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BRADFORD CREEK WATERSHED ANALYSIS

ITERATION 1.0

DEC 2002

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

SIGNED_____ DATE_____

TABLE OF CONTENTS

Title Page 1

Watershed Analysis Summary 3

Summary Matrix 5

Key Findings 14

Watershed Analysis Narratives 16

Aquatic Ecosystem 16

Terrestrial Ecosystem 23

Social Aspects of the Watershed 33

Appendices

GIS Maps and Reports List 42
Road Restoration Priorities 43
Hydrology Data 44
Literature Cited 45
Interdisciplinary Team Members 48

Watershed Analysis Summary

Introduction

The Bradford Creek Watershed Analysis was initiated to obtain information on the condition of the watershed. That information will be used to guide future resource management projects in the watershed. It will also be used in project analysis to ensure that 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 the Ecosystem Analysis at the Watershed Scale, (Version 2.2, August 1995). The watershed analysis has three components: the aquatic 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. For example, both aquatic and vegetative ecosystems are derived in part from the geology of the watershed. And, riparian areas are essential to the aquatic ecosystem, but they are also very important to the terrestrial ecosystem and to the social aspects of the watershed.

This watershed analysis report contains the watershed analysis summary, the watershed analysis narratives, and the appendices. The narratives cover the same topics as the summary, but with greater detail. The appendices provide supporting detailed information to the analysis report.

Bradford Creek Watershed

The Bradford Creek watershed is a small watershed, approximately 2350 acres. It is located on the south side of the Rogue River between the Quosatana watershed to the west and the Lawson watershed to the east. Bradford Creek drains into the Rogue River approximately 17 river miles northeast of the community of Gold Beach. The elevation ranges from 70 feet at the confluence with the Rogue River to 3780 feet at Wildhorse Lookout. Average annual precipitation varies from 105 to 120 inches occurring primarily between October and May. Coastal fog during the summer months often extends inland to elevations near 1,500 feet, blanketing the lower one-third of the drainage. This maritime influence often ends at Wildhorse Ridge on the eastern portion of the watershed. Road 33 provides vehicle access to the lower portion of the watershed and Road 3318 and 3318.300 provide access to the upper portion of the watershed.

The watershed has been allocated to the following management areas by the Siskiyou Land and Resource Management Plan (LMRP) as amended by the ROD, 1994.

Management Areas	**Acres**
Supplemental Resource	745
Late-Successional Reserves	81,022
Special Wildlife	9 172
Riparian Reserves	11122
Partial Retention Visuals	13782
Matrix	1436
Total National Forest Land	**2,179**
Total Private Land	172
Total Acreage	2,351

AQUATIC ECOSYSTEM SUMMARY

KEY QUESTION: **What is the physical and biotic character of the fish habitat in the Bradford watershed?**

FACTORS	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
Sediment	There is a high amount of sediment in the first 0.7 miles of Bradford Creek. This is a result of both natural and human-caused processes.	Prevent increase in sediment from management activities.	Roads 3300.160 and 3318.300	Decommission or stabilize drainage.
Riparian reserves		Ensure that future harvest does not destabilize slopes or stream banks.		
Hydrology	Streamflow is rainfall dominated, with 30% of the watershed within the transient snow zone. Harvest and roading probably increased peak flows in the past, increasing sediment delivery. Harvested areas and skid roads are revegetating, restoring natural flow volumes. Road densities are not high.	Maintain streamflow.	Throughout watershed.	None at this time.
Large wood	Stream surveys completed in 1993 indicated less than optimum amount of large wood exists. Past harvest decreased both the amount of large wood in the streams and the future supply of large wood.	Provide for long term, future recruitment of large wood.	Harvested areas	Precommercial thin and/or plant conifers in riparian areas within old harvest units as needed.
Channel morphology	The lower 0.7 miles of Bradford Creek are aggraded, with few pools. Most other segments and streams have steep gradients with step pools and cascades. Some streams with clearcut banks are incised with bank failures.	Maintain natural processes.	Throughout watershed	None at this time.
Temperature	Stream temperatures are cool due to the short stream lengths, steep gradient, north aspect, and shading of the mainstem. This provides thermal refuge for salmonids at the mouth of Bradford Creek in the Rogue River.	Prevent increases in temperature during management activities.	Throughout watershed	None at this time.
Fish Distribution	The first 0.7 miles of Bradford Creek provides habitat for resident cutthroat trout.	Maintain high quality.	0.7 miles from the mouth	None at this time.
Aquatic non-fish fauna	Bradford Creek watershed provides habitat for numerous salamanders and tailed frogs. Little is known about the macroinvertebrate populations.	Maintain high quality habitathroughout watershed	None at this time.	

KEY QUESTION: **What are the important processes in the Riparian Reserves?**

KEY PROCESSES	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
Ephemeral channels transport sediment, water and nutrients and may have a site-specific biological role. **Intermittent channels** transport and supply sediment, water, allochthonous material and nutrients, and large woody material. It is important to maintain riparian vegetation as a source of allochthonous material. These areas provide thermal refuge for hillslope organisms, travel corridors for terrestrial organisms and important habitat for amphibians. **Perennial and fish bearing streams** have the same processes as intermittent streams, although these streams are more important biologically. Important processes include slope stability, large wood delivery to streams and riparian areas, and shade for stream temperature and microclimate.	In the past, management-caused bank failures have occurred in areas of ravelly Colebrook schist. Existing and future large wood and the conifer tree component of Riparian Reserves has been reduced by past timber management. These conditions should be taken into account if adjustment of Riparian Reserves is considered.	Define important aquatic and terrestrial processes so that Riparian Reserve widths may be adjusted based on a site-specific basis. Achieve Aquatic Conservation Strategy objectives and wildlife dispersal objectives.	Intermittent stream Riparian Reserves are the most likely to be adjusted from interim widths. Perennial stream buffers are less likely to be adjusted.	Interim Riparian Reserve widths may be adjusted to better meet on the ground conditions (i.e. topography, vegetation, etc.) if Aquatic Conservation Strategy objectives and wildlife dispersal objectives are met. Adjustment of Riparian Reserve widths may be investigated and/or proposed in specific management projects in the future.

TERRESTRIAL ECOSYSTEM SUMMARY

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What is the historic and existing late successional stage distribution in the watershed?	78% of the watershed (1,840 acres) was late-successional habitat prior to 1960 when timber harvest began. 63% of the watershed (1,471 acres) was interior forest habitat and it was mostly contiguous. Currently, 45% of the watershed (1,051 acres) is late-successional habitat and 12% (290 acres) is interior forest habitat.	Maintain existing large blocks of late-successional habitat. Accelerate growth and development of early-mid seral stands into late seral stands. Increase patch sizes of older forest and interior forest habitat by developing adjacent early and mid seral stands into late seral.	Early seral or mid-seral stands that could be precommercial or commercially thinned to enhance late-successional habitat. The highest priority would be those stands that increase future interior habitat or connectivity.	About 272 acres of precommercial thinning and 289 acres of release of managed stands in Late Successional Reserve (LSR) can be done in the next 5 to 10 years. About 400 of these acres could fill gaps in the core habitat area in the center of the watershed. About 50 to 100 acres of commercial thinning opportunities also exist in LSR.
What are the special/unique habitats in the watershed and how are they changing?	Open meadow areas are being reduced in size by tree encroachment. A rock area and an old-growth area have also been designated as special habitats by the Siskiyou LRMP. Their condition is not changing.	Restore open meadow habitat. Maintain rock habitat and old-growth habitat.	Wildhorse Meadow, Wildhorse Lookout Meadow and Shea Meadow have been heavily encroached. The portion of Fritsche Meadow in Bradford watershed has only limited encroachment.	Cut, girdle, or cut and remove encroaching trees in and around open meadows and around remnant black oaks. Manage with a prescribed fire program.
What is the relative abundance and distribution of the species of concern in the watershed?	The following threatened/sensitive species have been observed: peregrine falcon, bald eagle, northern spotted owl, marbled murrelet, red-legged frog and Del Norte salamander. Habitat for white-footed vole and wolverine occurs in the watershed. The only sensitive plant species documented in the watershed is Triteleia hendersonii var. leachiae.	Maintain or increase the population of threatened and sensitive plant and animal species within the watershed by maintaining or increasing habitat capability.	Protect known sensitive species sites. Develop potential habitat areas for spotted owls and marbled murrelets. Priority areas include those that will contribute to developing large blocks of interior late-successional habitat. Maintain and improve unique habitats.	Maintain and protect known sensitive plant and animal sites. Develop murrelet habitat (large limbs) and spotted owl structure within stands. Improve habitat conditions for spotted owls by developing recruitment/potential habitat stands. Restore and maintain meadows to protect Triteleia hendersonii var. leachiae habitat.
What risk does each road in the watershed present in spreading Phytophthora lateralis?	Lower quantities of Port-Orford-cedar (POC) trees than in the adjacent Lawson and Quosatana watersheds, mostly in riparian areas. Port-Orford-cedar root disease (Phytophthora lateralis) is known to have infested the tributary below road 3318.308. It is suspected that other tributaries in the watershed are also infested. The spread of the disease south of the Rogue River has slowed but still occurs.	Reduce risk of spread to remaining uninfested tributaries within and outside the watershed.	Individual POC trees, upslope areas, and remaining uninfested tributaries, especially west side of Wildhorse Ridge - Roads 3318.300, 3318.050.	Cut Port-Orford-cedar from edges of roads. Close selected roads to motorized vehicles. Clean equipment before operations. Restrict high-risk uses to dry season. Use disease-free or treated water in activities. Place rock on infested road sites where appropriate Plant disease resistant trees. Educate Public and enforce road closures.

