# North Fork Chetco
# Watershed Analysis

Bureau of Land Management

Coos Bay District

Myrtlewood Resource Area

First Iteration: August 1997


Resource Area Interdisciplinary Team Members

Steven Fowler - Forester/Engineer (Team Lead)
Earl Burke - Fuels Specialist & ACEC
Dan Carpenter - Hydrologist
Jay Flora - GIS
John Guetterman - Wildlife Biologist
James Kowalick - Silviculturist
Bruce Rittenhouse - Botanist
Dale Stewart - Soil Scientist
Vicki Ursitti- Fisheries Biologist

# Table of Contents


| Section | | Page |
|---|---|---|
| | List of Figures and Tables | *i* |
| | Introduction | *iii* |
| I | Watershed Overview | 2 |
| II | Issues and Key Questions Identified | 15 |
| III | Physical Characteristics | |
| | III.1 Geology | 16 |
| | III.2 Soils | 16 |
| | III.3 Climate | 21 |
| | III.4 Geomorphology | 22 |
| | III.5 Erosion Processes | 24 |
| | III.6 Hydrologic Processes | 36 |
| | III.7 Disturbance Processes | 48 |
| IV | Aquatic & Riparian Ecosystem | |
| | IV.1 Water Quality | 53 |
| | IV.2 Aquatic Habitat | 63 |
| | IV.3 Aquatic Species | 85 |
| | IV.4 Riparian Habitat | 94 |
| V | Terrestrial Ecosystem | |
| | V.1 Vegetation | 103 |
| | V.2 Terrestrial Habitat | 116 |
| | V.3 Terrestrial Species | 128 |
| | V.4 Port-Orford Cedar | 136 |
| | V.5 Noxious Weeds | 137 |
| VI | Riparian Reserve Evaluation | 140 |
| VII | Recommendations | 155 |
| | Literature Cited | |

Figures: Page


I-1 Watershed Hierarchy of North Fork Chetco Analysis Area . . . . . 1
I-2 Location Map of North Fork Chetco Analysis Area . . . . . 3
I-3 Land Use Allocations on BLM Administered Lands . . . . . 4
I-4 Hydrologic Units of the North Fork Chetco Analysis Area . . . . . 6
I-5 Hillshade Representation of Topography . . . . . 7
I-6 Transportation Theme by Control and Surface Type . . . . . 13
III-1 Geologic Formations and Fault Lines . . . . . 17
III-2 Soils Map . . . . . 18
III-3 Slope Hazard Classes . . . . . 19
III-4 TPCC Fragile and Withdrawn Acres on BLM Managed Lands . . . . . 20
III-5 National Weather Service Precipitation Data for Brookings, OR . . . . . 21
III-6 Maximum Precipitation Estimates . . . . . 22
III-7 Proportion of Landslides by Type . . . . . 25
III-8 Landslide Distribution in Relation to Perennial and Intermittent Streams . . . . . 26
III-9 Landslide Information by Land Ownership . . . . . 27
III-10 Landslide Distribution by Hydrologic Unit . . . . . 28
III-11 Landslides Rates by Hydrologic Unit . . . . . 29
III-12 Number of Landslides by Photo Year and Type . . . . . 29
III-13 Landslide Distribution Through Time (1940-1992) . . . . . 30
III-14 Approximate Volume of Delivered Sediment by Photo Year . . . . . 31
III-15 Volume Averages of Delivered Sediment by Land Ownership . . . . . 32
III-16 Volume of Delivered Sediment by Photo Year and Management Activity . . . . . 34
III-17 Comparison of Annual Peak Discharge between North Fork Chetco and Chetco Rivers . . . . . 37
III-18 Probability and Magnitude of Peak Flow . . . . . 38
III-19 Maximum Precipitation Estimates . . . . . 38
III-20 Intermittent Snowzone Areas . . . . . 40
III-21 Mean Monthly Flow for the North Fork Chetco Analysis Area . . . . . 41
III-22 Daily Flow Duration for the North Fork Chetco Analysis Area . . . . . 41
III-23 Magnitude and Probability of Annual Low Flows . . . . . 42
III-24 Domestic Water Sources . . . . . 46
III-25 Location of Human Caused Fires Since 1914 . . . . . 50
IV-1 Sedimentation Monitoring within the Analysis Area (10/94 through 11/95) . . . . . 54
IV-2 Precipitation Monitoring within the Analysis Area (9/94 through 4/95 ) . . . . . 54
IV-3 Streams with High Transport Efficiency . . . . . 55
IV-4 Streams with Sediment Depositional Hazard . . . . . 56
IV-5 Rosgen Stream Channel Types . . . . . 64
IV-6 Typical Stream Cross-Section . . . . . 65
IV-7 Typical Pebble Count Analysis . . . . . 66
IV-8 Typical Stream Longitudinal Profile . . . . . 66
IV-9 Anadromous and Resident Fish Presence . . . . . 71
IV-10 1995 Habitat Inventory Stream Reaches . . . . . 74
IV-11 Riparian Reserve Age Class Distribution . . . . . 96
IV-12 Age Progression of Riparian Reserves . . . . . 100
V-1 Dominant Overstory Timber Type on BLM Managed Lands . . . . . 105
V-2 Timber Age Class Distribution . . . . . 108
V-3 Special Habitat Areas . . . . . 110
V-4 Seral Stage Distribution . . . . . 119
VI-1 Estimated Intermittent Streams and Low Permeable Soils . . . . . 142
VII-1 Potential Hardwood Conversion Areas . . . . . 157

Tables: Page


I-1 Ownership and Land Use Allocations in North Fork Chetco Analysis Area . . . . . 6
III-1 Miles of Stream by Order in North Fork Chetco Analysis Area . . . . . 23
III-2 Landslide Rates by Various Management Activities . . . . . 33
III-3 Estimated Bankfull (2-year) and Extreme (100-year) Flows . . . . . 39
III-4 Logging Disturbance by Decade . . . . . 51
IV-1 BLM 1995 Temperature Monitoring Summary . . . . . 59
IV-2 Comparison of Historical and Recent Summer Stream Temperatures . . . . . 60
IV-3 Comparison of Habitat Conditions Against ODFW Benchmarks (1995 Survey) . . . . . 72
IV-4 Aquatic and Riparian Species of Ecological Concern . . . . . 86
IV-5 Peak Counts on the North Fork Chetco River Chinook Spawning Survey, 1989-1996. . . . . 88
IV-6 Peak Counts on the North Fork Chetco River Steelhead Spawning Surveys, 1996-1997 . . . . . 89
IV-7 Riparian Reference Conditions in the North Fork Chetco Analysis Area. . . . . 99
V-1 Dominant Cover Type Distribution on BLM Administered Lands . . . . . 104
V-2 Acreages of Various Age Classes in the Analysis Area . . . . . 109
V-3 Snags/Acre & Volume of Down Logs/Acre in Natural Klamath Province Stands . . . . . 118
V-4 Acreages of Various Seral Stages in the Analysis Area . . . . . 120
V-5 Numbers of Snags/Acre within 100' of Surveyed Streams in the Analysis Area . . . . . 121
V-6 Late-Successional Habitat Acreage - Lower Chetco 5th-field Watershed . . . . . 125
V-7 Late-Successional Habitat Acreage - North Fork Chetco Analysis Area . . . . . 126
V-8 Wildlife Species of Concern . . . . . 129
V-9 Habitat Associations for Wildlife Species of Concern . . . . . 130
VI-1 Ecological Classification of Riparian Species for Preliminary Vulnerability Assessment . . . . 144
VI-2 Habitat Associations for Vulnerable Species of Concern . . . . . 146
VI-3 Hazards to Values Associated with Riparian Zones . . . . . 150
VI-4 Evaluation of the Susceptibility of Various Hazards for a Given Management Activity . . . . . 152

