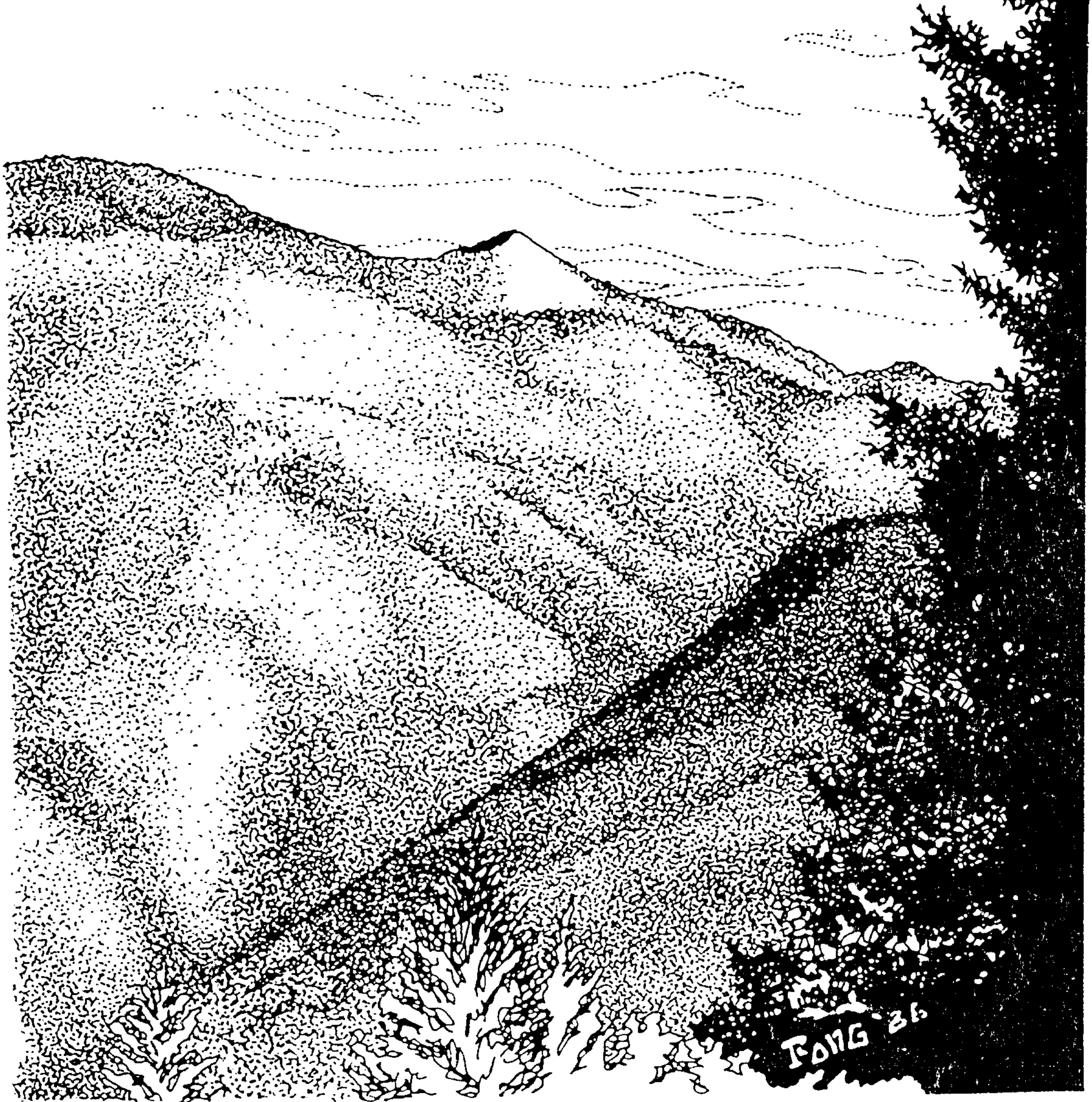
United States
Department
of Agriculture

Forest Service
Pacific
Northwest
Region

1996

SHASTA COSTA CREEK WATERSHED ANALYSIS

ITERATION 1.0



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I have read this analysis and it meets the Standards and Guidelines for watershed analysis required by an amendment to the Forest Plan (Record of Decision dated April 1994).

SIGNED Bonnie J. Wood DATE June 7, 1996
District Ranger
Gold Beach Ranger District
Siskiyou National Forest

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Watershed Analysis Summary

Introduction

The Shasta Costa Creek Watershed Analysis was initiated to obtain and interpret information on the watershed This information will be used to guide resource management and future project analysis. It will also be used to ensure Aquatic Conservation Strategy Objectives and other Standards and Guidelines contained 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 (ROD, 1994) will be met

The watershed analysis was completed by an interdisciplinary team using the six step process outlined in *Ecosystem Analysis at the Watershed Scale (Version 2 2, August 1995)* The watershed analysis has the following components· the aquatic ecosystem, the riparian ecosystem, the terrestrial ecosystem, and the social aspects of the watershed These components are separated in the watershed analysis report, however in the analysis process they are very much interrelated

This watershed analysis report contains the summary, the narratives, and references The narratives cover the same topics as the summary, but with greater detail.

Shasta Costa Creek Watershed

The Shasta Costa Creek watershed was designated as a Key Watershed by the ROD Key Watersheds serve as refugia that are crucial for maintaining and recovering habitat for at-risk species and stocks (ROD, B 12 B-18). Shasta Costa Creek flows into the Rogue River near the community of Agness, about 30 miles east of the Pacific Ocean The Shasta Costa Creek watershed is located in Curry County and is about 23,400 acres The entire watershed except 20 acres of private and State of Oregon lands is managed by the Siskiyou National Forest. Vehicle access to the watershed from Gold Beach is via the Agness Road, (Forest Service (FS) Road #33). The Bear Camp Road (FS Road #23) and the Burnt Ridge Road (FS Road #2308) encircle the watershed The Bear Camp Road is the major east-west route between Grants Pass and Agness, and also provides access to the Rogue River

The Siskiyou National Forest portion of the watershed has been allocated to the following management areas by the Siskiyou Land and Resource Management Plan (Siskiyou LRMP, 1989) as amended by the ROD 1994 (**Table 1**).

Table 1. Management Areas and Acreage in the Watershed.

Allocations	*Management Area*	*Acres*	*Percentages*
Wilderness	1	57	less than 1
Botanical	4	263	1
Supplemental Resource	7	1,621	7
Late-Successional Reserves	8	21,473	92
Total National Forest Land		**23,414**	**99.9**
Total Non-National Forest Land		**20**	**0.1**
Total Acreage		**23,434**	**100**

Other Documents Providing Information on the Shasta Costa Creek Watershed

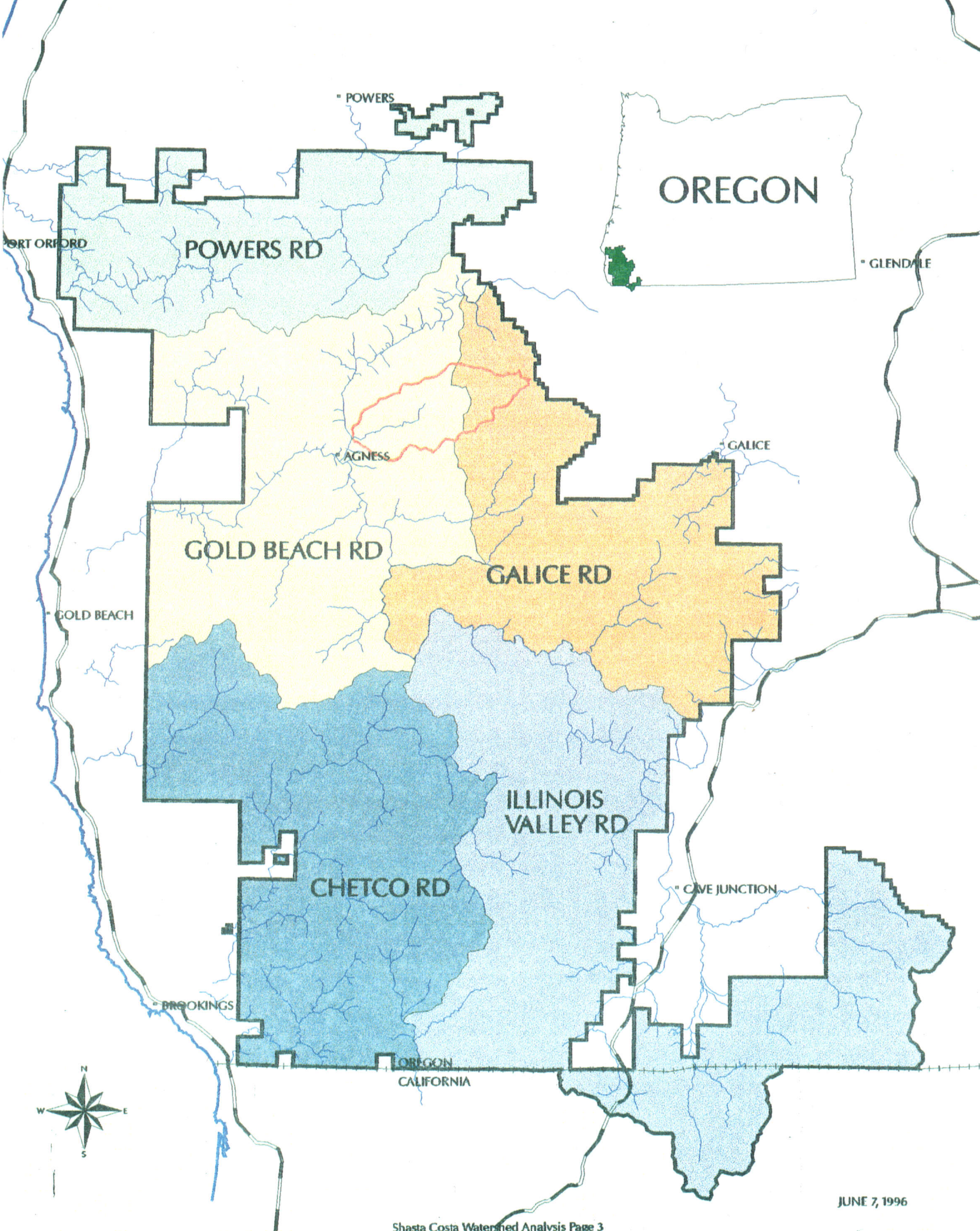
The Siskiyou LRMP, 1989 and the ROD, 1994 provide information and overall resource management direction for the National Forest portion of the watershed. The watershed is primarily allocated to Late-Successional Reserve (LSR) and is a part of the Fish Hook/Galice LSR. The Southwest Oregon LSR Assessment provides more specific information and resource management direction for this LSR

Much of the information for this watershed analysis was obtained from the Shasta Costa Timber Sales and Integrated Resource Projects Final Environmental Impact Statement and the process records (Shasta Costa FEIS, 1991). Any new ground or Geographical Information System (GIS) data that have been gathered since the time of the FEIS process have been incorporated into this watershed analysis Acreage and road mileage is to the nearest whole number, however, these numbers should be considered as approximate.

Watershed Analysis Summary

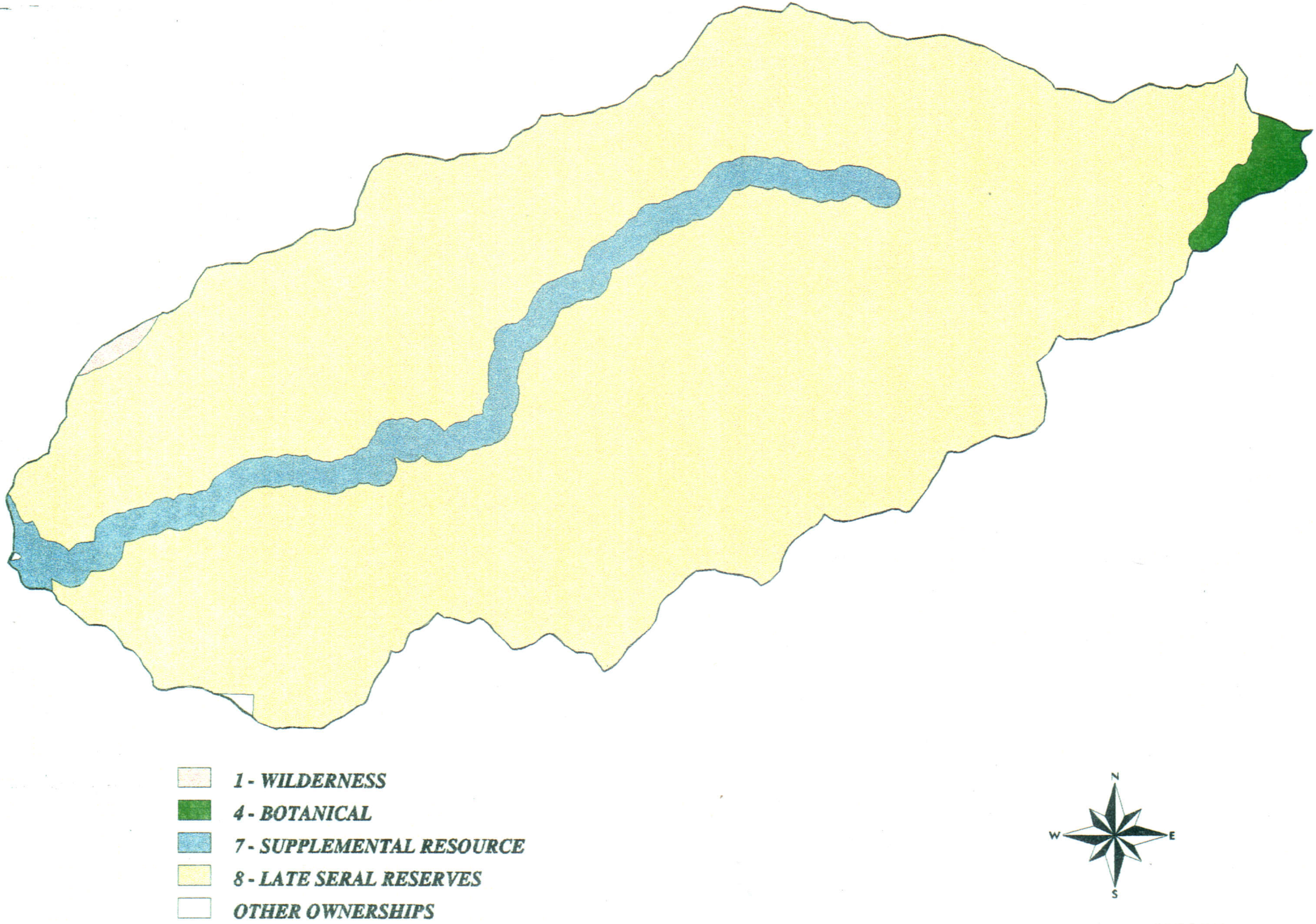
The following section summarizes the information obtained in the watershed analysis Following the vicinity and management area maps, (**Figures 1 and 2**) summary tables for the aquatic, riparian, terrestrial ecosystems and the social aspects of the watershed are presented. Key questions concerning the various resources, the existing condition, objectives, priority locations, and management opportunities are described The summary concludes with the Key Findings for the Shasta Costa Creek Watershed Analysis ıre 1

SHASTA COSTA WATERSHED VICINITY MAP



JUNE 7, 1996

MANAGEMENT AREAS



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AQUATIC ECOSYSTEM

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What erosion processes are dominant within the watershed?	Primary natural processes are inner gorge landslides, debris flows, slump earth flows, and deep-seated rotational movements Road construction, timber harvest, and fuels treatment have increased surface erosion and gullying since 1962, and may have increased rates of debris flows. Gullies are especially large below culverts on the Bear Camp Road, and have delivered sediment to streams	Maintain and restore the natural sediment regime and protect water quality	Throughout the watershed	Decommission roads that are abandoned, currently undriveable or not needed for future management needs Evaluate repairs to long term transportation system roads based on decreasing sediment delivery to streams, runoff diversion and erosion Avoid concentrating, diverting, or creating new channels for water when constructing, reconstructing, stormproofing, or decommissioning roads
What are the dominant hydrologic characteristics and processes?	Runoff may be quicker in Shasta Costa than in neighboring watersheds, with lower summer flows and a higher number of ephemeral streams. Harvest and road construction may have increased peak flows in some Watershed Analysis Areas (WAAs).	Maintain and restore hydrologic patterns	WAAs 3, 9, and 17	Decommission roads Evaluate plantations for for vegetation treatment to improve stand density which would promote hydrologic recovery
What are the basic morphological characteristics of stream segments and the general sediment transport and deposition processes?	Channels have been altered by natural processes (floods and landslides) and by human activities (harvest and road construction) The 1955 flood (prior to harvest and road construction within the watershed) had the greatest effect on the Shasta Costa Creek channel of any event since 1940 (date of the earliest aerial photographs) The lower 6 miles are depositional, and have evidence of fine sediment deposits. On tributaries, there is a close correlation between poor channel condition and proximity to roads and harvested areas	Prevent future changes to stream channels and riparian processes from management activities Complete restoration activities at sites where processes and conditions have been degraded	WAAs 2, 3, 9, 10, and 17, and Critical Reach 1 (mouth to River Mile 1 5)	Evaluate roads for decommissioning to correct flow alterations Evaluate plantations for for vegetation treatment to improve stand density which would promote hydrologic recovery. In Critical Reach 1, evaluate feasibility of channel restoration adjacent to "Rat Hole" terrace
What beneficial uses dependent on aquatic resources occur in the watershed, and what parameters relate to them?	The anadromous fishery is the beneficial use, and the temperature parameter is warm and may be limiting for salmonids This is a result of natural processes	Reduce stream temperature	Critical Reach 1	Evaluate feasibility of planting conifers and bigleaf maple for shade along the south side of Critical Reach 1 At Critical Reach 1 aggraded segment adjacent to "Rat Hole" terrace, evaluate the feasibility of channel restoration to provided a narrower, deeper channel

AQUATIC ECOSYSTEM (continued)

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What is the physical and biotic character of fish habitat in the watershed?	**Migration habitat** was altered by blasting a fish ladder at stream mile 1 5 in 1985, affecting fish distribution **Rearing habitat** Critical Reach 1 is temperature limiting for macroinvertebrates and may be limiting for salmonids Pool depths are good throughout the stream system Overhead and instream cover is excellent overall, with human-placed large wood in the first critical reach Low gradient habitats such as Critical Reach 1 were widened and made shallow during the 1955 flood It is inhabited by anadromous species resident trout, redside shiners sculpins and sticklebacks This reach is an important area for juvenile salmon rearing and adult salmon spawning. Critical Reach 2 has excellent rearing and spawning habitat for both resident trout and winter steelhead **Spawning habitat** is good in the mainstem, with high spawning densities in Critical Reach 1 in spite of fine sediments and embeddedness.	Maintain high quality habitat and improve degraded habitat Protect spatial and temporal connectivity	Planting and precommercial thinning Critical Reach 1 and riparian areas within managed stands Roads Throughout the watershed	Evaluate feasibility of planting conifers and bigleaf maple for streamside shade on the south bank of Shasta Costa Creek near the "Rat Hole" Evaluate the potential to improve mainstem temperatures by planting or precommercial thinning along tributaries within managed stands Evaluate roads for decommissioning and stormproofing, especially above critical reaches
What is the relative abundance and distribution of anadromous salmonids?	There are approximately 10 6 miles of habitat for resident rainbow and resident coastal cutthroat, 9 2 miles for winter steelhead; 3 3 miles for coho salmon, fall chinook salmon, migratory coastal cutthroat, and sculpins, and 1 4 miles for threespine stickleback and redside shiner. Klamath Mountain Province steelhead and coho salmon are currently proposed for Federal listing on the Threatened and Endangered Species List Fall chinook and coastal cutthroat are "at risk " Fish population surveys since 1986 show a declining trend for fall chinook Although coho, chinook, and steelhead have been planted, ODFW considers these fish populations a "wild stock "	Protect habitat for at-risk fish stocks	Throughout the watershed	Riparian planting and precommercial thinning Road decommissioning

RIPARIAN ECOSYSTEM

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What are the riparian processes in the watershed?	Nutrient energy sources, autochthonous and allochthonous, have a major influence on the structure and function of stream ecosystems Intermittent channels provide seasonal sources of water, sediment, allochthonous material, large wood, travel corridors, and microclimatic refuge for mammals, amphibians, and fish **Conifer forest** is the most abundant riparian type in the watershed Most human impacts have occurred here, and it is the most important riparian type for microclimate and wildlife migration **Hardwood riparian** stands occur when water is limiting or the fire regime favors them These stands most frequently surround seasonal streams and have less distinctive microclimates **Meadow and Oak Savanna riparian** areas are in the lower portions of the watershed They have open canopies and provide little microclimate but add to downstream aquatic diversity Most have been encroached upon by conifers	Preserve or restore riparian processes	Where activities have altered riparian processes Where management activities are proposed in or adjacent to Riparian Reserves	Restore altered riparian processes Implement activities within Riparian Reserves or adjust interim Riparian Reserve boundaries where appropriate. This can only occur when riparian processes are preserved and Aquatic Conservation Strategy objectives and wildlife dispersal objectives are met Activities and/or adjustments are more likely to occur in intermittent Riparian Reserves due to the high variability of these stream processes

TERRESTRIAL ECOSYSTEM

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What is the historical and existing late-successional stage distribution in the watershed?	Approximately 61 percent of the Shasta Costa watershed provided late-successional habitat in the 1950's, prior to any timber harvest About 48 percent of the Shasta Costa watershed is presently in late-successional forest Approximately 33 percent of the Shasta Costa watershed is in old-growth forest and 15 percent is in mature Of the old-growth only 36 percent is interior forest habitat or 12 percent of the overall watershed The interior forest habitat is not contiguous These levels are currently near the low end of the natural range of variability as a result of past timber harvest and fire Thirteen habitat connections located primarily in late-successional habitat have been identified in the Shasta Costa watershed Habitat connections are situated in riparian habitat, as well as along mid-slopes and ridges, and contain stands in several successional stages	Accelerate the growth and development of early through mid-seral stage stands to increase block size of older forest and interior forest habitat in the future	The highest priority for stand treatment to improve late-successional habitat are those mid-seral habitat stands adjacent to existing large late-successional habitat blocks, habitat connections or mid-seral stands within the mean home range of northern spotted owl activity centers The next priority is mid-seral habitat stands that will contribute to the landscape pattern of future late-successional forest habitat Another priority are the younger, densely vegetated managed stands within owl habitat, wildlife corridors and adjacent to remaining old growth forest blocks	Development of late-successional structure can be accelerated through commercial treatment for stand density of managed and natural stands Precommercial thinning and release of managed stands could also benefit late-successional owl habitat, wildlife corridors and fragmented core blocks There are about 362 acres that were identified as candidates for treatment in the Shasta Costa FEIS process (FEIS, II-66) Complete surveys and evaluate feasibility to determine if other stands could benefit from stand treatments in the future
What are the special/unique habitats in the watershed and how are they changing?	Meadow and oak savanna areas are being reduced in size by tree encroachment Ponds and rock sites are maintaining their current sizes The Bear Camp Botanical Area has a particularly diverse habitat Varied topography and microclimates provide niches for an unusual assortment of plant species including several sensitive species A population of Alaska yellow cedar also exists in this area The largest known distribution of bensonia in the world and the majority of known populations of Bolander's Onion and Leach s brodiaea occur in the watershed	Restore meadow and oak savanna habitat Protect sensitive plant species and habitat	Shasta Costa Meadow Meadow and oak savanna areas throughout the watershed Bear Camp Botanical Area and other sensitive plant sites in the watershed	Cut, girdle, or cut and remove encroaching trees in and around meadows and oak savanna areas Manage with a prescribed fire program Seed disturbed areas with native grass seed

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What is the relative abundance and distribution of the species of concern in the watershed? What is the distribution and character of their habitats?	The following endangered or threatened species have been observed in the watershed bald eagle, northern spotted owl and peregrine falcon The watershed has suitable habitat for the marbled murrelet, but is approximately 3 5 miles beyond its known range on the Gold Beach Ranger District High elevation pioneer successional stages are important for neo-tropical migratory birds in the fall prior to migration There is a wide variance of snags per acre across the watershed but on the average there is only one per acre The following sensitive species have been observed in the watershed common kingsnake, california mountain kingsnake and Del Norte salamander Habitat for the following sensitive species occurs in the watershed northwestern pond turtle, white-footed vole, Pacific big-eared bat and wolverine The following sensitive plant species have been documented in the watershed *Allium bolanderi* var *mirable*, *Arctostaphylos hispidula*, *Bensoniella oregana*, *Erigeron cervinus*, *Haplopappus hitneyi* var *discoideus*, *Iliamna latibracteata*, *Mimulus douglasii*, *Encalypta brevicola crumiana*, *Frasera umquaensis*, and *Triteleia hendersonii* var *leachiae*	Maintain or increase populations of these plant and animal species by maintaining or increasing habitat capability within the watershed	Protect known sensitive species sites Develop potential late-successional habitat areas for spotted owls and other species that use late-successional habitat. Priority areas include those that will contribute to the development of large blocks of interior late-successional habitat Maintain and improve unique habitats	Maintain and protect known sensitive plant and animal sites Develop spotted owl structure within stands. Improve habitat conditions for late-successional dependent species by developing recruitment/potential habitat stands Protect existing snags and create new snags where feasible Restore and maintain meadows and oak savannas

TERRESTRIAL ECOSYSTEM (continued)

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What are the locations and risk of spread of noxious weeds?	Seven noxious weed species currently inhabit the watershed and two additional species occur in neighboring watersheds Most populations are currently restricted to disturbed areas including roadsides, disturbed woodlands landing sites, and streambeds Four species (Scotch broom, French broom yellow star thistle, and gorse) exist in low enough numbers that treatment can limit their populations The aggressive nature of these weed species threatens native plant communities and sensitive plant species Canada thistle, bull thistle, and tansy ragwort are established in the watershed and pose a lesser threat because they have already long occupied many of the watershed s disturbed sites Italian thistle and teasel occur in neighboring watersheds but have not yet appeared in Shasta Costa	Minimize impact of noxious weeds by restricting their spread and introduction to new sites When possible eradicate species that are not well established in the watershed	Scotch broom is the most common species and occurs in multiple locations on the Bear Camp Road (FS Road #23) French Broom is found primarily near the junction of the Agness Road (FS Road #33) and Bear Camp Road plus one isolated plant near the center of the watershed on the Bear Camp Road Gorse occurs at one location on Road 2308 270 Yellow star thistle has been found on roadsides near Agness at the "Rat Hole", meadow 252 and meadow 325, and on an extirpated site near a former lookout site near Bear Camp	Cut/pull/burn colonies of gorse, yellow star thistle, and broom, and monitor sites for reoccurrence Clean construction machinery before and after operation Use only "clean" fill material and "certified" weed free hay Seed disturbed soils with native seeds to reduce the risk of noxious weed establishment Reduction of soil disturbance (i e ripping roads) in weed infested areas will help control populations Use of biological controls (especially for tansy ragwort and Canadian thistle) will help control populations
What is the risk of spreading *Phytophthora lateralis* (Port-Orford-cedar root disease) to Port-Orford-cedar or Pacific yew in the watershed?	The Port-Orford-cedar stands are small, somewhat isolated and located in the lower 1/3 of the watershed. Two occurrences are adjacent to roads. The remainder of the Port-Orford-cedar is located along the mainstem of Shasta Costa creek within 2 1/2 miles of the confluence with the Rogue River Pacific yew are found in riparian areas throughout the watershed None of the Port-Orford-cedar appear to be infected with *Phytophthora lateralis* within the watershed	Reduce the risk of introduction of *Phytophthora lateralis* to the watershed.	Scattered Port-Orford-cedar along the Bear Camp road (FS Road #23), near the 820 spur and those growing in the riparian area near Red Cub water source on the Burnt Ridge Road (FS Road #2308)	Cutting Port-Orford-cedar from the edges of the roads, wet weather closure of spur roads to motorized vehicles, cleaning equipment before any operations, restrict high risk uses to dry season only, use uninfested water in firefighting and other activities; place a berm of gravel along infested road sites where POC exists, plant disease-resistant trees in low-risk riparian sites and upland sites, continue public education regarding the importance of road closures, enforce closures

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What is the fire history of the Shasta Costa Creek watershed and what is the future role of fire in the watershed?	The past natural range of conditions are poorly understood although there is evidence that multiple, low intensity underburns may have been more prevalent than isolated stand replacement fires Between 1910 and 1920, 5 human-caused fires burned around 44 percent of the area, mostly in the eastern half of the drainage In the past 75 years, 14 lightning-caused and 19 human-caused fires have burned, only one of which grew beyond 20 acres Miners, cattlemen, and Native Americans used fire for manipulating and maintaining vegetation and to enhance their particular interests. Fire has been suppressed for the past 75 years The effects of this exclusion are becoming evident in the meadow areas and possibly in other unique habitats	Maintain the natural processes of fire in the ecosystem Determine where fire exclusion is contributing to the degradation of certain plant communities and unique habitats Determine conditions and fire intensity levels that would provide benefits to these areas	Encroached meadows, special and unique habitats, late-successional habitats are priority areas Other areas in the watershed may also benefit	Prescribed fire can be used to achieve the management objectives for special and unique habitats, Late-Successional Reserves, and other land allocations Fire management plans need to be completed to determine conditions where prescribed fire will be used in the Late-Successional Reserve

SOCIAL ASPECTS

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What were the prehistoric uses of the watershed?	Known sites indicate seasonal use of the watershed for hunting and gathering food-stuffs and obtaining raw materials for stone tool manufacture, basket making, woodworking etc Trade and travel routes also traverse the watershed with associated short-term traveling camps Quarry sites for the procurement of raw stone for tool manufacture exist in the watershed as well as sites demonstrating the socio-religious concepts of the Native Americans	Identify and protect cultural resources	Meadow areas, major dividing ridgetops, chert outcrops and riverine terraces on all major watercourses	Conduct cultural resource surveys prior to any ground disturbing projects Identify, document and evaluate any discovered sites for the Forest inventory and possible inclusion to the National Register of Historic Places Suitable cultural resource properties may be interpreted for recreational use and the educational benefit of the general public
What were the historic human uses of the watershed?	Historic elements represent early settlement, mining for precious or strategic minerals and early Forest administration Travel routes are an important aspect of the cultural fabric They often follow aboriginal paths or were established during the mining period Many of these routes evolved into administrative and recreational roads and trails The Siskiyou National Forest s contribution to the area s history is represented by evidence of Forest improvements and facilities	Identify and protect cultural resources	Mining sites and their associated dwellings scattered throughout the watershed Meadow areas some of which contain early settlement structures and remains Sites containing Forest Service administrative facilities such as Shasta Costa Ranger Station, and historic camps Existing trails and trail segments, and former trails located on historic Siskiyou National Forest maps	Conduct cultural resource surveys prior to any ground disturbing projects Identify, document and evaluate any discovered sites for the Forest inventory and possible inclusion to the National Register of Historic Places Suitable cultural resource properties may be interpreted for recreational use and the educational benefit of the general public
Does the watershed contain any culturally significant traditional use areas?	No evidence suggests that the watershed is presently used for traditional activities by local Indian groups The local recognized tribes (Tolowa, Karuk, Coquille and Siletz) were consulted and did not provide additional information regarding traditional use in the watershed	Manage traditional use or religious sites in coordination with American Indian tribal groups. Recognized tribes will be contacted during the public involvement phase of project planning	None known at this time	If suitable cultural resource properties are found, there is an opportunity for partnership with the recognized tribes in the development of recreation al and educational programs for the public

SOCIAL ASPECTS

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What are the major recreational uses in the watershed?	Recreational uses include leisure driving, hiking, hunting, dispersed camping, botanical study and wildflower viewing, Christmas tree cutting, non-commercial collecting of special forest products, and snow related activities There are opportunities for both roaded and unroaded recreation experiences Overall use is moderate and is expected to remain the same or gradually increase The Recreation Opportunity Spectrum classification for the watershed is Semi-Primitive Non-Motorized in the roadless interior and Roaded Natural in the surrounding perimeter Much use is tied to the Bear Camp Road, which is a primary thoroughfare between Grants Pass and Gold Beach and is used heavily to access the Rogue River	Provide recreational facilities, roads, and trails which meet the needs of the public and are appropriate with other management goals	Motorized recreation primarily occurs on the Bear Camp Road, (FS Road #23), which is the principle transportation route through the watershed The Burnt Ridge Road (FS Road #2308) is also a heavily used road in the watershed, but less than Bear Camp	Develop and provide information to the recreating public on natural feature interpretation, trail opportunities, value of unique habitats, proper camping and day use etiquette, and fishing regulations Determine appropriate recreation use of closed roads Rehabilitate areas that have been damaged Consider closure of roads and sensitive areas that have a high potential of damage Enforce closures and regulations

SOCIAL ASPECTS

KEY QUESTION: What commodities can be produced from the watershed?