TERRESTRIAL ECOSYSTEM SUMMARY

KEY QUESTION	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
What are the locations and risk of spread of noxious weeds?	Four noxious weed species currently inhabit the watershed. Most weed sites are currently restricted to disturbed sites. Scotch broom is beginning to appear in the watershed. Canada thistle, bull thistle, and tansy ragwort are established in the basin. Gorse and star thistle have not yet been found in the watershed but have been found on areas bordering the watershed making them potential problems.	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.	Several small colonies of scotch broom have been detected on roads 3318.057, 3318.053.	Cut/pull/burn colonies of broom, and monitor sites for re-occurrence. Immediately eradicate any new sites for broom, gorse, star thistle, or meadow knapweed. Clean construction equipment before and after operation. Use only "clean" fill material and "certified" weed free hay. Reduction of soil disturbance (i.e. ripping roads) in weed infested areas will help control populations. Use of biological controls may be necessary to control some weed species.
What risk does white pine blister rust present in the watershed?	White pine blister rust occurs in lower quantities than the adjacent Lawson and Pistol watersheds. High stand density in sugar pine sites is increasing the risk of stress and introduction of bark beetles and blister rust.	Reduce risk of spread.	Upslope and ridgetop areas, and the westside of Wildhorse Ridge.	Reduce stand density through thinning and/or prescribed fire, and planting disease-resistant trees.
What is the fire history and the future role of fire in the watershed?	Fire burned through the entire watershed in 1917. Historically, lightning fire starts within the drainage have been very low in frequency. Although no serious effects are obvious at this time, fire suppression has prevented fire from playing its natural role for the past 50 years. Overall fuel loading in the watershed is somewhat less than Quosatana watershed. Continued fire exclusion may have an adverse effect on certain habitats in the watershed and prescribed fire may provide a benefit to these areas.	Determine what areas and habitats would benefit from the use of prescribed fire. Determine conditions and fire intensity levels where benefits would be achieved.	Encroached meadows, late successional habitat, stands with high fuel loading.	Prescribed fire can be used to achieve the objectives of special and unique habitats, Late-Successional Reserves and other land allocations. Fire management plans will need to be completed to determine conditions where prescribed fire will be used. Account for private land holdings in these management plans.
What areas are available for land exchange/purchase that would benefit unique habitats in the watershed?	About 7% (172 acres) of the watershed is in private ownership. Fritsche Meadows has been identified as a possible candidate for land exchange. A block of private land is in Late Successional Reserve (LSR). It would be beneficial to acquire ownership to promote late successional characteristics in the stand. This block also bisects a habitat connection between Bradford Creek and Lawson Creek. Currently, little funding for land exchange exists.	Maintain unique habitats such as meadows for landscape diversity. Work with private landowners to maintain continuous unique habitat across ownerships. Consider land exchange with private land owners where unique habitats and LSR would benefit.	Fritsche Meadow. Lands with potential LSR characteristics in center of Bradford watershed.	Fritsche Meadow and land with potential LSR characteristics could be acquired as land becomes available and as funding allows.

SOCIAL ASPECTS SUMMARY

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 foodstuffs, basket making, woodworking etc. Trade and travel routes also traverse the watershed with associated short term traveling camps. Evidence of stone tool manufacture exist in the watershed. Vision quest sites may also exist.	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 uses of the watershed?	Historic elements represent early settlement, the works of the Civilian Conservation Corps (CCC) 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, or CCC 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 as well as commodity production.	Identify and protect cultural resources.	Meadow areas, some which contain early settlement structures and remains. Sites containing Forest Services administrative facilities such as Wildhorse Lookout, historic camps and guard stations. All existing trails and trail segments including those former trails located on the 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.
What are the current recreational uses and where do they occur in the watershed?	Recreational uses include hiking and motorized recreation (sightseeing, hunting, camping, Christmas tree cutting, non-commercial collecting of special forest products, and snow related activities). Overall use is light and is expected to remain the same or gradually increase. A non-system trail runs from Fritsche Meadow to Road 3300.160. The Recreation Opportunity Spectrum classification for the entire watershed is Roaded Natural.	Provide recreational facilities, roads, and trails which meet the needs of the public and are appropriate with other management goals.	Wildhorse Prairie and dispersed campsite, Wildhorse Lookout, and a non-system trail receive off-road recreational use. Motorized recreation occurs on Roads 3318.300, 3318.308 and other short spur roads.	Develop and provide information to the recreating public on appropriate use of undeveloped areas and dispersed campgrounds, and value of unique habitats. Pack it out garbage/waste. 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.
What areas are appropriate for electronic sites in the watershed?	The Wildhorse Lookout site was evaluated for potential use as an electronic site in September 1992. It was determined that it was not suitable and was not designated as an electronic site.	None at this time.	None at this time.	None at this time.

SOCIAL ASPECTS SUMMARY

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

TYPES OF COMMODITY	EXISTING CONDITION	OBJECTIVES	PRIORITY LOCATIONS	OPPORTUNITIES
Timber	About 993 acres of timber has been harvested in the watershed. In the future, timber harvest could include commercial thinning or regeneration harvest in matrix/partial retention. Commercial thinning or hardwood conversion could occur in Late-Successional Reserve (LSR) if it would improve the stand's ability to develop late-successional habitat characteristics at an earlier date.	Produce commercial timber while meeting management area objectives. Commercial thinning: treatment of dense or single structure mid-seral stands in matrix/partial retention and next to late successional habitat patches in LSR. Regeneration harvest: Late-seral vegetation in matrix/partial retention.	The following broad opportunities exist: commercial thinning in matrix/partial retention - 100 to 150 acres; regeneration harvest in matrix/partial retention - 100 acres; commercial thinning in LSR - 50 to 100 acres. Site-specific information and analysis would have to be obtained before specific recommendations could be made for harvest in these stands.	
Special Forest Products (SFP)	Collecting has occurred over a broad area of the watershed with minimal impacts. Only Road 3318.300 (incense cedar) and the Coos-Curry Powerline Corridor (Port-Orford-cedar and other SFP) have been identified as potential areas for concentrated harvest. Products include: cedar posts, poles, and bolts; a variety of mushrooms; ferns; Christmas trees; burls; brush; boughs; beargrass; alder; and firewood.	Provide the opportunity for collection of SFP.	Areas close to roads and markets. Locations need to be assessed for risk of spreading Port-Orford-cedar root disease and for other impacts or conflicts with management area objectives.	Provide a sustainable collection of special forest products and meet management goals through collection permits and/or contracts.
Mining:	Prospecting has occurred in the past, but no significant minerals have been produced. A greenstone rock quarry was developed at the end of Road 3300.160. The mineral rights to this quarry are owned by the Lloyd Corporation.	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 has occurred since the 1850's and was first permitted by the Forest Service in 1924 as the Wildhorse-Quosatana Range Allotment. The allotment was vacated some time between 1965 and 1974, although the exact date is unknown. It has not been reissued.	Maintain populations of deer and elk. Protect important populations of native grasses. Protect riparian areas. Protect existing recreational opportunities.	None.	None.

KEY FINDINGS

Resident cutthroat trout inhabit the first 0.7 of a mile of Bradford Creek. Embeddedness is moderate in the low gradient reach where the fish occur due to sediment delivery from natural and human caused processes. Pool habitat is low along with the amount of large woody material. There is an opportunity to improve fish habitat and recruit future large wood by planting and thinning conifers, and releasing conifers from hardwood competition in the riparian areas.

Physical aspects of the fish habitat in the watershed have been affected by timber harvest and road construction. These activities have increased sediment delivery from landslides and may have increased peak flows for a few decades. Summer stream temperatures are very cool, providing a small thermal refuge for salmonids in the Rogue River where Bradford enters. There is an opportunity to limit future sediment production by stabilizing some portions of roads in the watershed.

Interim Riparian Reserve widths may be adjusted in conjunction with management activities if Aquatic Conservation Strategy objectives and wildlife dispersal objectives are met. Riparian Reserves of intermittent streams have the greatest liklihood of being adjusted due to their highly variable characteristics.

Late-successional and interior forest habitats are fragmented. The amount of interior late-successional habitat in the watershed has been reduced from a level of 63% (1471 acres) before timber harvest began in 1960 to an existing level of 12% (290 acres). There are opportunities to precommercial and commercial thin in the Late-Successional Reserve (LSR) to promote development of late-successional habitat.

Open meadows are being reduced in size by tree encroachment. These areas can be treated by prescribed burning, cutting, girdling, or cutting and removing encroaching trees.

Port-Orford-cedar occurs in lower quantities than in the adjacent Lawson watershed, mostly in riparian and wet serpentine sites. Port-Orford-cedar root disease is limited to the tributary below Road 3318308. Measures which reduce the risk of spread include cutting Port-Orford-cedar along roads, closure of roads, restricting high-risk use to dry seasons, planting disease-resistant trees, and other measures.

Noxious weed infestations occur on the 3318.053 and 3318.057 roads. Weeds are spreading along roads. Scotch broom is beginning to appear. Canada thistle, bull thistle, and tansy ragwort are established. Star thistle, gorse, and meadow knapweed have not been found in the watershed, but are potential problems.

White pine blister rust occurs in lower quantities than the adjacent Lawson and Pistol watersheds. There are locations where the risk of spread can be reduced through stand density measures, such as thinning and burning, and planting disease-resistant trees.