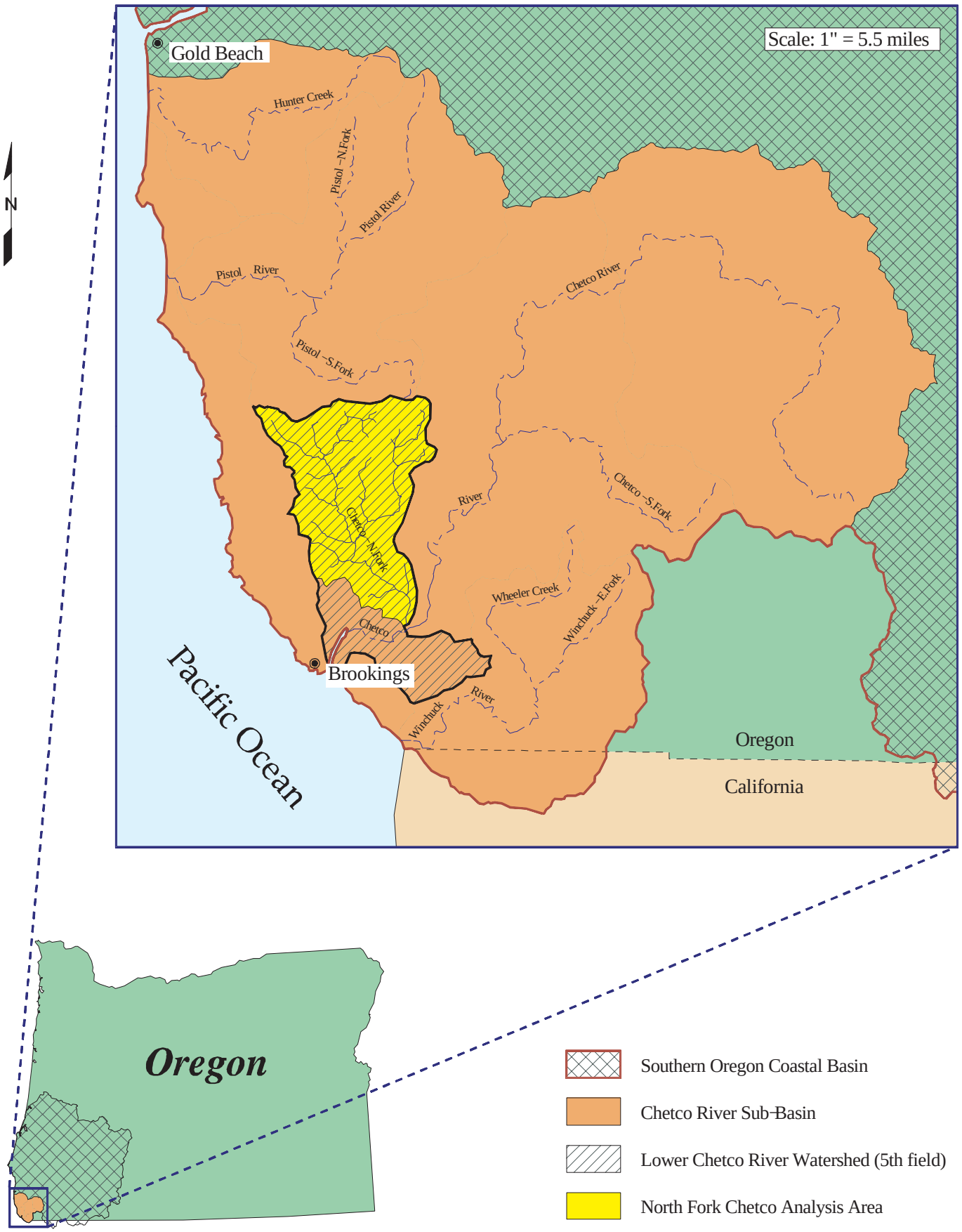
# Introduction

This report is the first watershed analysis for the North Fork Chetco subwatershed and is organized within reasonable conformity to the format described in the *Federal Guide for Watershed Analysis Ver. 2.2* (Guide). Prior analysis for this area includes the Chetco River Assessment prepared by the Chetco Watershed Council, March 1995, the Chetco Watershed Analysis (USDA Forest Service, 1996a), and the Guide to Project Selection-South Coast Fish Management District, ODFW 1995. These analyses focused on a general overview of the Chetco drainage.

Watershed analysis is a major component of the ecosystem-based management strategy mapped out 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 (USDA/USDI 1994). The stated purpose of watershed analysis is to develop and document a scientifically-based understanding of the ecological structures, functions, processes, and interactions occurring within a watershed, and to identify desired trends, conditions, data gaps, and restoration opportunities. The information, recommendations and data gaps documented in a watershed analysis can be used to help plan land management activities that are appropriate for the analysis area, support the NEPA process, and direct future data collection efforts. Watershed analysis was designed as an iterative process, with reports being revised as additional information becomes available.

*Watershed analysis is <u>not</u> a decision making process. Rather it is a stage-setting process. The results of watershed analysis establish the context for subsequent decision making processes, including planning, project development, and regulatory compliance.* [from the Introduction to Ecosystem Analysis at the Watershed Scale, Federal Guide for Watershed Analysis. August 1995, Ver. 2.2]

# Figure I−1 Watershed Hierarchy of the North Fork Chetco Analysis Area



# I WATERSHED OVERVIEW

## LOCATION

The North Fork Chetco analysis area is an Regional Ecosystem Office (REO) designated 6th field (subwatershed) within the greater Lower Chetco River 5th field analytical watershed (Figure I-1) and comprises 71% of the 5th field. The analysis area is located about 6 miles north of Brookings, Oregon and is 25,562 acres (40 sq. mi.) in size.

