EA #OR-014-96-02

LOWER SPENCER CREEK WATERSHED

FOREST HEALTH TREATMENTS

Lower Spencer Creek Forest Health Treatments - EA # OR014-96-02

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Chapter 1

Introduction

This environmental assessment (EA) will cover all proposed forest health treatments located primarily within the lower elevations of the Spencer Creek Watershed. Proposed treatments will include thinnings, large tree and pine component enhancement, and removal of excess mortality. Treatments will be implemented by developing timber sales in the treatment areas over the next three to five years. The general location of the proposed treatment areas are shown on Map 1. The treatment areas are located as follows:
T.38S., R.6E., Sections 19,20,21,22,23,24,25,26,27,28,29,30,33,34,35
T.39S., R.6E., Sections 4,5,6,9,15,16,17,19,20,21

The purpose of this EA is to provide the public with information about these forest health treatments and assist the decision maker in determining if an environmental impact statement needs to be prepared.

Purpose and Need For Action

The Spencer Creek Pilot Watershed Analysis identified many management actions and restoration opportunities for the area to be discussed in this EA. Two of those restoration opportunities involved thinning and/or burning stands to reduce stand densities and reducing fuel hazards. The management considerations section also discussed the objective of enhancing the sustainability of some existing forest communities in the watershed, protecting remaining stands where threatened by dense stands, and reducing fuel loads and biomass levels that have increased in some areas as a result of fire exclusion and past harvesting. This proposal in part addresses some of the concerns and restoration opportunities outlined in the Spencer Creek Pilot Watershed Analysis.

Many of the forest stands in the proposed project area (See Map 1) can be generally described as multi-aged, multiple canopy stands. Many of the stands that are proposed for treatment contain a residual large tree overstory component of pines, Douglas-fir and true firs, and a dense, stagnated understory component of true firs. Past management practices coupled with the suppression of natural fire have contributed to the overstocking primarily of the understory. This has contributed to a decline in forest health (stand resiliency) and an increased fire hazard in some forested areas. Forest health in this EA is defined as the resiliency of the residual stands to sustain themselves in the process of natural disturbances such as insect outbreaks and wildfires. A more detailed discussion of forest health can be found in the Spencer Creek Watershed Analysis pages 4-18 to 4-56 and pages 3-63 to 66 in the KFRA 1994 FEIS.

The proposed treatment would focus on improving forest health, maintaining habitat for native plant and animal species (particularly ponderosa pine associated species identified in the Spencer Creek WA pg 4-113 to 4-121), enhancing the residual pine component in the area, and protecting riparian and other areas by reducing the general fire hazard. The proposed treatments would also provide forest products that will help maintain stability of local and regional economies.

Conformance With Existing Plans & Environmental Impact Statements

These proposed treatments are being planned under the direction of:

-the Klamath Falls Resource Area Record of Decision (ROD) and Resource Management Plan (RMP) (June 2, 1995). (KFRA ROD/RMP)

- the Final - Klamath Falls Resource Area Management Plan and EIS (FEIS) / (Sept. 1994). (KFRA FEIS)

- the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. / (April 1994 / Also known as the Northwest Forest Plan (NFP).

-the Final Supplemental Environmental Impact Statement on Management Habitat for Late-Successional and Old-Growth forest Related Species Within the Range of Northern Spotted Owl, Feb. 1994 (FSEIS).

-the Klamath Falls Resource Area Fire Management EA#OR-014-94-09 (June 10, 1994)

-the Klamath Falls Resource Area Integrated Weed Control Plan (EA July 21, 1993).

-Spencer Creek Coordinated Resource Management Plan (June 1994)

-Range Reform FEIS (August, 1995)

Addition information supporting this environmental assessment can be found in the Spencer Creek Pilot Watershed Analysis of August 1995 - as updated.

Chapter 2

Affected Environment

Introduction

This chapter briefly summarizes the physical, biological, and socioeconomic characteristics of the project areas. These characteristics are discussed thoroughly in the KFRA ROD/RMP, the KFRA FEIS and the Spencer Creek Pilot WA. Therefore, the discussion here will be general with page references to the KFRA ROD/RMP & FEIS and the Spencer Creek WA. For more detailed information on the affected environment see pages 3-3 to 3-79 in the KFRA FEIS and chapters 3,4, & 5 in the WA.

The proposed project area is located approximately 10 miles northwest of Keno in Klamath County, Oregon (see Map 1) within the Klamath Falls Resource Area. Land use practices surrounding the project area include National Forest and Weyerhaeuser Timber Company lands subject to timber harvest, public and private livestock grazing, and recreational use (primarily consisting of hiking, camping, hunting, snowmobiling, and wildlife viewing).

Land Allocations

Table 1 and Figure 1 show the acres by NFP land allocation in the Lower Spencer Creek Analysis Area.

Table 1. NFP Land Allocations of Lower Spencer Creek Watershed Forest Health Treatment Area. BLM / Microstorms Data

Land Allocation	Acres
Administrative Withdrawals	
T&E Sites	47
TPCC & Non Forest	85
Roads	325
LSR/DDR (District Designated Reserves)	462
	919
Riparian Reserves	2,373
Matrix	
GFMA (General Forest Management Area)	3,250
DDRB (District Designated Reserve Buffer)	611
PRA (Protected Recreational Area)	297
VRM 2 (Visual Resource Class II)	47
	4,205
Totals	7,497