A **human-caused fire** burned the entire watershed in 1917. Lightning-caused fires have been very low in frequency. Fire suppression has been very effective for the past 50 years. Continued fire exclusion may have an adverse effect on certain habitats in the drainage and prescribed fire may provide a benefit to these areas.

A priority area for **land exchange** in the watershed is Fritsche Meadows.

Recreational use is currently light and is expected to continue at that level or gradually increase. Recreational uses include dispersed camping, hiking, and motorized recreation including sightseeing, hunting, and snow related activities. The Recreation Opportunity Spectrum classification for the watershed is Roaded Natural.

Potential commodity production opportunities include timber harvest, special forest products and mining. Timber harvest opportunities in matrix and partial retention visuals allocations include commercial thinning, brushfield conversion, and regeneration harvest of scattered late seral vegetation. There are opportunities for special forest products collection in the watershed. Currently there is no mining activity in the watershed. Future mining opportunities are unknown and dependent on market conditions.

AQUATIC ECOSYSTEM NARRATIVE

The following issue and key questions were developed to focus and describe the aquatic ecosystem of the Bradford Creek watershed.

Aquatic Issue

Past timber harvest and road construction combined with periodic flood events have deposited sediment and removed riparian vegetation from Bradford Creek and its tributaries.

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

There are a number of factors in answering this key question: geology and sediment, hydrology, channel morphology, water quality, fish distribution and aquatic non-fish fauna.

The reference condition for the physical factors of fish habitat is pre-timber harvest. The 1957 aerial photos are the most applicable for pre-harvest conditions and were used to determine reference conditions.

Geology

Most of the rocks in the watershed were deposited as marine sediments between 95 and 150 million years ago. Subsequent tectonic activity accreted these rocks onto the North American continental plate. During this process these marine sediments were subjected to higher temperatures and pressures which metamorphosed some of these rocks into phyllites and schists.

The watershed contains two major formations and three rock types. The three formations found in the watershed are the Colebrooke and the Dothan. The rock types are sediments, metamorphics (schists) and submarine volcanic rocks.

Colebrooke schist covers the largest part of the area, and dominates the eastern portion of the basin. Included within the Colebrooke are metamorphic rocks derived mainly from fine-grained sedimentary rocks and subordinate amounts of submarine basalt. The rocks of this formation are made primarily of fine-grained schist or phyllite with abundant quartz veins. Most likely, the Colebrooke schist was originally Galice formation which was tectonically metamorphosed.

Metavolcanic rock occurs in a number of locations in the watershed, but the largest areas are the east part of Skookumhouse Butte and some areas near Wildhorse Lookout. Areas of metavolcanics are more resistant to erosion than surrounding rocks and tend to form topographic highs.

The Dothan formation is located in the southern portion of the watershed. Rocks of this formation are late Jurassic in age and are about 150 million years old. The Dothan tends to be graywackes, which contain small quartz and occasional calcite veinlets. The Dothan has been thrust under older formations, including the Colebrooke schist. This formation is equivalent to the Franciscan Formation in California. The Dothan formation includes metavolcanic rocks such as pillow basalts and greenstones (altered tuffs and breccias). Colored banded cherts also occur within this formation.

Topography

The watershed ranges in elevation from 70 feet at the confluence with the Rogue River to 3778 feet at Wildhorse Lookout. The terrain is moderate to steep with slopes averaging between 30 and 60%. Approximately 10% of the watershed has slopes greater than 60% (all slope information was gathered using a digital elevation model).

At least two episodes of high-angle faulting have occurred. The trends of these faults are northwest and northeast, with the northwest faults being the younger. The Mountain Wells fault has a northwest trend and runs through the center of the watershed. It is the largest fault in the area and has been mapped for a distance of at least 20 miles. It separates the Colebrooke and Dothan formations in the center of the watershed. The Mountain Wells Fault moves to the north and up on the west side and to the south and down on the east side.

The formation of Bradford Creek and the watershed undoubtedly has been influenced by the Mountain Wells Fault. The fault has created a shear zone where rocks have less resistance to erosion, resulting in runoff water creating channels more readily than other areas within the watershed.

Bedrock and fault activity exhibit some control of slope angle. Areas of volcanic rocks (Skookumhouse Butte and areas near Wildhorse Lookout) exhibit steep slopes, typically 60 to 90% and greater). This is due primarily from the fact that volcanic rocks within the watershed are more resistant to erosion than are surrounding sedimentary rocks. Sediments of the Dothan and Colebrooke formations generally have slopes of 60 to 90% with some areas of greater than 100%.

Sediment

The first timber harvest in the watershed occurred in 1960. In the 1960's, all the private land and 10% (245 acres) of National Forest land was logged. The harvest prescription at that time was clearcutting. Logging methods included using tractors on steep ground, construction of tightly spaced skid trails, road construction with low standards including the use of uncompacted fills, use of logs instead of culverts at stream crossings, and limited consideration for drainage. These practices delivered sediment to streams by fill failures, cutbank failures, sidecast of road waste, stream crossing failures, erosion from stream diversions, increased down cutting and erosion

from increased runoff efficiency and harvest of unstable lands. As a result, sizable volumes of sediment were delivered to Bradford Creek and its tributaries in the east half of the basin.

In the 1980's, road construction and timber harvest practices had improved on National Forest lands and there were fewer direct effects to the streams. It is likely that there were still some indirect effects from increased runoff efficiency from road construction, which slowed stream channel recovery.

Inspection of the 1988 aerial photos show that most areas where road construction and timber harvest had occurred in the 1960's had vegetated and appeared stable, however there were some areas which continued to deliver sediment to streams.

Hydrology

The watershed is small and has a fairly uniform amount of precipitation; 105 inches near the mouth to 120 inches near Wildhorse Ridge. Most of this is within the rain-dominated zone below 2500 feet elevation, however there are some higher elevations near Fritsche Cabin and Wildhorse Ridge that are in the transient snow zone.

The hydrology of the watershed was probably affected by human activities from 1960 when roads were first constructed and clearcutting began to 1988 when recovery was progressing in most areas. Forty-two percent of the watershed (Private and National Forest lands) was clearcut during this period. Of this, 35% of the transient snow zone (2500 to 4000 foot elevation) was harvested. The road density is low, 1.8 miles per square mile. However, this does not include the dense network of cat roads whose effect in concentrating peak flows would have been similar to the effect of roads. Peak flows were probably higher during this period, contributing to increased sediment delivery and channel changes. (See Hydrology Data in the Appendix for additional information).

The present condition of the watershed is well-vegetated, and is probably hydrologically recovered.

Channel Morphology

Most streams within the watershed are steep, over 10% gradient, with step pools or cascades. Substrate varies from gravel to six foot boulders. Streams flowing through clearcut areas are incised and have numerous bank failures. In the late 1960's, tractor yarding across and in the stream channel removed channel structure. During subsequent storms, road crossings washed out, increasing the sediment load. Exposed channels appeared aggraded in aerial photos from 1969 to 1973. The streams have transported and organized the increased sediment since then and appear similar to natural conditions today.

The first 0.7 miles of Bradford Creek, from the forks to the mouth , has an average gradient of 2 to 5% with a long depositional reach before it drops more steeply into the Rogue River. This reach is heavily aggraded, with several elevations of terraces, floodplains, and braided channels.

Because this is naturally a depositional reach, and Colebrooke schist has a naturally high level of sediment production, it is unknown how much the morphology of this reach is affected by the human activities of two to three decades ago. Anecdotal reports say that the sediment deposition noticeably increased following harvest.

Much of the structure in the watershed's stream channels is provided by bedrock and boulders. There is some large wood in the channels, but it is probably lower than pre-harvest amounts. Future large wood was removed from about half the length of the mainstem.

Water Quality

Water quality in Bradford Creek and its tributaries is good. Like most streams in this area, turbidity clears quickly after winter storms or landslides.

Temperatures are consistently cool. Thermographs placed near the mouth in Summer, 1992 to 1995 recorded 7-day average maximums from 59.5 to 61.6 degrees Fahrenheit. The stream is short and flows swiftly, with short duration to solar exposure.

During the period following clearcut harvest with no stream buffers, when much of the channel length (including half the length of Bradford Creek) was exposed to the sun, maximum summer stream temperatures may have been higher. Riparian vegetation has grown back and shading today is good.

Fish Distribution and Biotic Factors

Southwest Oregon Province Relationship

Salmonid fish stocks using Bradford Creek are representative of other coastal Southwest Oregon Province stocks, which roughly occupy the area between Cape Blanco, Oregon and Cape Mendocino, California inland to the crest of the coast range. Most of these salmonids migrate to the ocean to take advantage of the abundance of food there. Where barriers to migration exist in streams, resident cutthroat and rainbow trout are found above the barriers. In most streams open to migration, a small resident trout population exists, presumably in proportion to the amount of food available year around to these fish.

Anadromous salmonids make up the majority of fish life in Southwest Oregon Province streams. The province supports runs of coho, chinook (spring and fall), steelhead (winter and summer), and anadromous cutthroat trout. Chum salmon stray into the rivers, but do not constitute reproducing populations.

Salmonid populations in the Southwest Oregon Province are believed to be in decline (Nielson, et al., 1991). Anadromous fish in the Southwest Oregon Province are managed by the National Marine Fisheries Service (NMFS). Concern for anadromous stocks throughout the Pacific Northwest has prompted NMFS to conduct status review for all anadromous fish in the region.