TYPES OF COMMODITY	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
Timber	Approximately 2,557 acres of timber have been harvested since 1960 With the current land allocations, there is no programmed timber harvest in the watershed The meadow habitat is being encroached by trees Commercial timber activities would be limited to removing the encroachment to reestablish meadows and oak savannas treatment to accelerate growth and development of early and mid-seral stands into late-seral stands, salvage of hazard trees adjacent to open roads, and salvage if catastrophic events occur	Improve the condition of the Late-Successional Reserve (LSR) by accelerating growth and development of early and mid seral stands in the watershed Return meadows to an open and early seral habitat condition similar to what existed prior to effective fire prevention and suppression	The highest priority for stand treatment to improve late-successional habitat are those stands that are mid-seral habitat adjacent to larger blocks of primarily late-successional habitat, within the mean home range of a northern spotted owl activity center or that are in habitat connections The next priority are those stands that are mid-seral habitat that will contribute to the landscape pattern of future late-successional habitat About 362 acres were identified as candidates for treatment in the Shasta Costa FEIS (II-66) Additional surveys need to be completed to determine if other stands could benefit from stand treatment in the future The highest priority meadows and oak savannas that would benefit from the removal of encroaching conifer trees are located in the lower half of the watershed Other meadows and oak savannas may also benefit from the removal of encroaching trees	Stand treatment methods, such as commercial thinning which accelerate growth and development of early and mid-seral stands to improve the condition of the LSR remove tree encroachment to maintain meadows and oak savannas, salvage of hazard trees along roads and salvage of trees if catastrophic events (fire or wind) occur in the future.
Special Forest Products	The upper portion of the watershed receives a moderate amount of personal use Christmas tree harvest Commercial collection of special forest products has been limited by to roaded access and remoteness to markets Impacts on resources have been minimal Products include cedar and fir boughs vine maple, Christmas trees mushrooms, firewood, and some beargrass and salal Special forest products can be collected in Late-Successional Reserve under the Southwest Oregon LSR assessment	Meet Late-Successional Reserve and other management area objectives while allowing for collection of special forest products	Near roads in the lower and uppermost reaches of the watershed	Collection of cedar and fir boughs, mushrooms Christmas trees, vine maple bear grass, salal and firewood

KEY QUESTION: What commodities can be produced from the watershed? (continued)

TYPES OF COMMODITY	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
Mining	Prospecting has occurred in the past, but no significant minerals have been produced There are three known mining prospects, two for copper and one for coal While there may still be claims and prospecting within the watershed, there is no known mining activity	Facilitate mineral exploration and development while protecting surface resources and stream quality	No priority locations	Mining may occur when economic conditions make the operation viable
Grazing	Grazing probably began in the watershed in the 1850 s and was first permitted by the Forest Service in 1919 as the Bob's Garden - Squirrel Peak Allotment There were 720 Animal Unit Months (AUMs) allocated in 1919, with a maximum of 1200 AUMs in 1922 Grazing declined to 60 AUM in 1937 and remained at that level through 1965 In 1983, the primary allotment was moved to Big Bend and the Bob s Garden/Squirrel Peak Allotment became a secondary allotment Over time, this allotment was phased out. Currently there are no allotments in the watershed, and none are planned for the future	Maintain populations of deer and elk Protect important populations of native grasses Protect riparian areas Protect existing recreational opportunities	None	None

SOCIAL ASPECTS

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
Which roads are needed for future access in the watershed and which roads need treatment to protect the resources of the watershed?	The Bear Camp Road (FS Road #23) and the Burnt Ridge Road (FS Road #2308) are the primary roads in the watershed These roads provide east-west access from Grants Pass to Agness The remaining roads in the watershed were initially constructed for timber harvest access but also provide roaded-recreation opportunities Currently, there is about 56 miles of road in the watershed A rating of the roads in the watershed was completed from a variety of resource perspectives to determine what type of restoration treatment, if any would be needed in the future	Determine which roads are needed for future access and which roads need treatment to protect the resources of the watershed	For public and administrative access, Roads 23 and 2308 are the primary roads in the watershed Roads 2300 088, 2300 700, 2300 740, 2308 016, 2308 210 are classified as secondary roads The remaining roads in the watershed are candidates to be potentially closed to motorized traffic as need, funding, and priorities allow	The following roads were identified for decommissioning 2300 474 2300 475, 2300.730 (last one mile), 2300 731 2300 735 2300 736, 2300 840, 2300 842 2300 844, 2300 864, 2300 915 Road 23 is in high need of repair and maintenance Road 2308 has a moderate need of repair and maintenance Slide repair and reconstruction will be completed on the 2308 016 road this summer

KEY FINDINGS

AQUATIC

Harvest and road construction have increased surface erosion and gullying in the watershed Gullies are especially large below culverts on the Bear Camp Road, and have delivered sediment to streams

The **1955 flood** had the greatest effect on the Shasta Costa stream channel of any natural or human related process within the period of photo record since 1940

Fair to poor **channel condition** of tributaries is closely correlated with higher levels of harvest and roading.

Overall **fish habitat** is good to excellent within the watershed.

Critical Reach 1 (mouth to river mile 1.5) is **temperature limiting** for macroinvertebrates and at certain times of the year it appears to be limiting for salmonids. This is the result of natural processes.

Critical Reach 1 has a moderate to high percentage of **macroinvertebrate taxa** in the reach that are tolerant of fine sediments These sediments may be the result of natural and human caused erosion

Shasta Costa is an **important Key Watershed** for the recovery of at-risk fish stocks

TERRESTRIAL

Late-successional forest habitat has been reduced from a level of 61 percent before timber harvest began in the 1950's to an existing level of 48 percent. The existing late-successional habitat is fragmented. Interior old-growth forest habitat is estimated to be 12 percent of the overall watershed (Shasta Costa FEIS p. III-27)

Open meadows and oak savannas are being reduced in size by conifer and hardwood tree encroachment

Although there is a **wide variance of snags per acre across the watershed**, past disturbances, both human and natural, have left an average of one snag per acre This does not meet the Siskiyou LRMP as ammended by the ROD requirements.

Noxious weed infestations occur primarily on roads associated with the 2300 and 2308 road systems Plants are spreading along infested roads.

Port-Orford-cedar occurs in very low quantities in the lower end of the watershed, mostly in riparian sites. The current population does not appear to be infected

Fire occurrence has shaped vegetation along with timber harvest and soil type

SOCIAL

The Shasta Costa Watershed provides both **roaded and unroaded recreation opportunities.** The two primary roads within the watershed are the Bear Camp Road, (FS Road #23), and the Burnt Ridge road (FS Road #2308). These are multiple purpose routes which serve moderate to heavy recreation, timber, and administrative traffic In contrast to these roads, the heart of the watershed, which lies below and between the Bear Camp and Burnt Ridge road systems, is unroaded and remains natural in appearance.

Primary **recreation activities** in the watershed include leisure driving, dispersed camping, hunting, fishing, hiking, nature study, botanical study/viewing, snow play, and gathering of special forest products Current estimates indicate that recreational visitor use is somewhere between 9,000 and 10,360 RVD's annually

Timber harvest opportunities in the watershed will be limited to stand treatments that promote the development of late-successional habitat or management that helps restore meadow and oak savanna habitat to a historical condition

Watershed Analysis Narratives

AQUATIC ECOSYSTEM NARRATIVE

GEOLOGIC CHARACTERIZATION

Rock Types

The Shasta Costa watershed can be roughly divided into three sections by rock type the upper, middle and lower (See Geology Map. **Figure** 3) The upper section has rocks of the Dothan formation, which are sandstones, siltstones, mudstones and minor amounts of chert The middle section is a narrow band of diorites and metavolcanics, which are more resistant to erosion and typically form steep slopes and cliffs The lower section consists of rocks of the Flournoy and Lookingglass Formations and the Undifferentiated Umpqua Group, all Tertiary in age. Rocks of these formations are mudstones, siltstones, sandstones and conglomerates. Within this lower section, along the mainstem of Shasta Costa Creek are exposures of serpentinite, diabase and andesites

Mudstones erode relatively easily and can form deep soils (see Soil Depth and Parent Material Map, **Figure** 4) Some areas of mudstone can be sensitive to disturbance. Poorly located roads, trails and other disturbances can cause ravelling, headward erosion, and gullies, which in turn cause a loss of vegetation

Siltstones and sandstones are more resistant to erosion, forming steeper slopes than those seen in mudstones Accumulations of soils derived from sandstones and siltstones tend to be thin on ridges and steep slopes Soils have greater depth on more moderate slopes.

Conglomerates and volcanic rocks (diabases, metavolcanics, andesites) are resistant to erosion and typically form steep slopes and cliffs Erosion on these sites tends to be rock fall.

Faults

North-south trending, high angle faults separate almost all of the rock units shown on the geologic map. Shear zones associated with the faults are areas where the rock has been ground or broken from a few feet to tens of feet around the fault These areas may be conduits for water, forming springs and seeps

GEOMORPHOLOGY

It is possible to infer some of the effects that the geology has had on the watershed by reviewing the geologic map (**Figure** 3) In the center of the watershed as the mainstem heads downstream it takes a sharp turn to the south and then to the west This is a result of fault movement diverting the stream

The fault movement also appears to have influenced the gradient of the stream, with the gradient increasing above the contact between volcanics and the Dothan formation. These faults are responsible for the formation of waterfalls within the mainstem and influence fish distributions and the location of critical reaches

Glacial activity is apparent in the upper reaches of the watershed in the areas around Brandy Peak and Squirrel Camp Peak. Some steep slopes in these areas appear to have been carved by glaciers, with deposition of glacial outwash nearby

Slope steepness within the watershed is also influenced by rock types. The vertical bands on the Slope Class Map (**Figure** 5) reflect the vertical bands on the Geology Map (**Figure** 3). The mudstones of the Flournoy, Lookingglass and Umpqua formations, as well as the mudstone unit within the Dothan formation, have the flattest slopes Slopes in the sandstone units of the Dothan formation are moderately steep. The band of volcanic rocks in the center of the watershed are more resistant to weathering and erosion, so slopes formed by these rocks are the steepest in the watershed ure 3

SHASTA COSTA WATERSHED GEOLOGY

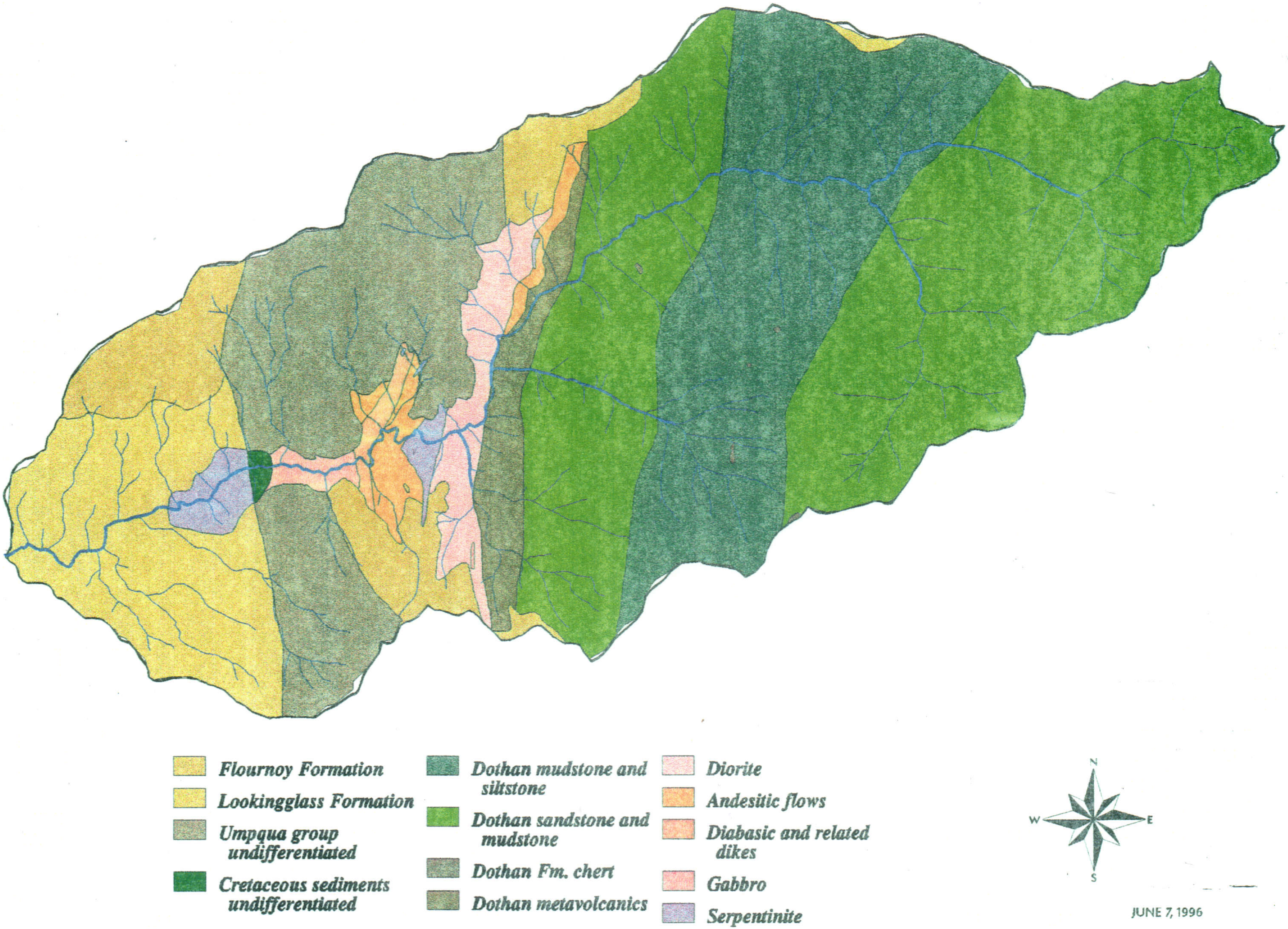
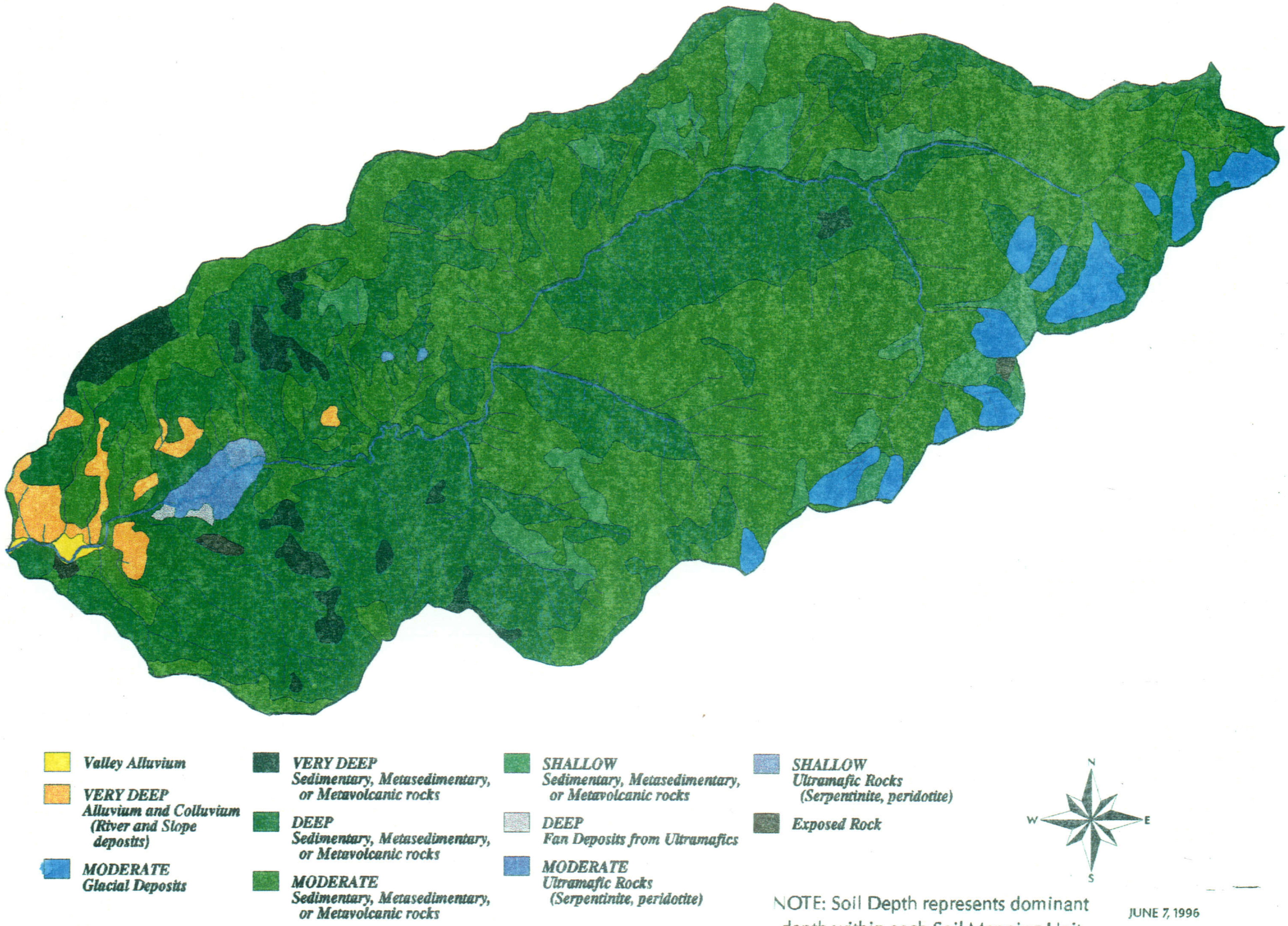


Figure 4

SHASTA COSTA WATERSHED
SOIL DEPTH AND PARENT MATERIAL



NOTE: Soil Depth represents dominant depth within each Soil Mapping Unit

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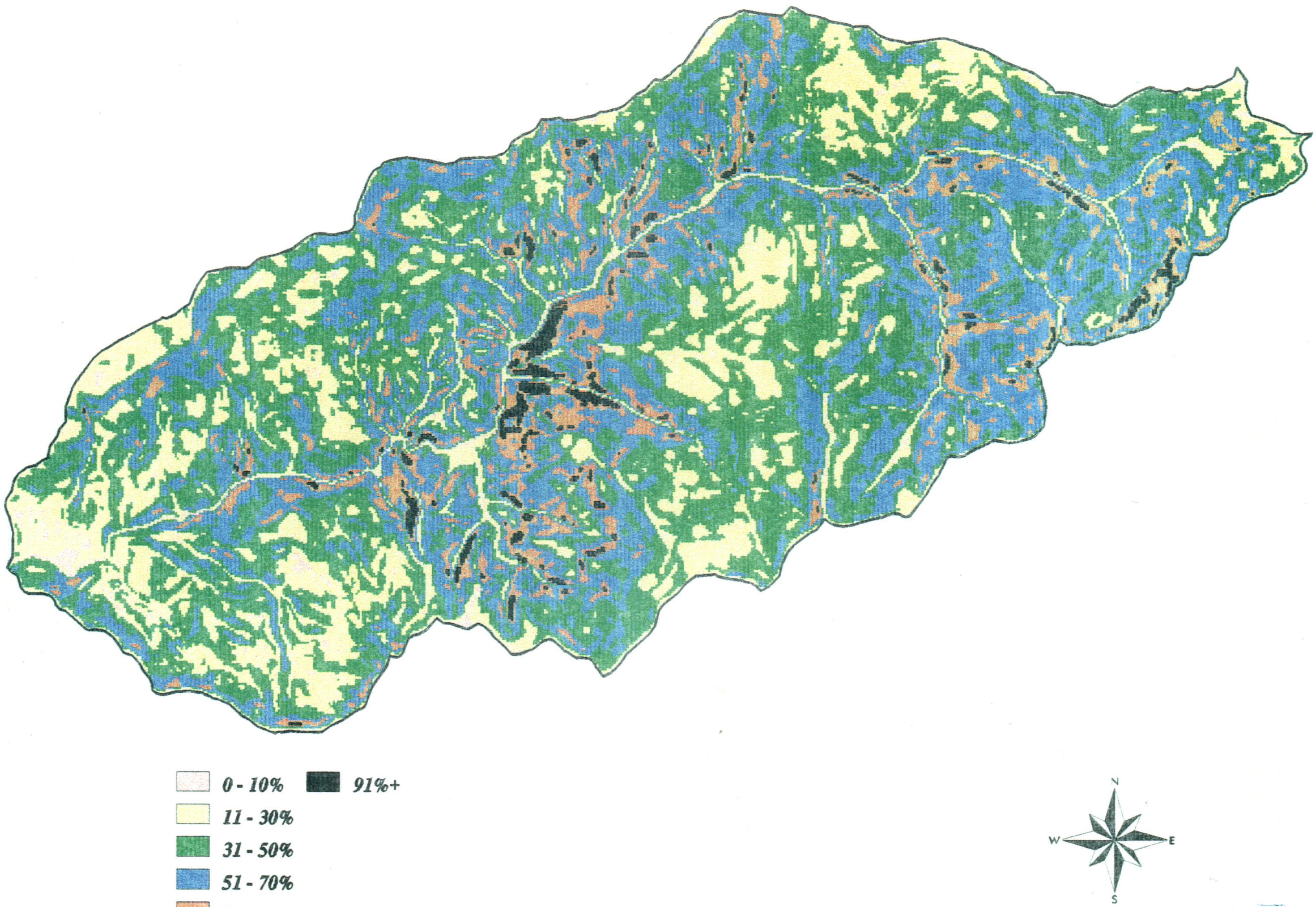
Figure 5

SHASTA COSTA WATERSHED
SLOPE CLASSES



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What erosion processes are dominant within the watershed?

Natural Processes

Landsliding and erosion are natural processes that deliver sediment to streams. Landslides within the steep inner gorges of Shasta Costa creek and its tributaries are common. These typically deliver relatively small amounts of sediment and wood to streams. Shallow erosional processes such as surface ravel of weathered rock can affect relatively large areas but also deliver small amounts of sediment to streams. An example of this is the large dark slide (a natural slide) visible from the Bear Camp Road in the lower watershed.

Debris flows, which can originate in steep headwall areas, can travel downslope for long distances and entrain significant volumes of wood and coarse sediment. They are mass failures that have high energy and have the ability to scour streams to bedrock. They are linear features and do not affect large areas, unless the deposits they form are large Debris flows are visible in the Elk Wallow/Brandy Peak area.

Slump-earth flows are downslope movements of soil and rock which can include large areas. Typically these are deep seated features associated with thick soils. These flows have a profound effect on topography. Large curved valleys with steep hillsides are formed by the downslope movement of the earth and rock. The deposits form areas of low slope and rolling topography, and can flow into streams causing diversions or blockages. Historical active flows, current active flows, and flow deposits can be seen within the watershed, and are noticeable in the cracks and slumps along the Bear Camp Road.

Deep-seated rotational movements of bedrock can cause large volumes of soil and rock to flow down slope These types are not common in the watershed but have been observed. In 1986 a large block of rock below Green Knob moved in a rotational failure, creating a scarp and causing a slide which delivered sediment to Shasta Costa Creek and two miles downstream to the Rogue River The sediment plume extended from the landslide down the Rogue River below its confluence with the Illinois River. The landslide was approximately 15 acres in size

Natural erosion and landsliding processes have contributed to the formation of stream channels within the watershed The influx of fine and coarse sediment, large wood, and boulders from landslides influences the quality of fish habitat. At varying times and circumstances, this can have a positive or negative effect on habitat

Human activities affecting erosion processes

Road construction, timber harvest, and fuels treatment are the principal management activities with the potential to increase sediment to the streams These activities have added to the naturally high levels of sediment delivery since 1962 when timber management began. They increased the role of surface erosion in the sediment delivery process over what occurred naturally. These activities may also have increased debris flow and mass delivery rates.

Soils derived from Tertiary sediments are highly susceptible to destabilization, surface erosion, and gullying. The gullies below culvert outlets on the Bear Camp road are examples of erosion caused by human activities A field survey in 1990 followed channels below culvert outlets on the Bear Camp Road. Surveyors found gullies below nearly all culverts examined, some up to 10 feet deep and 20 feet wide. Where riprap had been place at the outlet, it protected the road fill but the gully extended downhill from the toe of the riprap. Where the culvert discharged onto a flat bench, the water dissipated across the bench, then concentrated and cut a gully after leaving the bench The size of these gullies may be the result of a combination of factors more rapid runoff characteristic of this area (see Hydrology), highly erodible soil type, and deep soils.