The 56 mile long Chetco River is the largest system in Chetco River sub-basin, draining 351 square miles from the Coast Range and the Kalmiopsis Wilderness Area in the Siskiyou Mountains, westward to the Pacific Ocean. The Lower Chetco River watershed is the most western of three (fifth field) watersheds and has a drainage area of about 56 $mi^2$. The analysis area comprises 11% of the Chetco River.

## OWNERSHIP and LAND USE ALLOCATIONS

Of the 25,562 total acres in the analysis area, the Myrtlewood Resource Area of the Coos Bay District - BLM manages 9,263 acres (36%) with the remaining 25,562 acres (64%) privately owned, predominately by South Coast Lumber Company (Figure I-2).

All BLM lands are designated according to the categories set forth by the Record of Decision for the Coos Bay District Resource Management Plan (RMP) and the Record of Decision (ROD) for the *Supplemental Environmental Impact Statement on Management of Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (SEIS).

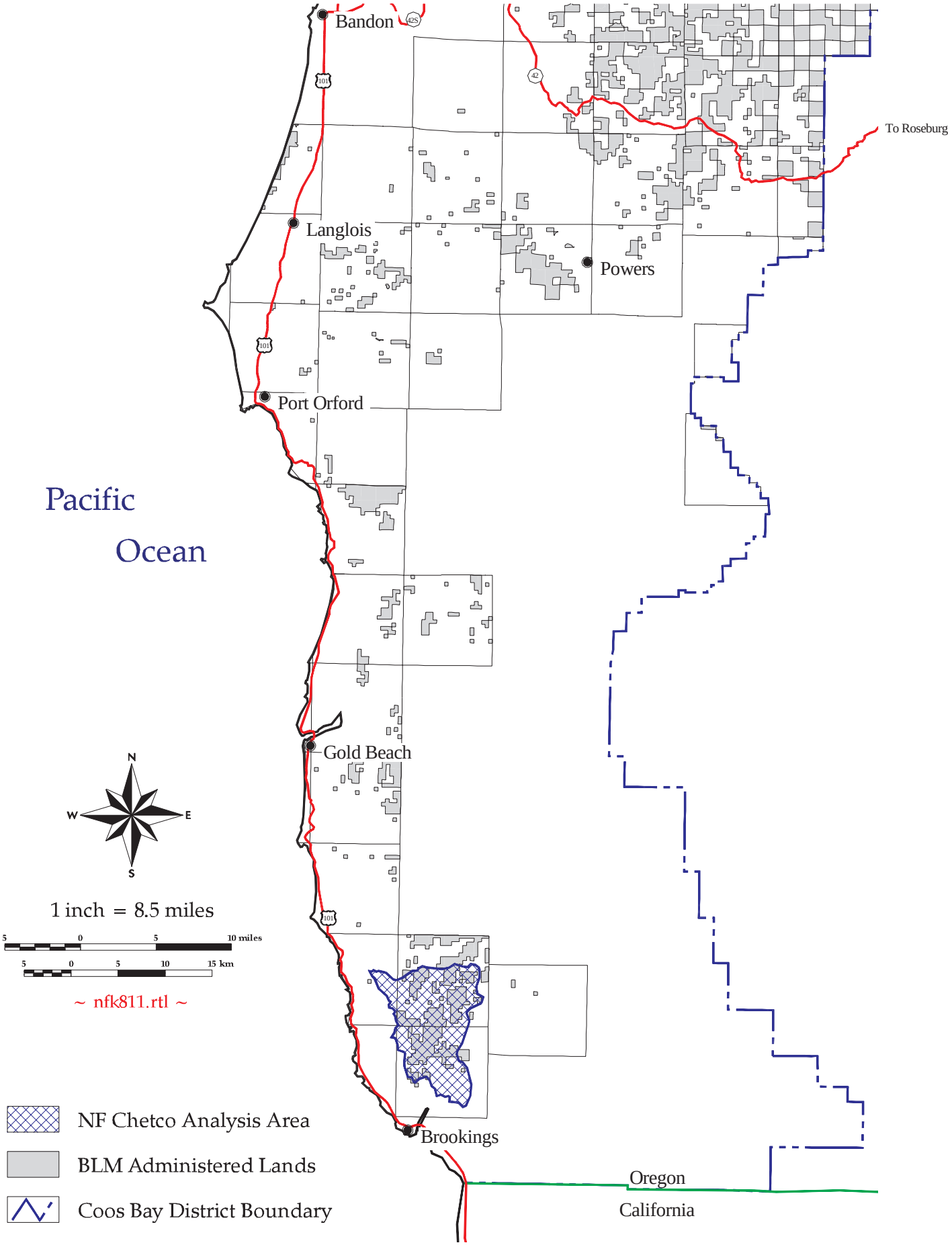
Portion of the analysis area has been designated a Key Tier-1 watershed. The Key watershed is 19,429 acres in size and encompasses 76% of the analysis area. The types and amounts of other land use allocation are shown in Table I-1 and their respective locations are shown on Figure I-3.