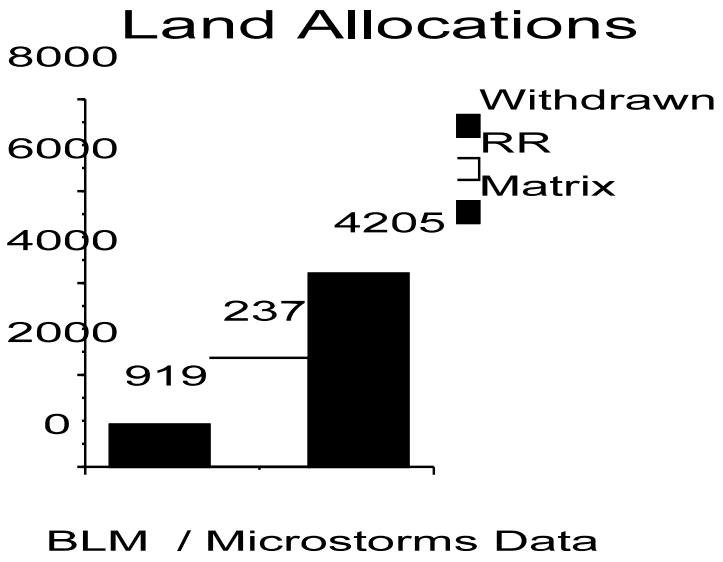

Figure 1 Land Allocations / BLM Microstorm Data

Water Resources

The proposed treatments are located in the lower part of the Spencer Creek watershed. Spencer Creek has been classified as a Tier 1 Key Watershed because of its contribution to conservation of at-risk anadromous salmonids and resident fish species and its high potential of being restored as part of a watershed restoration program. The Spencer Creek watershed is approximately 54,160 acres in size, of which 56 percent is in federal ownership (16 percent BLM-administered). Clover Creek, a tributary to Spencer Creek, has been classified as a Tier 2 Key Watershed because of its influence on the water quality of Spencer Creek. The Clover Creek watershed is approximately 13,960 acres of which eight percent is BLM-administered.

The hydrology of the Spencer Creek watershed is snow melt driven. Spencer Creek is the primary perennial stream in the area. Water input from tributaries, other than during spring runoff, is negligible. Springs and interflow dominate the flow regime nine months of the year. Two main tributaries, Clover Creek and Miners Creek, are intermittent but have perennial reaches which subside prior to joining with Spencer Creek. In all, there are about 10 miles of perennial streams and 20 miles of intermittent streams in the analysis area. Field work in 1996 will further refine stream classifications on BLM-administered lands and will assist in determining whether and for how long fluvial connectivity occurs between Spencer Creek and its two major tributaries. Spencer Creek flows into the Klamath River at J.C. Boyle Reservoir.

The primary water quality concerns in the Spencer Creek watershed are temperature and sediment. Throughout the mainstem of Spencer Creek, temperature has exceeded State of Oregon water quality standards during critical times of the year. Fine sediment is affecting aquatic habitat complexity and integrity.

Detailed information about the quality and quantity of water resources in the Spencer Creek watershed can be found on pages 4-139 to 4-153 in the Spencer Creek Watershed Analysis.

Riparian Resources

BLM-managed land in the Spencer Creek watershed has relatively few springs, wet meadows, and riparian areas associated with still water habitats. Therefore, the lentic riparian areas that do occur are highly valuable to the species associated with these habitat types. Also, there is a high likelihood that these areas contain rare mollusks and special status amphibian species. The Riparian Reserve widths prescribed in the RMP and the Northwest Forest Plan may not provide adequate protection from solar radiation or the effects of freezing in winter. Therefore, the Spencer Creek Watershed Analysis recommended that thermal protection for spring areas, seeps and constructed ponds under one acre be provided by buffering these areas with a Riparian Reserve of a width equal to one site potential tree, starting from the edge of the wetland area. An assessment of the existing Riparian Reserve system for streams found that these small wetlands are located within and are protected by these existing Riparian Reserves. In addition, many of these areas would receive buffers as specified on page B-4 Table R-1 of the KFRA ROD/RMP. Therefore, no additional Riparian Reserve designation is recommended for these areas.

Roads

Road construction in the treatment area started sometime in the 1940s. Presently the road density within the forest treatment analysis area is approximately 4.5 to 5 miles of road per square mile on BLM-administered lands. This is consistent with the average road density for the Spencer Creek subwatershed (See Spencer Creek WA). Approximately 20 to 30 percent of the roads within the analysis area are blocked to prevent vehicle traffic from disturbing wildlife and reduce soil disturbance. The WA and the approved Resource Management Plan recommends reducing the open road density to 1.5 miles per square mile. The ID Team is working on a Transportation Management Plan for the analysis area concurrently with this EA to try and meet this objective. As each treatment or timber sale is developed in the analysis area, roads within the boundaries of the treatment area

will be identified for blocking and obliteration.

Soil Resources

The primary soil series occurring in the analysis area are Oatman, Pokegama and Woodcock. Generally, these soils can be described as deep to very deep, low density, well drained soils with gravelly to very cobbly subsoils. The high rock content of the Oatman and Woodcock soils can make amelioration of compaction through subsoiling difficult. Surface erosion susceptibility ranges from low to high; compaction and displacement susceptibility range from moderate to high in these soil types. Maps 17 and 18 in the Spencer Creek WA shows areas with high surface erosion, compaction and displacement susceptibility in the analysis area.

Almost all of the forested land in the Spencer Creek watershed (outside of the Mountain Lakes Wilderness) has been entered at least once for timber harvest. The type of harvest, design of the skid trail and road system, the soil conditions present during harvest, and the type of site preparation have varied. Yarding has been mostly ground-based, with an extensive network of skid trails and roads. Site preparation methods have also been varied. Tractor piling has been commonly used, with scarification, ripping and broadcast burns also occurring. It is likely that some losses in soil productivity have occurred, mostly from compaction and displacement during road building and timber harvest activities. Detailed information about the soils in the analysis area can be found on pages 4-76 to 4-83 in the Spencer Creek Watershed Analysis.

An intensive inventory known as the Timber Productivity Capability Classification system has been completed for the analysis area. This information identifies fragile sites where the timber growing potential could be reduced by management activities due to inherent soil properties and landform characteristics. Table 2 shows that approximately 85 acres have been classified as either TPCC withdrawn or nonforest.