Harvest units in the upper end of the watershed, and where roads are located in the watershed, continue to deliver small amounts of sediment to streams. These units were clearcut in the 1960's with little or no riparian protection, then burned hot, removing residual vegetation and causing surface erosion.

In some cases, there appears to be a relatively simple connection between degraded stream condition and harvest and roading However, in most cases it is a complex relationship between local site conditions including unit/road placement, slope, soil/rock type, type and amount of fracturing, root strength, groundwater, and surface hydrology

Information Needs: Complete the culvert inventory begun on the Bear Camp Road to determine the quantity and extent of past sediment delivery to streams Establish cross-sections in streams and gullies below the Bear Camp Road to determine whether they will continue to erode and deliver sediment, or if they have stabilized

Management Opportunities: Complete road repair projects to decrease the amount of sediment delivery to streams, runoff diversion, and erosion from the existing road system.

Decommission roads that are abandoned, currently undriveable, or not needed for future management

Avoid concentrating, diverting, or creating new channels for water when:

- constructing or reconstructing roads,
- obliterating or repairing roads,
- harvesting timber,
- building trails and trailheads.

What are the dominant hydrologic characteristics and processes in the watershed?

Characterization

The Shasta Costa watershed receives an average of 110 inches of precipitation per year, with a range from 85 inches near Green Knob to 145 inches near Squirrel Peak (State Isohyetal mapping). Most of this falls as rain However, approximately 36 percent of the watershed is within the transient snow zone between 2500 and 4000 feet in elevation, where rain on snow events concentrate precipitation and increase the size of flood events (See Elevation Zone Map, **Figure 6**) About 13 percent is within the snowpack zone (above 4000 feet), where precipitation is stored through the winter and released to streams in the spring, combining with spring rainfall to increase peak flows.

Streamflow measurements in August and September have found lower flows in Shasta Costa Creek than in neighboring watersheds. There is no evidence of variation in precipitation that would cause this. State isohyetal maps do not indicate less precipitation in Shasta Costa. The snowpack zone is traversed by the Bear Camp and Burnt Ridge roads, and is observed to carry at least as much snowpack as other watersheds for similar durations. The hydrology network may be flashier in Shasta Costa than in neighboring watersheds This would be consistent with channel observations. The watershed has large, dry channels that seem to flow only during storms, with a little retained as groundwater/baseflow.

Table 2. Summer Streamflow Comparisons

Watershed	Acres	Square Miles (Sq Mi)	Late Summer Flow (cfs)	Flow/Sq Mi (csm)
Shasta Costa	23 434	37	10	0 27
Lawson	25 241	39	20	0 5
Foster	7 735	12	9	0 7
Lobster	44 252	69	31	0 4

Known flood events since 1940 (date of earliest aerial photos) occurred in 1955, 1964, 1972, and 1983 Although the 1964 event was larger in the Pacific Northwest as a whole, coastal portions of the Siskiyou National Forest experienced greater effects from high flows in 1955. Effects of these events are discussed under channel morphology.

Harvest and road construction may have affected the hydrology of some Watershed Analysis Areas by increasing peak flows (See Watershed Analysis Area Map, **Figure 7**). The increases in peak flows may have increased sediment delivery and changed stream channels. These effects are most likely in tributary drainages where more than 20 percent of the area was harvested, or in drainages with road densities greater than 4 miles per square mile. Effects are especially noticeable where snow-storage concentrates runoff. Watershed Analysis Areas (WAAs) 3, 9, and 17 have had both harvest and road construction levels at greater than these thresholds

Table 3. Harvest, Road Density, and Channel Condition

WAA	Percent Harvested	Road density mi/sq mile	Percent Elevation >2500 feet	Fair/Poor Channel Percent of length	Stream length Percent harvested
1	9	2 32	15	49*	--
2	36*	2 67	11	94*	63*
3	44*	4.97*	47*	57*	32*
4	7	1 92	49	34*	19
5	--	1 70	37	.	
6	3	0 68	41	19	
7	.	0 29	62	04	
8	6	1 75	92	9	..
9	20*	4.08*	100*	78*	35*
10	25*	2 09	100*	50*	36*
11	--	0 02	95	20	--
12	--	0.25	76	6	.
13	--	0 09	3	36*	
14	13	2 50	7	70*	22
15	17	3 39	21	83*	17
16	15	2 48	2	35	8
17	38*	3.96*	1	60*	37*
18	29*	3 17	5	65*	21
19	13	0 94	38	28	4

*Factor large enough to have measureable effect

__Management Opportunities:__ WAAs 3, 9, and 17 are the highest priority for hydrologic restoration activities road decommissioning and vegetation planting or precommercial thinning in riparian areas where beneficial to restore the flow regime and stabilize banks.

Figure 6

SHASTA COSTA WATERSHED
ELEVATION ZONES

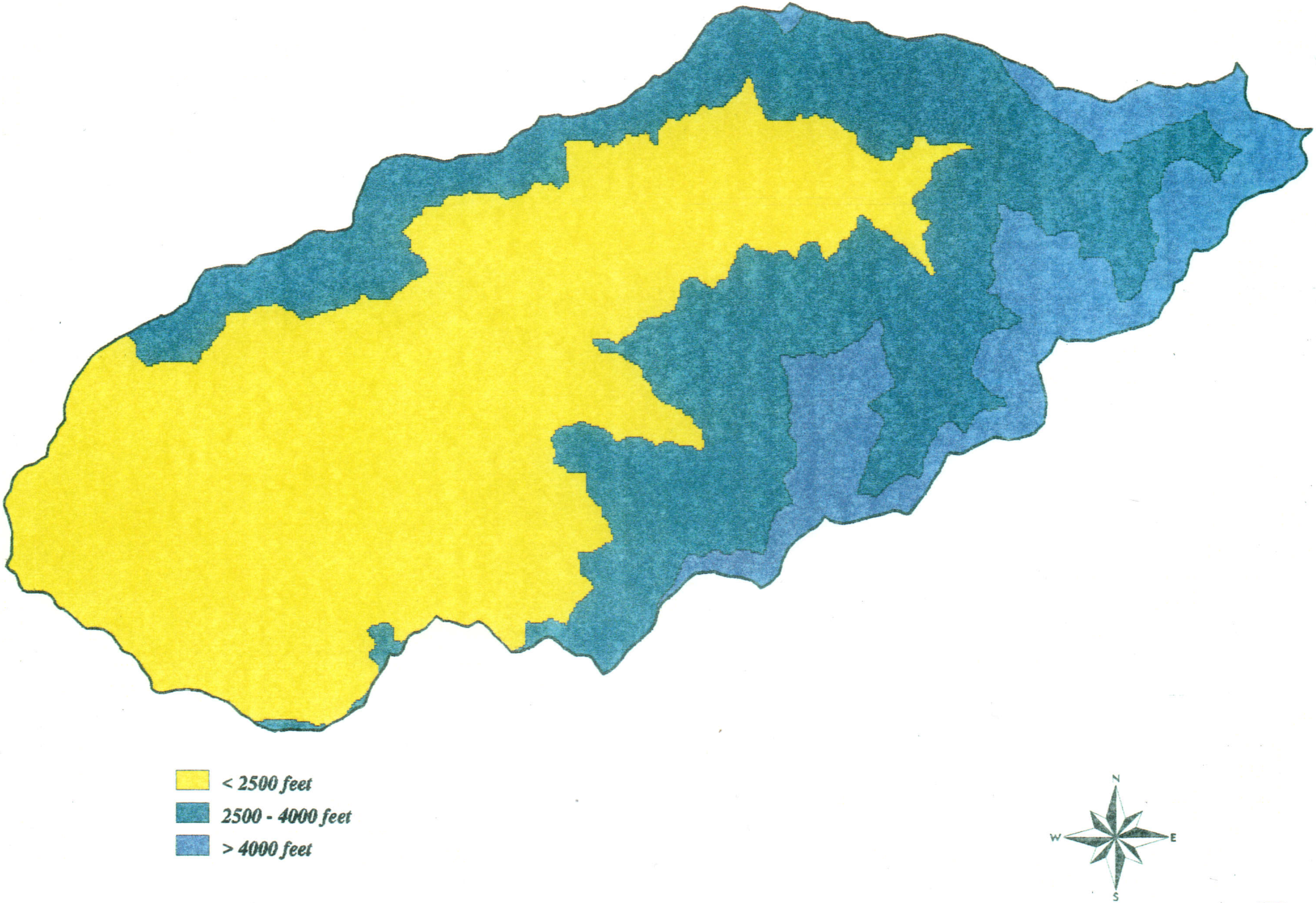

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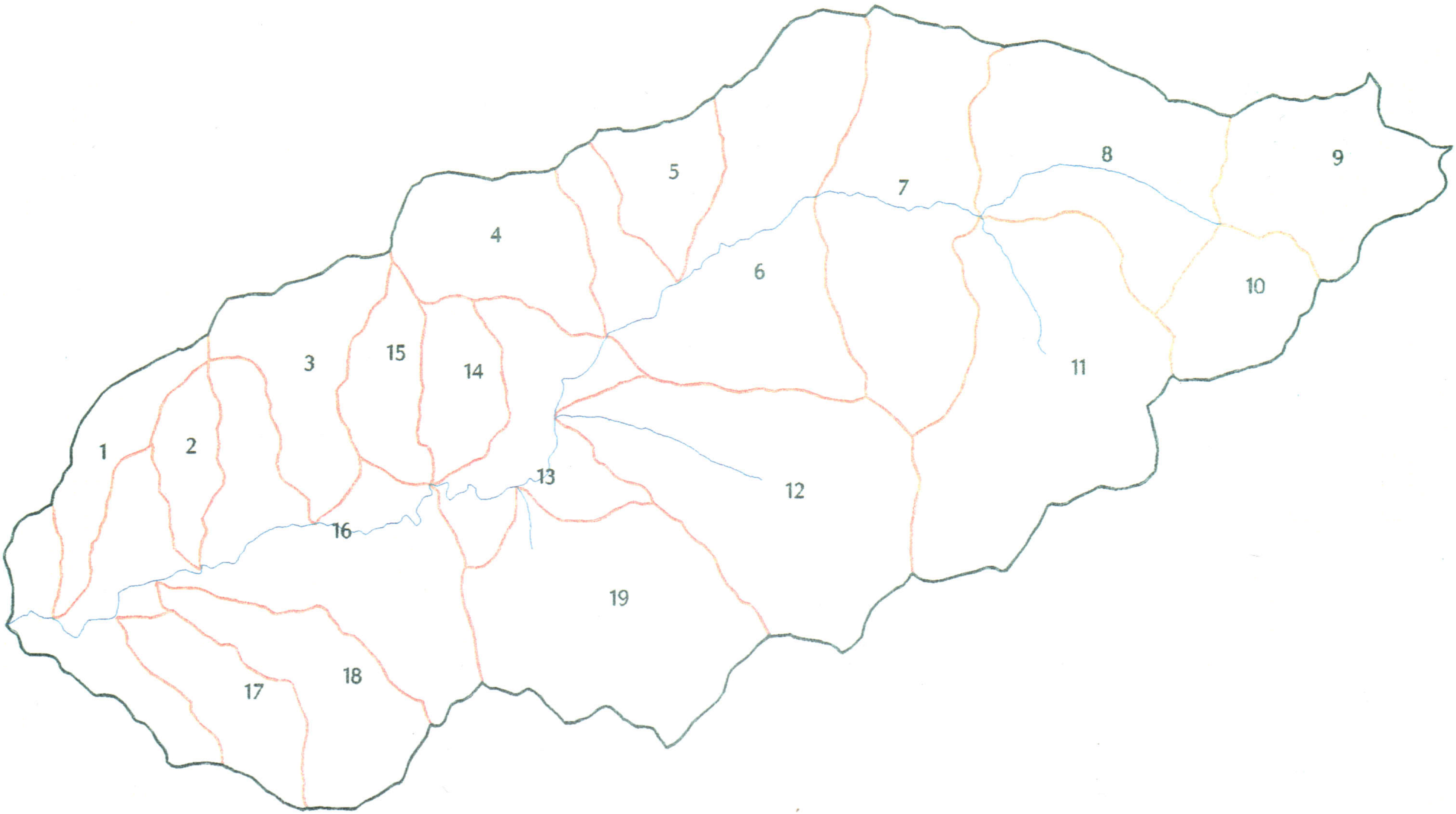
Figure 7

SHASTA COSTA WATERSHED
WATERSHED ANALYSIS AREAS



Watershed Analysis Area boundaries

Class I and II streams

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What are the basic morphological characteristics of stream segments and the general sediment transport and deposition processes in the watershed?

Shasta Costa Creek may be characterized in four segments The headwaters segment (approximately 0.5 mile) is steep, with gradients over 20 percent

The next 3.5 miles down to Squirrel Camp Creek have an average gradient of 10 percent. Although the gradient is steep, transport capability of the upper one mile is limited by the amount of streamflow. Flows and transport capacity increase beyond the confluence with the tributary draining the east side of Brandy Peak.

The next 5 miles downstream, from Squirrel Camp Creek to the upstream end of Critical Reach 2, is primarily a transport segment. It has an average gradient of 5 percent

The 6 mile segment from the upstream end of Critical Reach 2 to the mouth has an average gradient of 2 percent This segment is depositional A 1994 stream survey reported valley bottom configuration varying from U-shaped to narrow V-shaped, with side slopes 30 to 60 percent and valley widths less than 100 feet Substrate is sand and cobbles; embeddedness is greater than 35 percent This is the most diverse segment of the creek, with the broad multi-levelled terrace in the "Rat Hole" area, the large dark mudstone landslide ravelling directly into the channel across from the terrace (visible in 1940 photos), and the "fish ladder" cascade.

Tributaries to Shasta Costa Creek tend to be steep, with flatter gradients on topographic benches. Channels are characteristically well-defined on the steeper segments, even if flow is ephemeral, and may be poorly defined or nonexistent in flatter areas.

Massive sandstone in Tertiary sediments and Dothan rock types provides structure in the form of boulders and bedrock in many stream channels in the watershed Additional structure is provided by large wood

As with many streams in the area from Elk River to the Chetco River whose headwaters are within coastal mountains, the flood event of 1955 had the greatest effect of any natural event within the period of photo record. On the 1940 photos, both the Shasta Costa mainstem and tributaries are shown to be stable and well-vegetated. There are few inner gorge landslides. Riparian vegetation varies from large conifers to small brush species. At that time there had probably not been a major flood event in decades. Beginning with the 1957 photos, numerous inner gorge slides appear, with widened riparian openings along most of the mainstem and many tributaries. This is prior to road construction and harvest within the Shasta Costa watershed. One section of channel in the lower critical reach was surveyed with an analytical stereoplotter, comparing cross-sections in 1940 photos to 1986 photos. The channel width increased 30 to 40 feet, and became shallower, primarily from the 1955 flood (Shasta Costa FEIS, p. III-43, and Process Records) (Lower critical reach cross sections are displayed in Shasta Costa Creek Channel Changes, **Figure 8**). Subsequent storm events in 1964, 1972, and 1983 caused additional small inner gorge slides along banks destabilized in 1955 The 1973 infrared photos are particularly clear, and show the fresh bank slides and devegetated channels from the winter before. Most of these areas are revegetated with hardwoods on the 1986 photos.

Harvest and road construction began in 1962, and most of the present road system was in place by 1969. At that time standards for road construction and harvest did not adequately protect resources. Roads and harvest activities added to the destabilizing effect of storms. Increased sediment delivery aggraded flatter stream segments. Increased peak flows incised channels and scoured banks of steeper stream segments, further increasing the sediment load. Harvest of riparian vegetation destabilized stream banks in some locations. Channel condition mapping of both mainstem and tributaries, from aerial photos and field surveys in 1989, shows a close correlation between poor channel condition and proximity to roads and managed stands. This is especially noticeable in WAAs 2, 3, 9, 10, and 17 (see Stream Condition Map, **Figure 9** and Harvest, Road Density, and Channel Condition, **Table 3**). Although some of the WAAs with low levels of harvest and roading have high percentages of fair to poor channel condition streams, all of the WAAs with high levels of harvest and roading have high percentages of fair to poor channel condition streams

In the upper watershed, scour and deposition of a one-mile section of Shasta Costa Creek near the headwaters can be directly linked to timber harvest in 1962. Riparian areas were not sufficiently protected and areas that could deliver sediment to streams received inappropriate silvicultural treatment. Adjacent portions of the upper mainstem, upstream of the tributary draining the east slopes of Brandy Peak, are severely aggraded and still flow subsurface in summer.

The depositional channel segment of the lower mainstem, 6 miles long, with 2 critical reaches, has a complex interaction of processes. It received large volumes of coarse and fine sediments from natural sources following the 1955 flood and from the two large lower watershed landslides. Added to this, tributaries flowing into this lowest segment had high levels of harvest and roading (see **Table 3**, WAAs 1-3, 14-18), and some are known to have transported increased sediment from gullies and surface erosion. Macroinvertebrate sampling in Critical Reach 1 has found a high percentage of taxa tolerant of fine sediments, usually an indicator that fine sediments are present. Stream surveyors found embeddedness greater than 35 percent throughout this segment.

This mainstem segment also receives high streamflow volumes during peak flow events, as flashy tributaries rapidly transport rainfall and/or snowmelt. Neither of the large landslides in the lower watershed has left traceable deposits in the channel, nor have most tributaries known to have carried sediments from natural or human events left deposits at their mouths. Much of the material delivered to this low gradient reach may be transported through to the Rogue River. Sediment deposits near the mouth of Shasta Costa Creek are observed to move and be reshaped by near-annual events.

The relative contributions of ongoing sediment delivery and earlier material working its way through the system are unknown; as are the relative contributions of natural processes and human alterations The deposits, the fine-sediment tolerant macroinvertebrates, and the embeddedness, combined with visible bed mobility, indicate that this depositional segment continues to receive fine and coarse sediment. The photo record suggests the dominance of natural processes (floods and landslides), with added contributions from harvest and roads

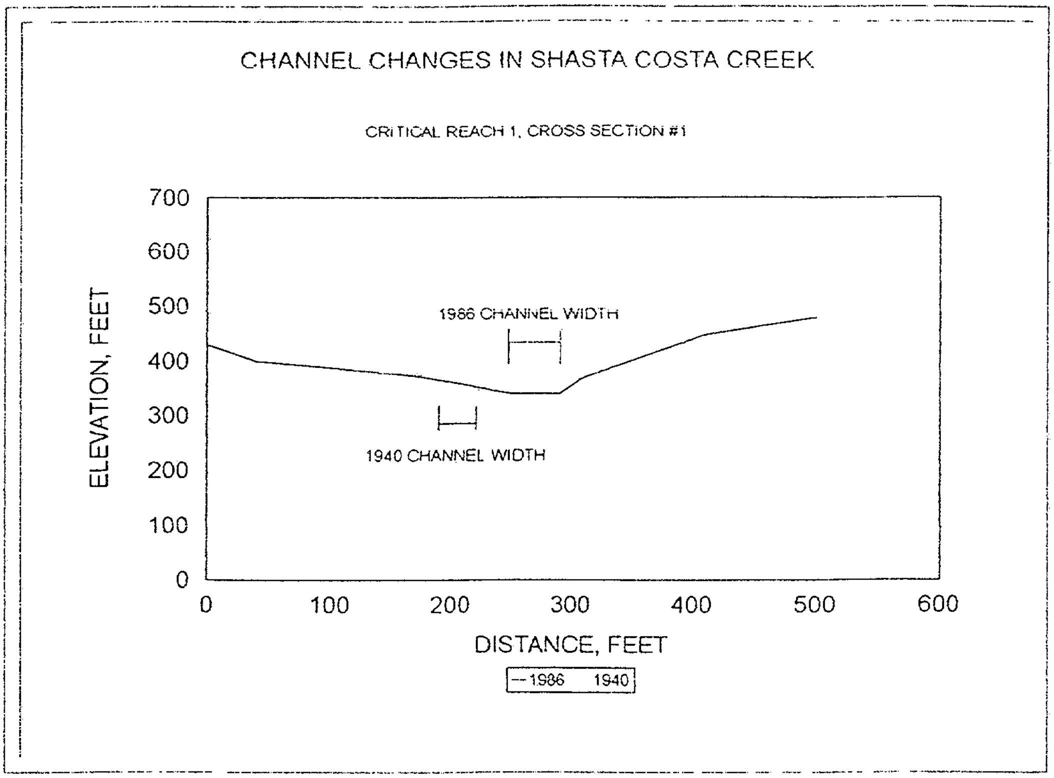
Channels seen from roads or while conducting fish and wildlife surveys appear stable at this time, with little change since 1989 except for vegetation growth. The tributary in WAA 2 that carried material from the Shasta Costa slide in 1986 was described as having poor channel condition in the 1989 survey. The portion of it within 300 feet of the Bear Camp Road appears well-vegetated in 1996, with little evidence of recent scour or deposition.

Information Needs: Field survey stream channels to determine present condition

Management Opportunities: Evaluate roads for decommissioning to correct flow alterations. Evaluate plantations for vegetation treatment needs which would promote hydrologic recovery. Priority areas for treatment are in WAA's 2, 3, 9, 10 and 17 where stream channels are most affected by human activities.

In Critical Reach 1, evaluate the feasibility of restoring the aggraded segment adjacent to the "Rat Hole" terrace to a narrower, deeper channel

Figure 8


CHANNEL CHANGES IN SHASTA COSTA CREEK
CRITICAL REACH 1, CROSS SECTION #1
ELEVATION, FEET
700
600
500
400
300
200
100
0
1986 CHANNEL WIDTH
1940 CHANNEL WIDTH
0
100
200
300
400
500
600
DISTANCE, FEET
1986
1940

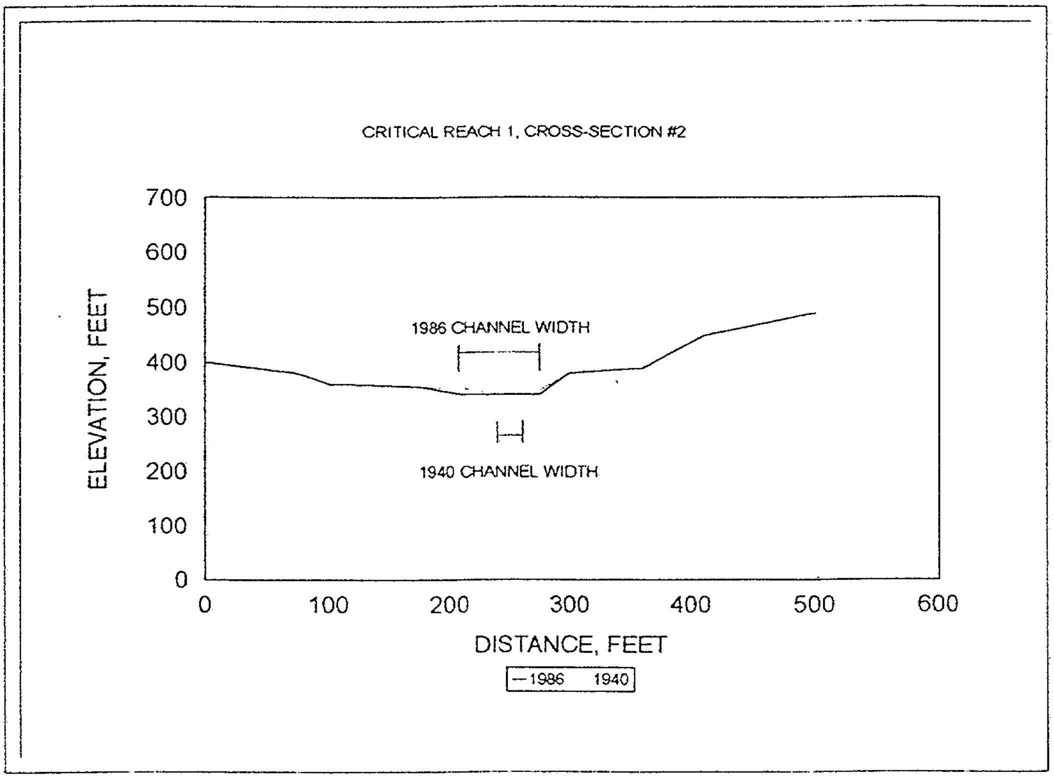
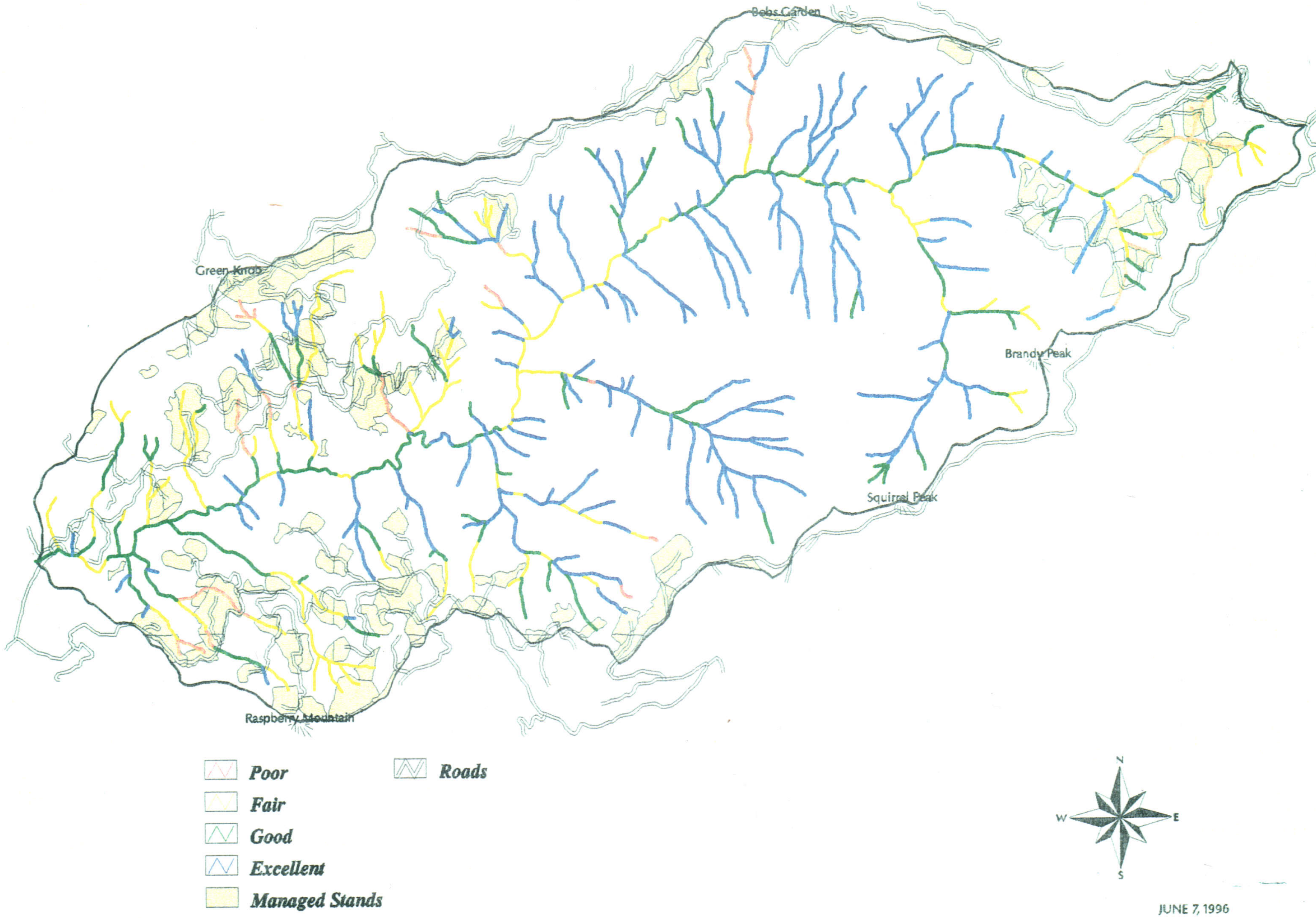

CRITICAL REACH 1, CROSS-SECTION #2
ELEVATION, FEET
700
600
500
400
300
200
100
0
1986 CHANNEL WIDTH
1940 CHANNEL WIDTH
0
100
200
300
400
500
600
DISTANCE, FEET
1986
1940

Figure 9

SHASTA COSTA WATERSHED
STREAM CONDITION



What beneficial uses dependent on aquatic resources occur in the watershed, and what parameters relate to them?

The primary beneficial use is the anadromous fishery. There are no water withdrawal rights on Shasta Costa Creek, and recreation use is minimal. The critical parameter is stream temperature, with some concern for turbidity.