**Table I-1: Ownership and Land Use Allocations in North Fork Chetco Subwatershed**

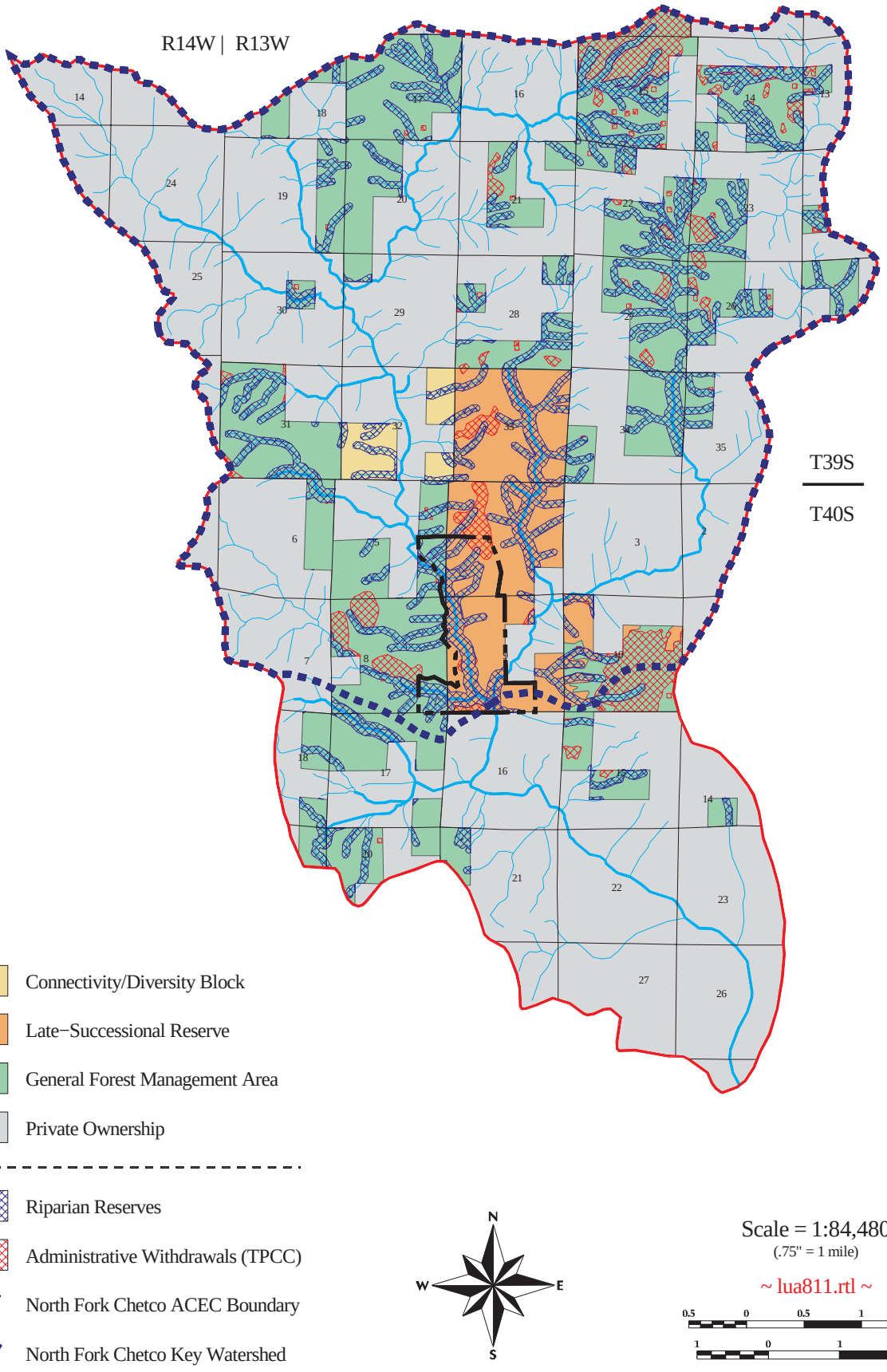
| | |
|---|---|
| Total Acres | 25,562 |
| Private | 16,299 |
| BLM | 9,263 |
| GFMA (General Forest Management Areas) | 7,123 |
| LSR/MMR (late-Successional Reserves) | 1,870 |
| Connectivity | 270 |
| Riparian Reserves-all land allocations (estimate) | 2,944 |
| Total Reserves [1] | 5,062 |

[1] Includes TPCC withdrawn lands, and Riparian Reserves (GFMA only)

# Figure I−2 Location Map of the North Fork Chetco Analysis Area



# Figure I−3 Land Use Allocations on BLM Administered Lands



## PHYSICAL CHARACTERISTICS

The geology , soils, and climate are typical for this part of southwest Oregon. Over 90% of the analysis area lies within the Dothan-Otter Point geologic Formation. Soils have moderate infiltration rates, low water storage, and are a good source of gravels and cobbles. Soil productivity is not considered to be high (site index 3) and compaction of soil surfaces does not readily occur. The climate is very mild, ranging from slightly below freezing to the low 90's, due to the maritime influence of fog and cooler temperatures.

Drainage density is 4.3 miles of stream/mile$^2$, which is much lower than the 6-8 mi/mi$^2$ commonly found in drainages further to the north. The distribution of small headwater streams (72%) and larger streams (28%) is comparable to the more northerly subwatersheds. The North Fork Chetco River has a length of 12.7 miles and is a 5$^{th}$ order stream for approximately one-third of its length. Bravo Creek is the largest tributary to the North Fork Chetco and is also a 5$^{th}$ order stream. The other tributaries are short (3½ miles or less), steep streams (Figure I-4).

In contrast to subwatersheds in the Coast Range Physiographic Province, the hillsides are more smooth to convex in shape. That is, the ridge tops are generally more rounded and broad, sloping off steeply as one approaches the stream system. The streams have very steep, unstable sideslope (often 90% or more) and a narrow floodplain, if one exists at all. The most prominent feature is Bosley Butte, which forms part of the northerly boundary and has an elevation of 3400' (Figure I-5).