Two groups of fish occurring in the Southwest Oregon Province have been proposed for listing as Threatened under the federal Endangered Species Act by NMFS, Klamath Mountains Province steelhead and Northern California-Southern Oregon coho. Status reviews by NMFS have not been completed for the other species of anadromous salmonids in the region.
Oregon Department of Fish and Wildlife (ODFW) is responsible for the management of the resident trout stocks. Little is known of the history of these fish, but ODFW is currently researching this. While numbers of individual resident trout may not be lower than historical levels, loss of endemic populations is suspected due to stocking of non-endemic populations for recreational fishing opportunities.

Rogue River Basin Characterization

The Rogue River lies in Southwest Oregon and is the largest coastal stream in Oregon. The Rogue River basin is the only Oregon coastal basin with the exception of the Umpqua River which originates in the Cascade Mountains east of the Coast Range. The Klamath River to the south and the Columbia River to the north begin east of the Cascade Mountains. The Rogue River is located in the Klamath Mountain physiographic area and the Cascade Mountain area which includes the west Cascade sub-province.

The basin is approximately 110 miles from east to west, roughly rectangular, with the main river about 210 miles in length from Crater Lake National Park to Gold Beach. The upper section of the river originates primarily in the steep topography of the Rogue-Umpqua Divide, west slope of the Cascade Mountains and Siskiyou Mountains.

For more information on the Rogue River Basin, refer to the Quosatana Watershed Analysis Fisheries Appendix.

Bradford Creek

Bradford Creek is a lower Rogue River tributary and has its confluence with the Rogue River approximately 17 miles east of the Pacific Ocean. Bradford Creek and Quosatana Creek share watershed boundaries and both lie on the south side of the Rogue River. The Bradford watershed is approximately 2,350 acres in size.

Fish in Bradford Creek have not been studied to any great degree, due to the small area in which they occur. Resident cutthroat (Oncorhynchus clarki) occur from the culvert under Road 33 to 0.7 mile above the culvert and just above the first forks of the creek. An anadromous fish blockage occurs near the mouth, above the culvert. A steep gradient (approximately 8%) prevents the fish from moving further upstream. A waterfall approximately 3500 feet upstream creates another anadromous fish barrier. ODFW maintains Bradford has always been a resident cutthroat trout stream with no anadromous fish present, with the exception of anadromous fish holding at the mouth of Bradford due to the cool water temperatures.

One mile of Bradford (from the mouth to above the confluences) was surveyed in 1993, using the Hankin and Reeves Level II stream survey. Measurements indicated that large wood amounts (24 pieces per mile) were lower than desired (50 to 90 pieces per mile). A riparian zone of 100 feet from the stream channel determined that 17% of the area was in a sapling/shrub seral stage, and 83% of the area was in a small tree seral stage. The dominant species was alder, with myrtle and tanoak also present. The riparian zone survey indicates that a future supply of large wood is not present, due to the lack of conifers.

In the low gradient reach, where the resident cutthroat trout are found, much sediment has been deposited causing a moderate amount of embeddedness. The sediment fills in pools and interstitial spaces, where macroinvertebrates and fish may take refuge. The pool/riffle ratio was 8 to 85. A desirable pool/riffle ratio is 40 to 60, indicating that Bradford Creek is lacking pools.

Bradford Creek is home to other aquatic, non-fish fauna. Tailed frogs (Ascaphus true), Dunn's salamander (Plethodon dunni), (the only known population on the Siskiyou National Forest is in this watershed), Pacific Giant salamander (Dicamptodon ensatus), Southern torrent salamander (Rhyacotriton variegatus), and Del Norte salamander (Plethodon elongatus), which is a sensitive species, are common in the watershed. Various macroinvertebrates are found throughout the creek.

Information Needs: The 1973 infrared photos show numerous landslides into the steeper sections of Bradford Creek in the areas harvested by clearcut. Measuring the distances these slides extend from the stream channel could provide useful data for considering widths appropriate for ensuring bank stability within riparian reserves in areas of similar geology and topography.

Management Opportunities: Increased sediment delivery from existing roads can be prevented. Road 3318.300 from where it crosses Bradford Creek to the first switchback is on unstable ground that has had landslides in the past and will probably have them in the future. Removing culverts and pulling back road fills in this area would prevent exacerbating the natural effects. Road 3300.160 has surface erosion with some gullying. This road is within 500 feet and parallels the depositional reach of Bradford Creek. Delivery of measurable amounts of sediment from surface erosion is improbable, but at least one mass failure occurred shortly after the road was constructed and delivered sediment to the stream. Any culvert failures or other drainage problems could trigger another such event that could have some effect on resident fauna in the stream.

Conifer stocking in riparian areas can be examined to determine if there is an the opportunity to increase the amount of future large wood available to streams by planting conifers and/or thinning dense stands of trees.

What are the important processes in Riparian Reserves for the Bradford Creek watershed?

The Bradford Creek watershed can be stratified into two areas. One area is where timber management has occurred, primarily in the central and mid-eastern portion of the watershed on

Colebrook schist rock. The other area is where timber management has not occurred and is in the far eastern and western portions of the watershed. The geology is primarily Dothan sandstone or Colebrook volcanics.

In considering riparian reserve widths, particular attention should be paid to stability in the Colebrook Schist central portion of the watershed because of past sediment delivery and bank failures. Soils derived from this geology tend to fail more readily and are more sensitive to disturbance. Another consideration is past timber harvest has reduced existing and future large wood and the confier tree component in Riparian Reserves.

Riparian Processes and Components

Riparian Reserves provide both the physical habitat and the energy flow components for biological organisms. Riparian vegetation provides autochthonous and allochthonous nutrition sources, large wood for structure and nutrition in streams and riparian areas, root strength, shade, riparian microclimate, and wildlife habitat, including habitat connections. These components are important in intermittent streams, including ephemeral and intermittent channels, perennial, and fish bearing streams. A more in-depth discussion of these processes and components may be found in the Quosatana Watershed Analysis.

Information Needs: Site specific surveys of streams should be completed prior to any activities that could potentially affect Riparian Reserves (ROD, B-21, 23).

Management Opportunities: There may be management activities where it would be appropriate to modify Riparian Reserve interim widths. Aquatic Conservation Strategy objectives and wildlife dispersal objectives (ROD, B-13, B-16) must be met. Specific Riparian Reserve boundaries would be delineated during planning for site-specific projects based on the analysis of the critical hillslope, riparian, and channel processes. Riparian reserve boundaries for permanently-flowing streams should approximate the boundaries prescribed in ROD standard and guidelines. Riparian reserve boundaries for intermittent streams may vary from interim standards due to the high variability of hydrologic, geomorphic and ecologic processes of these streams (ROD, B-13). Management activities where adjustment of Riparian Reserve widths could be considered include but are not limited to timber sales, road construction and restoration, silviculture projects, special forest products collection, recreation projects, and fish and wildlife enhancement projects.

TERRESTRIAL ECOSYSTEM NARRATIVE

The following wildlife and vegetation issues focus the analysis of the terrestrial ecosystem of the Bradford watershed. Following the issues, the characterizations and key questions were developed to describe the terrestrial ecosystem.

Wildlife and Vegetation Issues

Timber harvest has removed and fragmented a large portion of the late-successional habitat and interior forest habitat in the Bradford watershed. This type of habitat is important to late-successional dependent species including the threatened northern spotted owl and marbled murrelet. The Bradford watershed is within the limited range of the marbled murrelet and occupied behavior has been observed in the watershed. Murrelets have extremely limited occurrence beyond Wildhorse Ridge which is the eastern boundary of the watershed. There is one spotted owl activity center in the watershed.

Meadows are unique habitat type in the Bradford watershed. With the suppression of fire, these meadows are being encroached by hardwoods and conifers. It is important to maintain these meadows for the plant and wildlife species, including sensitive species, that depend on this habitat type for survival.

Non-native species such as noxious weeds, Port-Orford-cedar root disease and white pine blister rust are present and threaten to spread in the Bradford watershed. Control measures for these species have been undertaken in recent years and should continue.

Vegetative Characterization

Marine climate and soils affect vegetation in the watershed. Average annual precipitation varies from 105 to 120 inches, with most occurring between October and May. Coastal fog during the summer months often extends inland to elevations near 1,500 feet, blanketing the lower one-third of the watershed.

Colebrooke schist and the Dothan formation cover the largest part of the watershed and support stands dominated by Douglas-fir and tanoak. Alders replace tanoak in riparian areas and on lower slopes. Western hemlock and/or Port-Orford-cedar are also found in some riparian sites on these soils.

The range of herbaceous species present includes those characteristic of areas with marine influence, such as evergreen huckleberry, and those more characteristic of drier inland areas, such as dwarf Oregon grape. Triteleia hendersonii var. leachiae is the only sensitive plant species that has been found in the watershed.

About half of the Douglas-fir/tanoak/alder stands in the watershed are in plantations from 5 to 40 years old. Alders have dominated some plantations on lower slopes, especially on private and

public land in the central portion. Effects of fire history on vegetative composition are varied. Ridgetop Douglas-fir stands along the eastern rim probably originated from stand replacement fires and were maintained by frequent moderate-intensity underburning that inhibits tanoak. Brushfields on Skookumhouse Butte were likely created and maintained by frequent high-intensity fires.

Dry meadows, grassy areas and brush fields are present on the east and southern edges of Bradford Creek. Meadows such as the Fritsche Meadow complex and Wildhorse Lookout Prairie were likely maintained by fire up until 50 years ago.

Wildlife Habitat CharacterizationCU

The western portion of the Bradford Creek drainage is designated Late-Successional Reserve (LSR). It is part of the southern portion of the Northwest Coast LSR.