Turbidity

Shasta Costa Creek, like most streams in the area, has little turbidity except during winter storm events The stream does not seem to have greater or longer lasting turbidity than other streams, even though the mudstones in the lower watershed break down readily into fine particles that cause turbidity. An example of a natural event that caused noticeable turbidity is the Shasta Costa Slide of February 22, 1986. This delivered sediment to the creek, which released a plume to the Rogue River that was visible above the background turbidity in the river and extended below the Illinois River confluence. Subsequent storms continued to deliver sediment plumes from Shasta Costa Creek to the Rogue River through September, 1986.

The gullies below the Bear Camp Road culverts are examples of human activities that increased turbidity during periods of rapid erosion Road cutbank failures have also been observed to increase turbidity in small tributaries during storms.

Temperature

Stream temperatures near the mouth of Shasta Costa Creek are warmer than optimum for salmonids. Thermographs placed near the mouth beginning in 1989 have recorded the following 7-day average maximum temperatures in degrees Fahrenheit (F)

Table 4. Stream Temperature

Year	7-day Maximum (Degrees F)	Dates of Maximum Temperature
1989	75 6	September 1 to September 7
1990	74.7	August 7 to August 13
1991	71 1	July 27 to August 2
1992	72 5	August 2 to August 18
1993	67 9	August 1 to August 7
1994	70 5	July 15 to July 21
1995	69 4	July 31 to August 6

In general, the higher maximum temperatures correspond to years with lower stream flow

Temperature modelling with the computer program SHADOW estimated that maximum temperatures were 1 5 degrees lower in 1940 than in 1989. Factors that would have contributed to this increase are storm events that caused landslides, bank scour, removal of riparian shade vegetation, and wider, shallower channels Removal of riparian shade vegetation on harvested tributaries and increased sediment delivery from roads and harvest units also increased temperatures.

Streamside vegetation has since grown back along harvested tributaries, and it is estimated that temperatures in these streams have returned to pre-harvest levels. The heating effect caused by channel widening through aggradation in the upper reaches of the mainstem may be offset by the shading effect of subsurface flow The primary heating at the present time occurs in the lower reaches that were widened by the 1955 storm Thermographs placed above and below the cross-sectioned stream segment in 1991 found a 1 1 degree increase in peak temperature through that portion of the aggraded section.

GIS data shows that although less than 10 percent of riparian reserve acres have been harvested, more than 50 percent is in early successional stages. Hardwoods and brush species provide dense shade to small streams, but are too short to shade wider portions of the mainstem

Management Opportunities: Evaluate the feasibility of planting conifers and bigleaf maple for shade along the south side of Critical Reach 1. Evaluate the feasibility of restoring the aggraded segment of Critical Reach 1 adjacent to the "Rat Hole" terrace to a narrower, deeper channel. Monitor stream temperature in more locations to more closely determine temperature gradient.

What is the physical and biotic character of fish habitat in the watershed?

In answering this question emphasis will be placed on the three basic elements of anadromous salmonid habitat as outlined in the Siskiyou Land and Resource Management Plan (LRMP) migration habitat rearing habitat and spawning habitat.

Migration Habitat

The Siskiyou LRMP states that salmonid aquatic habitat will provide for upstream and downstream migration for both juvenile and adult salmonids. Management prescriptions in the LRMP state that the Forest Service should improve or develop fish passage at culverts, natural falls, velocity barriers, etc where the desirability has been determined in cooperation with Oregon Department of Fish and Wildlife (ODFW) ODFW's current policy on passage is to not introduce anadromous fish where they have not historically occurred

There are no barriers caused by culverts in the watershed. A natural barrier in the form of a bedrock waterfall did exist at approximately River Mile (RM) 1 5. This was identified in 1935 when Fred Ziesenhenne (Junior Biologist) conducted a survey to determine if any stream improvement opportunities existed on the Siskiyou National Forest. In a letter to Forest Supervisor Glen E. Mitchell dated September 27, 1935, Fred Ziesenhenne submitted a report on his field work on the Agness Ranger District. He reported that "Shasta Costa has 2 falls on it that are barriers to fish migration The lower falls, located 2 miles upstream, could easily be shot out In high water the fish are able to clear the falls. Shasta Costa Creek upper falls, about 4 miles upstream is a rather large undertaking. To plant trout above the falls would be easier than blowing out the falls."

In 1978 a "fish ladder" was built on the waterfall at mile 1.5 to facilitate passage for steelhead and salmon This ladder proved ineffective, and collapsed in 1984 In 1985 the ladder was "re-built" by blasting away most of the bedrock with dynamite

Salmon and steelhead are now able to negotiate the waterfall This access provided an additional 1 5 miles of salmon habitat. Salmon migration is blocked by a large cascade with a log jam at the upstream end of the reach Winter steelhead are able to negotiate the cascade and log jam and can access an additional 5 miles of habitat. At that point there is a waterfall that appears to be a barrier to steelhead due to the approach and velocity of streamflow. Above this point it is believed that only resident fish exist.

The removal of the fish blockage at River Mile (RM) 1.5 had unknown effects on resident trout populations The effects were most likely negative since anadromous fish can out compete residents due to their larger size, and there is the possibility that hybridization could occur between steelhead and resident trout

Rearing Habitat

This section will discuss what is known about the following rearing habitat elements in Shasta Costa Creek water temperatures, pool depths, overhead and instream cover, instream woody debris, and low gradient habitats (e.g side channels, glides and overwintering areas)

Water Temperatures

Stream temperatures have been monitored in Shasta Costa Creek since 1989. The 7-day average high temperatures recorded near the mouth ranged from 67.9 to 75.6 degrees Fahrenheit (F) (see Table 4). Stream temperatures that range from 45 degrees F to 59 degrees F are considered "optimum" for salmonids (Siskiyou LRMP FEIS). Temperatures that range from 59 degrees F to 69 degrees F are considered "less than optimum" From 69 degrees F to 75 degrees F it is believed that growth ceases, and when temperatures get above 75 degrees F mortality could occur. With that as a reference, stream temperatures can be defined as well above optimum and may be a limiting factor during certain portions of the summer to salmonid survival.

Reeves et al. (1987) showed that stream temperature affected competition between redside shiners and juvenile steelhead. At warmer temperatures (66.2 degrees F to 71.6 degrees F) redside shiners had the competitive advantage over juvenile steelhead for habitat and prey. Steelhead and redside shiners are sympatric in the first Critical Reach of Shasta Costa Creek (See Critical Reach Map, **Figure 10**). The temperature data that have been collected shows summer redside shiners have a competitive advantage over juvenile steelhead during peak temperature periods.

These elevated stream temperatures are also a limiting factor for macroinvertebrates in the stream. Samples collected and analyzed in 1994 showed that cool/cold water taxa richness was very low, and warm water indicators were present. Samples were collected in three types of habitat (riffle, margin, and in Coarse Particulate Organic Matter - CPOM) in the first critical reach. All three metric scores for the different habitats fell into a range that indicates "low habitat/biotic integrity".

In 1993, the Oregon Department of Environmental Quality (DEQ) collected macroinvertebrate samples in the first critical reach of Shasta Costa Creek. Their results showed that the Total Biotic Condition scores were low and in the "impaired" category for both the pools and riffle samples. Their findings show that fine sediment and temperature may be impacting this site based on the number of sediment-tolerant taxa and the lack of cool water taxa present in the samples The percent of sediment tolerant taxa was "moderate to high" for the first critical reach When DEQ compared their 1993 data with the data collected in 1994, they found that the results were consistent. This consistency suggests that Shasta Costa Creek, at least at this site, is experiencing conditions that are impairing the invertebrate community.

Pool Depths

During summer flows, pool depth in medium and small forest streams becomes critical and is considered an important limiting factor for 1+ age class steelhead, juvenile coho, and resident trout. The Siskiyou LRMP FEIS has identified the need for pool depths of 3 feet minimum for low-flow survival of juvenile steelhead and coho to the smolt stage The Hankin and Reeves Riparian Inventory uses 3 feet as the minimum pool depth at which "depth" can be considered a form of fish cover.

All reaches identified during Hankin and Reeves Riparian Inventories had an average residual pool depth of greater than 3 feet (residual pool depth is the absolute minimum depth a pool would have). In the two reaches with the lowest gradients (critical reaches) the average residual pool depths were 3.8 and 4.0 feet. Pool depths in Shasta Costa Creek are good throughout the stream system and do not appear to be limiting salmonid survival

Overhead and Instream Cover

Overall, cover for salmonids is excellent in Shasta Costa Creek The majority of large wood that provides cover in the first reach was placed there by humans. These structures provide cover for rearing juveniles and for spawning adults. The habitat above the first reach is in a near pristine or natural condition with excellent cover for adult and juvenile salmonids in the form of pool depths, large wood, turbulence and substrate.

Low Gradient Habitats

Low gradient habitats are important for summer and winter rearing, and spawning salmonids. These low gradient habitats are also susceptible to sedimentation and solar temperature influences.

Two "Critical Reaches" (low gradient reaches) have been identified during Hankin and Reeves Riparian Inventories (see Critical Reach Map, **Figure 10**)

Critical Reach 1 is inhabited by fall chinook, coho, winter steelhead, migratory cutthroat, resident trout, redside shiners, sculpins and sticklebacks. This first reach is an important area for juvenile salmon rearing, and adult salmon spawning. This reach was widened approximately 30 to 40 feet and made shallower by sediment deposition during the 1955 flood

Critical Reach 2 is inhabited by winter steelhead and resident trout. Winter steelhead are a relative newcomer to this area since the blasting of the waterfall at RM 1.5. This reach has excellent rearing and spawning habitat for salmonids.

Spawning Habitat

Qualitatively it can be said that spawning habitat in the Shasta Costa watershed is good. The first reach is important to salmon and does show signs of aggradation. However, spawning surveys show that the upper portions of Reach 1 have relatively high spawning densities. Large wood placed in Reach 1 by humans is providing cover for spawning adults

What is the relative abundance and distribution of anadromous salmonids?

Fish Populations

Shasta Costa Creek provides habitat for a variety of species from the Family Salmonidae and other families of fish. These include·

- fall chinook salmon and coho salmon
- winter steelhead
- coastal cutthroat trout (both migratory and resident)
- other fish that occur in the watershed include: sticklebacks (Family Gasterosteidae), sculpins (Family Cottidae), and redside shiners (Family Cyprinidae).

Fish Distribution

There are approximately 10.5 miles of known fish habitat in the watershed. The following table shows miles of known habitat for fish species in Shasta Costa Creek (see Fish Distribution Map, **Figure 11**).

Table 5. Miles of Fish Distribution

Fish Species	Miles of Fish Distribution
Threespine stickleback and Redside shiner	1 43 miles
Coho salmon, Fall chinook salmon, Migratory Coastal cutthroat, and Sculpins	3 29 miles
Winter steelhead	9 21 miles
Resident Rainbow and Resident Coastal cutthroat	10 59 miles

Population Status and Trends

The following is a summary of population status and trends for anadromous salmonids that inhabit the Rogue River system. Summer steelhead are not listed below because they do not inhabit Shasta Costa Creek

Population Status Two species are currently proposed for Federal listing on the Threatened and Endangered Species List. They are Klamath Mountain Province steelhead, and coho salmon.

Table 6. Population Status

Species	Rating
Fall chinook	High Risk of Extinction (Lower Rogue)* Depressed (Lower Rogue)**
Coho	High Risk of Extinction (Rogue Basin)* Depressed (Lower Rogue)**
Winter steelhead	no rating* Healthy (Rogue Basin)**
Coastal cutthroat	Moderate Risk of Extinction (Coastal Tributaries)* Lack of inventory data precludes quantitative assessment of the status However, it is believed that by 1980 populations may have already been much lower than historic levels due to habitat loss **

*Nehlsen et. al. (1991)
ODFW

**Nickelson et. al. (1992)
American Fisheries Society

Population Trends: There are no "historic surveys" available for Shasta Costa Creek Those surveys done in the recent past were primarily to locate migration blockages and determine if passage could be achieved.

On July 31, 1974, Oregon Department of Fish and Wildlife (ODFW) conducted a stream survey in Shasta Costa Creek from the mouth upstream 5.5 miles They observed chinook and steelhead below the falls at River Mile (RM) 1.5 and numerous resident trout above the falls up to RM 5.5. ODFW described the surveyed area as having diverse habitat conditions.

There is very little historic information available for fish populations in Shasta Costa Creek. Consistent and repeatable spawning surveys have been conducted since 1986 The survey period is from November 1 to January 31. **Table 7** shows the highest one day peak count for fall chinook in Shasta Costa Creek

Table 7. Highest One-day Peak Counts for Fall Chinook

Year	*Adults*	*Jacks*
1986	51	8
1987	81	7
1988	41	2
1989	17	3
1990	4	1
1991	8	1
1992	25	4
1993	7	0
1994	9	1
1995	5	2

Fish stocking has occurred in Shasta Costa Creek According to ODFW coho were planted in the early 1980's Documentation of plants before 1984 is not available. After 1984, fry plants of chinook and steelhead occurred in the following years:

- fall chinook 17,000 in 1984 and 18,391 in 1986
- winter steelhead: 20,000 in 1984. 47,000 in 1985; 39,480 in 1987; and an unknown number in 1989

Local ODFW biologists consider the fish populations in Shasta Costa Creek a "wild stock"

Fall Chinook

Chinook salmon in Oregon coastal streams from the Rogue River south are considered southward migrating in the marine environment. Studies by ODFW show that north-migrating chinook stocks are generally healthy, and south-migrating stocks are generally not.

During the last 10 years, many south-migrating populations increased from very low levels to very high levels in 1985-88 and have declined again to very low levels in 1991-92. For example, the run of spring and fall chinook salmon entering the Rogue River basin was about 30 thousand fish in 1983, increased to about 200 thousand fish in 1988, and declined to about 30 thousand fish in 1992

Coho

Abundance of wild coho salmon spawners in Oregon Coastal streams declined during the period from about 1965 to 1975 and has fluctuated at low levels since that time. Little information is available on populations of coho salmon in Curry County although it is thought they were probably never very large. Current information suggests wild coho populations in the Rogue Basin are at 10 percent of historic levels.

Winter steelhead

Steelhead populations vary in abundance from year to year for many reasons Catch of all winter steelhead (hatchery and wild) in the Rogue was below average in 9 out of the last 10 years, 4 out of the last 5, and 2 out of the last 3

Coastal Cutthroat

There are no consistent indicators of trends in abundance for most populations of sea-run cutthroat trout. However, anecdotal information, creel surveys, and fish counts at dams have raised concerns that sea-run populations in Oregon may be experiencing widespread decline

Information Needs: Determine the temperature gradient along the mainstem by monitoring stream temperatures with thermographs, and with macroinvertebrate sampling

Along warmer segments of the mainstem, monitor stream temperatures of major tributaries to determine which ones would be important to improve shade quality.

Management Opportunities: Temperature reduction for the lower mainstem is important for both macroinvertebrates and salmonid fishes Treatments could include planting big leaf maple and conifers. Riparian areas in managed stands should also be reviewed to determine if any planting or precommercial thinning will benefit mainstem temperatures

Protect the critical reaches as important habitat for at-risk salmonids

Evaluate road decommissioning above critical reaches.

Shasta Costa is an important Key Watershed for the recovery of at-risk fish stocks. It provides important habitat for these salmonids. Key Watersheds have an increased importance at a regional scale given the large number of at-risk coastal salmonid species and stocks.

Figure 10

SHASTA COSTA WATERSHED
CRITICAL REACHES

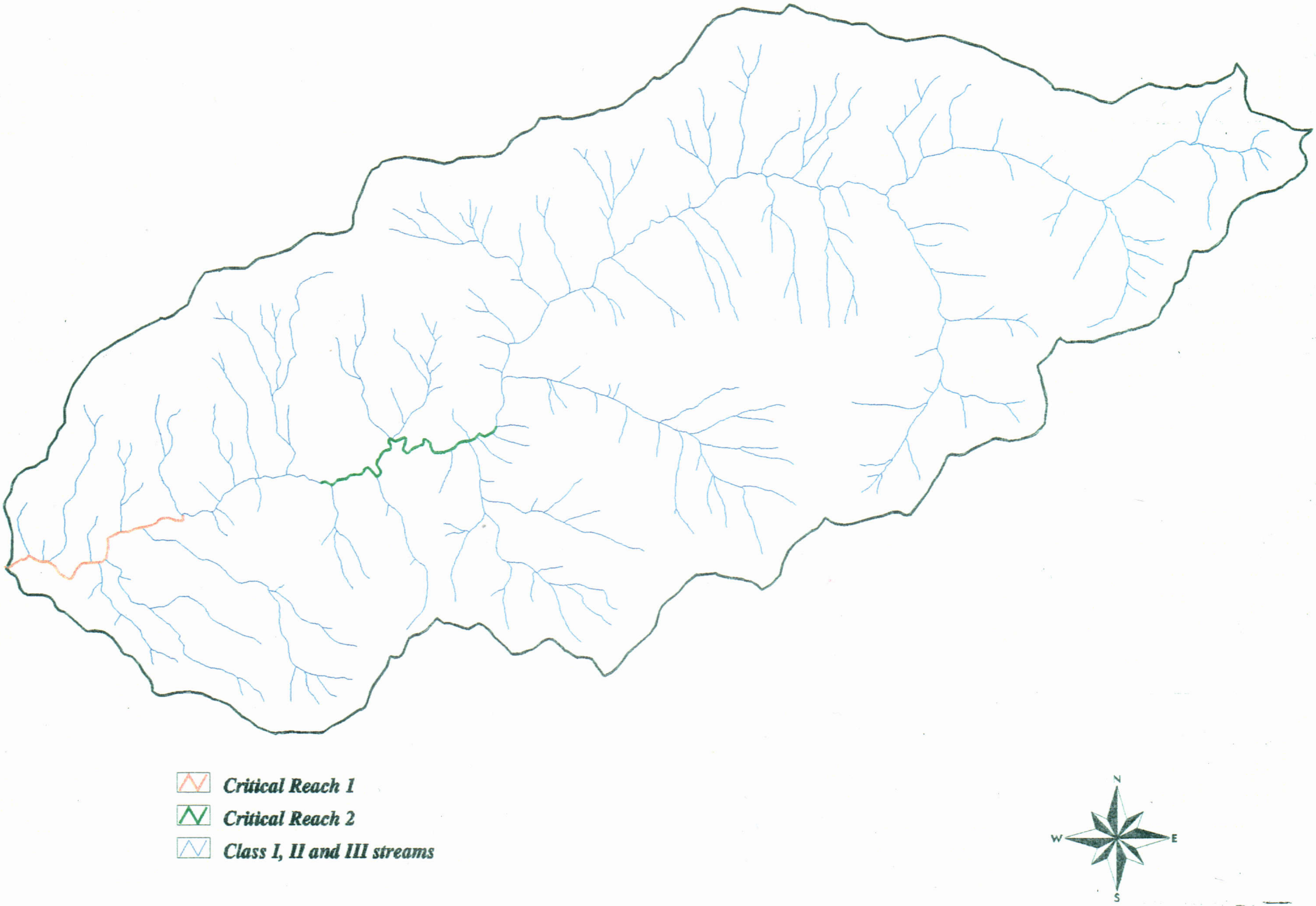


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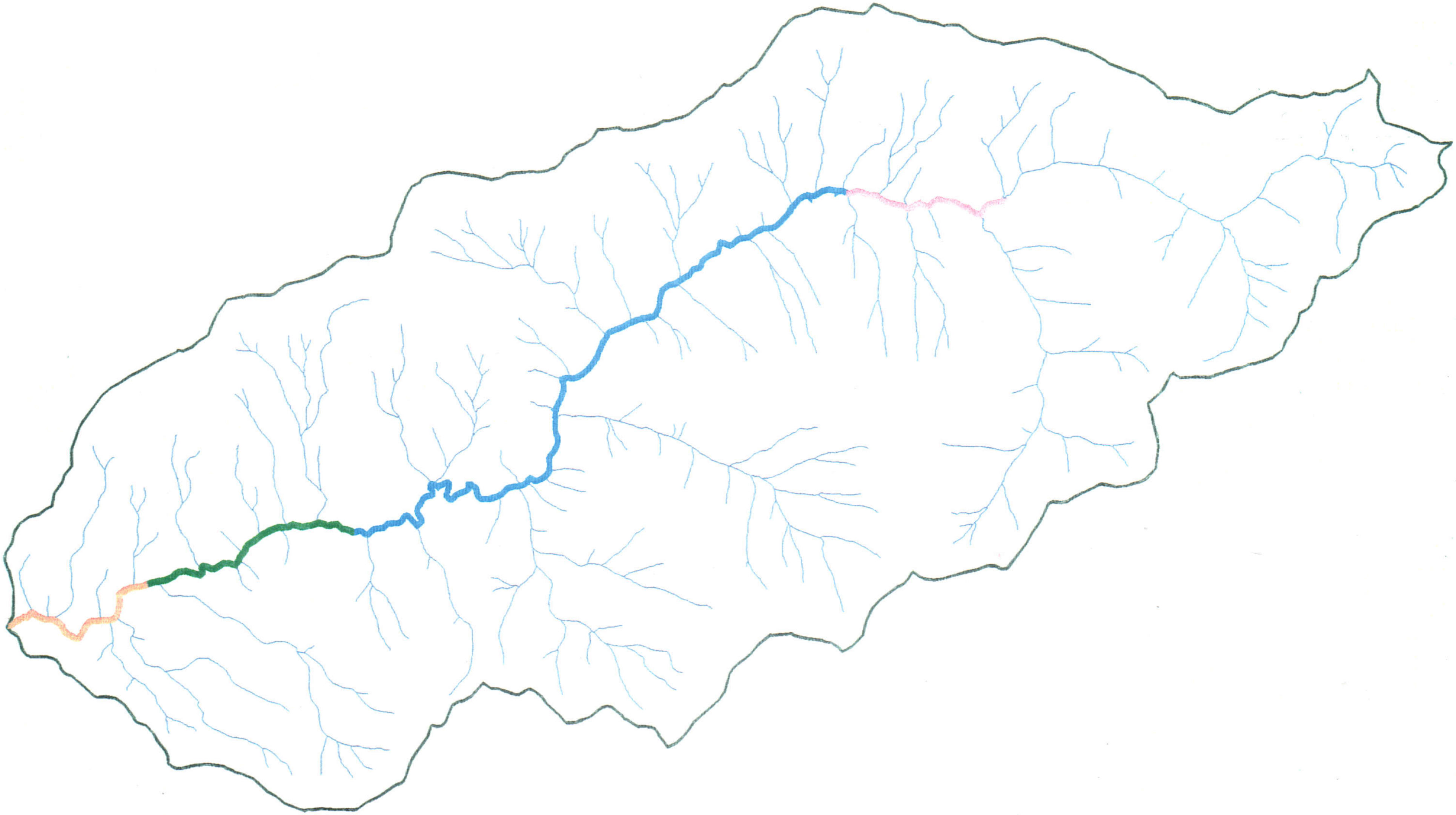
Figure 11

SHASTA COSTA WATERSHED FISH DISTRIBUTION



- ***Coho, Fall chinook, Searun cutthroat, Resident cutthroat, Winter steelhead, Resident rainbow, Redside shiner, Sculpin, Threespine stickleback***
- ***Coho, Fall chinook, Searun cutthroat, Resident cutthroat, Winter steelhead, Resident rainbow, Sculpin*** [illegible]
- ***Resident cutthroat, Winter steelhead, Resident rainbow***
- ***Resident cutthroat, Resident rainbow***

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RIPARIAN ECOSYSTEM NARRATIVE

What are the riparian processes in the watershed?

NUTRIENT ENERGY SOURCES

One important process that all Riparian Reserves share is "energy flow". There are two sources of energy for biological organisms in stream ecosystems: **autochthonous sources** (photosynthesis by aquatic plants in the stream itself), and **allochthonous sources** (decomposition of organic matter imported from outside the stream). The mix of energy sources has a major influence on the structure and function of stream ecosystems (Murphy and Meehan 1991).

Autochthonous sources of energy are affected by stream size, gradient, and exposure to sunlight. Allochthonous sources of energy contribute organic matter to the stream by four main pathways: litterfall from streamside vegetation; groundwater seepage; soil erosion; and fluvial transport from upstream. Organic matter from these sources differs in when and how it enters the stream, how it decays, and where it predominates (Murphy and Meehan 1991)

Most animals require food with a Carbon to Nitrogen ratio (C:N) less than 17:1 (Russell-Hunter 1970). Almost all forms of allochthonous organic matter have higher C:N ratios, so they require microbial processing to enhance food quality. The quality of various forms of organic matter varies widely, as measured by the C:N ratio At the low end of the spectrum are woody debris (1343:1) and conifer needles (97:1); at the high end are periphyton, macrophytes, and fast-decaying deciduous leaves (77 to 23:1) (Murphy and Meehan 1991).

When prescribing silvicultural activities in Riparian Reserves, the nutritional quality of allochthonous material as well as physical factors, must be considered.

STREAM CATEGORIES

Intermittent Streams

An intermittent channel is defined by the Record of Decision (ROD) as "any non-permanent flowing drainage feature having a definable channel and evidence of annual scour or deposition" (ROD pg. B-14 par. 2) This definition includes both "ephemeral" channels and "intermittent" channels These two types of channels are distinguished by flow. ephemeral channels carry only stormflow, while intermittent channels are supplied by groundwater during part of the year (Reid and Ziemer 1994).

The biological importance can be different for ephemeral and intermittent channels and is dependent primarily on the presence of water and distinctive riparian vegetation. The most ephemeral channels may contain water for only a few days of the year and may not support riparian vegetation, so they are unlikely to have much on-site biological significance. Their major biological role is likely to be their influence on downstream channels through their supply of sediment, water, and organic materials, and management of their physical role may be adequate to preserve their biological function. These "most ephemeral channels" are likely to require special biological analysis and modified protection over what is needed for physical factors, only if there are biological considerations such as their use as migration corridors, or the presence of unique wildlife species (Reid and Ziemer 1994).

Intermittent channels in the Shasta Costa Creek watershed are important to fish resources as seasonal sources of water, sediment, allochthonous material, and large wood. Because intermittent channels can form a high proportion of the entire channel system in a watershed, they contribute a lot of nutrients to downstream reaches (Ried and Ziemer 1994). It is therefore important to maintain their allochthonous material input. These small streams are the most easily influenced by forest management activities and any manipulation of the canopy or streambank vegetation will influence the stream's energy supply (Chamberlain et al 1991)

Intermittent channels can also be important to amphibians Most amphibians require water for reproduction, and some need open water throughout the year These streams may be particularly important as nursery areas for amphibians, because these sites support fewer predators than perennial channels (Reid and Ziemer 1994)

Intermittent channels and associated riparian zones provide an important source of food and water for hillslope ecosystems, they can function as travel corridors, and they can provide microclimatic refuge for hillslope animals during times of thermal stress (Reid and Ziemer 1994) The distinctive vegetation and higher moisture content of these sites can modify fire behavior, so their distribution can affect the patchiness of large burns

Perennial and Fish Bearing Streams

Keeping in mind the logic used to discuss "biological significance" for intermittent streams, perennial streams would be more significant biologically than intermittent streams. The ROD stated that "although Riparian Reserve boundaries may be adjusted on permanently-flowing streams, the prescribed widths are considered necessary for attaining Aquatic Conservation Strategy objectives" (ROD pg. B-13). The widths maintained in the ROD were deemed necessary to maintain riparian processes.

The importance of fish bearing streams is discussed under the fisheries, hydrology, and geology sections of this watershed analysis. In general, salmonids are affected by both the physical conditions of their habitat, and the energy flow processes occurring in the watershed.

VEGETATIVE CATEGORIES

Riparian zones in the Shasta Costa Creek watershed can be stratified into three distinct categories based on vegetative characteristics. These are conifer forest, hardwood forest, and meadows/oak savanna. Each category has its own processes for sediment delivery, channel formation, hydrologic regime, susceptibility and response to change, microclimate qualities, flora, fauna, and migration habitat qualities This discussion will focus on riparian areas associated with intermittent and ephemeral streams, where adjustment of Riparian Reserve boundaries are more likely to be considered Potential riparian restoration sites have been identified in the large wood, sediment delivery, and fish habitat discussions.

Conifer Forest Riparian

The most abundant riparian type in the Shasta Costa watershed is the conifer riparian forest. It is generally located on soils with high to moderate productivity, where water supply is not limiting growth and topography tends to exclude frequent or intense fire. Due to its abundance and high value wood production, more land use activities have occurred in this riparian type than in any of the others. Many conifer riparian stands are candidates for restoration

Abundant, tall conifers dominate these riparian areas. Douglas-fir is by far the most common overstory conifer. Pacific yew has scattered distribution while Port-Orford-cedar is limited to specific areas Hardwood species such as bigleaf maple, vine maple, myrtle, and alder often add diversity to conifer riparian areas

The stand canopy is closed in these areas and often multi-layered. Hardwood trees are often an important mid-layer component Conifers, with the exception of cedars, create more acidic soils through litterfall than hardwoods. The evapotranspiration associated with the numerous large trees is high. Air temperatures are cool and diurnal fluctuations are moderated throughout the year. These riparian ecosystems maintain important microclimates.