Upland Vegetation

The forests occurring in the proposed treatment area can be generally described as dense, multi-aged, multiple canopy stands containing some residual old growth. Some of the stands contain 10 to 30 trees per acre greater than 19 inches diameter at breast height (dbh) along with a dense understory component. In contrast, in other stands most of larger overstory trees have been harvested and the residual stand consist mostly of pole and small saw timber sized trees (6" to 18" dbh). The stands contain the following tree species: ponderosa pine, sugar pine, Douglas-fir, white fir, Shasta red fir, and incense cedar. In the lower elevations and southern slopes, most of the overstory component consist of shade intolerant species like sugar pine, Douglas-fir, and ponderosa pine. In contrast, the understory is dominated by shade tolerant white fir.

Understory species composition varies with precipitation and exposure. Generally the areas in the east of the treatment area receive less precipitation than the units farther to the west. Also, south and west exposures are drier than north or east exposures. Understory species associated with drier sites include bush chinquapin (*Chrysolepis sempervirins*), pathfinder (*Adenocaulon bicolor*), onion grass (*Melica* sp.), Ross' sedge (*Carex rossii*), and threeleaf anemone (*Anemone deltoidea*).

Understory species associated with wetter sites include big huckleberry (*Vaccinium membranaceum*), violets (*Viola* spp.), white trillium (*Trillium ovatum*), and twinflower (*Linnea borealis*). Other common understory species in the treatment area include creeping snowberry (*Symphoricarpos mollis*), prince's pine (*Chimaphila umbellata* var. *occidentalis*), wintergreen (*Pyrola* spp.), squaw carpet (*Ceanothus prostatus*), Oregon grape (*Berberis aquifolium*), and dogbane (*Apocynum androsaemifolium*).

The understories of ponderosa pine plantations and areas with open canopies resulting from timber harvest in the treatment area are dominated by snowbrush (*Ceanothus velutinus var. velutinus*) and green leaf manzanita (*Arctostaphylos patula*). Several natural openings in the forest within the treatment area are dominated by snowbrush, willow (*Salix* sp.), and

gooseberry (*Ribes* sp.).

The vegetation within the treatment areas has been extensively modified from past management practices that include harvesting primarily the overstory component and fire suppression. This has resulted in higher fuel loads, and structural and species composition changes in the forest that increase the likelihood of stand replacement fires and insect mortality and leave the stand less resilient to natural or human caused disturbances. Vegetation plant groupings are discussed in the KFRA FEIS under Douglas Fir-Ponderosa Pine/Ceanothus/Herbaceous Group and Shasta Fir/Shrub Herbaceous Group on Page 3-26. Similarly, the Spencer Creek Watershed Analysis describes in detail and maps the different plant groupings within the treatment area and the forest health problems associated with each plant grouping.

Table 2 and Figure 2 show the acres by seral stage in the Lower Spencer Creek Analysis Area.

Table 2. Seral Stages of Lower Spencer Creek Watershed Forest Health Treatment Area (BLM Microstorms Data)

Seral Stage	Acres
OG 200+ years	1,125
Mature 100-190 years	2,456
Late 50-90 years	2,124
Mid 20-40 years	339
Early 0-10 years	1,116
Non Forest	336
Total	7,496

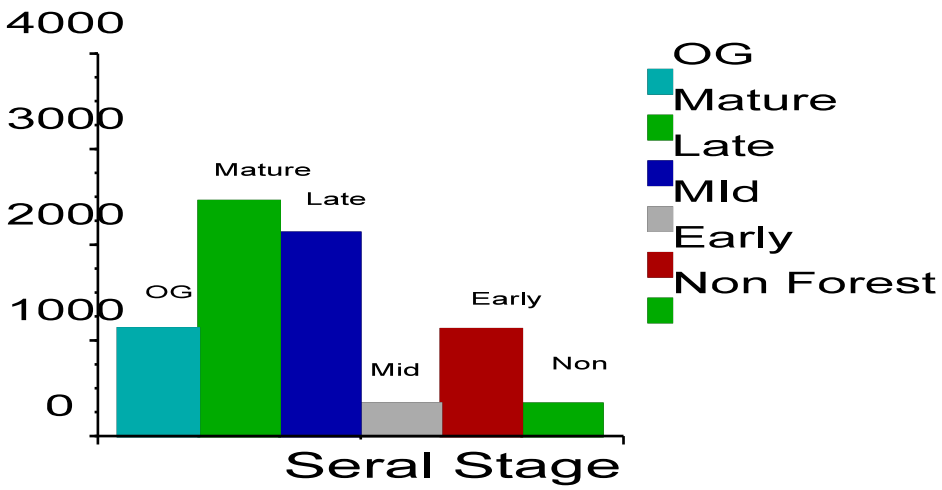

Figure 2 Seral Stages of Lower Spencer Creek Watershed Forest Health Treatment Area / BLM Microstorm Data

Noxious Weeds

Noxious weed inventories have identified small isolated pockets of Damation Toadflax, Canada Thistle, and St John's Wort along the edges of some roads in the treatment/project areas.

Wildlife and Fisheries

A list of wildlife species common to area is in draft KFRA ROD/RMP, Appendix 3C, and a description of their habitats is in the KFRA FEIS, pages 3-37 to 3-41 and in the Spencer Creek WA, pages 4-93 to 4-124. Common wildlife species in the treatment area include deer and elk, neotropical migratory birds, small mammals, furbearers, including american martin, and upland game species including blue grouse and mountain quail.

Streams, springs, seeps and man-made ponds in the treatment area contain habitat for aquatic dependent species such as fish, amphibians, and aquatic macroinvertebrates. The common native fish species that occur in Spencer Creek are redband trout, and speckled dace. Other fish such as rainbow trout, brook trout, brown bullhead, and fathead minnow have been introduced in the Spencer Creek stream system. Details regarding the life history and habitats of these fish can be found the Spencer Creek WA, Appendix 7

Special Status Species (plant and animal)

PLANTS

A Special Status Species plant inventory has revealed that a Bureau Sensitive Species, Green-flowered wild ginger, *Asarum wagneri*, occurs in the treatment areas. *Asarum wagneri* is a low growing aromatic perennial herb. In the Spencer Creek watershed, green-flowered ginger was described as occurring in lodgepole pine (dry), mixed conifer, and white and Shasta fed fir forests (see page 4-60 of the Spencer Creek Watershed Analysis and pages 3-42 to 47 in the KFRA FEIS).