The late-successional habitat in the watershed provides important nesting habitat for the threatened northern spotted owl and marbled murrelet. Prior to 1960 when timber harvest began, 78% of the watershed (1840 acres) was in late-successional habitat. Of this, 63% of the watershed (1471 acres) was interior forest habitat and it was mostly contiguous. Currently 45% of the watershed (1051 acres) is in late-successional habitat of which 12% (290 acres) is considered interior habitat.

Pioneer successional (grass/forb/low shrub) habitat in the watershed is found in recent (less than 10 years old) clearcut areas, meadows, and brushfield areas. About nine percent (210 acres) of the watershed is currently in the grass/forb/low shrub condition, compared with only two percent (47 acres) in 1940. The existing clearcut areas that are functioning as grass/forb/low shrub habitat will grow out of this condition within the next five years. Meadow habitat is being encroached by conifer trees.

The remainder of the watershed is in early to mid-successional habitat which typically is smaller diameters trees in a closed canopy condition. Approximately 46% (1081 acres) of the watershed is in this condition.

The following endangered and threatened species have been observed in the watershed: peregrine falcon, bald eagle, northern spotted owl and marbled murrelet. The following sensitive species have been documented to occur in the watershed: red-legged frog and Del Norte salamander. Habitat for the following sensitive species occurs in the watershed: white-footed vole and wolverine.

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 (USDA, 1993). The Regional Ecosystem Approximation Report (USDA, 1993) estimated historic levels of late-successional habitat between 45 and 75

percent for the lower Rogue River basin. Without human influence, it is likely that the Bradford watershed would be on the high end of the natural range of variability for late-successional forest. This is due to its north aspect and low frequency of high intensity fires. However, timber harvest has reduced late-successional habitat to a low level within that range of variability.

Existing habitat connections in the Bradford watershed contain stands in several successional stages. Habitat connections are situated in riparian habitat, as well as along mid-slopes and ridges. Three such connections have been identified in the Bradford watershed. One connection to the Quosatana Creek watershed, one to the Lawson Creek watershed, and one to the Rogue River corridor. Late-successional forest habitat connections at least 1,000 feet wide are necessary to retain the middle 200 feet in a condition that is not affected by the deleterious "edge effect" that result from adjacent stand conditions. Minor impacts in the form of "edge effect" from new clearcuts to the habitat connections to Quosatana Creek and Rogue River corridors has occurred since 1940. The Lawson Creek connection has been bisected by a strip of harvested private land, and new adjacent openings have added "edge effect" to the connection.

Interior forest habitat has been reduced from 63% of the watershed pre-timber harvest to 12% of the watershed currently. The interior forest habitat which does exist is not contiguous. Current levels are likely below the natural range of variability for the Bradford watershed. The large contiguous stand of late-successional forest remaining in the LSR portion of the watershed is ecologically important.

Information Needs: Determine which stands need to be precommercially and commercially thinned to improve late-successional habitat, specifically in Late-Successional Reserves (LSR) and in habitat connections.

Management Opportunities: Potential late-successional habitat can be improved by thinning managed and natural stands of potential habitat. About 272 acres of precommercial thinning and 289 acres of release of managed stands in LSR can be done in the next 5 to 10 years. About 400 of these acres could fill gaps in the core habitat area in the center of the watershed. The following managed stands are priority for precommercial thinning and/or release: 3015330; 3015055; 3015179; 3015315; 3015274; 3015319; 3015320; 3015365.

The highest priority for commercial thinning to improve late-successional habitat are those stands that are mid-seral habitat within stands of existing large late-successional habitat blocks and mid-seral stands in habitat connections. The next priority are those stands that are mid-seral habitat in the LSR that will contribute to the landscape pattern of future late-successional forest habitat. There are about 50 to 100 acres which currently meet the above criteria. Additional surveys need to be completed to determine if stands could benefit from commercial thinning in the future.

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). A total of 196 acres has been designated in the Bradford watershed. This includes three meadows totalling 117 acres (including meadow buffers), one rock area of three acres and one designated old growth area totalling 76 acres. These sites constitute important components of overall wildlife habitat diversity and botanical values within the watershed.

Open meadows are being reduced in size by tree encroachment. Historically, fires helped in maintaining these meadow areas in early seral habitat. In the last few decades with the suppression of fires, the grasses and brush have become overgrown with tree species. The designated old growth area is maintaining its current size.

1940 aerial photos can be used as a reference condition for these special and unique habitats. The amount of encroachment to meadow areas can be determined using these photos. Siskiyou LRMP direction provides for restoration work which returns these areas to a size which approximates 1940 conditions.

Information Needs: Inventories of the meadows need to be completed to determine species composition, amount of encroachment, the best methods to remove the encroachment, and the best methods to improve or restore native grasses and other species.

Management Opportunities: Trees encroaching on meadows should be cut and/or removed, or girdled. Prescribed fire should be used with or without the above treatment to return these areas to an open and early seral habitat condition similar to what existed in 1940. Priority locations for restoration work include Wildhorse Lookout Meadow, Wildhorse Meadow, Fritsche and Shea Meadows (also known as Sorrel Prairie).

What is the relative abundance and distribution of the species of concern that are important 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

Peregrine falcon, bald eagle, northern spotted owl and marbled murrelet, which are listed endangered or threatened species, have all been observed in the watershed. One peregrine falcon was sighted around Fritsche Meadow, but no known nests occur in the vicinity. Bald eagles have been sighted along the Rogue River between Bradford Creek and Quosatana Creek, as well as in the upper reaches of Bradford Creek. It is likely that a nest occurs in this area, but it has not yet been located. Marbled murrelets have been detected in five stands of late-successional Douglas-fir forest in the watershed. These habitats provide the structural characteristics required by the murrelets for cover, roosting, nest sites, and protection from weather and predation. Behaviors

observed infer nesting in the area. The Bradford Creek drainage contains one northern spotted owl activity center, although the nest has not been located. Northern spotted owls are strongly associated with late-successional Douglas-fir forests. The Bradford watershed meets the 50-11-40 rule regarding dispersal habitat for the northern spotted owl.

All habitat in the late-successional seral stage is assumed to be spotted owl and marbled murrelet habitat. For more information, refer to the key question discussion regarding late-successional habitat.

Del Norte salamander and red-legged frog are sensitive species known to occur in the watershed. Habitat favorable for white-footed vole and wolverine also occur in the area. Bradford watershed contains 10 known populations of Del Norte salamanders or 19 percent of those known on the Gold Beach Ranger District. This is significant, especially considering its small size (roughly 1 percent of the district). The watershed also has significant populations of other amphibians that are not designated as sensitive species. Bradford has the only known Dunn's salamander on the Gold Beach Ranger District, as well as large numbers of southern torrent salamander, pacific giant salamander, and tailed frog.

Bradford watershed also has the only sighting for sharp-tailed snake on the Gold Beach Ranger District, a species of special status for Oregon. This is one of only seven sightings on the Siskiyou National Forest.

One species of sensitive plant has been documented in the watershed: Triteleia hendersonii var. leachiae.

Indicator Species

Bald Eagle and Osprey - Bald eagle occurrence has been described above. Osprey are active and nest near the mouth of Bradford Creek just outside of the watershed. Osprey represent other species, such as river otter, which use the Forest's riverine habitat. Riparian Reserves 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. The Late-Successional Reserves will maintain viable populations of species using this habitat type.

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). The 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 Final Environmental Impact Statement (FEIS), pages III-104, III-105). On the Forest, and most likely in Bradford, 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 regeneration harvest in order to provide for 60 percent woodpecker habitat capability over time. Up to 50% of these trees may be existing snags (recently dead, less than five years). Currently there are 2.5 snags per acre in the Bradford watershed which meets 65% habitat capability.

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 is assumed to be the most restrictive habitat component in this area (Siskiyou LRMP FEIS, pages III-106, III-107). Elk and deer represent more than 180 wildlife species that need young successional stages to meet all or some of their requirements (Guenther and Kucera 1978, Brown 1985).

Elk habitat was evaluated using a model developed for application in Western Oregon. The model was based on the interactions of four variables: size and spacing of forage and cover, road density, cover quality, and forage quality (Wisdom et. al., 1986). **The following table lists the acres of each type of habitat estimated for the Bradford watershed.**

Habitat Type	Acres	Percent of Watershed
Optimal Cover	602	27
Thermal Cover	449	20
Hiding Cover	421	19
Forage	796	35

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. Hiding cover allows elk to escape human disturbances. The quality of forage is as important as the amount of forage available. There are 1.76 miles of road per square mile of area in the Bradford watershed. Motor vehicle access allows human disturbance which reduces elk use of habitat adjacent to roads.

The elk habitat effectiveness model gave an overall score of 0.52 on a scale of 0 to 1.00, with 1.00 being optimal. A score of 0.52 indicates that the habitat present in the Bradford watershed is capable of supporting a viable population of elk. The four component values were: sizing and spacing of forage and cover areas, 0.82; density of roads open to motorized vehicles, 0.52; cover quality, 0.63; and forage quality, 0.27. The lowest value was forage quality which makes it the most restrictive habitat component. Forage seeding could be used where timber harvest occurs to enhance the forage value. Larger amounts of permanent forage areas (meadows) would enhance this habitat component. Seeding commercial thinning with shade tolerant grasses, such as Elymus glaucus, would also enhance this value. Roads could be closed to vehicular travel to improve the road density value.