The stands are generally very stable. Tanoak seldom reaches climax condition due to the time-span required for this succession and the longevity of dominant conifers (200 to 300 years) Fire does not start or carry well in most of these stands Small-scale disturbances from windthrow, land movement, wind or snow damage leads to continual recruitment of conifers In the event of large scale disturbances, these riparian stands are slow to recover to a mature state

Conifer forests often have a higher percentage of perennial streams than other vegetation types. Root strength and often dense undergrowth contribute to generally stable stream banks. However, riparian conifer stands can develop on earthflows, and exhibit features of deep-seated instability. Earthflows can be important sources of structure for stream channels by providing boulders and large wood. Areas disturbed by debris flows and inner gorge landslides are often colonized by alder.

In conifer riparian areas, large wood in the form of limbs and boles is continuously delivered to and incorporated into the channels. Stream temperatures tend to be cool throughout the year Tall trees can shade even moderately wide channels in the summer.

Where coniferous riparian areas are surrounded by similar upland stands, they are important water sources for interior habitat-dependent wildlife. When they are dissimilar to the surrounding upland habitat, they are important uphill-downhill migration corridors for interior species. Stable air temperatures make them valuable thermal refugia in extreme weather for many wildlife species. These riparian stands can be important habitat for spotted owls.

Conifer riparian areas have a moist microclimate that is important to a variety of amphibians. For example, Pacific giant salamanders utilize headwater streams to lay their eggs (Stebbins 1966), and talus habitat in these moist areas can be important for Del Norte salamanders

Hardwood Forest Riparian

Hardwood-forested riparian stands tend to replace conifer-forested riparian stands where water is limiting or where a regime of either frequent low intensity or high intensity fires has disturbed the riparian zone. The economic value of the hardwoods is much lower than conifers, so far less timber harvest has occurred in these riparian areas. As a result, restoration opportunities targeting this riparian type are few.

Hardwood riparian stands are dominated by tanoak trees, with madrone, myrtle, chinquapin, knobcone and sugar pines often present. Often scattered conifers such as Douglas-fir will grow directly out of the stream channel, where there is more water, but they are anomalies.

Although the canopy is closed, the single-storied structure does not have the insulating qualities of the conifer forest. Humidity is much lower and air temperatures vary a great deal with the seasons The microclimate differs little from surrounding upland. Stream temperatures are cool as a result of the closed canopy Fire will start and carry well in these riparian stands These stands have low resistance to change from fire and wind and snow damage, but their closed canopy, single-storied structure is quick to regenerate

Stem density can be very high and subsequent root strength combined with less water leads to generally stable banks. Ground cover is usually low, leading to more surface erosion than conifer riparian stands.

Hardwood riparian stands are generally similar to their upland surroundings. They are valuable watering sites for local wildlife but less important for thermal cover and migration corridors than coniferous riparian stands Their acorn crop makes them important foraging areas for mast-dependent wildlife

Meadow and Oak Savanna Riparian

Meadow and oak savanna riparian areas occur primarily in mudstone in the lower portions of the watershed A reduction in fire frequency over the past century has increased conifer encroachment rates on these dry site meadows. As a result, these sites are candidates for restoration to remove the conifer encroachment.

The majority of meadow riparian areas have open canopies. Some riparian areas in the mudstone geology have dense riparian vegetation, but the majority are dominated by grass and/or hardwood trees. As a result, these types of riparian areas receive high amounts of solar radiation, have high diurnal temperature fluctuations, little microclimate difference from adjacent upslope areas, and a narrow range of influence beyond the active channel Fire will start and carry very rapidly through meadow and oak savanna riparian areas They are dependent upon frequent fire for maintaining their open canopy characteristics

Stream channels tend to be along the margins of the meadows and are either seasonal creeks or perennial seeps or boggy areas Light vegetative-covering makes easily destabilized banks prone to downcutting and headwall erosion. Water temperatures show a strong diurnal fluctuation, similar to air temperatures Many of the streams in these areas are intermittent or ephemeral in nature. On-site diversity of these groups are low, yet may include highly specialized or unique species. Downstream aquatic diversity is increased because of the different types of production occurring at these sites.

Meadows provide a horizontal migration route. Riparian areas on their margins provide important water sites for the meadow-dependent species, but do not function as important migration corridors themselves However, their location along the edge of the forest/meadow ecotone increases the on-site diversity of terrestrial species

TERRESTRIAL ECOSYSTEM NARRATIVE

Vegetative Characterization

The Shasta Costa watershed contains a diverse assortment of plant communities. The plant series in the watershed include. white fir (4,166 acres), Shasta red fir (487 acres), tanoak (487 acres), tanoak/Douglas-fir (10,490 acres), ponderosa pine (197 acres), Douglas-fir (7,158 acres), Douglas-fir/tanoak (295 acres), and western hemlock (154 acres). (See **Figure 12**, Plant Series)

Exposure, soil moisture, elevation, parent material, and different hydrologic regimes combine to produce the following habitats for the plant communities

- rock outcrops, ridges, and screes
- wet meadows, seeps, and bogs
- high elevation coniferous forest
- riparian areas
- dry meadows, grassy areas, and brush fields
- mixed broadleaf/conifer forest

Other habitats that are present, but less common, include dry serpentine, mixed open woodland, and deciduous woodland habitat types.

Rock outcrops, talus, and rocky ridges are present particularly along Bear Camp Ridge. Sensitive plant species that prefer this habitat include Howell's manzanita, snifter moss, Siskiyou daisy, Siskiyou fritillaria, California shield fern, bell-shaped woodland star and Douglas' monkeyflower

Wet meadows, seeps, and bogs are present in limited amounts in the upper reaches of the drainages, particularly below Bear Camp Ridge, in openings of forested areas Sensitive plant species that may be found in this habitat include bensonia, Cascade sedge, and Siskiyou daisy. Siskiyou sedge might also be found here

High elevation coniferous forest consist of white fir and Shasta red fir plant series. Sensitive plant species found in this habitat include bensonia, clustered lady-slipper, Umpqua frasera, and branching montia.

Riparian habitat is present at all but the highest elevations. Sensitive plant species preferring riparian habitat include bensonia, Siskiyou daisy, California globe-mallow, California shield fern, California greenbrier and Tracy's willow

Dry meadows, grassy areas and brush fields are interspersed throughout the area in pockets ranging from one to ten acres. Sensitive plants found in these habitats include Bolander's onion, Howell's manzanita, Bolander's hawkweed, California globe-mallow, Douglas' monkeyflower, Siskiyou monardella, Piper's bluegrass, maple-leaved sidalcea, oak flat sidalcea, and Leach's brodiaea.

The mixed broadleaf/coniferous forest is one of the most common habitat types in Shasta Costa. It is well distributed at all elevations. The tanoak and Douglas-fir plant series are included in this habitat type Sensitive species that may be found in this habitat include Bolander's onion, Howell's manzanita, clustered lady's slipper, branching montia, Leach's brodiaea, and maple-leaved sidalcea.

Dry serpentine is limited to no more than 100 acres in the western half of the watershed Sensitive plant species preferring this habitat include Bolander's onion, Howell's manzanita, Bolander's hawkweed, Del Norte pea, and Piper's bluegrass

Open mixed woodlands in Shasta Costa are transition zones between meadows/rock outcrops and dense forest, particularly in the middle and lower parts of the drainage. Although the species present in the open mixed woodland are similar to those in mixed broadleaf/coniferous forest, the habitats differ in their degree of openness and the concentration of grass and forbs present in the herbaceous layer. Sensitive plant species present in this habitat type that are not present in mixed broadleaf/coniferous forest include Umpqua frasera and California globe-mallow. Pure deciduous woodlands occur only occasionally in the form of groves of well-spaced white and black oaks and over a grass and low shrub layer, usually at meadow edges

The headwaters of Shasta Costa Creek, from the high ridges running southwest from Bear Camp to Brandy Peak, provide a particulary diverse habitat A portion of this area has been designated as the Bear Camp Botanical Area (Management Area 4) in the Siskiyou LRMP. Varied topography and microclimates provide niches for an unusual assortment of plant species. Several sensitive species occur here and on the slopes just below the ridgeline, between elevations of 4,000 and 5,000 feet.

In addition to the sensitive species, there are species that are disjunct populations distanced from their normal ranges. These disjunct species and their usual ranges include tufted saxifrage, located from Lincoln county and the Columbia Gorge northward, with another disjunct population at Marble Mountain, California; Hall's isopyrum from Marion County, the Columbia Gorge and northward; and Alaska yellow cedar of the Cascades and eastern Siskiyou mountains Umpqua fraseri, found near the Bear Camp Lookout site, is a species from the Cascades. Six species of Penstemon can be found here as well as five species of currants. Siskiyou gooseberry is also present nearby at Bear Camp pasture. Four species of stonecrop and at least 13 genera of the lily family occur here. Such large aggregations of these groups are highly unusual

The principal portion of the worldwide distribution of bensonia is found within the watershed. The area as a whole is of particular importance to Leach's brodiaea and Bolander's onion. The majority of the known population of Leach's brodiaea is located in the watershed, and the largest populations of known Bolander's onion sightings in Oregon exist in the Shasta Costa area.

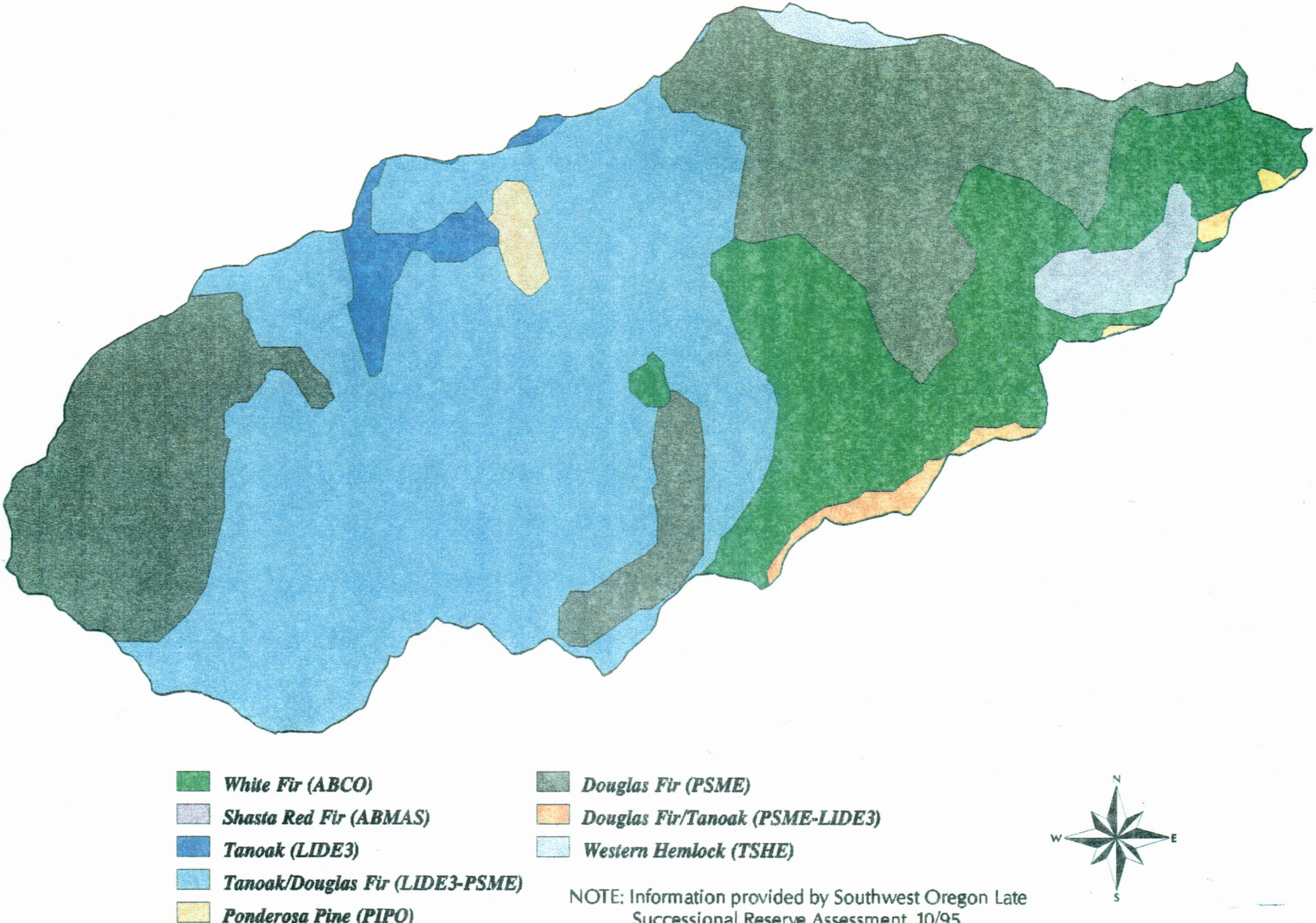
Common and scientific names for the above mentioned plants are found in **Table 8.**

Table 8. Botanical Names

Common Name	Scientific Name	Common Name	Scientific Name
Alaska yellow cedar	*Chamaecyparis nootkatensis*	Kurabayash's trillium	*Trillium kurabayashii*
bell-shaped woodland star	*Lithophragma campanulatum*	Leach's brodiaea	*Triteleia hendersonii var leachiae*
bensonia	*Bensoniella oregona*	maple-leaved sidalcea	*Sidalcea malachroides*
bigleaf maple	*Acer macrophyllum*	oak flat sidalcea	*S setosa ssp querceta*
black oak	*Q. kelloggi*	pine mat manzanita	*Arctostaphylos nevadensis*
Bolander's hawkweed	*Hieracium bolanderi*	Piper's bluegrass	*Poa piperi*
Bolander's onion	*Allium bolanderi*	poison oak	*Rhus diversiloba*
branching montia	*Montia diffusa*	red cedar	*Thuja plicata*
California globe-mallow	*Iliamna latibracteata*	serviceberry	*Amelanchier sp*
California greenbrier	*Smilax californica*	snifter moss	*Encalypta brevicolla ssp crumiana*
California laurel	*Umbellularia californica*	Siskiyou daisy	*Erigeron cervinus*
California shield-fern	*Polystichum californicum*	Siskiyou fritillaria	*Fritillaria glauca*
Cascade sedge	*Carex scabriuscula*	Siskiyou monardella	*Monardella purpurea*
clustered lady's slipper	*Cypripedium fasciculatum*	Siskiyou sedge	*Carex gigas*
Coast fawn lily	*Erythronium revolutum*	sitka alder	*Alnus sinuata*
Currant	*Ribes sp.*	strawberry saxifrage	*Saxifraga fragaroides*
Del Norte pea	*Lathyrus delnorticus*	Tracy's willow	*Salix tracyi*
Douglas' monkeyflower	*Mimulus douglasii*	Umpqua frasera	*Frasera umpquaensis*
Greene's hawkweed	*Hieracium greenei*	Vollmer's lily	*Lilium vollmeri*
Gray's pink	*Silene grayi*	white oak	*Quercus garryana*
Hall's isopyrum	*Isopyrum hallii*	tufted saxifrage	*Saxifraga caespitosa.*
huckleberry oak	*Quercus vaccinifolia*	tufted saxifrage	*S bronchialis*
Howell's manzanita	*Arctostaphylos hispidula*		

Figure 1

SHASTA COSTA WATERSHED
PLANT SERIES



NOTE: Information provided by Southwest Oregon Late Successional Reserve Assessment, 10/95.

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Wildlife Habitat Characterization

The Shasta Costa watershed is part of the larger Fish Hook/Galice Late-Successional Reserve (LSR) The western boundary of the Fish Hook/Galice LSR is the known inland extent for the range of the marbled murrelet on the Siskiyou National Forest. This is 3 1/2 miles from the Shasta Costa watershed.

The late-successional habitat in the watershed provides important nesting habitat for the threatened northern spotted owl. Currently 48 percent of the watershed is late-successional habitat. About 13 percent of late-successional habitat has been harvested since 1960.

Pioneer successional habitat (grass/forb/low shrub) in the watershed is found in recent (less than 15 years old) clearcut areas, meadows, open woodland areas and brushfield areas About 8 percent (3 percent meadow/oak savanna and 5 percent managed stand) of the watershed is currently in the grass/forb/low shrub condition The majority of the existing clearcut areas that are functioning as grass/forb/low shrub habitat will grow out of this condition within the next ten years. The meadow habitat is being encroached by trees

The remainder of the watershed is in early to mid-successional habitat which typically is smaller diameters trees with closed canopy. Approximately 56 percent of the watershed is in this condition.

The special and unique areas in the watershed include meadows, ponds, rock bluffs, wildlife areas, botanical, hardwoods, and dispersed habitat areas. Pond and rock bluff areas in the watershed are maintaining their current sizes. Meadows and wildlife areas are being encroached by conifer trees.

What is the historic and existing late-successional habitat in the watershed?

Historic levels (pre-1850 to 1950) of late-successional forest have fluctuated over time due to climatic changes and human influence (Atzet, et.al. 1993). The Regional Ecosystem Assessment Report (USDA, 1993) estimated historic levels of late-successional habitat between 45 and 75 percent for the Lower Rogue Basin.

It is estimated 61 percent of the Shasta Costa watershed provided late-successional habitat in the 1950's, prior to any timber harvest. About 48 percent of the Shasta Costa watershed is presently in late-successional forest (See Vegetation Map, **Figure 13**). Approximately 33 percent of the Shasta Costa watershed is in old-growth forest and 15 percent is in mature. Of the old-growth, only 36 percent is interior forest habitat or 12 percent of the overall watershed. (Shasta Costa FEIS p. III-27) (See Interior Old-Growth Map, **Figure 14**). The interior old-growth forest habitat is not contiguous, and the largest block is 1,060 acres (See **Table 8**). These levels are currently near the low end of the natural range of variability and are a result of past timber harvest and fire. The larger contiguous stands of late-successional forest remaining in the watershed are ecologically important

Table 9. Distribution of interior old-growth forest blocks within the Shasta Costa watershed.

	Existing	
Block Size in Acres	**Number of Blocks**	**Total Number of Acres**
1-50	59	533
51-100	5	350
101-300	2	299
301-500	0	0
501-700	1	537
701-900	0	0
> 900	1	1,060

Connection between blocks of late-successional forest within and outside the watershed is critical to ecosystem health and stability. Many authors have discussed the significance of corridors which maintain habitat connectivity across the landscape and facilitate wildlife and plant movement from wilderness or between forest patches across managed landscapes (for a sample: Harris 1984; Noss and Harris 1986; Simberloff and Cox 1987; Noss 1987; Lehmkuhl and Ruggiero, in press). Late-successional forest habitat connections at least 1,000 feet wide are necessary to retain the middle 200 feet in a condition not affected by the deleterious "edge effect." Microclimate effects from edge extend "two tree lengths" or approximately 400 feet into the forest interior, which is a guideline for the Pacific Northwest (Harris 1984; Franklin and Forman 1987). The preliminary results of current research (Spies et al 1990) generally support this approximate distance

Thirteen habitat connections located primarily in late-successional habitat have been identified in the Shasta Costa watershed. These areas connect with late-successional habitat in the Rogue River corridor, the Indigo Creek basin, the Stair Creek basin and the Wild Rogue Wilderness. Habitat connections are situated in riparian habitat, as well as along mid-slopes and ridges. Existing habitat connections in the Shasta Costa watershed contain stands in several successional stages. It is not known how significant a barrier early seral stands present to forest interior species, particularly smaller mammals and amphibians.

The National Forest Management Act (36 CFR 219.19) requires the maintenance of viable populations well distributed throughout their current geographic range. Designation of Late-Successional Reserves (ROD, 1994) has been employed to accomplish this distribution. Ninety-two percent of the watershed has been designated Late-Successional Reserve (LSR). Another 7 percent of the watershed will be managed towards a late-successional habitat condition through other land allocations.

Nearly 13 percent (3,014 acres) of the historic late-successional habitat in the Shasta Costa watershed has been harvested since 1960 (See Managed Stand Map, **Figure 15**). The managed stands created by these activities do not provide habitat for species dependent on old growth forests and may limit connection between late successional blocks for some species. Competition of vegetation within managed stands is slowing development of conifers and hardwoods, delaying the the development of late-successional characteristics. (See Late-Successional Habitat Map, **Figure 16**).

Information Needs: Determine which stands need treatment to improve late-successional habitat.

Management Opportunities: Development of late-successional structure can be accelerated through treatment of managed and natural stands. Approximately 3,014 acres in 163 managed stands in the watershed are within the mean home range for the northern spotted owl and wildlife corridors and fragmented core blocks The development of late-successional structure could be accelerated in these stands About 34 percent of these stands could receive precommercial thinning and release treatment.

The highest priority for commercial stand treatment to improve late-successional habitat are those stands that are mid-seral habitat adjacent to existing large late-successional habitat blocks and habitat connections The next priority are those stands that are mid-seral habitat that will contribute to the landscape pattern of future late-successional forest habitat. There are about 362 acres that were identified as candidates for treatment in the Shasta Costa FEIS process (page II-66). Additional surveys, and feasibility need to be completed to determine if other stands could benefit from stand treatments in the future.

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SHASTA COSTA WATERSHED VEGETATION

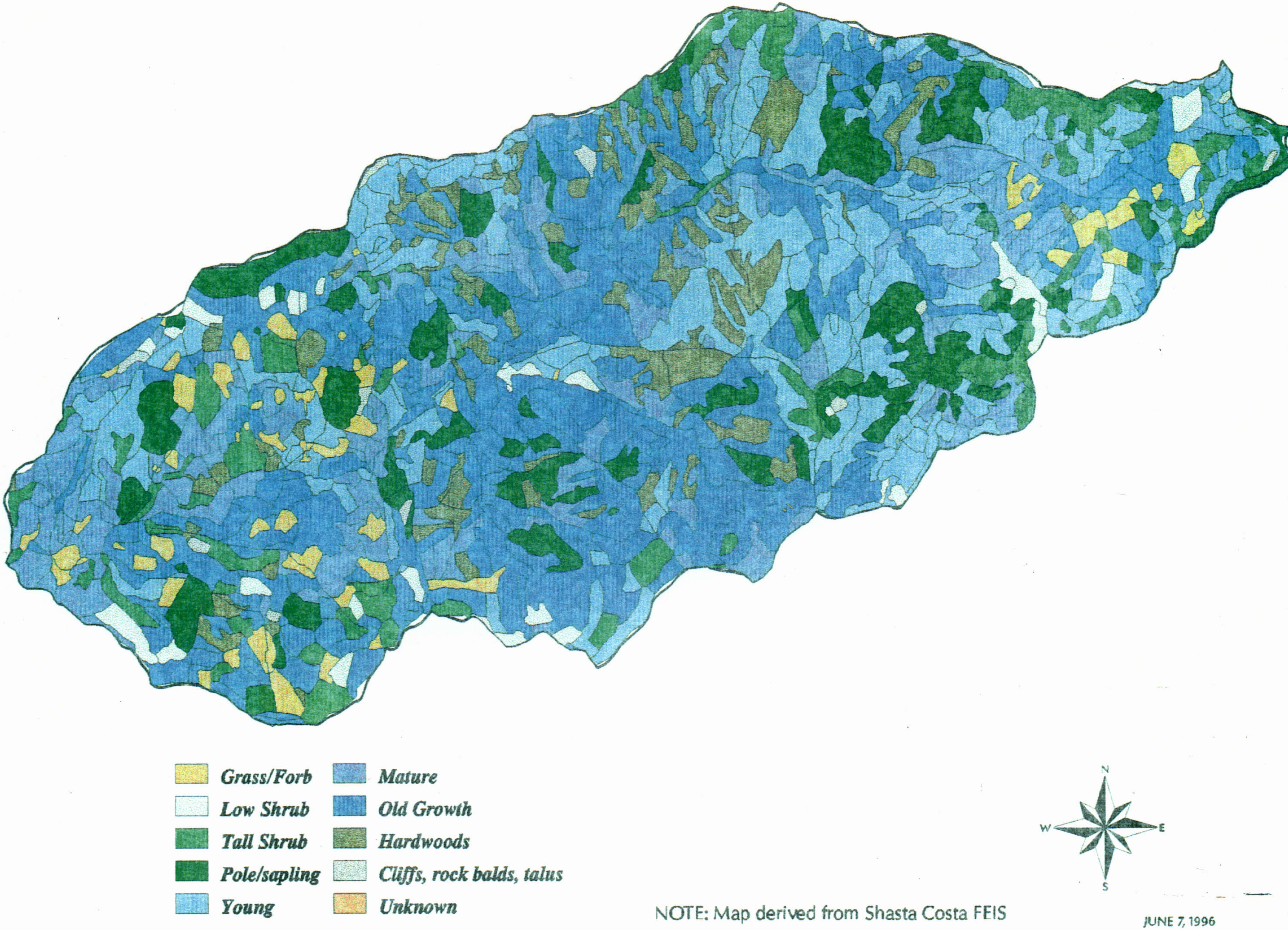
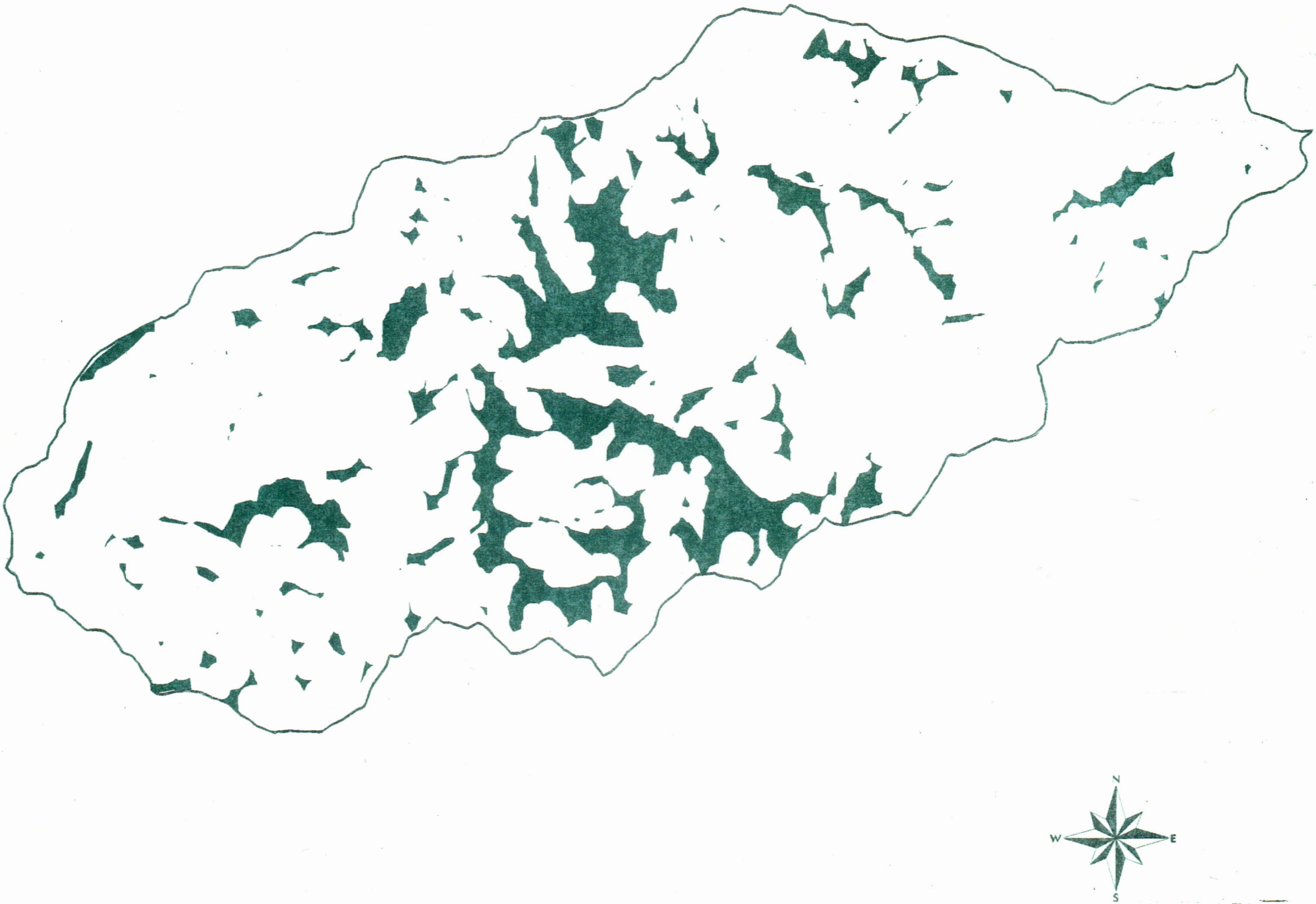