ANIMALS

Threatened and Endangered Species: The northern spotted owl and the bald eagle are known to occupy nesting territories in the Lower Spencer analysis area. There are five Late Successional/District Designate Reserve areas (DDRs) within the analysis area. Each DDR is approximately 100 acres in size.

Late successional Species Habitat: There are four Late-Successional/District Designated Reserve Buffer (DDRBs) areas adjacent to the DDRs. General management objectives for the DDRBs is to protect and enhance conditions of late-successional and old growth forest stands which serve as habitat for late-successional and old growth forest-related species. A more detailed explanation of the Late-Successional/District Designated Reserve Buffers can be found on pages 2-20 to 2-22 in the KFRA FEIS and pages 23 to 26 in the KFRA ROD/RMP.

Corridors for movement and dispersal of late-successional species was found to be deficient in the Spencer Creek watershed (Spencer Creek WA 1994). A portion of the area in T38S., R6E., Section 19 was proposed as an area with high potential to provide a portion of a late-successional habitat corridor between the Mountain Lakes Wilderness Area and the Surveyor Mountain Area. This corridor would meander over space and time as forest stands change through succession and implementation of various silvicultural prescriptions.

Protection buffer species: The species listed in the FSEIS applicable to protection

standards and guidelines for this project include the white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, flamulated owl and the Great-grey owl. (FSEIS, 3-177 to 3-181). These species are dependent on an adequate supply of snags as a source for feeding and for nesting habitat.

Other Special Status Species: The northern goshawk and the American marten are two late successional habitat dependent species which occur in the analysis area. Winter tracking surveys and incidental observations indicate moderate use levels by American marten. One year of goshawk surveys have been conducted in the analysis area according to BLM protocol standards. There is one known goshawk nesting territory in the analysis area. Other raptor species known to nest in the area include: sharp-shinned hawk, Cooper's hawk, red-tailed hawk, northern saw-whet owl, northern pygmy owl, and great horned owl. Mountain quail and upland game species also occur in the project area.

Aquatic species requiring special management considerations found in the treatment area include the Cascade frog, the spotted frog, and the redband trout. Sites have been identified in the treatment area for all three of these species through various survey and inventory efforts.

Survey and Manage species:

Bats: Surveys for bats in the area indicate the likely presence of four of the bats listed in the standards and guidelines for protection of known sites. They include Long-eared myotis, long-legged myotis, fringed myotis, and silver haired bats. These bats commonly use roosts and hibernacula including caves, man-made structures, snags, and decadent trees with loose bark crevices. There are no known caves, mines, and abandoned wooden bridges and buildings in the project area that would qualify for additional protection.

Vascular and non-vascular plants and Mollusks: Some preliminary (cursory) surveys for survey and manage species, as identified in Table C-3 of the Northwest Forest Plan, have been conducted for bryophytes, lichens, mollusks, fungi, and arthropods within the proposed treatment areas. No known species were found in these preliminary surveys within the proposed treatment areas. Botanical surveys produced detailed vascular plant species list for each section of BLM-administered lands surveyed. No vascular plant survey and manage species were detected during these surveys. Known sites for these species require protection from ground disturbing activities.

No other survey and manage species are known to occur in the project area. This analysis area is outside the geographic range for many other survey and manage species, including the listed amphibian species, and were therefore dropped from further consideration.

Special Designations / Clover Creek Forest Education Area

This area is approximately 30 acres in size and is used on a yearly basis as an environmental education area. This area is part of the Matrix land allocation and management is restricted to maintaining the area for forest educational values, recreation and forest health.

Cattle Grazing/Wild Horses

Cattle grazing is permitted within the proposed treatment areas. The treatment areas lie within portions of the Buck Lake (#0104), Buck Mountain (#0103), and Grub Springs (#0147) allotments. A complete description of the grazing activities in these allotments, including current use levels, historical use, allotment boundaries, etc. is found in the Spencer Creek Pilot Watershed Analysis - Part 1: Social Ecosystem - "Livestock Grazing". Additional information is found in the KFRA RMP/FEIS, KFRA ROD/RMP and Rangeland Program Summary.

The proposed project area does not lie within or immediately adjacent to a Wild Horse Herd Management Area.

Cultural Resources

Based upon survey records of the surrounding area and within the Lower Spencer Creek Watershed itself, numerous cultural resource sites, both historic and prehistoric have been recorded . The archaeological literature for this area relates human use over the past 6,000 years. In this watershed, most of the prehistoric sites are confined to the riparian areas, or near springs and seeps. There are some few isolate sites in the higher elevations. The historic sites occur mainly near the confluence of the Klamath River and Spencer Creek , but also occur elsewhere in the watershed, especially near the Buck Lake area.

The Lower Spencer Creek Watershed has been surveyed for cultural resources using BLM Class III survey methods. Sites have been identified and site descriptions have been forwarded to the Oregon State Historic Preservation Office (SHPO) for recording. In all cases, all sites will be avoided and buffer zones of up to 300 feet in diameter will be established where required. In the case of isolates, the site will be avoided. These isolates have no further scientific use and under BLM Regulation 8111.21 (F) are considered to be of discharged use. No Native American (American Indian) traditional use areas have been identified. Clearance is contingent upon SHPO concurrence.

Recreation/Visual Resource Management

Recreation near the proposed treatment area generally is camping at the Surveyor Recreation Site (5 camping sites), hiking, hunting, fishing, snowmobiling, and wildlife viewing. Recreationists number between 2,000 to 5,000 visitor use days (per the 1994 Klamath Falls Recreation Management Information System Inventory).

The majority of the treatment area is in Visual Resource Management (VRM) Class III. Class III objectives are to partially retain the existing character of the landscape. VRM Class II areas exist within 1/4 mile either side of Spencer Creek. Class II objectives are used to retain existing character of the landscape.