The Wildhorse Ridge area in the Bradford, Quosatana and Lawson watersheds has been designated as a restocking release site for Roosevelt elk by the Oregon Department of Fish and Wildlife. The amount and quality of habitat was surveyed in August 1994 by John Toman (ODFW) and Mike Miller (USFS) to determine an estimated number of elk that could be stocked and maintained in the area. It was estimated that 40 to 70 elk could be released to revitalize the existing populations. Historically, these watersheds maintained larger elk herds than those that currently exist.

Deer are found throughout the watershed, though a current estimate of their population is unavailable. Deer use newly harvested areas and meadows for foraging. They also feed on acorns from oak trees throughout the area and use riparian areas during fawning season and summer. The majority of meadows below 3,000 feet in elevation are 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) data needs to be ground verified to ensure validity. The correlation between certain vegetation types, seral stages and wildlife use of those habitats need 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 and marbled murrelet 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. Murrelet habitat (large limbs) within stands can be developed. Spotted owl structure within stands can be developed. Encroaching trees in open meadows and serpentine areas can be cut and/or removed or girdled. These habitat types can be burned to remove encroachment and benefit native species.

What risk does each road in the watershed present in spreading Phytophthora lateralis?

Port-Orford-cedar occurs in lower quantities than in the adjacent Lawson and Quosatana watersheds, mostly in riparian areas. Phytophthora lateralis is a root disease spread by water-borne spores which is deadly to Port-Orford-cedar. The disease is known to have infested the tributary below Road 3318.308 and it is suspected in other tributaries in the watershed. Since the disease was introduced 20 to 30 years ago, spread has slowed, but there is still a risk of spread to areas that have not been previously infected.

The following list ranks the roads in the Bradford watershed. The risk assessment matrix from the interregional Port-Orford-cedar disease control strategy format was considered along with amount of traffic, miles of uninfested stream, risk of disease export, and risk of disease spread within already infested areas.

Road	Risk rating	Ranking	Miles of uninfested stream	
			Percent POC along road	
3318.053/054/057	High	1	1.5	0-40
3318	Moderate	2	0.5	0-20
3318.300	Moderate	3	0.5	0-20
33	Moderate	4	0.0	0-20

Road 3318.057 currently has a seasonal closure in place. Year-round closure is proposed on 3318.057 and seasonal closure is proposed on 3318.050. Sanitation of small Port-Orford-cedar (less than 8 inch diameter) has been completed within 25 to 50 feet of roads 3318 and 3318.300.

Information Needs: Appropriate sites and levels of stocking need to be determined for riparian planting of disease-resistant Port-Orford-cedar and other species.

Management Opportunities: The following prevention techniques can be used to minimize the spread of Phytophthora lateralis: sanitation cutting and/or logging Port-Orford-cedar from the edges of the roads; closure of selected roads to motorized vehicles; cleaning equipment before any operations; restrict high-risk uses to dry season only; use disease-free water in fire suppression and other activities; place a lift of rock on infested road sites where appropriate; plant resistant trees in low-risk riparian sites and upland sites; and provide public education and enforcement of road closures.

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

Four noxious weed species currently inhabit the watershed. Noxious weed populations have likely increased as the road mileage in the watershed increased. Most populations are currently restricted to disturbed areas including roadsides, disturbed woodlands, landing sites, and streambeds. Scotch broom is beginning to appear in Bradford and its aggressive nature threatens to destroy native plant communities. Infestations of gorse have been detected just outside the watershed and it is likely colonies will soon be detected in Bradford. Gorse and broom may become safety hazards due to their highly flammable characteristics. 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. Star thistle and meadow knapweed have not yet been found in the watershed but have been found in the proximity of the watershed making them potential problems.

The following list provides more detailed information on which species of weeds inhabit which roads.

RoadsWeed Species

3318.053 two scotch broom sites, tansy ragwort, bull thistle.
3318.057 scotch broom site

Information Needs: Complete surveys to determine noxious weed locations.

Management Opportunities: Treatment of infested areas is needed to reduce, control and/or eliminate the further spread of these plants in the watershed. Treatment opportunities include cutting, pulling or burning noxious weeds, closing roads, cleaning heavy construction equipment before and after work at construction sites, using only "clean" fill material, and using only certified weed-free hay. Reduction of soil disturbance (i.e. ripping roads) in weed infested areas will help control populations. Control methods are limited for thistles and tansy because of their wide distribution. Biological controls may be used to control noxious weeds.

What risk does white pine blister rust present in the watershed?

White pine blister rust occurs in lower quantities than the adjacent Lawson, Pistol, and Quosatana watersheds. However, high stand density in sugar pine sites is increasing the risk of stress and introduction of bark beetles and lister rust. The disease risk is highest at sites that collect high amounts of summer fog. In Bradford, these areas include upslope and ridgetop areas, mostly on the westside of Wildhorse Ridge.

Information Needs: Individual site surveys would need to be completed prior to determining site specific prevention techniques.

Management Opportunities: Possible prevention techniques include reducing stand density through thinning and/or burning, and planting disease resistant trees.

What is the fire history and future role of fire in the watershed?

There is evidence of both prehistoric and historic fires in the watershed that were caused by lightning or were human-caused. These fires in combination with the soils of the watershed have had a significant influence on the vegetative diversity and wildlife distribution of the area for thousands of years.

A single human-caused fire burned the entire Bradford Creek drainage in 1917. Historically, lightning fire starts within the drainage have been very low in frequency. Two lightning-caused fires have been recorded in the past eight years. One of the lightning fires had the potential to evolve into a major fire, but was held to a small size by retardant and road access.

Although no serious effects are obvious at this time, fire suppression has prevented fire from playing its natural role for the past 50 years. Continued fire exclusion may have an adverse affect on certain habitats in the drainage and prescribed fire may provide a benefit to these areas.

The area experiences a somewhat unique climatological influence because of its location. The Bradford watershed is located at a major bend in the Rogue River corridor. The drainage becomes charged with warm air from the late afternoon down-river winds during the summer. This effect is much more pronounced in the Bradford drainage than in the adjacent Quosatana drainage. This would have a serious effect on fire behavior if a fire did occur under these conditions.

Private land holdings within and adjacent to the drainage are protected by Coos Forest Protective Association. Under a reciprocal mutual aid agreement, Forest Service firefighting resources share in protecting these lands utilizing "the closest forces" concept.

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.

Management Opportunities: Prescribed fire can be used to achieve the objectives of special and unique habitats such as meadows, Late-Successional Reserve and other land allocations. Fire management plans will need to be completed to determine conditions where prescribed fire will be used. Private land holdings need to be accounted for in these management plans.

What areas are available for land exchange that would benefit unique habitats in the watershed?

Some meadows and portions of the Late-Successional Reserve are currently in private ownership. If these lands become available for a land exchange, and the Forest Service has funding, there would be a benefit to the landscape diversity of the watershed for these lands to be acquired. In the interim, the Forest Service and private landowners can cooperatively work to maintain continuous unique habitat between ownerships.

Fritsche Meadows is a potential site for land exchange. It is 320 acres and is located on the central eastern boundary between Quosatana Creek and Bradford Creek. Fritsche Meadows as well as the other meadows in the Bradford watershed provide excellent forage for big game and habitat for native grasses and sensitive plant and animal species. Meadows and unique habitats are an important component of the watershed.

Another priority for land exchange are those lands with potential Late-Successional Reserve characteristics. This is especially important where there is intermingled private and National Forest ownership and there is potential to improve the distribution and quality of the Late-Successional Reserve. This situation does exist in Bradford and in addition, the private land bisects a habitat connection between Bradford Creek and Lawson Creek. There is an opportunity to promote late-successional characteristics of the watershed if ownership of this land is acquired.

SOCIAL ASPECTS NARRATIVE

The following characterizations and key questions were developed to describe the past, present and potential future human uses of the Bradford Creek watershed.

Cultural Characterization

The watershed is characterized as a dynamic landscape whose main influences are Bradford Creek and the Rogue River. The interactions between natural and human forces have shaped the human use of the area in the past and present. Human uses have influenced the configuration of plants, animals and even the topography of the watershed. In a symbiotic relationship, the land provides plant and animal resources which have influenced human use.

Flat, open land, preferred for human use, is limited within the watershed. Although much of the watershed appears to be uninhabitable, the resources of the watershed have encouraged humans to occupy and exploit this rugged terrain. In general, most human induced impacts to the watershed have occurred in recent history.

The prehistory and history of the analysis area are treated in 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 and ethnographic information relating to the Bradford Creek watershed is scant, but growing. Most archeological and anthropological research has focused on areas outside of this watershed.

The Native American groups which inhabited southwestern Oregon consisted of several groups; each spoke a different dialect of the Athapaskan language and each had its own name. Collectively these Athapaskans are referred to as the Tututni or Coast Rogues.

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. 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 from tradition.

According to an 1854 map compiled by J.L. Parrish, Indian Agent for the Port Orford District, the watershed was utilized by a Tututni band called the Mikonotunne (also called the Ma-can-o-tins). In 1854 Parrish attempted a census of the native peoples and compiled a map of their

approximate territories. According to this map, the Mikonotunne occupied the area surrounding the Rogue River from Lobster Creek to a point up river from Wakeup Rilea Creek. Their main village was located at the mouth of Lobster Creek and was reported to contain 145 individuals. They were bordered on either side by other Athapaskan speaking bands. The upland extent of the bands territories is unknown.

Although a limited number of prehistoric sites or isolated finds have been found within the watershed, those cultural resources that have been located are representative of the common upland site types found in the Siskiyou National Forest. These include temporary campsites related to hunting and gathering activities, which contains the debitage (waste flakes) from stone tool manufacture, and nearby, the Moorsky Acorn Site, which contains the remnants of acorn processing tools. A possible, although undocumented, site is believed to exist on the crest of Skookumhouse Butte. The rock rings said to exist here have been called a "signal pit", but may be a religious site related to vision quest activities. Major ridge tops which surround the watershed were also used by the aboriginal population as trade and travel routes.