Figure 1

SHASTA COSTA WATERSHED
INTERIOR OLD-GROWTH



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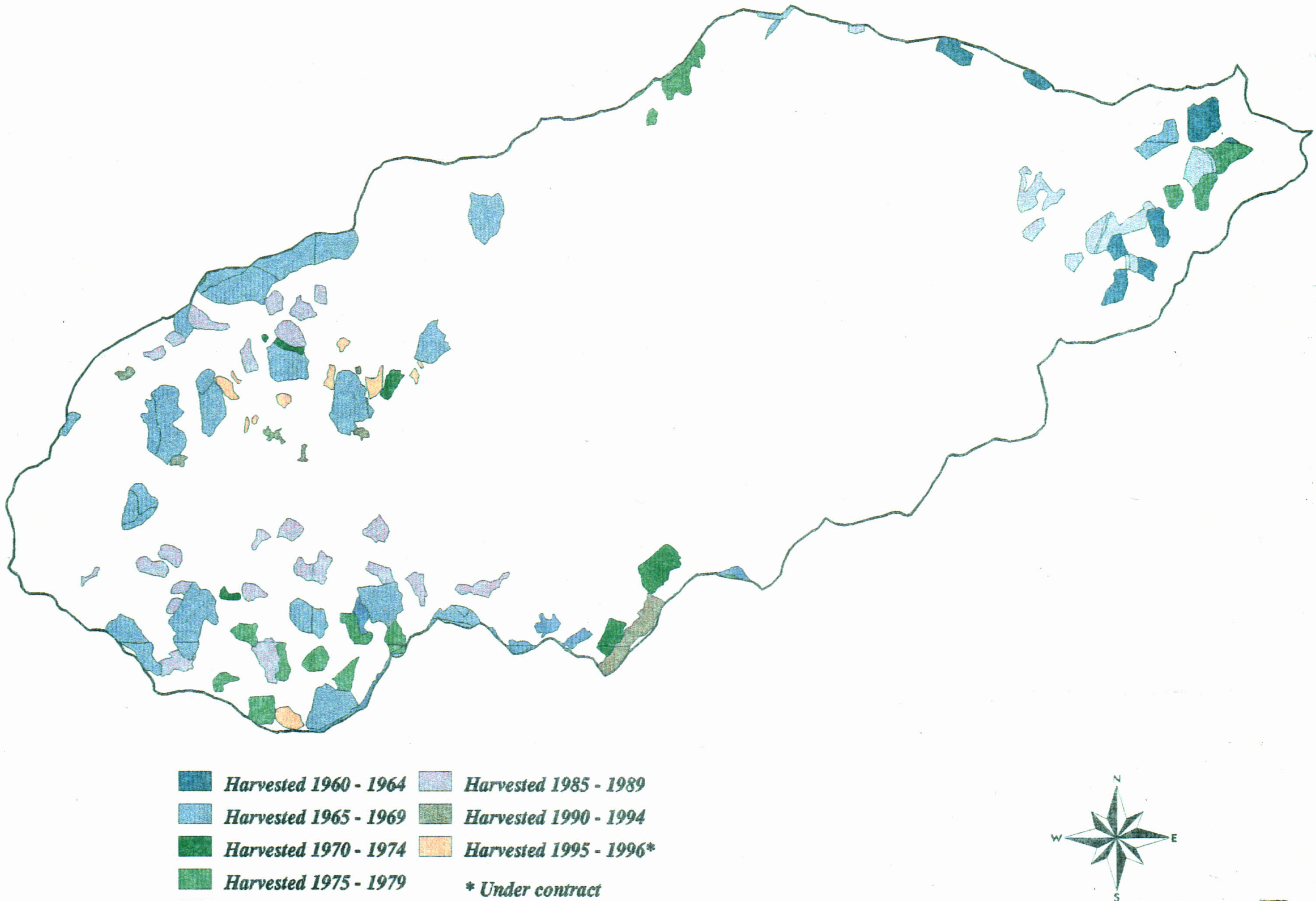
SHASTA COSTA WATERSHED MANAGED STANDS



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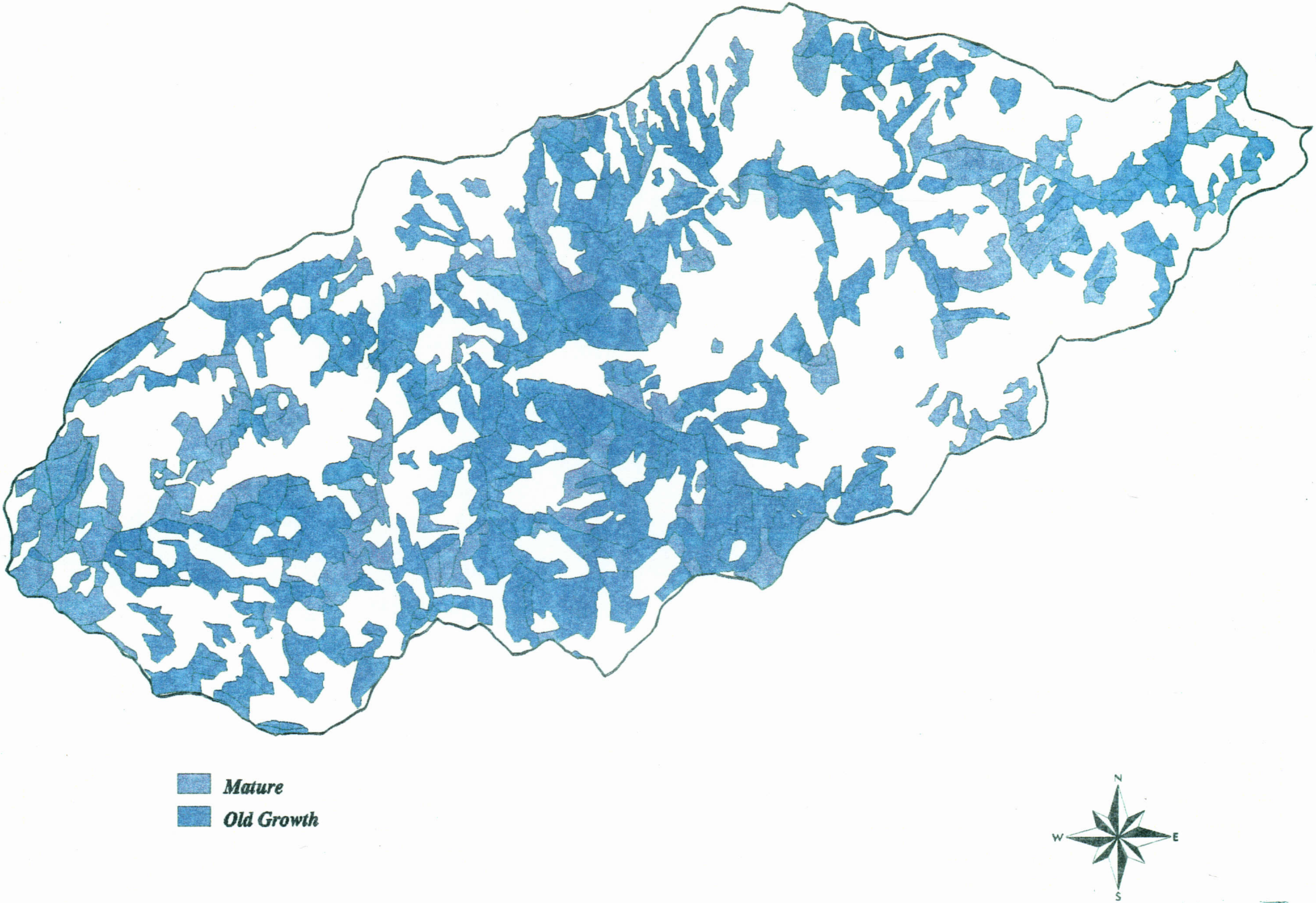
SHASTA COSTA WATERSHED
LATE SUCCESSIONAL HABITAT



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What are the special and unique habitats in the watershed and how are they changing?

During the past ten years a number of important but relatively small Special Wildlife Sites on the Forest have been identified as unique wildlife habitats and small botanical sites (Siskiyou LMRP, page IV-113) (See **Figure 17**, Special Wildlife Sites). A total of 1,624 acres has been designated in the Shasta Costa watershed. This includes 14 meadows totalling 693 acres, 8 rock sites (cliffs, caves, talus) totalling 126 acres, 1 pond totalling 3 acres, 1 hardwood site totalling 26 acres, 2 wildlife areas totalling 249 acres, 1 botanical area totalling 15 acres, and 12 dispersed habitat sites totalling 512 acres. These sites constitute important components of overall wildlife habitat diversity and botanical values within the watershed.

Open meadow areas and open oak savannas are being reduced in size by conifer encroachment. Historically, fires helped in maintaining these meadow and oak savannas in early seral habitat. Since the early 1900's, when fire suppression became effective in the watershed, the grasses, white oak and black oak have become overgrown with conifer tree species.

The Southwest Oregon LSR Assessment (Version 1.0, page 143) identified meadow and oak savanna habitat within the Late-Successional Reserves as important elements in habitat diversity. "Maintenance of these areas ensures this habitat continues to function and provide biological diversity. Though the maintenance of this habitat is contrary to late-successional conditions, the limited area, arrangement, and importance of this habitat-niche does not adversely impact the objectives of the late-successional reserves, and does improve ecosystem resilience by increasing diversity".

Refer to the Vegetative Characterization for information on sensitive plants in the watershed and the Bear Camp Botanical Area.

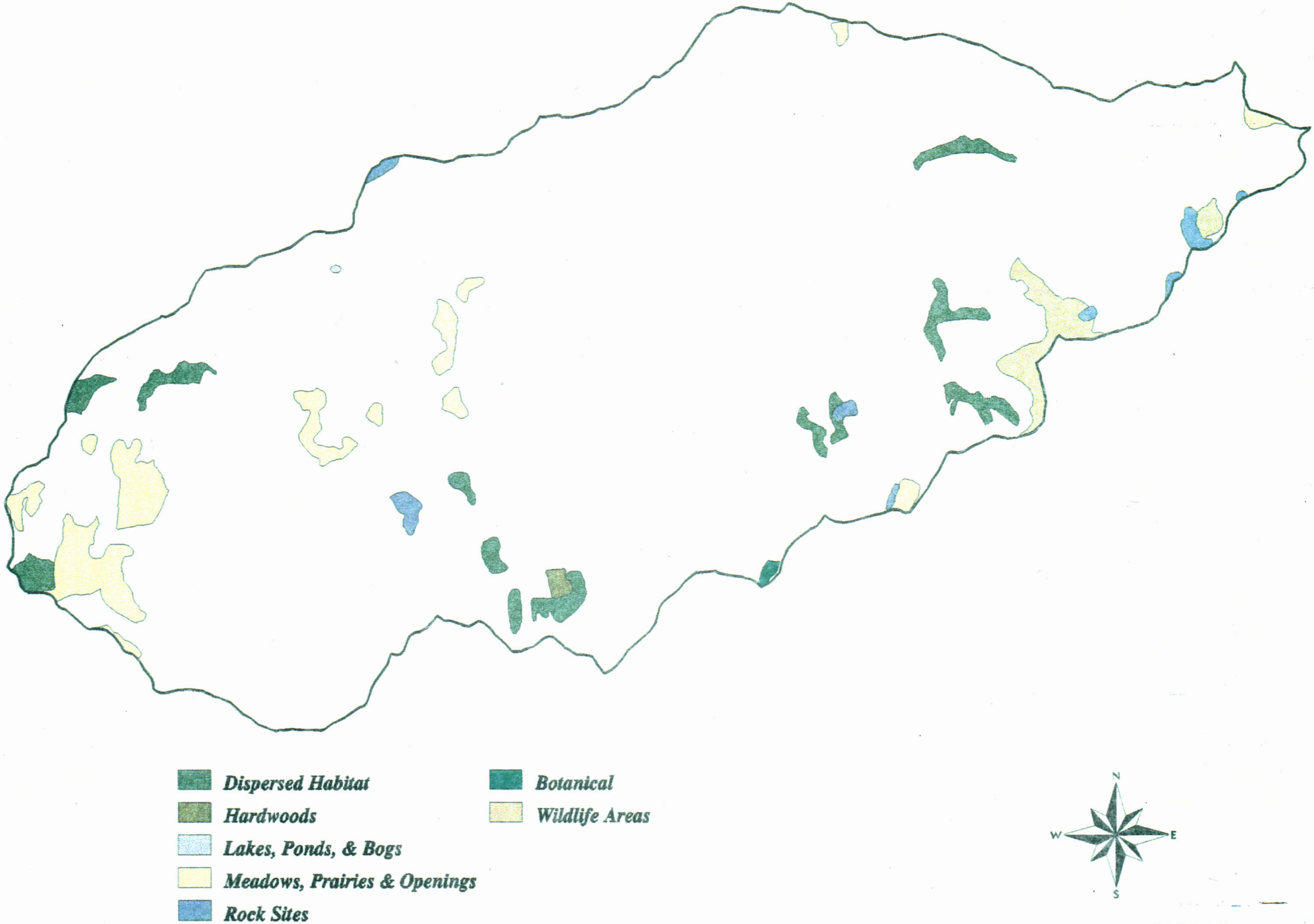
Information Needs: Inventories of the meadows and oak savanna areas need to be completed to determine species composition, amount of encroachment, the best methods to restore the meadow/savanna habitat, and the best methods to improve or restore native grasses and other species The areas identified during the Shasta Costa FEIS planning effort as potential special and unique sites need to be surveyed to determine if they meet Management Area 9 (Special Wildlife Site) criteria.

Management Opportunities: Restore meadows and oak savannas by cutting, cutting and and removing, or girdling Prescribed fire could be used with or without the above treatment to return these areas to an open and early seral habitat condition similar to what existed prior to effective fire suppression. Priority locations for restoration work include Shasta Costa Meadow, and other open meadows and oak savanna areas throughout the watershed

Consider expanding MA-9 Meadow 3069 to the southwest to include the plantation on the 2308 road This site provides breeding habitat for green-tailed towhee. This site has elderberry, white-thorn ceanothus, and grass and forbs which provide excellent early successional habitat. Without management, this site will soon become a closed-canopy Douglas-fir stand Consider wide spacing on Douglas-fir to maintain the early successional habitat component This may also provide habitat for the sensitive globe mallow plant

Figure 17

SHASTA COSTA WATERSHED
SPECIAL WILDLIFE SITES



JUNE 7, 1996

What is the relative abundance and distribution of the species of concern in the watershed (e.g., threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?

Proposed endangered, threatened and sensitive (PETS) species

The Siskiyou National Forest has four species listed as endangered or threatened under the Endangered Species Act: the (1) peregrine falcon, (2) bald eagle, (3) northern spotted owl, and (4) marbled murrelet. The peregrine falcon and bald eagle are not known to nest in Shasta Costa, but the watershed is within the foraging range of an active nest for both species. Marbled murrelets have not been detected in the watershed. Approximately 620 acres of marbled murrelet habitat has been surveyed in the watershed with no detections. Northern spotted owls do nest in the watershed. The Shasta Costa watershed contains a portion of the median home range (1.3-mile radius around a nest or activity center) of 7 spotted owl pairs or likely pairs (USDI Fish and Wildlife Service, dated April 10, 1991). Of the 7 pairs, 2 nests and 2 activity centers are in Shasta Costa drainage, 1 nest is within 0 7 miles of the watershed, and 3 nests or activity centers are within 1.3 miles of the Shasta Costa watershed

The Shasta Costa watershed meets the 50-11-40 rule regarding northern spotted owl dispersal habitat (Shasta Costa Final Environmental impact Statement (FEIS, page III-23). All habitat in the late-successional seral stage was assumed to be spotted owl habitat Thus, 48 percent (11,300 acres) of the Shasta Costa watershed was classified as spotted owl habitat

Table 10. 50-11-40 Analysis

Management Area	Mature/Old-growth Seral Stage Acres	Total Acres
01 (Wilderness)	49	57
04 (Botanical)	68	263
07 (Supplemental Resource)	1,123	1,621
08 (LSR)	9 932	21 473
Other Ownership	14	20

The ROD designated 99 percent of the watershed to be managed towards a late-successional habitat condition (Management Areas 01, 04, 07, and 08) The remainder of the watershed is State of Oregon and private ownership (less than 1 percent).

Sensitive Species

The following sensitive species have been documented to occur in the watershed common kingsnake California mountain kingsnake and Del Norte salamander Habitat for the following sensitive species occurs in the watershed northwestern pond turtle, white-footed vole, Pacific big-eared bat, red-legged frog and wolverine

Neotropical Migratory Birds

The high elevation wet meadows and brushfields in the watershed are particularly important for neotropical migratory birds. In late summer, just prior to migrating south to their wintering grounds in Central and South America, many neotropical migrants utilize high elevation brushfields to fatten themselves to prepare for the rigors of migration There is a songbird demographic study area at the Bear Camp Botanical Area which has shown this high elevation area particularly important to the following neotropical migrant species: solitary vireo; hammond's flycatcher; nashville, hermit, orange-crowned, MacGillivray's and Wilson's warblers as well as short-distance migrant species such as golden-crowned kinglet and dark-eyed juncos. High elevation brushfields in the watershed also provide important habitat for rare coastal breeding populations of green-tailed towhee and fox sparrow

Indicator Species

Bald Eagle and Osprey - A bald eagle nest is present just outside the Shasta Costa drainage and they are occasionally seen flying up Shasta Costa Creek. Osprey are active and nest near the mouth of Shasta Costa Creek just outside of the Shasta Costa watershed Osprey represent other species, such as river otter, which use the Forest's riverine habitat The Riparian Reserve Management areas within the watershed, along with the Aquatic Conservation Strategy (ROD, 1994) should improve the habitat quality for these species.

Northern Spotted Owl - As an indicator species, the Northern spotted owl represents over 150 other wildlife species which use late-successional forest habitat for all or part of their life cycles (Guenther and Kucera, 1978, Brown, 1985). Spotted owls are strongly associated with dense mature and late-successional Douglas-fir forests These habitats provide the structural characteristics required by the owls for food, cover, nest sites, and protection from weather and predation.

Pileated Woodpecker and Pine Marten - Pileated woodpeckers and pine marten represent the composite needs of over 160 wildlife species which utilize mature forest (Guenther and Kucera 1978, Brown 1985). Designation of Late-Successional Reserves will provide long-term habitat for these species and the species they represent

Woodpeckers - The composite snag needs of woodpeckers represent all wildlife species that use cavities for nesting or denning (Siskiyou LRMP FEIS, pages III-104, III-105). On the Forest, and most likely in Shasta Costa, there are over 75 species which use snag habitat (Guenther and Kucera 1978, Brown 1985) Siskiyou Forest Standard and Guideline 4-13a states that habitat capability of woodpeckers should be continually maintained in areas managed for timber production at not less than 60 percent of potential population levels. Five trees per acre (green trees and snags) need to be retained after harvest in order to provide for 60 percent woodpecker habitat capability over time. Up to 50 percent of these trees may be existing snags (recently dead, less than five years) Although there is a wide variance of snags per acre across the watershed, past disturbances, both human and natural, have left an average of one snag per acre. This does not meet the Siskiyou LRMP as amended by the ROD requirements.

Elk and Deer - Elk and deer use all successional stages to meet their habitat needs for cover, forage, and reproduction. Natural or created openings provide the majority of the feeding habitat, which has been assumed to be the most restrictive habitat component in this region (Siskiyou LMRP, pages III-106 through III-107) Elk and deer are considered to represent over 180 wildlife species needing young successional stages to meet all or some of their requirements (Guenther and Kucera 1978, Brown 1985).

There are two elk herds which use the Shasta Costa area. A herd of approximately 15 to 20 animals summers in the High Ridge/Brandy Peak/Stair Creek area, and winters around the meadows in the lower Shasta Costa Creek area. A slightly larger herd summers in the High Ridge area and winters around the Raspberry Mountain area, as well as the meadows near lower Shasta Costa Creek. Local migration usually occurs late in the fall, though deep snow sometimes drives the herds out of their high elevation summer areas earlier An important component of the migration route is the capacity of the forest canopy to intercept snow, allowing travel underneath

Elk habitat was evaluated using a model developed for use in Western Oregon. The model was based on the interactions of four variables (1) size and spacing of forage and cover, (2) road density, (3) cover quality, and (4) forage quality (Wisdom et al 1986) **Table 11** lists the acres of each type of habitat estimated for the Shasta Costa watershed.

Table 11. Habitat Type

Habitat Type	Acres	Percent of Planning Area
Optimal Cover	3,747	16
Thermal Cover	1,171	5
Hiding Cover	16,712	71
Forage	1,789	8

Optimal cover modifies ambient climate, allows escape from human harassment, and provides forage, thermal cover functions similarly to optimal cover, but does not provide forage; and hiding cover allows elk to escape human disturbances (Wisdom et. al. 1986). The quality of forage available is as important as the amount of forage There is a total of 55 miles of existing roads in the watershed, of which 10 miles are naturally closed Human disturbance allowed by motor vehicle access reduces elk use of habitat adjacent to roads (Wisdom et. al 1986) Currently, there are no roads in the interior 15.4 square miles of the watershed.

Deer occur throughout the watershed, though an accurate estimate of their population is unavailable Deer use newly harvested areas and natural meadows for foraging, also feeding on acorns from oak trees throughout the area They use the riparian areas during fawning season and summer. The majority of the meadows below 3,000 feet in elevation are most heavily used by deer and elk during the wet seasons when conditions are best for grass and forb growth.

Information Needs: Pacific Meridian Research (PMR) vegetation data needs to be ground verified to ensure validity. The correlation between certain vegetation types, seral stages and wildlife use of those habitats needs to be verified. This can be completed by continuing to do surveys for presence of indicator and PETS species

Management Opportunities: Habitat conditions for spotted owls can be improved by developing potential habitat stands. Priority areas include those that will contribute to the development of large blocks of interior late-successional habitat. Known sensitive plant sites need to be protected and maintained. Disturbance to sensitive species sites and/or individuals should be minimized Spotted owl structure within stands can be developed Woodpecker habitat can be improved by managing for snags. Retain existing snags in the watershed, except those that are hazardous along roads, where possible. Protect snag pockets during management activities and create snags where needed to meet the Siskiyou LRMP as amended by the ROD. Forage seeding could be used where timber harvest occurs to enhance the forage value for elk. Roads could be closed to motorized travel to improve the road density value for elk Encroaching trees in open meadows and oak savanna areas can be cut and removed or girdled These habitat types can be burned to remove encroachment and benefit native species Areas of exposed soil can be seeded with native species.

What are the locations and risks of spread of noxious weeds?

Noxious Weed Information

Seven noxious weed species currently inhabit the watershed and two occur in neighboring watersheds Noxious weed populations have increased as the road mileage in the watershed has increased Most populations are currently restricted to disturbed areas including roadsides, disturbed woodlands, landing sites, and streambeds Four species exist (scotch broom, french broom, yellow star thistle, and gorse) in low enough numbers that treatment can limit their populations

Brooms (Cytissus sp.) and gorse (Ulex) are beginning to appear in the Shasta Costa watershed and their aggressive nature threatens to destroy native plant communities. Gorse and broom may become safety hazards Gorse has dangerous thorns and both can become fire hazards. Of the four species, Scotch Broom occurs most frequently There are multiple locations on the Bear Camp Road (FS Road #23) within two miles of the junction with the Agness Road (FS Road #33). Scotch broom is also found in several small isolated colonies of a few plants farther east on the Bear Camp Road and on two locations on FS Road #2300.700 French Broom is found primarily near the junction of the Agness Road and Bear Camp Road plus one isolated plant near the center of the watershed on the Bear Camp Road. Gorse occurs at one location on FS Road #2308.270

Yellow star thistle has been found in the Shasta Costa watershed, on roadsides near Agness, at the "Rat Hole", meadow 252, and meadow 325, and on an expatriated site near a former lookout site near Bear Camp Yellow star thistle has the potential to rapidly expand its populations in the meadows and oak savanna on the western side of the watershed. Star thistle is an aggressive colonizer and competes with native species, including sensitive plants, for open sites. There is a large amount of suitable habitat present near Road 2300 which is a corridor to large established populations to the east of the watershed

Canada thistle, bull thistle, and tansy ragwort are established in the watershed and pose a lesser threat because they have already long occupied many of the watershed's disturbed sites Italian thistle and teasel occur in neighboring watersheds but have not yet appeared in Shasta Costa

Management Opportunities: Treatment of infested areas is needed to reduce, control and/or eliminate the further spread of these plants in the watershed It will be necessary to survey disturbed areas to detect new populations of noxious weeds before they become well established. Treatment opportunities include cutting, pulling or burning noxious weeds, closing roads, cleaning construction machinery before moving into National Forest lands and before leaving infested sites, using only "clean" fill material, and using only certified weed-free hay Seeding disturbed areas with native plant species will reduce opportunities for weeds to become established, and biological controls may be necessary to control widely distributed weed populations Follow-up surveys of treated sites will be necessary to detect noxious weed population regeneration. Ripping roads in contaminated areas should be evaluated to determine if this action would encourage noxious weeds to take over the disturbed sites

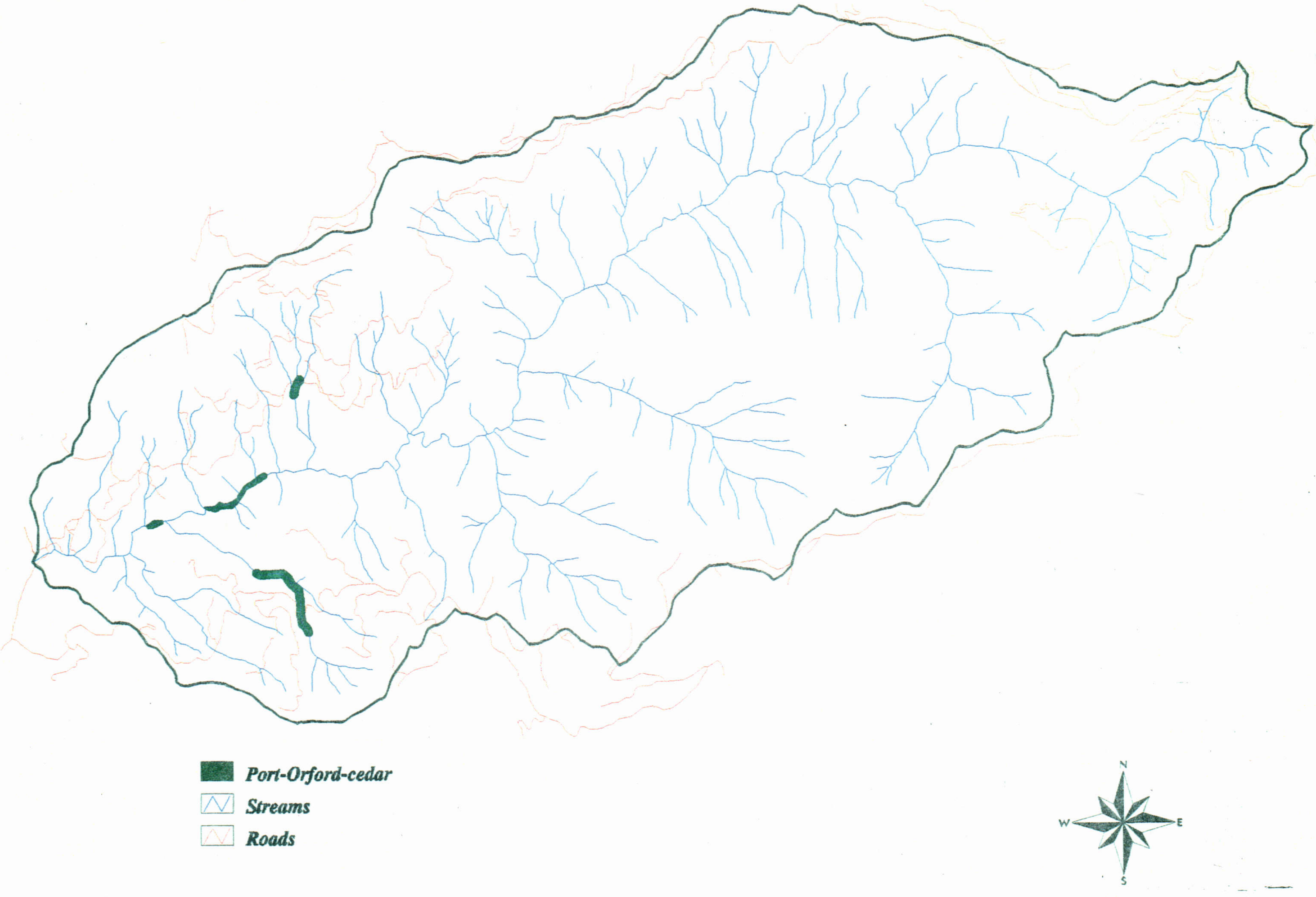
What is the risk of spreading *Phytophthora lateralis* (Port-Orford-cedar root disease) to Port-Orford-cedar or Pacific yew in the watershed?