CHAPTER 3

ALTERNATIVES

Introduction

The following alternatives have been developed for the Lower Spencer Creek Forest Health Treatments. There are certain management actions, including the use of prescribed fire, and best management practices that are common to all alternatives and are stipulated in the Klamath Falls Resource Management Plan Record of Decision. These management actions and best management practices are summarized in the Appendix D4 of the approved KFRA ROD/RMP.

The description of each alternative is shown below. Chapter 4 describes the impacts by each alternative. Appendix A provides specific details of the project design features developed to minimize or reduce adverse impacts.

Lower Spencer Creek Forest Health Treatment Alternatives Considered in Detail:

Alternative A:	Uneven-age/multiple canopy management - Large Tree Structural Retention, Thinning, and Salvage - (Proposed Action)
Alternative B:	Retain **only** 16 to 25 Large Trees per Acre
Alternative C:	Harvest only Salvage Volume
Alternative D:	No action
Alternative E:	Prescribed Fire Treatment only

Alternative A (Proposed Action) Large Tree Retention, Thinning, and Salvage

This alternative would treat between 2,000 and 5,000 acres and provide up to 12MMBF in forest products. Most of the vegetation treatments would be in the matrix. Some vegetation treatments (thinnings) would occur in the riparian reserves in order to achieve Aquatic Conservation Strategy objectives such as acquiring desired vegetation characteristics (e.g... maintaining a pine component), controlling stocking, and/or reducing excess fuels.

This alternative includes the following vegetation treatments within the **matrix** area:

- a portion of the largest and healthiest green trees (approximately 16 to 25 trees) on each acre would be reserved. In addition, a sustainable uneven-aged understory would be reserved so that there is a variety of different sized trees and species represented throughout the stand available for recruitment.

-in areas where a residual large tree component is missing, most of the vegetation treatment within the matrix area would consist of commercial and chip thinning below the overstory trees. This type of harvest would reduce competition and stress to the overstory and improve resiliency.

-in areas where the large tree component is sufficiently represented, some harvest of selected overstory trees in fair to poor condition would occur to capture on going mortality or remove selected trees heavily infested with mistletoe.

-within the understory, a major objective would be to enhance the resiliency of under represented understory tree species such as ponderosa pine, sugar pine, and Douglas-fir.

-provide small patch cuts to allow regeneration of ponderosa pine, sugar pine, Douglas-fir. Up to 15 percent of the matrix area would consist of patch cuts no larger than 3 acres in size. These areas are intended to create stand openings to allow for planting and natural regeneration of less shade tolerant species(pines). The patch cut areas would retain the average of 16 to 25 large trees per acre. The arrangement and distribution of these trees may be clumped so a more open area can be created (see Figure 3). Most of the white fir understory would be removed. The existing healthy understory pine and Douglas-fir component would be reserved, since regeneration of these early seral species is the objective of the patch cut.

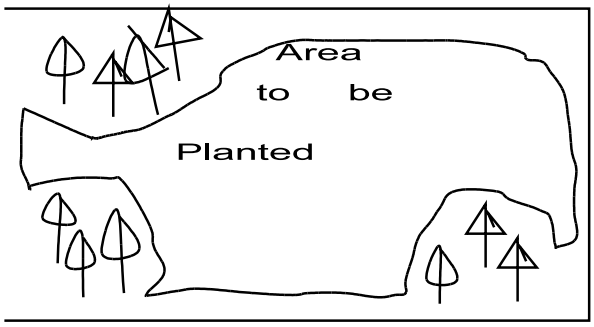

Figure 3 Example of 3 Acre Patch Cut designed to reintroduce (plant) early seral species; Pines and Douglas-fir.

Patch cut and other stand openings would also be planted with pines, incense cedar, and Douglas-fir.

Skid trails not designated for use in future harvesting would be ripped and planted with native vegetation. A designated skid trail system would be in place after the harvest. This designated skid trail system would be used for stand treatments in the future.

In this alternative up to one mile of new road may be constructed. The new roads would be constructed to allow timber to be skidded to landings outside of the Riparian Reserves. Because this is a Tier 1 Key Watershed, there would be no net increase in roads. For every new foot of road constructed, a corresponding decommission of an existing road would take place which could help achieve Aquatic Conservation Strategy by closing roads in Riparian Reserves. In this alternative, selected existing landings, skid trails, and roads may be used within the Riparian Reserves. After harvesting, non-permanent roads and all landings that are located within Riparian Reserves would be ripped and planted with native vegetation.

If Alternative 'A' is selected, the next stand-wide vegetative treatment (excluding fire) in this area would likely occur within 15 to 20 years.

Alternative B
Retain Only 16 to 25 Large Trees Per Acre

Alternative 'B' is the same as Alternative 'A' except that where there are more than 16 to 25 large trees per acre this alternative would harvest those surplus trees. Alternative

'B' would provide 12 MMBF of forest products on less acres than alternative 'A' because more trees per acre would be removed under alternative 'B'. Overall, less acres would be impacted under Alternative B.

If Alternative 'B' were selected, the next stand-wide vegetative treatment (excluding fire) in this area would likely occur within 25 to 30 years.

Alternative C
Harvest Only Salvage Volume

Alternative 'C' would treat up to 1,300 acres and provide up to 2 MMBF in forest products. This alternative would harvest only dead and dying trees within the matrix. No harvest of dead trees would occur in the riparian reserve areas except along commonly used transportation routes.

Alternative 'C' would differ from Alternatives 'A' and 'B' as follows:
-no patch cuts would be used;
-no harvest would occur within Riparian Reserves Areas;
-no tree seedlings would be planted;
-no thinning of dense understories would occur;
-no new roads would be constructed under this alternative. All existing skid trails and landings would be used and left for use in future treatments.

The next stand-wide vegetative treatment would be needed within the next 5 years after this harvest because tree mortality is expected to continue due to the remaining dense stands and potential insect attacks.

Alternative D
No Action

The no action alternative would not treat or harvest any of the project areas covered under this EA.