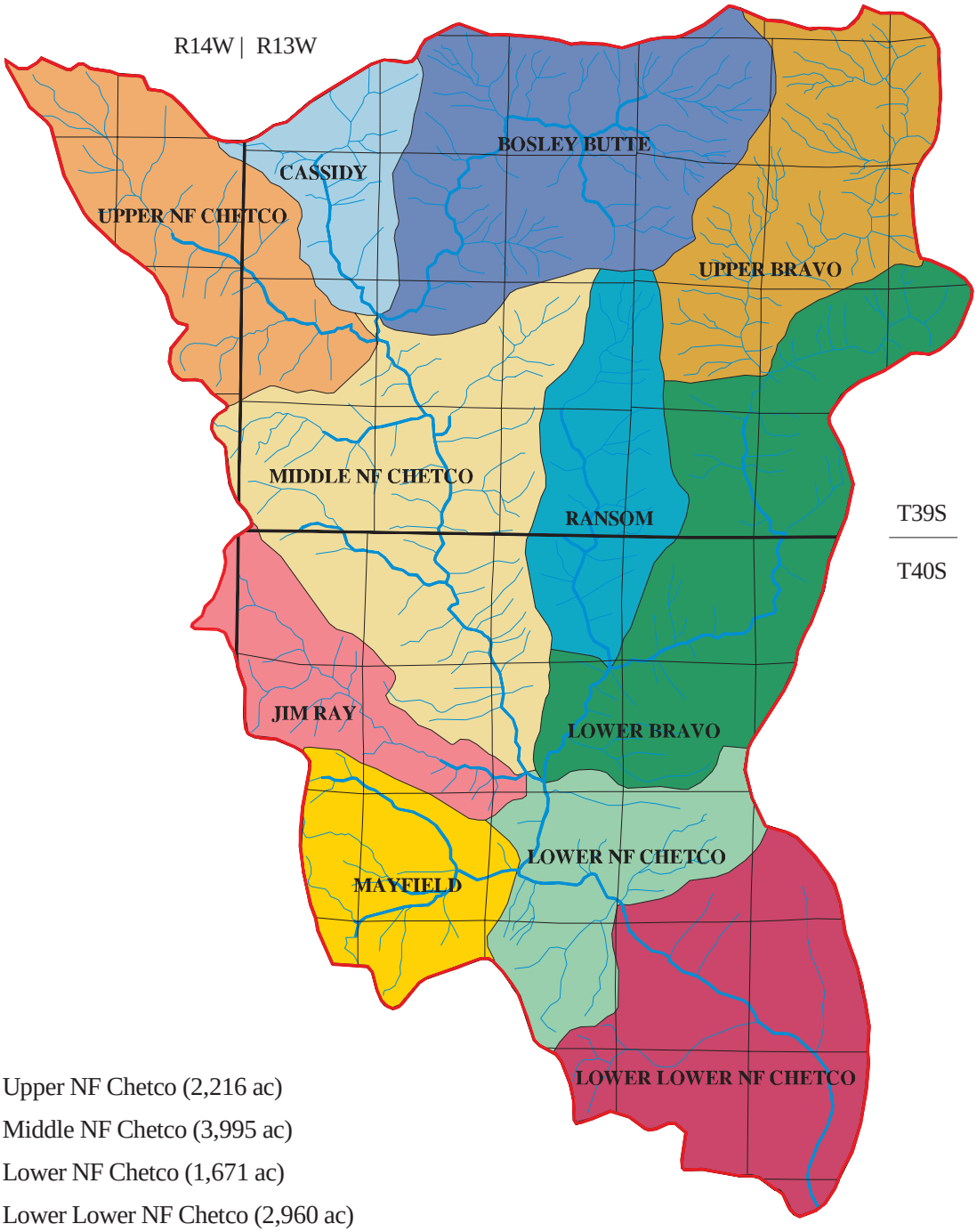
## EROSION PROCESSES

The dominant erosional process is non-channelized shallow rapid debris sliding, which constitutes 84% of the total landslides. Landslide location is most strongly correlated with extremely steep slopes (>90%) adjacent to perennial stream channels.

Management activities (timber harvest and road construction) have led to an increased frequency of all types of landsliding, including stream-side shallow rapid slides, channelized debris torrents, and large persistent landslides. A majority of these slides occurred between 1955 and 1970, coincident with high harvest rates (43% of the analysis area) and significant floods (1955 and 1964). Early timber harvest was usually performed with ground-based equipment and road construction techniques involved side-casting earthen material. A marked decrease in landslides was observed since 1970. The current rate of landsliding is approaching pre-management levels, which may reflect changes in forest management techniques and a long drought period (1985-1994).

Sediment delivery from surface erosion and mass movements has occurred, but no attempt to quantify the actual delivery amount was made. The over-riding hypothesis for this analysis area is that, over a long period of time, all slide material will eventually be delivered to the stream system.

# Figure I−4 Hydrologic Units




- Upper NF Chetco (2,216 ac)
- Middle NF Chetco (3,995 ac)
- Lower NF Chetco (1,671 ac)
- Lower Lower NF Chetco (2,960 ac)
- Bosley Butte (3,301 ac)
- Cassidy (1,036 ac)
- Upper Bravo (2,473 ac)
- Lower Bravo (3,534 ac)
- Jim Ray (1,305 ac)
- Ransom (1,632 ac)
- Mayfield (1,439 ac)

N
W E
S

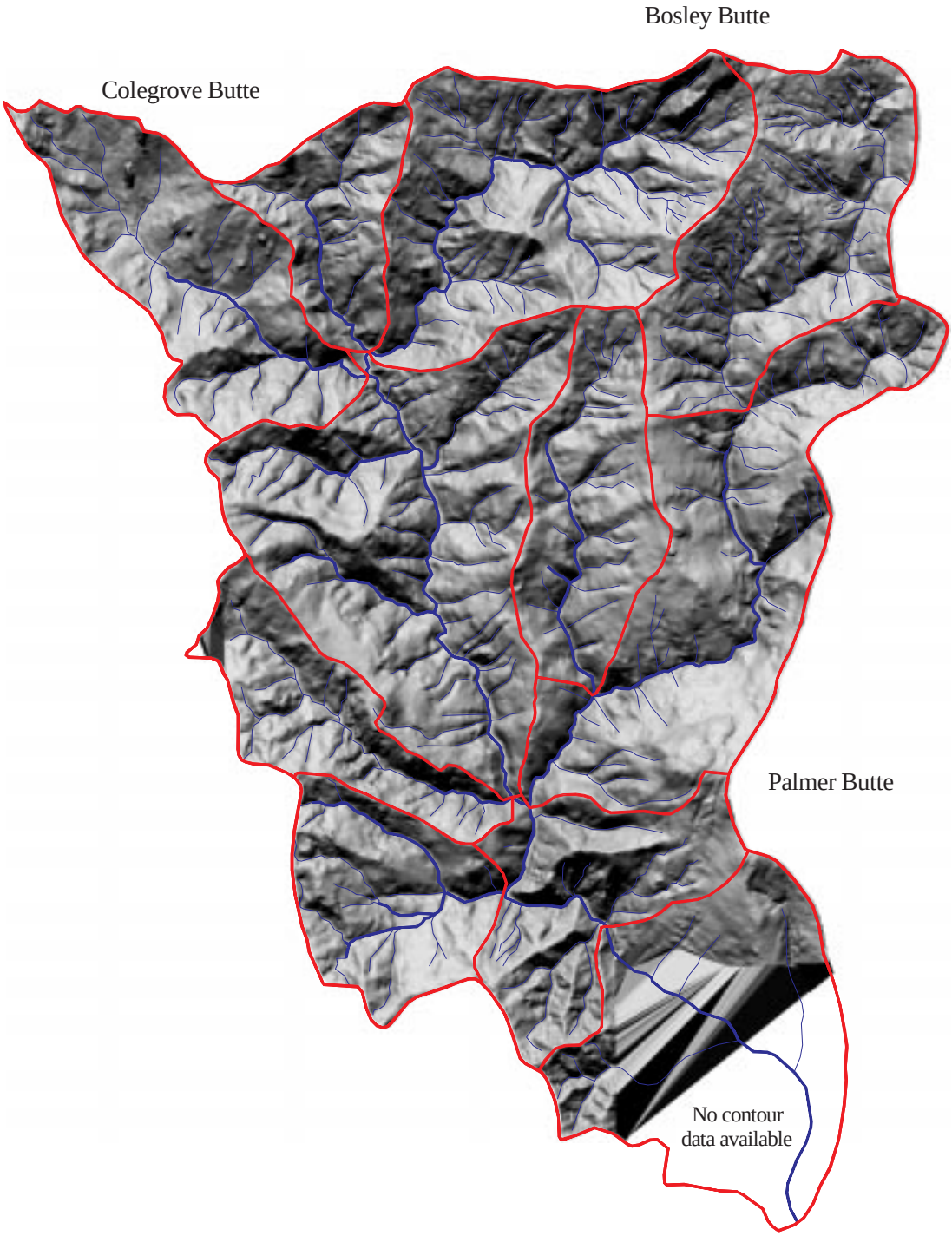
Scale = 1:84,480
(.75" = 1 mile)

~ drainage811.rtl ~

0.5 0 0.5 1 1.5 miles

1 0 1 2 km

# Figure I−5 'Hillshade' Representation of the Topography




Hydrology

Watershed Drainages

(Topography 3−D effect is exaggerated 3x)

N
W
E
S

Scale = 1:84,480
(.75" = 1 mile)

~ hillshade811.rtl ~

0.5 0 0.5 1 1.5 miles

1 0 1 2 km

The amount of land surface compacted from roads and equipment trails was determined to be 1.7 % of the analysis area. Most of the roads and trails were captured on the data base and are reflected in this figure. The level of compaction from timber harvest was not determined, but is expected to be lower than the level caused by roads. Compaction is only an issue in the upper elevations (snow zone) of the analysis area when it concentrates flows, thereby increasing erosion on poorly maintained road surfaces.