Port-Orford-cedar and Pacific yew occur mostly in riparian areas and wet serpentine sites in the watershed The Port-Orford-cedar stands are small, somewhat isolated and located in the lower 1/3 of the watershed. Two occurrences are adjacent to roads One is on the Bear Camp road (FS Road #23) near the junction of the 820 spur and the other 1/4 mile east of the junction with 2308 260 near the Red Cub water source The latter has been sanitized by removal of Port-Orford-cedar, less than 8 inches in diameter, within 25 feet of the Burnt Ridge Road (FS Road #2308) The remainder of the Port-Orford-cedar is located along the mainstem of Shasta Costa creek within 2 1/2 miles of its confluence with the Rogue River. Pacific yew are found in riparian areas throughout the watershed No Port-Orford-cedar appear to be infected with *Phytophthora lateralis* within the Shasta Costa watershed. (See map, **Figure 18**.)

Management Opportunities: The following prevention techniques can be used to minimize the spread of *Phytophthora lateralis*: cutting Port-Orford-cedar from the edges of the roads, wet weather closure of roads to motorized vehicles, cleaning equipment before any operations, restrict high risk uses to dry season only use uninfested water in firefighting and other activities; place a berm of rock on infested road sites where appropriate, plant disease-resistant trees in low-risk riparian sites and upland sites, continue public education regarding the importance of road closures, and enforce closures

Figure 18

SHASTA COSTA WATERSHED
PORT-ORFORD-CEDAR



JUNE 7, 1996

What is the fire history of the Shasta Costa Creek watershed and what is the future role of fire in the watershed?

The Shasta Costa watershed, like most others of the Klamath Province, has been influenced by the effects of fire over time. Although it can be safely assumed that fires have burned the entire watershed, the evidence of fire is most apparent in the eastern half of the drainage. It appears that fire return frequencies for Shasta Costa approximate 50 to 90 years, which is similar to adjacent areas.

During pre-historic times and up to the early part of this century, weather and natural terrain features were the only factors that affected the spread of wildfire Native Americans used fire to enhance forage for game which they hunted, and to stimulate the growth of plant species used both for food and to make baskets It is likely that open meadows were maintained in this fashion. A study of the panoramic photograph taken from Brandy Peak in 1934 suggests a pre-historic fire had burned on the north side of Shasta Costa creek in the upper reaches of the drainage, outside of the area where historical fires burned. Undoubtedly, there have been other large pre-historic fires in the watershed, but there is not enough evidence remaining to allow for sound analysis.

Fire records indicate that since 1910 approximately 44 percent of the watershed has burned once, and approximately 3 percent of the watershed has burned twice. The records show there have been 6 large fires that burned 10,528 acres. Five of these 6 burned 10,167 acres and occurred in 1919 and 1920. All of these large fires were human-caused During this era, miners and cattlemen were suspected to have purposely started many fires to enhance exploration opportunities and maintain pastures Aside from these larger fires, approximately 14 lightning-caused and 19 human-caused fires have occurred from 1910 to present. None of these fires grew beyond 20 acres in size, with the exception of fire caused by timber harvest operations in 1975.

Two-thirds of the small human-caused fires were located in the lower 2.5 miles of the watershed, in close proximity to the mainstem. The remaining one-third of the fires were concentrated along the main trails. Early settlers used the lower end of the drainage (the "Rat Hole" area) for grazing stock, orchards, fishing, hunting, and possibly raising crops It was their presence that caused many of these fires, and it is possible, in a paradox manner, that their presence kept these fires small. Early occupants had a vested interest in not allowing fires to reach uncontrollable sizes Their presence allowed for early detection and taking rapid action Studies of conifer encroachment in the "Rat Hole" area indicate that the encroachment process began to take over shortly after the turn of the century This effect coincides with the early settlement uses.

It is possible that more active fire suppression occurred in Shasta Costa 20 to 40 years earlier than more remote unsettled watersheds on the west side of the Forest. The proximity of the former Agness Ranger Station, established in 1914, at the "Rat Hole", the Burnt Ridge trail on the southern edge of the watershed, the Bear Camp Trail on the northern edge, and the Lake-O-Woods, Bob's Garden, Bear Camp, and Brandy Peak lookouts that had direct views into the area, all contributed to keeping fires small. There were crude communication links between the lookouts, as well as to the Ranger Station. Heliographs and hand-cranked telephones served as state-of-the-art communications during the early part of the century. In 1936 the Civilian Conservation Corps established a camp in the Agness area. This added a strong contingent of firefighters to the local area The Forest Service also maintained a string of pack stock at the Ranger Station to support firefighting efforts.

From this time forward, fire suppression capabilities have become more effective and fire suppression policies mandated that all fires will be controlled. The Siskiyou LMRP states, pre-planned suppression strategies and acre objectives are set to control fires at 30 acres or less, 90 percent of the time It is desirable to control any fire of moderate to high intensity. The standards and guidelines for Late-Successional Reserves (ROD 1994) emphasize the prevention of loss due to large scale fires, particularly stand-resetting disturbances

As a result of the fire suppression, the majority of stands in the watershed have evolved for the past half century or longer without fire playing its natural role. The only use of prescribed fire in the watershed has been slash treatments applied to harvested areas Overall, fuels have been accumulating on the forest floor; areas that were historically or pre-historically burned for human needs have begun to be encroached upon by surrounding vegetation; and unique native plant species, dependent on the return of fire, are receiving competition from non-native and sometimes noxious vegetation

Interpretation

The Southwest Oregon Ecological Assessment Team (SWEAT) prepared a study for the Regional Ecosystem Assessment Project on the range of natural conditions for fire in the Klamath Province The authors indicate there is not conclusive evidence on what can be used as a reference or a natural range of conditions for fire They state that prior to 1850 assumptions about the climate, fire regime, and Native American activities are a questionable reference point. They further conclude that the post-1850 conditions poorly represent natural conditions, due to the influence of early settlement The report states there is evidence that suggests multiple, low-intensity underburns were more prevalent than individual stand re-setting fire events ". . our temporal window is small Disturbance regimes of the last 300 years hardly give the range our ecosystems have experienced," (Atzet and Martin 1991) It is not known what the pre-historic "status-quo" was with regard to cycles of fire, because it is an element of such random and chaotic nature.

Fire cycles west of the Cascade mountains are estimated to be considerably longer than those found east of the Cascades, particularly in northeastern Oregon Forest conditions in northeast Oregon can be referenced for the forest health issue and the effects of fire exclusion there. A similar scenario can be made for southwestern Oregon, only on a much longer timescale. Atzet and Martin suggest that fire suppression has increased the mean interval between fires, in the Douglas-fir series. Continued suppression may cause an "unnatural" build-up of fuels, resulting in a greater proportion of high-intensity fires when an area burns. Additional information on the average fire interval and estimated range of fire interval periods by plant series can be found in the Southwest Oregon LSR Assessment (Version 1.0, Table 12, Page 113).

Looking at the time frame in which fire has essentially been excluded from the Shasta Costa watershed against the natural cycle of fire, it would appear that the watershed overall is not outside the range of variability. Fuels in the eastern portion of the drainage are light to moderate, compared to the moderate to heavy fuels found in the western portion of the area. This can be attributed in part to the greater amount of past fires in the eastern portion of the drainage It is possible the potion of the watershed with a high occurrence of fire in the early part of the 20th century was on the high end of the range Conversely, it is probable that those areas which have not been burned in the last 100 years, and those areas which typically support a more diverse community of fire dependent species, have begun to experience adverse effects from fire exclusion

Fire starts will continue to occur and will continue to be suppressed within our capabilities, but the time is coming when a significant fire event of stand replacement intensity will occur. There is no precise way to predict the timing of such an event. If such a fire happens under moderate weather conditions, and in areas where fuel conditions are such that the fire burns with a lower intensity, the forest would benefit and the values associated with Late-Successional Reserve (LSR) will remain intact. However, under current policy, fires burning under these conditions are likely to be controlled in their early stages, thus precluding any such benefit If another half century of fuels is allowed to build up on the forest floor, and/or a major wildfire event occurs under extreme weather conditions, a stand-resetting disturbance is likely to be the result.

Information Needs: Determine if fire exclusion has contributed to the degradation of certain plant species and unique habitats. Identify areas and habitats where the return of fire would provide a benefit, and what intensities would provide that benefit. Complete a fire management plan to determine conditions where prescribed fire will be used in LSR.

A more thorough fire history study collecting on-the-ground data could be conducted.

Management Opportunities: Prescribed fire can be used to achieve the resource objectives for encroached meadows, special and unique habitats, Late-Successional Reserve (LSR) and other land allocations.

Fire management plans need to be completed to determine conditions where prescribed fire can be used in the LSR. The fire management plan will incorporate the objectives and conditions for the LSR as described in the Southwestern Oregon LSR Assessment The LSR assessment recognizes that fire can be used for the enhancement of fire-dependent species and prevention of stand replacement fire events. These objectives can be met using either natural-caused or management-ignited prescribed fire under the proper conditions. Generally, any fire in the LSR will have to be of low intensity, with an emphasis on the retention of snags and large woody material Private and State land holdings will need to be taken into account in these management plans

SOCIAL ASPECTS NARRATIVE

The following characterization and key questions were developed to describe the past, present and potential future human uses of the Shasta Costa watershed

Cultural Characterization

The Shasta Costa watershed can be characterized as a dynamic landscape. For millions of years, Shasta Costa evolved without the influence of humans. Over the last several thousand years, Native Americans followed by early settlers discovered and utilized Shasta Costa. Humans have continued to use the watershed for recreation and commodity production. Human use has been an integral part in the evolution of the watershed as it appears today

The stream, the land, and the resources available have set limits and provided opportunities for prehistoric and historic inhabitants alike. Interactions between natural and human forces have shaped the human use of the area Flat, open land, preferred by humans, is limited within the watershed.

Prehistorically, the stream and river corridors were used as resource procurement areas dealing with shell and anadromous fishes. Upland areas were seasonally used as procurement areas and as travel routes In historic times, the lure of mineral wealth or land to settle attracted people to this difficult terrain.

The history of human use within the Shasta Costa watershed can be reconstructed and interpreted by examining the physical remains of previous inhabitants as well as observable changes which are the results of human activities Remains, examined in conjunction with information provided by the natural environment and historical records, can reveal patterns of human behavior and adaptation. The Shasta Costa watershed contains both prehistoric and historic sites which represent every cultural milestone in the local history. Middle Archaic to historic-contact period, prehistoric sites, early settlements, mining, and early Forest Service sites can all be found within the watershed Depression Era sites can also be found in the general vicinity.

The prehistory and history of the watershed are treated in Stephen Beckham's *Cultural Resource Overview of the Siskiyou National Forest* (Beckham, 1978). Additionally, Bancroft and Wallings have compiled general histories of the region and fragmentary local histories exist in the form of oral histories, family journals, manuscripts and photo collections.

What were the prehistoric uses of the watershed?

The archeological record attests to a continuous human occupation of southwest Oregon for at least the last eight to nine thousand years. Study of the Marial site (35CU84, Griffin, 1983) on the Rogue River provides several carbon-14 dates beginning at 8560 B.P , clearly establishing the antiquity of human life in this portion of southwest Oregon. Excavations carried out near the mouth of the Illinois River at the Tlegetlinten site (35CU59, Tisdale, 1986) unearthed materials from a later ancient culture, possibly dating from two major periods of use at 6000 and 2000 years ago. Human adaptations in southwest Oregon appear to have changed from a moderately mobile, hunting-gathering lifestyle to more sedentary, specialized economies. These changes are likely to have been influenced by the effects of population displacement and growth as a result of changing climates and environments in southwestern Oregon as well as in other areas.

Ethnographically, the Tututni are representatives of the final cultural period in southwestern Oregon. These Native American groups either inhabiting or using the general vicinity consisted of several groups, each of which spoke a different dialect of the Athabaskan language and each having its own name. Collectively these Athabaskans are referred to as the Tututni or Coast Rogues.

These peoples inhabited much of southwestern Oregon from the beaches to the upland forests. They occupied the region from south of Bandon, Oregon to northern California and extending up the major drainages like the Smith, Chetco, Pistol, and the Rogue Rivers The bands were numerous and the locations diverse.

According to an 1854 map and census compiled by J.L. Parrish, Indian Agent for the Port Orford District, the watershed was utilized by a Tututni band called the Shasta Costa (also called the Chasta Costa or Shas-te-koos-tees)

The 1854 census by Parrish reported the "Shas-te-koos-tees" numbered 146 individuals with their major "chief" being Yah-chum-see. The map compiled by Parrish attempted to locate the approximate territories of the native peoples. According to this map, the Shasta Costas occupied the area surrounding the Rogue River from the Illinois to Big Bend and up the Illinois River Whether these groups maintained strict territorial boundaries delineating upland resource areas is unclear Parrish describes the bands holdings as "reaching back from the coast indefinitely"

The general pattern of Tututni settlement indicates that large winter villages, containing 50 to 150 individuals, were established along coastal areas, rivers and major streams. Houses constructed at village settlements were substantial, consisting of semi-subterranean structures with bark or plank walls and roofs about twelve to sixteen feet square. These villages served as semi-permanent habitation spots, where foods collected throughout the year could be stored for use in the winter.

Generally, the Tututni were hunter-gatherers, subsisting on a diet consisting primarily of salmon and acorns and supplemented by a variety of game and collected food items. A seasonal round of activities was practiced which is characterized by dispersed, small task-specific groups utilizing the upland areas during the spring and summer months. These hunting and gathering groups would traverse the upland areas in search of game, plants, nuts, berries and other raw materials. Temporary camps in the uplands consisted of grass covered, brush or animal hide shelters. Fall signalled the time for communal fishing and acorn gathering and the occupation of winter villages by multi-family groups. In winter, these people would subsist largely on stored resources collected during the summer and fall.

Major villages were known to have existed at the confluence of the Rogue and Illinois Rivers (tle' geet-tlinten, 35CU59), along the lower reaches of the Illinois River at Oak Flat (SK-108), the point of land which is now the town site of Agness (cecl-gut tun'ne), at Big Bend (se-e'ltanitcu) and the terrace above the mouth of Shasta Costa Creek (yetce'wet, 35CU161) (Waterman, 1925).

The Shasta Costa village site was located at the south end of the terrace opposite a riffle in the river which provides an excellent fishing spot A long time resident, who lived along Shasta Costa Creek at the turn of the century, reported twenty-two housepit depressions, about 15 to 20 feet across and 2 to 3 feet deep at this location. Burials and trade beads were reported coming from this site, as well as abundant fresh water mussel shells (Lucas interview, 1971). Excavations at this site indicate that Shasta Costa terrace was a significant habitation site over a very long period of time. Cultural materials thirty feet below river-laid sediment suggest the antiquity of the site, although no date can yet be assigned to the lower component. The detailed descriptions of the site at the turn of the century which include reports of intact housepits, fire rings, and mussel-shell mounds, as well as local reports of Indian fishing practices at Shasta Costa riffle suggest that the site was occupied near the time of contact. Cultural investigations indicate that the site has several components, and has a complex range of artifacts relating to various tasks and demonstrating at least three stone-working technologies. One of these technologies involves flaking river cobbles and using the flakes, a practice not previously recognized at sites investigated along the Rogue River This technology may possibly be related to fish processing

This site has been repeatedly disturbed. Early settlers reportedly cleared the flat of trees around the turn of the century, and later farmers leveled some areas along the top of the terrace (Rusty Hill interview, 1987) The 1964 flood inundated the terrace and deposited 6 to 18 inches of silt as other, older floods must also have done Bank erosion has also been heavy in the past This prehistoric site has also been repeatedly vandalized Four recent potholes are visible on site

The material found in the various sites in the watershed indicates considerable use of the stream corridor and the resources contained in and adjacent to the stream. Various tools and other artifacts not only establish site locations, but also reveal the types of resources being utilized and the types of technologies being performed Ten prehistoric sites and isolated finds have been located within the watershed, however, two of these are of questionable origin and will not be discussed further. The remaining sites and isolated finds are representative of the common upland site types found in the Siskiyou National Forest. These include temporary campsites related to hunting and gathering activities such as SK-862, the Shasta Costa Meadow Site, SK-734, the Chipmunk Prehistoric Site and SK-1104, the "Rat Hole" Lithic Scatter Artifacts found in these temporary camp sites include lithic debitage, the waste material from the manufacture of stone tools, and the tools themselves, such as projectile points and scrappers. Temporary camp sites are often located on or near major ridge lines which were used as travel routes or in areas where diverse vegetation encouraged the collection of unique resources An example to the latter are meadows where grass seeds and flowering tubers such as camas were gathered.

Site SK-861, the Shasta Costa Quarry site, is an example of another common upland site type found in the watershed It represents a site where the procurement of raw materials for the production of stone tools was the focus of activity. Pits dug into outcrops of chert, a cryptocrystaline stone capable of being knapped, and extensive surface rubble from lithic reduction activities typify this site type. Debitage is predominantly large blocky shatter and flake fragments typical of early core shaping activities. Although several uniface pieces and a number of bifaces found at this site suggest that formalized pieces were also being produced here. Hammerstones of a material not native to the site are also present. These hammerstones range from softball to pebble size. This range represents the lithic reduction sequence, that is from course quarrying work to the fine work required to shape a biface.

Other types of sites which can be found within the watershed offer insights to the religious and spiritual nature of the Native Americans in the area. SK-101, the Green Knob Vision Quest Site, consists of a series of pits, some with hand piled rock circles large enough for a person to sit inside and providing a commanding view of the Shasta Costa drainage. The six pits are arranged in a semi-linear orientation.

The vision quest was one of the most fundamental and widespread religious concepts of North American Indians, including the inhabitants of southwest Oregon. Certain rites of passage were key in the life cycle of these aboriginal people, the vision quest being one of the most important. This rite was performed by young men and women at puberty on the bald peaks and headlands of the region. The vision quest was undertaken to seek a guardian spirit and to obtain supernatural power The vision seeker sought the aid of the spirit world through prayer, dreaming, fasting, dancing and going without sleep until a guardian spirit came to the candidate in a vision An individual could undertake more than one vision quest in his or her lifetime in search of spiritual aid and guidance

This site has been disturbed by both natural and human means. Some of the pits have been partially overgrown causing portions of the stone walls to fall inward. Another pit on the southernmost side shows evidence of the rock walls apparently pushed over the adjacent rock bluff. This site is an outstandingly significant, Class I cultural resource as it represents a traditional socio-religious practice of the native peoples. Very few of these vision quest sites are known to exist in southwest Oregon

The major ridge tops which surround the watershed were also used by the aboriginal inhabitants as trade and travel routes. As previously mentioned, temporary campsites are often located along these ridgetops. Evidence of trade can be assumed from the artifacts found in various sites. The presence of material such as obsidian, not native to the area, is proof of intercourse with the interior regions. Sourcing of obsidian from various excavations indicates a widespread trade network reaching into northern California, south central Oregon and the central Cascades. In exchange, coastal products such as shells found their way inland. Historically, trails and later roads often followed these aboriginal travel routes.

Differences in culture, lifestyle and economic subsistence between the native peoples and the newly arrived Euro-americans inevitably led to conflicts. By the end of the Rogue Indian Wars in 1856, the remaining population of aboriginal people had been removed to the Grand Rhonde and/or the Siletz reservations. Some individuals escaped relocation or were allowed to return to their homelands, mainly because of intermarriage with the white settlers However, some individuals returned to their homelands after the enactment of the Dawes Act which opened public domain allotments to Indian peoples In 1938, twenty-three allotments were in existence in Curry County

Glimpses of these people and their way of life have been made known to us through ethnographic information, the journals and manuscripts of the early white explorers and settlers, records and accounts from the Rogue Indian Wars and the archaeological record as it pertains to the Northwest Coast Culture area. The ethnographic information that exists for these people was acquired from research conducted at Siletz and Grande Rhonde reservations and the Smith River rancheria However, by the time the interviews or ethnographic sketches were compiled in the late 1800's and the early part of this century, most sources of information were already a generation removed.

What were the historic uses of the watershed?

The historic period in this portion of southwestern Oregon begins as early as the 16th and 17th centuries with the voyages of the Spanish explorers. The earliest recorded contact between the coastal natives and Europeans is noted in the log of Captain George Vancover in 1792. Within the next quarter century trappers and traders, including North West Company fur trader Peter Corney and an American party of trappers led by Jedidiah Smith appeared in southwestern Oregon Russian traders and whaling ships of various nations also had contact with the native people on this portion of the coast.

The discovery of gold along the southwest Oregon coast in the early 1850's precipitated the settlement of the lower Rogue River and its surrounding environs by Euroamericans. Gold was first discovered on the coast at places like Whiskey Creek and Gold Beach, named for the gold rich, black sand deposits found there. Later, gold deposits were found in the Rogue River. Early prospectors left little of the local country unexplored and some exploration of the Shasta Costa watershed likely occurred at this time.

Hostile relations with the local Indians arose as a result of conflicting land use by Euroamericans who trespassed on traditional native territories in the pursuit of gold. Ultimately, ill feelings between the native populations and the Euroamericans exploded into the Rogue Indian Wars of 1855-56 With the removal of the native inhabitants at the conclusion of the war, the area was opened to settlement.

Early settlers and miners trickled into the area during the 1860's. They often built their homes on the same river or stream terraces that had provided homes for the native inhabitants. The remoteness and difficult access precluded extensive development and most people followed a subsistence orientated way of life This lifestyle made maximum use of the available fish and game, supplemented with produce grown and animals raised on small farms Goods and services were traded, bartered and scavenged. Cash earning activities were limited and population densities low. Small scale mining, and the sale of livestock and fish provided some income to local residents

Archeological sites which chronicle historic settlement within the watershed include cabin remains, trails, mines and camps used by travelers and cattle herders. Several Forest Service administrative sites are also found within the watershed. In the early decades of the twentieth century, recreational use of the area added a new alternative to the local economy

Mining within the watershed lasted from the end of the nineteenth century through the 1940's An early mining interest in the watershed was a coal seam which was worked by Joseph Yonkers (or Younkers) in the early 1880's He was successful in forming a company and purchasing a considerable amount of machinery However, his hopes for developing a coal mine ended when the barge carrying his machinery was sunk in the Rogue River Yonkers had his place of residence near the coal deposit. Here he constructed a house, barn and a store house/shop He also cleared some land for farming and planted an orchard. This location later became the site of the Shasta Costa Ranger Station (SK-130), also known as the "Rat Hole" site

Other cabins and associated mining features can be found within the watershed Two areas, the Red Cub prospect and the Shasta Costa prospect are located in the drainage. These two prospects were potential copper mines The Red Cub Mine appears on the 1940 Siskiyou National Forest Map. SK-615, the Lower Shasta Costa Cabin site, consists of the rock foundation and wooden superstructure remains of a relatively large cabin. Little in the way of artifactual material is present on the site, but what there is suggests the cabin was at one time used by a miner

Following or accompanying the prospectors were the early settlers. Few homesteads exist within the watershed, however it is known that the Lucas family grazed livestock in the oak savanna prairies in the lower end of the watershed Cattle were also driven to summer pasture in Whitten Prairie Sk-533, the Squirrel Camp Cabin, may have been established as a "line shack" by these early cattlemen Later, in the 1940's to the 1960's, the cabin was used as a hunting camp.

The Siskiyou National Forest was established on October 5, 1906 Henry Haefner, an early forester in the area states, "In 1909 the National Forest area was about as the indians had left it Nothing of importance had been done to improve the property or even find out what it contained in the way of timber or other natural resources " The early foresters duties included mapping, estimating the amount of timber and agricultural land, law enforcement, fire protection, as well as a multitude of other jobs involved with the administration of a large timberland The

rangers often built their own stations and headquarters. Sites which represent early Forest Service administration are common within the watershed.
SK-130, the Shasta Costa Ranger Station, is a prime example of a Forest Service administrative site in the watershed. In 1911 the Siskiyou National Forest purchased the property from the descendants of Joseph Yonkers for $200.00 This amount was the estimated value of the improvements which Yonkers had done to the site. At the time of purchase, neither the cabin nor the barn were worth anything as they had fallen into disrepair. No offer was made for the land as Yonkers had never filed a valid claim on the property The Shasta Costa Ranger Station soon became the headquarters for District 2 of the Siskiyou National Forest. By 1914, a log house, a barn, 5/8 mile of fencing, a storehouse and blacksmith shop were constructed by the Ranger and Guard. A water system was also being installed. The Shasta Costa Ranger Station was replaced by the Agness Ranger Station in the town of Agness in 1936. A Civilian Conservation Corps compound was built at the Ranger Station at this time.

Various trails, lookouts, camps, guard stations and telephone lines were constructed within the watershed during the first three decades of this Forest's history. Bear Camp Basin Lookout was first established as a camp and guard station in 1911. By 1915, the guard station had been improved to the status of a ranger station and a shake cabin was constructed on site in 1924. This structure was replaced in 1932 with a standard L-4 lookout cabin which remained in service until it was destroyed in 1965. Bob's Garden Lookout was another example of a lookout structure in the watershed. Built in 1941, Bob's Garden was also a standard L-4 cabin. However, it was mounted on a 40 foot tall pole tower. It remained in service until abandoned in 1954. Communications in the watershed consisted of primitive phone lines connecting the various lookouts to the ranger stations and the town of Gold Beach.

An important component of the historic fabric of the watershed is the trail system. These transportation corridors were the first travel routes within the watershed Many of these paths followed older aboriginal routes. "Chief" Elwin Frye identified the Bobs Garden Trail (SK-595) as an Indian travel route. Frye was a packer for the Forest Service and the grandchild of early Rogue River settlers John and Adeline Billings. Other historic trails within the watershed include: SK-740, the Bear Camp Ridge Trail, Green Knob Way and SK-090, the High Ridge Trail. Trail systems effectively linked the coastal area with the interior of the Forest, and the interior with the Rogue Valley. Many were routes that the miners, and the packers that supplied them, established to get their materials to and from the prospects. Others were used to drive cattle to summer pasture. During the first three decades of this National Forest's history, the trail systems were improved and expanded. Today many Forest roads follow these historic trail routes. Other remnants of this trail system form a portion of today's recreational trail system.

The Depression of the 1930's brought an influx of people to the public forest lands. Numerous out of work individuals sought survival in the mountains undertaking a subsistence economy lifestyle. These people were also engaged in prospecting and small scale mining encouraged by the revaluation of gold.

The Depression Era also saw the development of the Civilian Conservation Corps (CCC), another important chapter in the history of the Pacific Northwest. Fire prevention and suppression, timber stand improvement, range improvement, soil conservation, road building and forest facilities construction were all undertaken by the CCC volunteers. The Civilian Conservation Corps provided employment and a measure of financial relief for men and their families. The watershed contains little evidence of the work performed by the CCC. However, to the west of the watershed the Agness-Illahe Road and the Agness-Powers Road were two major projects undertaken by CCC crews. Also in the general area is the Agness Ranger Station, a premiere example of Civilian Conservation Corps construction

In the early decades of the twentieth century recreational use of the streams, rivers and forests added a new economic emphasis to the area Guides and packers often adapted older cabins and camps to their new enterprises As previously mentioned, the Squirrel Camp Cabin was used as a hunter's camp The Lower Shasta Costa Cabin was also adapted to house tourists on fishing trips.

Even though the historic element is by far more tangible than that of the prehistoric, much of this cultural fabric within the watershed is little known. Many of the sites in the watershed have not been formally documented or evaluated for their historic significance.

Does the watershed contain any culturally significant traditional use areas?

There is no evidence which suggests that the area within the watershed is presently used for traditional activities by local Indian groups. Recognized tribes consulted (Tolowa, Karuk, Coquille and Siletz) did not provide any additional information regarding traditional use in the watershed

The Confederated Tribes of Siletz have, for the past few years, used the Shasta Costa Ranger Station site (the "Rat Hole") for sweat lodge ceremonies under a special use permit with the Gold Beach Ranger District. It is their intention to continue this practice. The tribe has also expressed an interest in gathering traditional forest products such as pine nuts and beargrass. If requested, the gathering of forest products would be administered by the standard permit system.

Information Needs: The complete status and number of cultural sites in the watershed are unknown. Formal site evaluations of many sites have not been conducted.