Alternative E
Prescribed Fire Treatment Only (Treatment Alternative Dropped from Further Analysis)

Alternative 'E' would treat between 500 and 2,000 acres using only elected prescribed fire. No forest products would be produced under this alternative. Multiple treatments using prescribed fire would be used to accomplish thinning and slash reduction through the stands.

This alternative was considered but dropped because:

1) Some of the stands need to be thinned prior to underburning because of ladder arrangement of fuels and density of stands. Underburning without some type of pretreatment and removal of fuels could result in excessive and unacceptable mortality to desired tree species and potentially significant impacts to other resources including soils, riparian habitat, wildlife, and fisheries habitat.

2) No forest products would be produced and is therefore inconsistent with applicable land-use plans and decisions for providing some economic benefits of managing matrix lands.

Table 3. Summary of Alternatives and Project Design Features

Project Design Feature	Alt. A Large Tree Retention, Thinning, and Salvage	Alt.B Retain only 16 to 25 Large Trees per Acre	Alt. C Harvest only Salvage	Alt. D No Action
#Snag/ac to leave (NFP)	2.5 snags/ac.	2.5 snags/ac.	2.5 snags/ac.	all snags
Riparian Reserve Width (NFP)	Intermittent - 160 feet each side of stream Perennial - 320 feet each side of stream			
Riparian Reserve Treatment	Approximately 30 percent of the riparian zone would be treated to meet ACS objectives.	Approximately 30 percent of the riparian zone would be treated to meet ACS objectives.	Only hazard trees in RR along commonly used roads	No riparian zones would be treated
Large Trees per acre to be left (NFP)	a minimum of 16 to 25 large green trees per acre and a second and third structure layer to implement uneven-aged management	Only 16 to 25 large trees per acre.	All large trees except excess mortality would be left	All trees would be left.
Downwood Per Acre (NFP)	120 linear feet of logs 16 inches in diameter			all down wood
Volume to Removed	Up to 12MMBF	Up to 12MMBF	Up to 2MMBF	None
Acres to Treated	Up to 5,000 acres	Up to 4,000 acres	Up to 3,000 acres	None

Chapter 4
Environmental Consequences

This section briefly summarizes the environmental consequences of implementing the alternatives described in Chapter 3. All impacts expected from these forest treatments projects have been described and analyzed in the KFRA FEIS and are approved in the Resource Management Plan. Detailed information regarding specific environmental consequences and the cumulative effects within the Klamath Falls Resource Area from these types of treatments can be found on pages 4-1 through 4-143 in the KFRA FEIS. A description of cumulative effects in the Spencer Creek Watershed can be found in the Spencer Creek Watershed Analysis on pages 4-18 to 4-165. In addition, a summary of recommendations, restoration opportunities, and management recommendations can be found in the Spencer Creek Watershed Analysis on pages 5-2 to 5-44. This chapter summarizes some of the important effects and further analyzes specific cumulative effects of these treatments in this watershed.

The following resources are not present, or would not be impacted by any of the alternatives: prime and unique farmlands, mining claims, paleontological resources, wilderness, roadless areas, research natural areas, special areas (Areas of Critical Environmental Concern), wild and scenic rivers, Native American religious sites, wild horses/burros, rural interface areas, or hazardous materials.

Impacts From All Timber Sales

No adverse impacts beyond those described in the KFRA FEIS, prescribed fire EA #OR-014-94-09 or noxious weed EA #OR-014-93-09 are expected to the following resources:

- air quality (see KFRA FEIS pages 4-8 to 4-9)
- soils (see KFRA FEIS pages 4-11 to 4-12)
- vegetation, including riparian vegetation (see KRFRA FEIS pages 4-35 to 4-42)
- special forest/natural products (see KFRA FEIS pages 4-39,124)
- wildlife and fisheries (see KFRA FEIS pages 4-44 to 4-67)
- cultural resources (see KFRA FEIS pages 4-93 to 4-97)
- recreational/visual resources (see KFRA FEIS pages 4-97 to 4-108, WA page 119 and Appendix 14)

Vegetation/Forest Health Issue

A management recommendation and restoration opportunity identified in the Spencer Creek Pilot Watershed Analysis (See pages 4-113 to 4-121 and page 4-39 of Spencer Creek WA) was the enhancement of the pine and Douglas-fir component (early seral, shade intolerant species) to improve the health and resiliency of the forested stands. The thinning of the overstocked, primarily understory clumps of second growth, particularly around early seral species like the pines and Douglas-fir would have a positive effect. Additional growing space would enhance the resiliency of the residual trees and reduce the on going mortality of these species. White fir stands are very sensitive to disturbance, and on going mortality may continue after the treatment but should be minimal. On going mortality of a limited extent is beneficial as it provides snag recruitment habitat.

Thinning the understory beneath the large early seral species (pines and Douglas-fir) would have a positive benefit to the residual large trees. Additional nutrients and moisture would be available for the larger trees.

Soil Resources

The potential adverse impacts to soil resources resulting from the activities outlined in Alternatives A, B and C are described in the KFRA FEIS (pages 4-11 through 4-16 and Appendix S, Soil Resources). The Best Management Practices/Project Design Features selected for this analysis area (see Appendix D of the KFRA FEIS or Appendix C of this EA) would reduce or avoid adverse effects resulting from the implementation of the

alternatives.

Potential direct and indirect adverse impacts to soils and soil productivity include compaction, displacement, removal of soil surface cover and changes in nutrient status. The relatively flat topography and low to moderate erodibility of forest soils in most of the analysis area reduce the probability of impacts resulting from changes in soil surface cover to low. In areas where the susceptibility of soils to surface erosion is high, the probability of impacts is moderate. The level of impacts would be low, due to the limited number of acres with high surface erosion that would be treated. Because overland flow potential is low in the analysis area, any eroded soil would not be transported off-site.