Differences in culture, lifestyle and economic subsistence between the native peoples and the newly arrived Euro-americans inevitably led to conflicts, a pattern repeated throughout the history of this country. The year 1856 marked the sunset of the era of Native American dominance in the area. This year marked the conclusion of the Rogue Indian Wars. Some of the events of the Rogue Indian War occurred in or near the Bradford watershed.

For more information on the prehistoric uses of the Rogue River Basin and Southwestern Oregon refer to the Quosatana Watershed Analysis.

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 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.

Some of the first permanent Euro-american settlers in the area were miners attracted to the region during the gold rush era. In 1851, the first discovery of gold in Oregon occurred on Josephine Creek. Other gold strikes were soon to follow. 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. Some exploration and gold prospecting in the Bradford Creek watershed likely occurred at this time.

Following or accompanying the prospectors were the early settlers. Early settlers and miners moved into the area and often built their houses on the same river or stream terraces that had provided homes for the native inhabitants. The remoteness, difficult access and the absence of

arable or grazing land in the Bradford Creek watershed precluded extensive development. However, homesteads do exist within the watershed. Most of these early settlers followed a subsistence oriented lifestyle making maximum use of available fish and game supplemented with produce grown and animals raised on small farms. Goods and services were traded, borrowed and scavenged. The grassy ridge tops were attractive to early stockmen and are often the sites of early homesteads.

Located on the southwest boundary of the watershed, about 1 1/2 miles southwest of Wildhorse Prairie, is a meadow which contains the Moritz Fritsche cabin and homestead. The Curry County Census records of 1900 lists a "Mort Fritsches", age 39, birthplace Germany, as a resident of the county. His occupation is noted as stock raiser. The Siskiyou National Forest map of 1915 identifies the "Fritsche Ranch" location of his homestead. Fritsche seems to have had a long and colorful history in the area. According to Henry Haefner, an early forester on the Siskiyou National Forest, "Morris raised a little garden and for many years, before the Siskiyou National Forest was placed under administration, ran a small herd of cattle on Wild Horse Prairie some five or six miles by trail above his house..... For many years he "held domain" over the surrounding country, claiming it as his own, and greatly resented the enforcement of the payment of a fee for the grazing of his cattle on Wild Horse Prairie after the Forest Service took over. Because of this he threatened to kill "Dick" Helm, an early Agness ranger, who tried to collect the grazing fee..... He resented the incoming of more people and looked on early forest officers as intruders."

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. Various trails, lookouts and telephone lines were constructed in the general area during the first three decades of this Forests history. The rangers often built their own stations and headquarters. The 1915 Siskiyou National Forest map indicates the presence of a Wildhorse Ranger Station in Wildhorse Prairie. No evidence of the Ranger Station can be found today.

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 connecting Forest Service facilities with the populated coastal and river areas. Many of these paths followed older aboriginal routes. "Chief" Elwin Frye identified the Wildhorse Ridge Trail (once a portion of trail #1170, now F.S. Road #3318) as an Indian travel route. Frye was a packer for the Forest Service and the grandchild of early Rogue River settlers. Another example of a historic trail within the watershed is SK-133, the Fritche Trail. Although undocumented, this travel route connected the Fritche homestead with the Rogue River.

Forest Service lookouts are another important component of the historic fabric in the project area. The Wildhorse Lookout, is a premier example of this type of Forest Service facility. Forest Service lookouts were the most obvious symbol of the new attitude towards fire detection and prevention. The lookout not only served as the spotter of wild fires, he was often the "first line of defense" in fighting the fire he may have spotted from miles away.

According to Ray Kresek, in his publication Fire Lookouts of the Northwest, a fire lookout was established by the Forest Service 13 miles east-northeast of the town of Gold Beach and named Wildhorse after nearby Wildhorse Prairie. The first lookout facility was built in 1935 by the Civilian Conservation Corps according to Kresek, however, the Siskiyou National Forest map of 1933 indicates the existence of a lookout at the same location. It is possible that this earlier "Wildhorse Lookout" could have been a "rag camp", a semi-permanent lookout site consisting of a tent camp, firefinder, telephone, sometimes with a crude tower or crow's-nest. The 1922 and 1924 Siskiyou National Forest maps indicate a telephone line in the lookout area which supports this idea. The structure built by the Civilian Conservation Corps was a 40 feet pole tower with an L-4 style cabin. Trees felled adjacent to the east side of the tower to open the view still exhibit springboard notches on the stumps.

The original Wildhorse Lookout structure was replaced in 1947. According to George Morey, retired Fire Control Officer, the lookout tower "blew over in a wind storm... This happened in the winter, and we didn't find out about it until the following spring. But we could tell something was wrong looking up at it from the bottom." The new lookout was also mounted atop a 40 foot tower. The 1947 version tower is constructed of sawn timber beams rather than poles as was used in the original. The replacement is again an "L-4" style cabin, however this is the modernized version of the "L-4" constructed between the years 1936 and 1953.

During World War II lookout towers with a view of the coast were occupied around the clock for the entire year of 1942 in defense of the nation against attack from the air. Wildhorse Lookout saw service as an Aircraft Warning Service facility. The Aircraft Warning Service (AWS) was organized many months before Pearl Harbor, and was designed to protect the coastal regions from enemy air attack. It was the first large scale organization offering civilians an opportunity to be of assistance in the event of war. A small cabin was constructed at the base of Wildhorse Lookout for the AWS volunteers' winter watch. No evidence of this structure remains. George Morey states that supplying the lookout in the winter snows created unique logistical problems. Supplies had to be dragged in by toboggan while wearing snow shoes.

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. With the exception of the Wildhorse Ridge area, the watershed contains little evidence of the work performed by the CCC. In addition to Wildhorse Lookout, the Wildhorse Road (F.S. Road #3318) was constructed by CCC crews.

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

More information on the historic uses of the Rogue River Basin can be found in the Quosatana Watershed Analysis.

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

The Bradford Creek watershed encompasses 2350 acres, or roughly 3.7 square miles. In comparison, neighboring Quosatana Creek watershed totals 16,415 acres or roughly 25.6 square miles. As a result, Bradford Creek watershed does not provide a substantial amount of recreational opportunity when compared to its larger neighbor. The two most prominent features in the watershed besides the creek itself are Skookumhouse Butte and Wildhorse Prairie.

Roading and timber harvest has had the most affect on the watershed from a social and recreational perspective. Prior to road building and timber harvest, the watershed was mostly limited in access to open meadows and prairies, ridgelines, and trails. Hunting, fishing, firewood procurement, and gathering of other forest products were the primary recreational pursuits in the watershed. During the period of road building and timber harvest (1960 - 1990), motorized access to the local area and the Bradford watershed grew. As the road systems were developed, motorized recreational activity increased.

Bradford Creek watershed provides both roaded and unroaded recreation opportunities to a limited degree. The Recreation Opportunity Spectrum classification is Roaded Natural, although there is a modified appearance to portions of the landscape due to past timber harvest operations. Due to its small size and existing condition, opportunities for true semi-primitive recreational experiences in the watershed are very limited.

There are three areas capable of providing roaded recreation opportunities within the watershed. These are in the vicinity of: (1) Wildhorse Prairie, at the top eastern end of the watershed; (2) along roads 3318.300, 3318.308, and 3318.309 in the middle to southern part of the watershed; and, (3) along Forest Road 33 in the lower portion of the watershed.

The primary recreation uses in the watershed are road-related dispersed use. These activities include motorized sightseeing, exploration, hunting and camping, collecting special forest products and noncommercial firewood cutting. Road-related winter use includes Christmas tree cutting and limited sledding, skiing, and snowmobiling. Recreation use is estimated to be very low. There are no developed camping or picnic sites within the watershed, but there is a popular dispersed campsite at the northeastern edge of Wildhorse Prairie.

The newest motorized use is a tour bus operation under Special Use Permit by the Gold Beach Ranger District. The operator of this tour bus provides tourists with scenic trip opportunities and interpretation of forest uses and growth stages. The tour bus stops at Wildhorse Lookout for a visit to the lookout and a view of the surrounding area.

Hiking occurs on a limited basis. There are no forest system trails in the watershed, although there is a non-system trail that goes from Fritsche Meadow to Road 3300.160. This trail has limited local use, it is not listed in the district trail guides and it is not maintained by the Forest

Service. There is interest for trails in the area and the Quosatana/Bradford DEIS (page II-40) listed three potential trail construction opportunities.

Big game hunting is one of the most visible activities in the watershed. Use of Wildhorse Prairie and other smaller prairies and open areas for hunting is evident during the fall. Use of the dispersed campsite at the edge of Wildhorse Prairie peaks at this time of year as well. In addition to deer, other game such as black bear, cougar, bobcat, upland birds and elk are hunted.

Recreation Caused Impacts

Off-highway vehicle (OHV) and all-terrain vehicle (ATV) use in meadows and prairies has caused erosion and surface damage. On Wildhorse Prairie, road ruts are evident across the foot of the hillslope and directly up the side of the hill. Access to the Wildhorse Prairie dispersed campsite has caused some road rutting and prairie vegetation damage. 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 at some of the dispersed recreation areas. Other human-related damage that has occurred includes vandalism to signs, facilities, and other resources.