Management Opportunities: Cultural resource surveys will precede all ground disturbing projects. All sites discovered will be documented and added to the Forest inventory. The significance of inventoried sites shall be evaluated for eligibility for the National Register of Historic Places. Suitable cultural resource properties may be interpreted for recreational use and educational benefit of the general public. There is an opportunity for partnership with the recognized tribes in the development of recreational and educational programs

What are the major recreational uses and where do they occur in the watershed?

The Shasta Costa Watershed provides both roaded and unroaded recreation opportunities. The two primary roads within the watershed are the Bear Camp and Burnt Ridge roads. These are multiple purpose routes which serve moderate to heavy recreation, timber, and administrative traffic. The Burnt Ridge Road (FS Road #2308) is a single-lane gravel road on the south side of the watershed. The Bear Camp Road (FS Road #23) is a paved single-lane road located along the north slopes of Shasta Costa Creek.

During the summer months Bear Camp Road has been averaging 100 to 130 vehicles per day for the last several years. It is open about 5 months of the year. The remainder of the year the road is closed by snow at higher elevations. A traffic classification study for the Bear Camp Road shows traffic proportioned as recreation (88 percent), timber (2 percent), and administrative (10 percent). In addition to these two main roads on opposite sides of the watershed, there are also spur roads from the main roads that access the outer perimeter of the watershed. There are about 56 miles of road within the watershed. In contrast to these roads, the heart of the watershed, which lies below and between the Bear Camp and Burnt Ridge road systems, is largely unroaded and remains natural in appearance.

This dichotomy of roaded and unroaded acreage produces a watershed that is stratified into two primary recreational opportunity classes, based on the Forest Service Recreation Opportunity Spectrum (ROS) classification system. Shaped like an oblong doughnut, the interior portion is ROS classified as Semi-Primitive Non-Motorized (SPNM - 9774 acres) and the exterior is considered Roaded Natural (RN - 13,582 acres) There is one additional very small ROS component in the watershed On the NW border is a small portion of the Wild Rogue Wilderness Area whose boundary slightly crosses into the Shasta Costa drainage. This small portion of Wilderness (57 acres) is classified under ROS as Primitive (See ROS map, **Figure 19**)

Although tied primarily to the existing road system, recreation use within the Shasta Costa watershed is highly dispersed The roads were originally constructed for access to timber management activities, however, increasing recreation use through the area has resulted in substantially increased traffic volume. Leisure driving, dispersed camping, hunting, fishing, hiking, nature study, botanical study/viewing, snow play, and gathering of special forest products comprise most of the recreation activity. Historically, trout fishing took place above the waterfall at river mile 1 8 on the mainstem. Currently all fishing is prohibited in the watershed.

There is another significant element of recreational use that is connected to use outside the watershed This element is one of access to and from the Wild and Scenic Rogue River. The Bear Camp Road is a major thoroughfare for commercial and noncommercial boaters of the Rogue River. This high traffic volume is brief and transitory but none-the-less provides access across the watershed and is considered recreational use in nature. The peak time for this traffic is during the warmer months.

Recreation use of the roads, trails, and dispersed campsites spikes sharply upward during big game hunting season, roughly from early September to late October annually. Use also increases in the upper area of the watershed during the spring and fall turkey season. Average visitor stay, measured in Recreational Visitor Days (RVD) increases significantly as well (an RVD is one person using the area in a 12-hour period) This contrasts to the summer road traffic across Bear Camp Road because of the increased duration of the use and the broader use of the road system throughout the watershed. Current estimates indicate that recreational visitor use is somewhere between 9,000 and 10,360 RVD's annually.

Developed recreation facilities are limited in the watershed. Currently, there is one developed vista along Bear Camp Road; the Shasta Costa Overlook. This overlook is directly below Bob's Garden Mountain on the Bear Camp Road. This overlook has good parking and a picnic table but lacks a restroom, any form of interpretation, and shade. The overlook offers a commanding view of the Shasta Costa watershed as it stretches from Bear Camp Road in the east to a distant view of the Forest toward the west. In all, the panorama encompasses over 30 air miles of scenery.

Trails are also limited in the basin. Only one Forest System Trail exists; the Bearcamp Ridge Trail (#1147) which extends for about 1.5 miles from the 23/2308 Road intersection down Bear Camp Ridge to the Elk Wallow Road (Road 2308-016). There are several old historic trails which are still evident in some places, and there has been interest in developing more trails in the area. In the 1991 Shasta Costa FEIS in Volume 2, Appendix B (page B-6) there were several trail opportunities identified.

There are also unroaded recreation opportunities, primarily in the core of the watershed This unroaded portion is described in detail in Appendix C, Roadless Areas, of the Siskiyou LRMP FEIS under the designation of Shasta Costa (No. 6175). An important value of an unroaded area is the opportunity for solitude and semi-primitive recreation experiences. With highly broken topography and dense vegetation covering most of the unroaded area, the natural screening of both sight and sound provides ample opportunity for these types of experiences.

Recreation caused impacts

Road-related dispersed use has the potential to cause impacts, including non-point source pollution (oil and gas leaks) from vehicles, as well as human waste, grey water, and litter along roads and at some of the dispersed recreation areas. Other potential human-related damage that can occur includes but is not limited to vandalism to signs, facilities, and other resources.

Recreation trends

Recreation trends shown in the 1993 Oregon State Comprehensive Outdoor Recreation Plan (SCORP) Survey indicate that demand for dispersed recreation use of various types is increasing. The predominant activities that households are participating in, listed in rank order, are sightseeing/pleasure driving (69.3%), swimming (58 7%), boat fishing (40.6%), tent camping (39 1%), and nature study and wildlife viewing (38.5%) Demand for recreation opportunities in this watershed are expected to remain the same or gradually increase from current levels SCORP also indicates a demand for trails is increasing, although more emphasis is for accessible trails for the disabled, trails in or near or connecting to urban areas, trails that are closer to home for all users, and trails for equestrian users. Also, emphasis is for trail maintenance or reconstruction over new construction (1995 Oregon Recreational Trails Plan). Locally, there has been an increased interest in accessible trails; equestrian, mountain bike and ATV trails; and day-use trails

Another trend is declining road maintenance funds to keep roads open for public access. In addition, road closures for fish and wildlife protection, Port-Orford-cedar protection, road-related watershed restoration, meadow protection, and other resource related purposes will subtract from current levels of roaded access in the watershed Both of these trends indicate there will be fewer roads in the watershed in the future than there are now. Consequently, road-related dispersed recreation opportunities will decline, even though demand is expected to remain the same or gradually increase

The implications are that while demand for dispersed road-related recreation opportunities increase actual opportunities decrease. This may result in some segments of the public being unhappy with any proposals that close roads. In some cases this could lead to vandalism of signs and property, violations of gate closures and a general dislike of federal authority

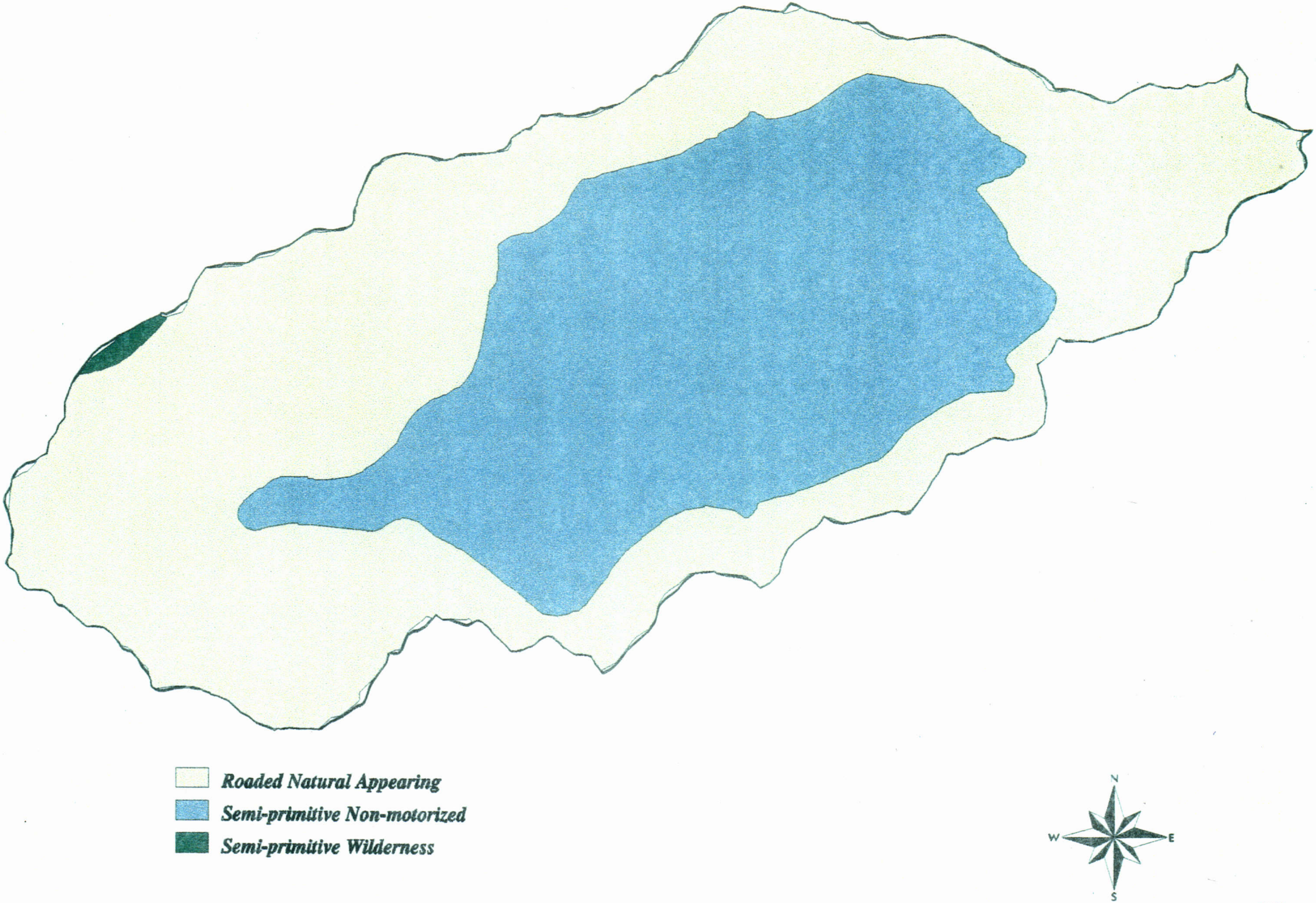
Information Needs: Current data on recreation use, recreation demand, types, seasons, numbers of people, areas of interest and opportunities for partnership.

Management Opportunities:

- Rehabilitate areas that have already been damaged due to recreation use If necessary roads may need to be closed or have restricted access to protect sensitive areas.
- Improve the Shasta Costa Overlook facility by installing a vault toilet facility and interpretation/information of the area.
- Develop and provide information and on-site education of unique sites, suchas meadows.
- Reconstruct some remnants of old historic trails into new system trails to meet the ever-increasing public demand for trails. Specific trail opportunities which have been identified are: the Bear Camp Trail extension, the Shasta Costa Creek Trail (4.0 miles); the High Ridge Trail (1.2 miles); and Bob's Garden Mountain Trail (0.9 miles). An elevated walkway has been proposed for a location in Curry County. There are a limited number of stands in the watershed which would meet the criteria for this proposal.
- Seek partnerships in recreation development and maintenance whenever possible, including Adopt-A-Trail and Adopt-A- Highway programs for litter cleanup and vandalism reduction.
- Improve visual condition from the Bear Camp Road by revegetating skyline skid trails in old timber harvest units that can be seen from the road.
- Provide information on. appropriate use of the undeveloped and dispersed areas, proper disposal of garbage and waste (pack-it-out), and to prevent fishing in restricted areas

Figure 19

SHASTA COSTA WATERSHED
RECREATIONAL OPPORTUNITY SPECTRUM



JUNE 7, 1996

What commodities can be produced from the watershed?

Timber

Approximately 2,557 acres of timber has been harvested since 1960. With the current land allocations, there is no programmed timber harvest in the Shasta Costa watershed. The meadow habitat in the watershed is declining due to encroachment by trees and past fire suppression policies. Commercial timber harvest activities would be limited to removing tree encroachment from meadows and oak savannas; stand treatment to accelerate growth and development of early and mid-seral stands into stands with late-seral structure, salvage of hazard trees adjacent to open roads; and salvage of trees if catastrophic events (fire or wind) occur in the future. (See Possible Stand Treatment Map, **Figure** 20).

__Management Opportunities:__ There are about 362 acres of mid-successional stands that were identified as candidates for treatment to accelerate the development of late-successional strucure in the Shasta Costa FEIS (FEIS, page II-66). Additional surveys need to be completed to determine if other stands could benefit from treatments in the future. Stand treatment of dense stands or mid-seral stands adjacent to large blocks of late-successional habitat, within the mean home range of northern spotted owls, or in habitat connections would be a priority over the next 5 to 15 years. Meadows and oak savannas could be returned to an open and early seral habitat condition similar to what existed prior to effective fire prevention.

Special Forest Products

The upper portion of the watershed receives a moderate amount of personal use Christmas tree harvest. Commercial special forest products collection has been limited due to lack of roaded access and remote location of the watershed Impacts to the resources of the watershed have been minimal. Products include cedar and fir boughs, vine maple, Christmas trees, mushrooms, firewood, and some beargrass and salal. Special forest products can be collected in Late-Successional Reserve in accordance with the Southwest Oregon LSR assessment.

__Management Opportunities:__ Collection of Port-Orford-cedar boughs can be managed to reduce the risk of introducing *Phytophthora lateralis* root disease to the watershed. Other special forest products may continue to be collected as the market dictates and in accordance with management ares objectives and requirements Collection rates in this watershed will likely be less than in others due to the distance from markets. Christmas trees for personal use will continue to be an opportunity in the upper portions of the watershed.

Mining

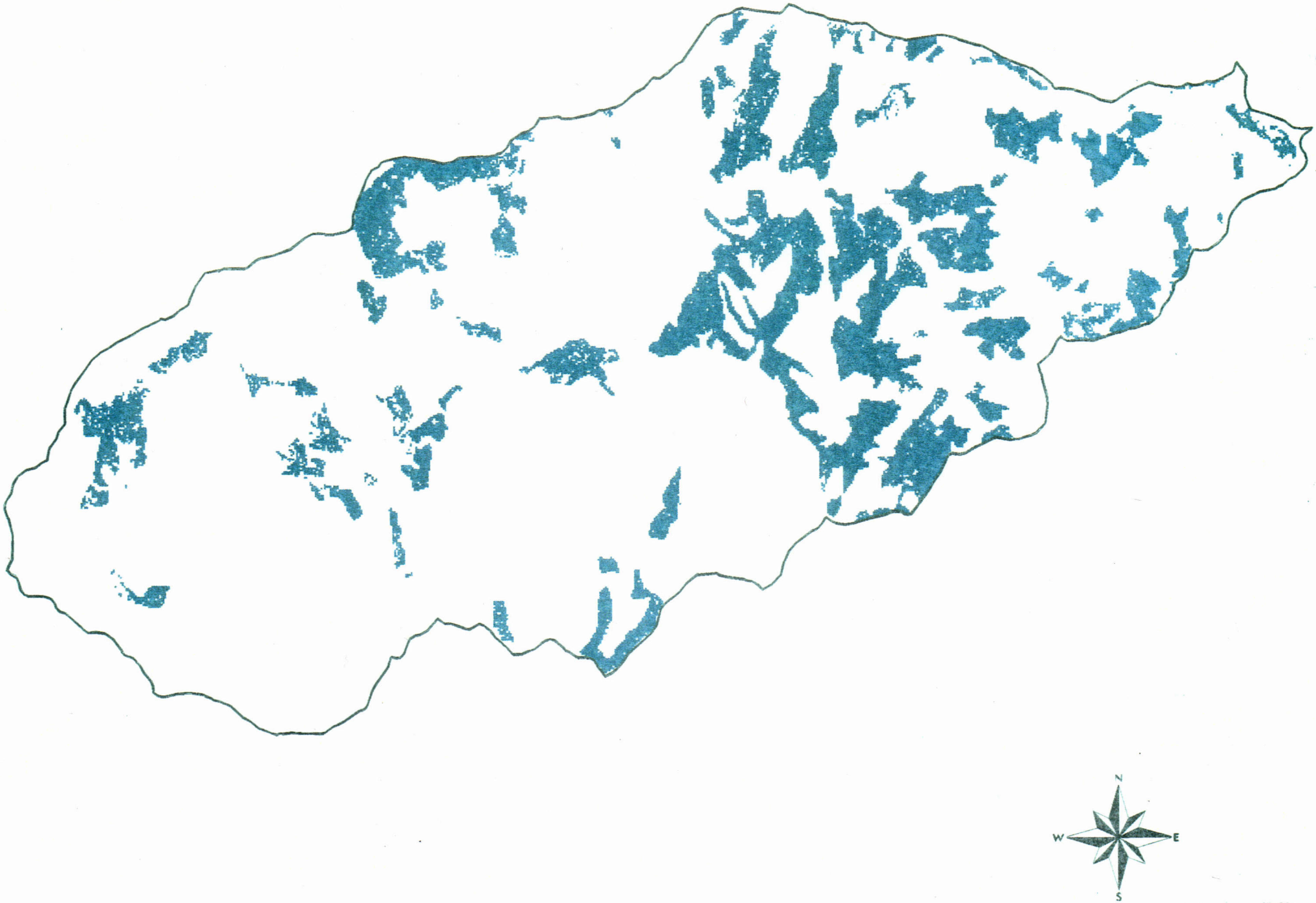
Prospecting has occurred in the past, but no significant minerals have been produced. There are three known mining prospects. two for copper and one for coal. While there may still be claims and prospecting within the watershed. there is no known mining activity at this time

Grazing

Grazing probably began in the watershed in the 1850's and was first permitted by the Forest Service in 1919 as the Bob's Garden - Squirrel Peak Allotment. There were 720 Animal Unit Months (AUMs) allocated in 1919, with a maximum of 1200 AUMs in 1922 Grazing declined to 60 AUM in 1937 and remained at that level through 1965. In 1983, the primary allotment was moved to Big Bend and the Bob's Garden/Squirrel Peak Allotment became a secondary allotment. Over time, this allotment was phased out. Currently, there are no allotments in the watershed and none are planned at this time

Figure 20

SHASTA COSTA WATERSHED
POSSIBLE STAND TREATMENT OPPORTUNITIES



JUNE 7, 1996

Which roads are needed for future access in the watershed and which roads need treatment to protect the resources of the watershed?

The Bear Camp road (FS Road #23) and the Burnt Ridge road (FS Road #2308) are the primary roads in the watershed. In 1968/1969 the Bear Camp Road became a "tie through" road providing a east-west travel route from Grants Pass to Agness and the Rogue River. Use of the road increased to seasonal average of 100 to 130 vehicles per day in the 1990's after the road was paved in 1988. The Burnt Ridge road became a tie through road in 1968 and is used as an alternate east-west travel route. These roads are generally open from mid-May to mid-November, dependent on snow conditions. The remaining roads in the watershed were initially constructed for timber harvest access, but also provide roaded-recreation opportunities

In response to a shrinking road maintenance budget, the Forest completed a Network Analysis in Spring 1994 to determine which roads were needed to continue land management activities and to provide for general public access. Within the Shasta Costa watershed, about 30 miles of road were identified as being needed and were classified as primary and secondary roads. The remaining 26 miles of road (approximate) were classified as candidate roads to be potentially closed to vehicular traffic as need, funding and priorities allowed

The Network Analysis was used as a starting point to further assess the roads in the watershed from a variety of resource perspectives. These include: sediment source potential, effect on peak flow, proximity to critical reach, wildlife concern, proximity to Port-Orford-cedar (POC), level of recreation use, and level of potential or actual administrative and commercial use. Each road was rated with a high, moderate or low factor on how that road might affect the resource Finally, a treatment option and any comments were recorded

Stormproofing is a road treatment where drainage would be improved so the road would not cause damage to streams in a flood event. Roads that are stormproofed may or may not remain open to vehicular traffic Stormproofing methods may include the removal of shallow culverts, construction of driveable or non-driveable waterbars and dips over culverts, and outsloping. Decommissioning is a type of road treatment that makes the road unusable by vehicles, but can provide greater protection to the streams and resources in a flood event. Examples of decommissioning include pulling culverts, pull back of road fills, ripping of the road surface. Any one or all of these treatments could be used to decommission a road.

Table 12 describes the road assessment for the watershed.

Information Needs: Mapping of old, undrivable "non-system" spur roads in the lower watershed needs to be completed. Most have been walked to determine if there is a need for treatment to protect resources Update mapping, status and condition of "nonsystem" spur roads on GIS There is a need for field evaluation of specific roads for treatment and status.

Management Opportunities: Treatments for specific roads are listed above. The following roads are candidates for decommissioning: 2300.474, 2300.475, 2300.730 (last one mile), 2300.731, 2300.735, 2300.736, 2300.840 2300.842, 2300.844, 2300.860, 2300.864, 2300.915. Additional roads may be added to this list following field evaluation.

The Bear Camp Road (FS Road #23) is in high need of repair and maintenance and the need will likely continue in the future. The Burnt Ridge Road (FS Road #2308) has a moderate need of repair and maintenance. Slide repair and reconstruction will be completed this summer on the Elk Wallow Road (FS Road #2308 016) Stormproofing and maintenance will be needed on this road in the future

Table 12. Road Assessment

Road	Transport Class	Sediment Source	Peak Flows	Proximity to Critical Reach	Wildlife	POC	Recreational Use	Administrative Commercial	Treatment and Comments
2300	Primary	High	Mod/High	Low/Mod	Low	Low	High	High	High need for repair and maintenance. Noxious weed concern Major east/west route
2300.088	Secondary	Low	Mod	Low	Mod	None	Mod	Low	Evaluate Decommission or improve upper section to dispersed rec sites and pull pipes below Last 1/4 mile grown in.
2300 115	Candidate	Low	Low	Low	Low	None	Low	None	No treatment necessary
2300 474 and 2300 475	Candidate	Mod	Mod	Low	Low	None	Low	Low	Decommission and dig out stream crossing Both grown over for the most part.
2300 700	Secondary	Low	Low	Low	Low	Mod	Mod	Mod	Stormproof Waste area access. Infected POC and wilderness concerns.
2300 730	Candidate	Mod	High	Low	Low	Low	Mod	Mod	Decommission last mile of road. The remainder should be evaluated for decommissioning or stormproofing. Last mile closed due to slide
2300 731	Candidate	Low/Mod	High	Low	Low	Low	Low	Low	High candidate for decommissioning. Currently closed Gullies
2300.735	Candidate	Low	Low	Low	Low	Low	Low	Low	Decommision with 730 road.
2300 736	Candidate	Low	High	Low	Low	Low	Low	Low	Currently closed by a slump Decommission with 730 road
2300 740	Secondary	Low	Mod	Low	Low	None	Low	Mod	Stormproof Access for West Knob T.S. High admin needs in the short term. Long term transportation classification could be changed to "Candidate"
2300 770	Candidate	Low	Low	Low	Low	Low	Low	Low	Currently closed Trees growing up in road High priority for evaluation.
2300 820	Candidate	Low	High	Low	Low/High	Mod	Low	High	Currently gated Access to West Knob. Short term high admin needs Low wildlife concerns at beginning of road, high concerns at end of road High priority to evaluate to determine whether to stormproof or decommission

Road	Transport Class	Sediment Source	Peak Flows	Proximity to Critical Reach	Wildlife	POC	Recreational Use	Administrative Commercial	Treatment and Comments
2300 824	Candidate	Low	High	Low	High	Mod	Low	High	Access to West Knob Treat the same as 820 spur
2300 840	Candidate	High	High	High	Mod	Low	Low	High	Currently gated Access to West Knob Road failed in the past Last 1/4 mile closed, grown in Decommission after administrative use complete
2300 842 and 844	Candidate	Mod	Low	High	Mod	Low	Low	High	Treat the same as 840 spur
2300 860	Candidate	Mod/High	Mod/High	Mod	Low	Low	Low	Low	Currently closed Slide at entrance, cut-bank failures Boulders at .2 miles Pipes with large fills Possible waste area near beginning Road goes to near base of Shasta Costa slide High candidate for decommissioning
2300 864	Candidate	Mod	Mod	Mod	Low	Low	Low	Low	Treat the same as 860 spur
2300 900 Part 1	Candidate	Low	Low	Mod	Low	Low	Low	Mod	Small waste area. Potential helicopter landing Stormproof
2300 900 Part 2	Candidate	Mod	Mod	Mod	Low	Low	Low	Low	Old road which parallels stream Data gap on condition of culverts High candidate for evaluation
2300 910	Candidate	Low	Low	Mod	Low	Low	Low/Mod	Mod	Berm at beginning being driven over Potential helicopter landing Maintain until admin use is complete Stormproof.
2300 911	Candidate	Low	Low	Mod	Low	Low	Low	Low	Closed past creek, no problems. No treatment necessary at this time.
2300 915	Candidate	Mod	Mod	High	High	Low	Low	Low	High candidate for decommissioning Erosion source, culvert is diverting flow and gullying occurring in meadow. Need to fix culvert location and entrance management

Road	Transport Class	Sediment Source	Peak Flows	Proximity to Critical Reach	Wildlife	POC	Recreational Use	Administrative Commercial	Treatment and Comments
2300 990	Candidate	Low	Low	High	High	Low	High	Mod	"Rat Hole" Loop Gate - wet weather closure Noxious weed and sensitive plants have high concern. Erosion potential in meadow Fire needs access if have rec use Location of Siletz special use permit Stormproof or improve road for vehicle access Decommissioning would not be successful
2300 992	Candidate	Low	Low	High	High	Low	Mod	Low	Ties into western segment of "Rat Hole" Loop Blocked with a tank trap No treatment necessary Maintain blockage
2300 995	Candidate	Low	Low	High	Low	Low	High	Low	Access to dispersed camping site Water-barred No treatment necessary
2308 000	Primary	Mod	Low	Low/Mod	Low	Low/ Mod	High	High	Moderate need for repair and maintenance Besides 2300 road, receives the most rec, admin travel
2308 016	Secondary	Mod/High	Mod	Low	High	None	Low/Mod	Mod	Stormproofing Reconstruct for admin/ commercial use, commitment to maintenance Potential for resource damage.
2308 110	Candidate	Low	Low	Low	Low	None	Mod	Low	Evaluate for decommissioning - low priority Stormproof
2308 130	Candidate	Low	Low	Low	Low	Low	None	Low	Evaluate for decommissioning - low priority Stormproof
2308 200	Candidate	Low	Low	Low	Low	None	Low	Mod	Evaluate for decommissioning or stormproof Gully and sinkhole problems.
2308 202 and 206	Candidate	Low	Low	Low	Low	None	Low	Mod	Evaluate with 200 road Primarily in N Fk Indigo watershed
2308 210	Candidate	Low	Low	Low	Low	None	Mod	Low/Mod	No treatment necessary at this time
2308 230	Candidate	Low	Low	Low	Low	None	Low	Mod	Stormproof Future precommercial thinning
2308 240	Candidate	Low	Mod	Low	Low	None	Low/Mod	Mod	Evaluate for decommissioning. Stormproof A couple of large (36 inch +) culverts need to be evaluated. Future precommercial thinning

Road	Transport Class	Sediment Source	Peak Flows	Proximity to Critical Reach	Wildlife	POC	Recreational Use	Administrative Commercial	Treatment and Comments
2308 250 and 255	Candidate	Low	Low	Low	Low	Low	Low	Low	Stormproof
2308 260	Candidate	Low	Mod	Low	Low	Low	Low/Mod	Low/Mod	Stormproof. Need to evaluate for sediment potential. Administrative use in the near term, less in the long term
2308 261	Candidate	Low	Low	Low	Low/Mod	Low	Low/Mod	Low/Mod	Stormproof Decommission last 1/2 mile at steep pitch Administrative use in the near term, less in the long term
2308 270	Candidate	Low	Low	Low	Low/Mod	Low	Low/Mod	Mod	Stormproof Gorse site in unit off of road Special forest products - huckleberry Need to remove garbage dumped Future precommercial thinning.
2308 409	Candidate	Low	Low	Low	Mod	None	Low	Low	No treatment necessary at this time
2308 410	Candidate	Low	Low	Low	Mod	None	Low	Low	No treatment necessary at this time
3577 000	Secondary	Low	Low	Low	Low	None	Mod	High	Stormproof and/or maintain. Most of the road is not in the watershed
3577 non-system spurs	Candidate								In Sections 8 and 9 (WAA's 16 and 17) Currently overgrown Need to evaluated for condition and possible treatment
3577 040	Candidate	Low	Low	Low	Low	None	Low	Low	Need to evaluate for pulling culverts and closing entrance
3577 090	Candidate	Low	Low	Low	Low	None	Low	Low	Need to evaluate for decommissioning

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