The BMPs/PDFs outlined for the alternatives would prevent or minimize other adverse impacts to soil productivity or would limit the impacts to levels described in the FEIS. Areas currently exceeding the 20 percent threshold for detrimental soil conditions could be improved through the subsoiling and/or planting of excess skid trails not needed as part of the permanent skid trail system. Reductions in road mileage through ripping and/or planting and seeding would have positive effects by reducing soil compaction and bare soil. Alternatives A and B allow for 15 to 25 years between harvest treatments, which would allow for natural recovery processes in the soil to occur. Under Alternative C, the analysis area could be re-treated at any future date. Overall, the acreage of detrimental soil conditions (mostly from compaction and displacement) would remain at current levels or would be slightly reduced in the short term (1 to 5 years). In the long term, further reductions in compaction could occur through natural recovery processes.

Water Resources

The potential adverse impacts to water resources resulting from the activities outlined in Alternatives A, B and C are described in the KFRA FEIS (pages 4-16 through 4-24 and Appendix P, Water Resources and Basic Hydrologic Principles). The Best Management Practices/Project Design Features selected for this analysis area (see Appendix D of the KFRA FEIS or Appendix C of this EA) would reduce or avoid adverse effects resulting from the implementation of the alternatives. The impacts resulting from implementation of Alternatives A, B and C would be similar to each other but slightly higher for Alternative B and lower for Alternative C.

Direct and indirect impacts to water quality would be minimal. Some sediment could directly enter streams as a result of soil disturbance on roads that cross or are in close proximity to streams and Riparian Reserves and by skidding across streams or in Riparian Reserves. Indirect sedimentation to streams could result from soil disturbance, road maintenance, renovation and obliteration activities, and hauling activities in proximity to ephemeral streams.

Direct and indirect impacts to water quantity would be minimal. Harvest activities would not occur in the transient snow zone, because the analysis area is located at elevations above 4,500 feet. Due to the extent of previous timber harvest activities (including road construction) in the analysis area it is likely that stream flow increases or changes in the timing of peak flows, if any, have already been realized. Because of this and the type of activity proposed in the alternatives (small patch cuts, salvage or thinning/harvest of the matrix to retain 16 to 25 large trees per acre), there would be little or no potential for increasing annual water yields above historic levels. Some snow accumulation would occur in the patch cuts; however, this could actually benefit stream flow if the melting snow is not routed directly to streams by roads or skid trails (thus affecting the timing and amount of peak flows). The no harvest buffers in Riparian Reserves and reduced road miles in Riparian Reserves would reduce the probability that snowmelt would be routed directly to streams.

No net increase in road mileage would occur. Because the total road miles and open road miles in the analysis area could be reduced or would at least remain static through implementation of the alternatives, the potential to adversely affect groundwater recharge and aquifer function would be low.

Fuel Loads

Fuel loads should not increase in the overall treatment area. Project Design Features will include gross yarding with tops attached. In addition, all residual material on the landing will be chipped, shredded, and removed from the site. There may be some isolated instances where the residual pile will be burned. Down wood requirements (120 linear feet of 16 inch material) will be met where available. Overall fire hazard should be reduced by eliminating some ladder fuels and reducing the stocking of dense stands.

Special Status Species (Plant and Animal)

Consultation with the US Fish and Wildlife Service has been conducted on those special status animal species that occur within the forest treatment areas as required under the Endangered Species Act. The adverse impacts are not exceeding those described in the KFRA final EIS pages 4-67 to 4-88.

Plant

Alternatives A, B, or C (timber sales) would have the potential for a moderate-to-high negative impact on the populations of the special status plant species, Asarum wagneri, Green-flowered wild ginger. Alternative D (timber sales) would have no impacts. Winter harvesting in at least 18 inches of snow, in those timber sale areas where dense concentrations of A. wagneri occur would significantly reduce the impacts to A. wagneri

Terrestrial Animals

Impacts to wildlife common to all alternatives are described on pages 4-172 through 4-190 of the final SEIS and in the KFRA PRMP/FEIS pages 4-44 through 4-88. The impacts resulting from alternatives A, B, & C will be greatest to those species that require larger patches of late successional and old growth forest habitat types. Species specifically identified in the Spencer Creek WA that were of particular importance include the American marten, the northern goshawk and the northern spotted owl as well as protection buffer species such as the woodpecker species and primary cavity nesters described in the affected environment section of this EA.

Alternative B would have the effect of greater disturbance levels on species and habitats but over less acreage. Conversely, Alternative A would have the effect of lighter disturbance levels but with less opportunity for deferred harvest areas.

Deer and elk habitat will be maintained at current levels or improved if there is a significant road density reduction. Alternative B would result in slightly less cover available for deer and elk since it would result in more open understories.

Current stand exam records indicate that snag densities for primary cavity nesters and excavators are currently at 100% population levels. Under alternatives A, B, and C this could be reduced to 60 percent population levels allowed for in the KFRA ROD/RMP. Alternative A, which includes prescriptions that will enhance the preservation and future recruitment of pine species, will have a long-term beneficial effect on pine dependent species such as the white-headed and black backed woodpecker. Given current tree mortality rates and present snag levels it is reasonable to assume that snag levels will be maintained above 2.5 and therefore greater than 60 percent population levels could be maintained.

American marten. Denning, foraging, and travel corridor habitat will be reduced in quantity and quality under alternatives A, B, and C. The negative effects of alternative B on American marten habitat would be greater then A or C because canopy closure and overall stand density would be reduced more under this alternative. The potential to maintain connectivity of late successional travel corridors as described in the Spencer Creek WA (page 5-35 through 5-36) would be reduced under alternatives A and B unless mitigating measures are adopted (see page 21 for specific mitigating measures.)

Bald eagle. Since most of the potential bald eagle habitat is within Riparian Reserves, Late Successional/District Designated Reserves (DDR), and District Designated Reserve Buffers (DDRB) and protected by eagle protection guidelines, all alternatives would have little effect on bald eagle habitat. Alternative A could benefit bald eagle nesting and roosting habitat by encouraging the maintenance, survival and long-term recruitment of the large pine and Douglas fir stand components in the matrix lands, and in portions of the

Riparian Reserves, and in the District Designated Reserve Buffers. Alternatives C and D could actually have detrimental long term impacts in isolated areas because the second growth pine component could be lost to invading an white fir component which would result in the loss of the preferred tree species by the bald eagle. Pages 4-80 to 4-81 of the KFRA PRMP/FEIS describe effects to Bald Eagles in detail.