## HYDROLOGIC PROCESSES

Stream flow patterns correspond to seasonal rainfall patterns. Stream flow responds quickly to precipitation events, with tributary streams having sharp increases in flow within just a few hours. Many soils are shallow to moderate depths and transmit water readily. Bedrock has low water transmissivity. Peak flows of record occurred in 1964 (15,235 cfs for the analysis area) and 1996 ( 13,165 cfs). Extreme flows (>2500 cfs) occur less than 5% of the time, moderate bankfull flows (100-2500 cfs) occur 55% of the time, and low flows (<100 cfs) occur 40% of the time. Low summer flows for North Fork Chetco are often less than 10 cfs (0.25 $cfs/mi^{-2}$ for 2 year-7 day low flow). These low flows are the result of dry summer conditions, combined with few landform characteristics, including lack of floodplains, that accumulate runoff and release summer flow. About 38% of the forest vegetation is currently under 40 years or age, and may not be hydrologically recovered. However, most of the analysis area is in the rain zone and is not susceptible to significant flow changes, or departures form natural conditions.

Overland flow, resulting in sheet erosion and formation of rills and gullies, can occur in the higher elevations of the analysis area. Within the higher elevation, the areas most susceptible are compacted areas, areas burned with intense fires, or that within the transient snow zone. Most of the gullies are discontinuous, although some have connected with the stream system. Road ditches have also extended the stream network, although not significantly.

The transient snow zone (elevations above 2000 feet) is found in 5% of the analysis area and is confined to the Upper Bravo Creek and Bosley Creek areas. Snowpack (representing water storage) and warm windy and rainy conditions in open areas or young timber stands may elevate peakflow in these tributary streams. However, the set of climatic conditions needed to initiate this type of event is infrequent.

Many stream channels are high energy, erosional, streams with moderate to steep gradients. Bedrock, boulder and cobble materials form stable channels with resistant streambed and banks. These channels are excellent in resisting degradation, both laterally and vertically from flashly, high flows.

Sediment delivered to the channels from landslides or torrents is routed through the stream system and does not appear to inundate channels with chronic levels. Few floodplains exist for water to spread, due to the steep canyon land formation, forcing streamflow velocities to remain high. Consequently, stream power is available to transport this bedload during storms, making these channels very resilient to inputs of sediment. Much of this sediment was introduced to channels during the 1950's to 1970's, coinciding with high levels of road building and forest

management and the 1955 and 1964 floods. Channel aggradation by coarse sediment (gravel and larger) may have occurred during this period. Today, sediment delivered to channels appears to be approaching that of pre-management levels and channel aggradation is not evident. Much of the material is suspected to have been exported from the stream system.

## DISTURBANCE PROCESSES

Fire is the primary natural disturbance process in this part of southern Oregon, including the analysis area. Historical fires were generally large in size and thought to be of low to moderate intensity. In contrast, recent fires caused by human activity tended to be more intense, resembling stand replacement fires. Fires of varying intensities produced vegetation patterns which are still evident within the analysis area. The last major fire burned in 1939. Presently, the most common form of large-scale disturbance is forest management.

Landslides appear to be the common form of disturbance in riparian areas. These play a major role in delivering components (boulders, gravels, large wood, etc.,) into the stream system. They also are a significant factor in maintaining pioneer tree species, such as red alder and Douglas-fir along riparian areas.

Wind has played a very limited role as a disturbance factor in the analysis area.

## WATER QUALITY

North Fork Chetco and Bravo Creek are listed on ODEQ's 303(d) list of water quality limited streams with regard to temperature during the summer. Streams are listed on the 303(d) list when monitoring data indicates stream reaches do not meet State water quality standards.

Suspended sediments, as measured by turbidity, does not appear to be a problem for streams in the analysis area. Water clarity is good (less than 1 NTU), except during storms, where turbidities may exceed 200 NTU. Most stream sediment delivery is the result of landsliding and debris torrents, with lessor amount from road ditches and gullies. Although natural surfaced roads constitute 82% of the road system, the process of surface erosion from roads appears to be different than in subwatersheds to the north. Soils in this area contain a high rock content and, after the first few years following construction, have the effect of amouring the road and ditch surfaces from continual surface erosion. Gullying is often the result of inadequate drainage or the lack of road maintenance.

In addition, embeddedness of fine sediments in stream gravels does not appear to be a problem in the analysis area. High stream velocities during bankfull or larger storms, rapidly transport coarse and fine sediments through the stream system.

## VEGETATION

The analysis area lies within the Mixed-Evergreen (*Pseudostuga*-Sclerophyll) forest zone (Franklin and Dyrness 1973). Douglas-fir and tanoak dominate forest stands, covering over 85% of the analysis area. Pure stands of knobcone pine are also present and the tend to be areas of recent fires. The largest stand is concentrated in the Bosley Butte area, with small pockets scattered along ridgetops elsewhere. Small acreages of grass-bald type meadows are distributed throughout the area. These meadows, which once numbered approximately 1000 acres, are disappearing due to encroaching vegetation.

There are approximately 230 vascular plant species representing 70 plant families documented or likely to occur within the analysis area. Bryophytes, lichens, and fungi represent a large percentage of the vegetative diversity. Many of these species, have important ecological roles (such as nutrient cycling, soil stabilization, water retention, etc.) in forested ecosystems while having specific habitat requirements. Species numbers are unknown, but it is estimated that over 500 species probably occur in the analysis area, at least 29 of which are of special management concern and require further site-specific analysis under the regional planning efforts .

Unharvested riparian areas adjacent to many small first- and second-order streams, as well as mainstem reaches, contain relatively high densities of large conifer trees compared to many upslope areas in the analysis area. These trees are available for snag and down log recruitment. Western hemlock, western redcedar, and Port-Orford-cedar are absent along the larger streams, but are present in a few locations on the western edge of the analysis area. The primary overstory species in unlogged riparian areas is Douglas-fir with bigleaf maple, tanoak, and Oregon myrtle (California laurel) co-dominate the middle and understory. Red alder is generally found in a narrow band immediately adjacent to streams and on disturbed (logging, flooding or landslide) sites. Previously harvested areas in main-stem reaches contain a mix of hardwoods in the overstory (red alder, bigleaf maple, tanoak, and Oregon myrtle), with no large conifers. In general, cover of salal and tanoak tends to increase as soil moisture decreases toward the headwaters.

