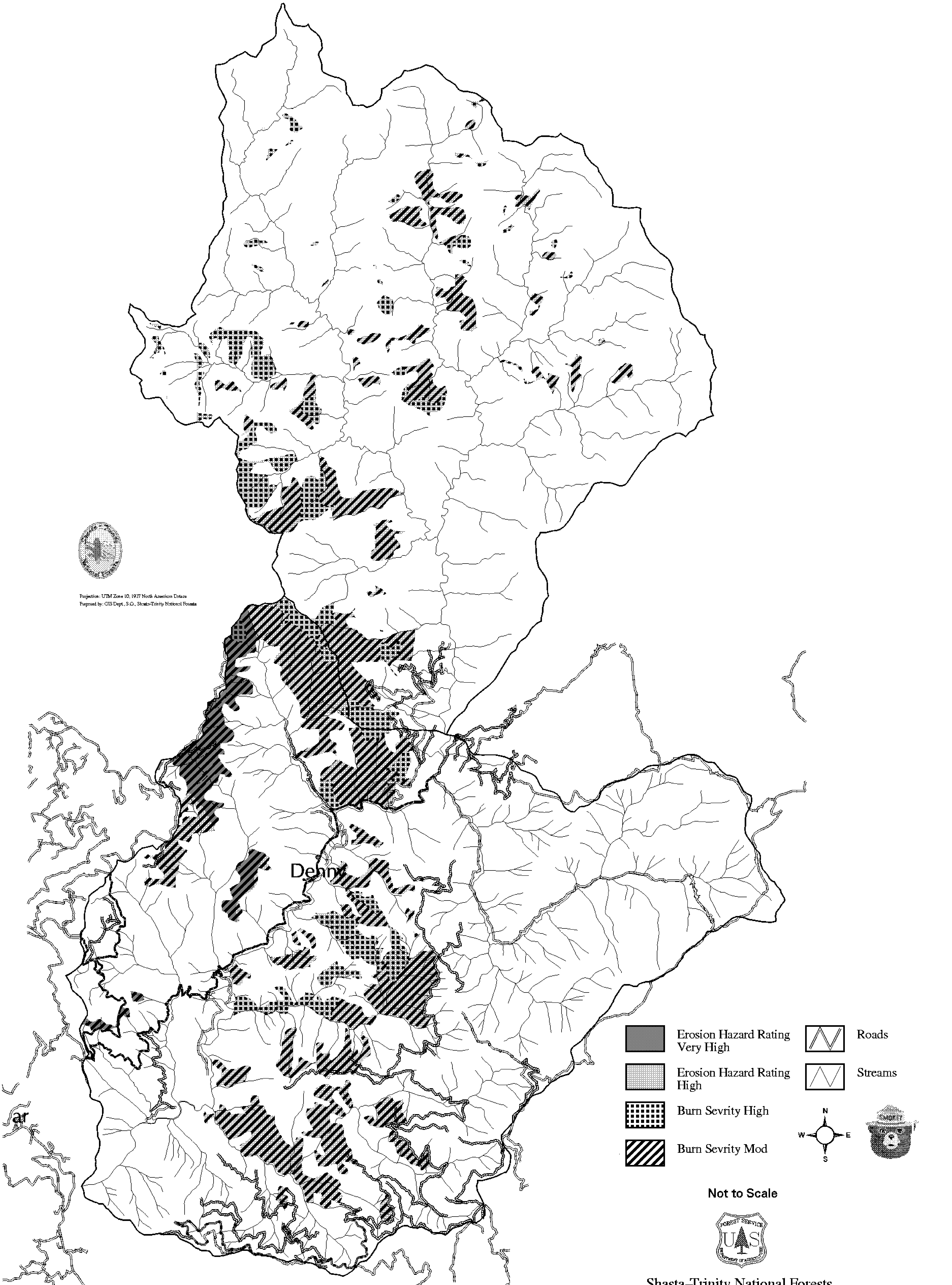



*Figure 1-4 Roadless Areas in New River Watershed*

# Map #1 Areas with High Sedimentation Potential




Shasta-Trinity National Forests

**Upper and Lower New River Watersheds**

April 3, 2000