Recreation Trends

Recreation trends shown in the 1993 Oregon 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 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 and equestrian use, but there is a greater demand for trails for day hikes and ATV trails. There has also been an increased amount of requests for mountain bike trails.

As mentioned before, the main cause of change between historical and current recreational and social uses in the watershed was increased roading and timber harvest. It appears this trend has leveled off and is on the decline. Fish and wildlife protection, Port-Orford-cedar protection, road related watershed restoration opportunities, and declining road maintenance funds all indicate that there will be less 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 gradually increase.

The implications of this are that while demand for dispersed road related recreation opportunities increases and actual opportunities decrease, some segments of the public may be unhappy with

any proposals to close roads. In some cases this could lead to vandalism to signs and other property, violations of gate closures, and a general dislike of federal authority.

Management Opportunities: Develop and provide information to the recreating public on appropriate use of undeveloped and dispersed areas. Provide education on pack out garbage and waste. Develop information and on-site education of unique sites such as meadows.

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. Access to Wildhorse Prairie from Road 3318 needs to be modified to protect sensitive soils and native grasses of the meadow. This could be accomplished by blocking an old road with rocks and roadside ditching, creating a new access road to the campsite, seeding disturbed areas, and improving the campsite. The campsite improvements needed at the site include a new access/exit road, some unit designations for trailers, some site hardening on the proposed units, a couple of picnic tables, and a pit toilet. The new access road to the campsite could come from the north side through the existing stand of trees, approximately 200 feet from the 3318 Road.

Recreation opportunities, access, and facilities should be developed and maintained in accordance with management objectives and budget constraints. Trails listed for potential development in the Quosatana/Bradford DEIS (p. II-40) include the Wildhorse Tie Trail, Fritsche Cabin Trail and Skookumhouse Butte Trail.

Seek partnerships in recreation development, appropriate uses of closed roads and volunteers for trail maintenance and construction.

What areas are appropriate for electronic sites in the watershed?

Wildhorse Lookout was evaluated for potential use as an electronic site in September 1992. It was determined that it was not suitable and was not designated in the final environmental assessment (EA) for westside electronic sites.

What commodities can be produced from the Bradford Creek watershed?

Timber

About 993 acres of timber has been harvested in the watershed. The following broad opportunities for timber harvest currently exist in the Bradford watershed: 100 to 150 acres of commercial thinning in matrix and partial retention visual allocations, 100 acres of regeneration harvest in matrix and partial retention visuals (2 to 3 MMBF), and 50 to 100 acres of commercial thinning or hardwood conversion in Late-Successional Reserve (LSR). Site-specific information would have to be obtained before specific recommendations could be made for harvest in these stands.

Commercial thinning or hardwood conversion in LSR could occur if it would improve the stand's ability to provide late-successional habitat characteristics at an earlier date. Hardwood conversion would likely be proposed as partial harvest (group selection) to enhance growth of conifers in alder-dominated stands on lower slopes. Upper slope tanoak-dominated stands created by fire would be left as natural unique habitats. Over the next 10 to 30 years, the priority for commercial thinning would be in dense stands or single-structure mid-seral stands next to older forest or interior forest habitat.

In the matrix and partial retention visual allocations, the same type of dense or single-structure stands would be priority stands to commercial thin. Regeneration harvest could occur in late-seral stands. Harvesting might be delayed in stands within a corridor connecting late-seral habitat.

There is very limited opportunity to salvage dead Port-Orford-cedar in Riparian Reserves. The presence of Port-Orford-cedar is limited, and disease is currently confined to Late-Successional Reserve where salvage would be limited.

If disease occurs in matrix areas, salvage could occur where the amount of large wood is at the high end of the natural range of variability. Other riparian processes and resources would have to be protected and the Aquatic Conservation Strategy Objectives (ROD, 1994) would have to be met. Roadside hazard trees exist and may need to be harvested for public safety. Site-specific information would have to be obtained before specific recommendations could be made for harvest in these areas.

Special Forest Products

Special forest products collection has occurred over a broad area of the watershed with minimal impacts to the resource. Products include: cedar posts, poles, and bolts; a variety of mushrooms; ferns; Christmas trees; burls; brush; boughs; beargrass; alder; and firewood. Only a few specific concentrated areas for harvest have been identified. Priority locations for collection include areas close to roads and markets without high risk to Port-Orford-cedar. This is mostly along the Coos-Curry Powerline right-of-way and Road 3318.300. Incense cedar can be found on Road 3318.300.

Mining

The Curry County Geologic Map (Ramp, 1977) shows there were no active mines within the Bradford Creek watershed. Exploration for precious metals has occurred in the past. In the early 1990's one company had claims within or near the watershed. These were apparently unproductive and all of their claims have lapsed. Future mining possibilities are unknown and would be dependent on market conditions. A greenstone quarry, locally referred to as the "monolithe", was developed at the end of Road 3300.160. The mineral rights to this quarry are owned by the Lloyd Corporation.

Grazing

The watershed has been grazed since the 1850's, first permitted by the Forest Service in 1924 as the Wildhorse-Quosatana Range Allotment. The allotment was vacated some time between 1965 and 1974, although the exact date is unknown. There are no plans to reissue the permit. Grazing cattle may conflict with elk release plans, existing recreational uses, and full restoration of the meadows.

Watershed Analysis Appendices
GIS Maps and Reports
Bradford Watershed Analysis

Maps available from ARC/Info

Vicinity Map
Roads, streams and watershed boundary
Managed stands by decade harvested and Private land
Geology by rock type
Management allocations
Roadless Area
Slope Classes
Forest Canopy Cover
Fish Distribution
Harvest Opportunities
Snow Zone
Vegetation Structural Stages (PMR data)
Vegetation Seral Stages (DEIS Data)
1940 Vegetation Seral Stages (DEIS Data)
Interior Mature and Old Growth
1940 Interior Mature and Old Growth

Paradox data tables (PC Software)

UTMS, elevation, percent slope, aspect in degrees, stream classes, subwatersheds, managed stands, roads, vegetation, late successional reserves, meadows, rivers, species, canopy closure, size structure, wildlife sites, geology by rock type, acres, miles, vegetation structural stages, management areas, and EIS Seral Stage for each pixel.
UTMS, subwatershed, 1940 vegetation, managed stands by year of harvest, acres, stream reaches, fish distribution, roadless area and managed stands by decade of harvest for each pixel.
UTMS, subwatershed, PMR polygon, TRI cell key, canopy cover, size structure, canopy size structure class, forest species class, region species class, non tree class, acres, vegetation structural stages, managed stands, late successional reserves and management areas for each pixel.

Utools Reports:

Acres of Private land
Acres of Management allocations
Acres of subwatersheds
Miles of stream classes by subwatershed
Acres of structural stages by subwatershed
Acres of Managed stands by subwatershed with % harvested
Road density by subwatershed
Road miles by slope classes

Road Restoration Priorities

The following table describes the roads in the Bradford watershed.

Road #	Maintenance Level	Risk of Sediment	Proximity to Fish Stream	Comments
3318.053	2	Low	Low	No problems noted.
3318.054	2	Low	Low	No problems noted.
3318.057	2	Low	Low	Guardrail barrier. POC closure. Slump and steep grade. Spring. Rd maint need, not a restoration need.
Section 12 spur	1	Low	Low	Closed with a boulder. No problems noted.
3318.300	2	Low	High	Settled one foot in meadow. Massive throughfill with no pipe, also no problem (MP.46). 84" pipe, .8 mile past 304 jnct, stable. 36" shotgun pipe, 10 ft drop. 1 mile past 304 spur. No problems after that, switchbacks ok (5 to 6% grade).
3318.308	2	Mod	Low	Accesses matrix, partial retention. Large pipes but small fills. Blockage potential low to moderate. Some surface erosion.
3318.309	2	Mod	Low	Above 308. Some crossings in better shape than 308.
3318.220/221/222	1	Low	Low	Headwaters of Bradford. All closed. No problems.
3300.160 (Quarry Rd)	1	High	Mod	Blocked w/guardrail. Access to private land and powerline poles. Bad shape, shoulder breaking off going to stream. Potential for blocked culverts. Didn't cross Bradford Ck. Lloyd Corp retains the mineral rights at the rock quarry which the road accesses.

The following table describes those roads in need of restoration or repair. Roads in the Quosatana watershed needing restoration were ranked higher than the roads in Bradford.

Road #	Maintenance Level	Risk of Sediment	Proximity to Fish Stream	Comments
3318.308	2	Mod	Low	Some surface erosion.
3318.309	2	Mod	Low	Better condition than 308.
3300.160 (Quarry Road)	1	High	Mod	High need of restoration, but private corporation owns mineral rights to rock quarry which the road accesses. Coordination with this party will need to take place.

Hydrology Data

The Transient Snow Zone (T/S) lies between 2500 and 4000 feet elevation.

Total Acres	AcresT/S	Acres Harvested	Acres T/S Harvested	Road Miles	RoadMiles T/S
2345	734	914	266	6.4	3.0

Acres harvested includes 740 acres that are USFS ownership, some of which were previously owned and harvested by private timber companies; and 174 acres still privately owned.

Interpretation of data:

-31% of the Bradford watershed is within the transient snow zone, where hydrology and peak flows are exaggerated by rain-on-snow events.

-29% of harvest was within the transient snow zone.

-36% of transient snow zone was harvested, exaggerating effects of harvest in increasing peak flows.

-47% of roads were constructed within the transient snow zone.

-Road density within the transient snow zone is 2.6 mi/sq mi. This is not high, but does increase the effect of roads in concentrating flow and delivering it more rapidly to streams during rain-on-snow events.

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