### Port-Orford Cedar

Port-Orford Cedar is virtually non-existent in the analysis area and, therefore, the threat of spreading Port-Orford Cedar root rot disease into or out from the area is not a management concern.

### Noxious Weeds

There are only a few isolated known locations of noxious weeds (gorse & broom) in the analysis area and the potential for introduction of noxious weeds exists. However, the opportunity for effective control appears good, due to the few number of infected sites and restricted access into the area.

## SPECIES AND HABITATS

### Terrestrial

Key habitats in the analysis area include *vegetation complexity and species composition, snags and down logs, and rocky habitats.* The majority of the area (83%) supports early seral habitat, most of which is the result of timber harvest. Compared to other subwatershed in the Resource Area, the analysis area contains larger blocks of relatively unmanaged stands. Fifteen percent of the analysis area supports a combination of mid and late-successional forest patches and is found almost exclusively on BLM administered lands. Many of these late-successional forests are along streams. Late-successional habitats comprise approximately 39% of the LSR (#251). The objective of retaining 15% of the federal land base in transition or old-growth habitat types can be met on Reserve lands.

Sixty one percent of the analysis area has been harvested and likely contains few if any down log and snag structures. Snag density goals equate to approximately 1.5 hard snags/acre, (4 hard snags/acre on Reserve lands). Critical snag shortages are likely in the near future unless additional snags are created through management. Minimum down log retention levels for hard down logs from the RMP equate to approximately 18-95% of that found in natural stands.

Since the analysis area is only 2-9 miles inland and on the edge of the main forest network on Forest Service land, it does not function as a critical dispersal area for mobile, late-seral wildlife. Its proximity to the ocean does hold unique function for those species, such as marbled murrelets, which use both inland and ocean habitats. Its function and significance are more local in scale in providing special habitat areas and populations of species on the western edge of their range.

Species of concern in the analysis area include amphibians, bats, raptors, voles, and snakes. Del Norte salamanders, red tree voles (S&M species); peregrine falcons, northern spotted owls, marbled murrelets (T&E species); and bats (special management guides) are known or very likely to occur and will require special consideration in management. Pre-project surveys for red tree voles are not required since habitat conditions are above thresholds established by draft protocol.

### Aquatic and Riparian

The North Fork Chetco analysis area contains approximately 14 miles of anadromous and resident fish-bearing streams with an additional 18 miles containing only resident fish. Total miles of anadromous fish distribution may vary yearly based on habitat and flow conditions. Native fish species include fall chinook salmon, coho salmon, winter steelhead, anadromous and resident cutthroat trout, and Pacific lamprey. The analysis area falls within the range of the Threatened Oregon coast coho salmon (southern Oregon/northern California ESU) and the Proposed Klamath Mountain steelhead. Resident rainbow trout are present in Bravo Creek, and cutthroat/rainbow hybrids are suspected elsewhere, apparently the result of residualized steelhead fry. The North Fork supports relatively high spawning populations of steelhead and chinook salmon, with a large proportion (up to 50%) of hatchery origin.

For anadromous and resident fish, access to spawning and rearing habitat in the analysis area

primarily limited by *natural* barriers or habitat conditions (high gradients or cascade/falls). In some streams, numerous passable obstacles cumulatively restrict the upstream distribution of fish. The only known human-caused barrier to fish migration is a culvert on the northern tributary to Mayfield Creek (Sec. 17, NW 1/4, NW 1/16). Although resident cutthroat trout were observed upstream of the culvert, it is a barrier to upstream movement.

Salmonid rearing potential in the analysis area is limited by high summer water temperatures, high winter flow and velocity, low summer flow, hillslope constraints, a shortage of floodplains, lack of large wood, and lack of deep complex pool habitat.

Several species of amphibians use streams for all or part of their life cycle. Amphibians, crustaceans and hundreds of other invertebrate species make up most of the biomass in streams and are the functional building blocks of the aquatic ecosystem. In addition to providing the major food source which sustains stream fishes, the invertebrates contribute to the maintenance of aquatic and riparian food webs by processing vegetation and leaf litter, increasing the availability of nutrients to other organisms (Christensen 1996, Taylor 1996).

## HUMAN USES

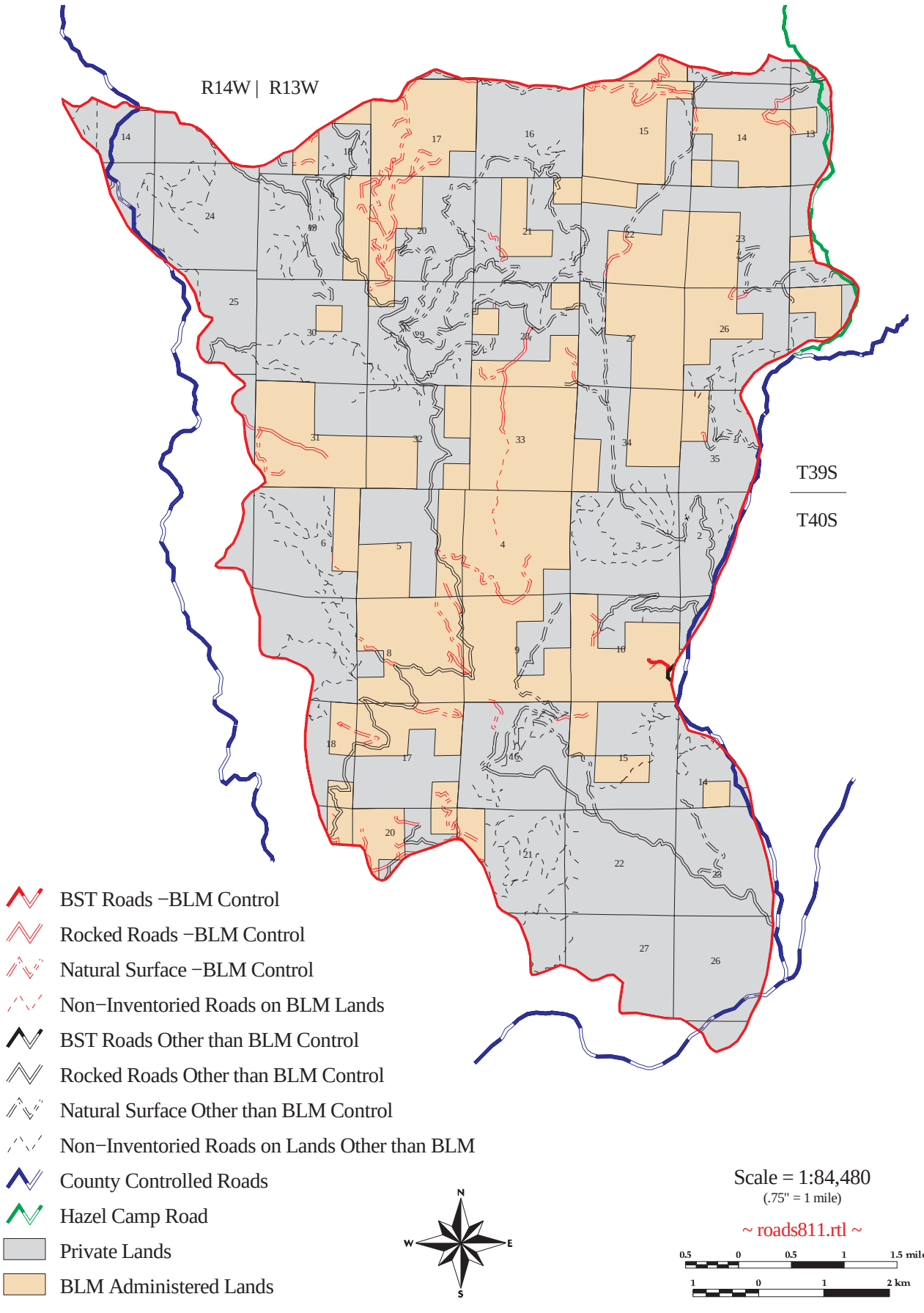
The North Fork Chetco area has been the location of both prehistoric and historic cultural activities. Its proximity to the coast and the mainstem Chetco River offered good foraging and hunting opportunities. The present focus of human development tends to concentrated along the east and west ridges bordering the analysis area. Residences and agricultural uses are located adjacent to the Gardiner Ridge County Road (on the east) and Old Highway 101(on the west). Within the analysis area, timber production is the predominant use of the land. No dispersed recreation (other than deer hunting) occurs within the interior of the analysis area, as access into the area is controlled by South Coast Lumber Company

### Transportation

The analysis area is bordered on the east, west, and south by County roads (Figure I-6). Hazel Camp Road, on the east, accesses the Siskiyou National Forest. The road system is somewhat similar to others throughout Western Oregon in that the early roads used to access the area were constructed along main streams. Three of these roads are presently being used as main access roads. In contrast with most other subwatersheds, most main roads currently used to access this area are of ridgetop and sometimes midslope location. The private road system forms the backbone of the transportation system in this analysis area.

The transportation system in the analysis area is comprised of approximately 145 miles of road, which equates to road density of 3.6 $mi/mi^2$. The road density on BLM lands is substantially less at 2.3 $mi/mi^2$. BLM controls 28 miles of road (20% of the total) and these are often short spur roads used to access BLM ownership. Approximately 82% of the road system is natural surfaced (25 miles of BLM and 94 miles of private road). The remaining system including the mainline access roads is predominately gravel surfaced. These figures (Appendix F, Table F-1) have been derived from GIS. While some data is missing, primarily on private lands, it does give the most up-to-date information available.

# Figure I−6 Transportation Theme by Control and Surface Type



**Transportation Management Objectives**

The BLM road system was evaluated for its present and future uses using a Transportation Management Objective (TMO) process. The TMO process applies only to roads controlled by the BLM, as management of those roads lies within the Bureau's jurisdiction. Road management is guided by the desire to reduce the impacts from a large road network on the ecosystem, maintain a network adequate enough to meet the needs of land management, and to reduce road maintenance expenditures. The checkerboard land ownership pattern significantly complicates transportation management due to the right of access for landowners and the fact that different landowners often own alternating parts of the same road. BLM has constructed roads on private lands through a variety of access agreements and private timber companies have constructed roads on BLM lands under 'reciprocal' right-of-way agreements. These agreements grant access rights to the BLM and the other party to cross each other's land. These rights must be incorporated into any decision concerning road management. In addition, roads adjacent to streams and midslope roads, which often have the most impact of the aquatic resources, are often the main access roads into and through the analysis area. Most of the roads which present the best opportunity for closure or restricted vehicular access are the shorter, mostly ridge-top roads which access only BLM lands.

The 1995 Rescission Bill authorized two 1991 timber sales within the Key Watershed and resulted in the construction of 2.8 miles of permanent road. These roads were located predominately on ridge-tops and contained only two stream crossings. The ROD Standards & Guidelines and the Biological Opinion concerning the Southern Evolutionarily Significant Unit of Coho Salmon require that there be no net gain of road miles within Key Watersheds. The TMO process identified 5.5 miles of road which could be removed from the transportation system.

**Rock Quarries**

There is one small rock quarry operated by South Coast Lumber Company located adjacent to Jim Ray Creek (NW¼ SW¼ Sec. 8, T. 40 S., R. 13 W.). Areas quarried to produce rock for specific road construction projects exist throughout the analysis area. These sites, such as Colebrook Butte, would normally be small and located where a road intersects hardened rock material.

# II ISSUES AND KEY QUESTIONS

**ISSUES**

Two main issues have initiated the need for, and the focus of, this watershed analysis in the North Fork Chetco area.

- Two 1991 timber sales, authorized by the 1995 Rescissions Bill, may not be in compliance with the NFP and RMP for management activities within Key Watersheds or with the recent Biological Opinion concerning the Southern Evolutionary Significant Unit of Coho Salmon.

- Resource conditions need to be evaluated in order to identify restoration opportunities, which could be implemented through the 'Jobs-in-the-Woods' program or other funding opportunities.

This document is NOT intended to identify potential timber harvest areas within the Matrix land use designation, other than hardwood conversion opportunities. Another iteration of WA needs to should completed to address this management activity.

Resource concerns identified in this analysis will be further analyzed on a site-specific level in future environmental assessment (NEPA) documents.

**KEY QUESTIONS**

The Guide recommends development of 'key questions' which address the main issues, focus on ecosystem elements as they relate to management actions, promote synthesis/interpretation of information, and are to be answered by the analysis. They are:

1. What immediate mitigation and restoration opportunities exist to comply with the recent Biological Opinion as a result of the two 1995 Rescissions Bill timber sales?
2. What is the current condition of the Late-Successional Reserve (#251) and what restoration opportunities exist to mitigate the impact of the two 1995 Rescissions Bill timber sales?
3. What opportunities and needs for restoration exist in the analysis area for aquatic and terrestrial habitats to improve water quality, aquatic habitat, vegetative communities, or wildlife habitat?
4. What management activities are appropriate within the Key Watershed and Riparian Reserves?

**ANALYSIS QUESTIONS**

Each section contains a series of analysis questions. These were developed by the team and are designed to become progressively more refined in order to answer the key questions. The Guide also contains a series of so called 'core questions' to be addressed. Answers to these core questions are contained within the team's analysis questions or were not found to be relevant to this analysis.