Northern Spotted owls and goshawks. The goshawk and spotted owl territories could be negatively impacted under alternatives A, B, and C because of a reduction in the amount of habitat that would otherwise provide nesting and foraging habitat. Alternatives A and B reduce the quality of foraging and roosting habitat because they reduce canopy which provides thermal cover and foraging opportunities. Alternative B would have the greatest negative impact because it would result in more even-aged stands with less potential to provide multi-aged stand structure and adequate prey bases for these species. The length of time needed for these areas to recover into a suitable habitat conditions would be greatest under alternative B. Since post fledgling family areas are generally within a one half mile radius of nest sites, harvest in the areas closest to the nest site have the greatest potential to result in the loss of nesting territories and to cause reproductive failure. Refer to page 20 and 21 for possible mitigating measures. Page 4-70 to 4-80 of the KFRA PRMP/FEIS describe in detail effect on the northern spotted owl. In addition, pages 4-82 to 4-83 of the KFRA PRMP/FEIS describe the effect to the northern goshawk.

Aquatic animals:

The Riparian Reserve standards and guidelines (FSEIS and NFP) provide conservative protection for most species with significant aquatic components in their life cycles. Limited entry into RRs (see PDFs, Appendix A) and adherence to BMPs (Appendix C) will minimize impacts to fish, amphibian, and other aquatic animals. Buffering wet and dry meadows as described in Table R-1, page B-4 in the KFRA ROD/RMP should meet the recommendations in the Spencer Creek WA for buffering spring, seeps, and pump chance ponds (Spencer Creek WA, pg 5-41) and reduce impacts to amphibians and aquatic invertebrates confined to those habitats. The potential impacts to fish and special status aquatic species resulting from the activities in Alternatives A, B, and C are described in general terms in the FSEIS (pages 4-163-176;4-190-203;4-256-257;Appendix B). Additional information regarding endangered sucker species protection is located in the KFRA FEIS, Appendix G. It should be noted that no analysis was performed on any of the redband trout or the Jenny Creek sucker because of insufficient information on ecology of these species (see FSEIS, page 4-193).

Livestock Grazing Impacts

Harvesting activities as described in alternatives A (proposed action), B, and C would have a small, short-term (2 to 10 years) positive effect on livestock grazing due to an increase of palatable, herbaceous plant species that would be more abundant once some of the overstory trees are removed. There could be a short-term (0 to 2 years) negative effect on forage amounts due to the ground disturbing impacts of the timber harvesting machinery. Observations of the grazing use in the proposed activity area by BLM range personnel, however, has indicated that cattle make very little use of the vast majority of these lands. Most of the grazing use in this area is made on the intermingled, though dominant, private lands; particularly Weyerhaeuser owned properties. Alternative D (no action) would have the effect of not providing any additional short-term forage for livestock.

A much more detailed description of potential impacts, including the cause and effect relationships between grazing, timber harvest activities, vegetation community structure, and forage production is found within the Spencer Creek Pilot Watershed Analysis, Part II: Terrestrial Ecosystem, "Rangelands" section. Additional information is also found in the Klamath Falls R.A. Resource Management Plan/EIS, Record of Decision and Rangeland Program Summary.

Cumulative Impacts From The Forest Treatment

The cumulative impacts from implementing the forest treatment/harvest projects are low. No adverse impacts beyond those described in the Resource Management Plan/Environmental Impact Statement, Prescribed Fire EA, or Noxious Weed EA are expected.

Soil Resources

The Spencer Creek Watershed Analysis describes in detail the current condition of soils in the analysis area (see pages 4-76 to 4-83). Implementation of Alternatives A and B could disturb or re-disturb up to about 1,200 acres, assuming that 20 percent of the activity area is disturbed and that all disturbance results in detrimental soil conditions. This acreage represents about one to two percent of the Spencer Creek watershed. Implementation of Alternative C could disturb or re-disturb up to about 260 acres, or less than one percent of the Spencer Creek watershed. It is likely that specific areas within the watershed currently exceed the 20 percent threshold for detrimental soil conditions. Subsoiling and road obliteration would reduce existing levels of detrimental soil conditions for a limited number of acres.

Water Resources

The Spencer Creek Watershed Analysis describes in detail the current hydrologic condition of the analysis area (see pages 4-144 to 4-148). Current hydrologic condition in the Spencer Creek watershed can be summarized as follows:

> Harvest activity in the last 30 years consisted of overstory removals, thinnings, and clearcuts, which removed 10 to 100 percent of the basal area present. Regeneration units are reforested with 300 trees per acre. It is estimated that, currently, the Spencer Creek watershed has approximately 13,945 acres in an unrecovered state (equivalent clearcut acres). This represents about 26 percent of the watershed area. Harvest activity has reduced the overall amount of transpiration, resulting in greater water availability to streams. However, the presence of a brush component and the capacity of the soils to absorb the increase in water partly compensates for this increased water availability. The road system and draining of Buck Lake have been determined to be the most influential in modifying peak flows. There are 1,047 acres of road surface and an average of 4.0 miles of road per square mile. Roads cross streams 150 times and 23 miles of road (opened and/or closed) are located within 100 feet of stream channels.

Based on the information above and the assumed effects of the activities described in the alternatives, it is estimated that Alternatives A, B and C could increase the area considered "hydrologically unrecovered" or in "equivalent clearcut condition" as follows:

Alternative A: 1,063 acres (2 percent of the watershed area).

Alternative B: 1,415 acres (3 percent of the watershed area).

Alternative C: 130 acres (<1 percent of the watershed area).

Therefore, the cumulative impacts to the Spencer Creek watershed from implementing Alternatives A , B or C are within levels analyzed in the FEIS. Please refer to the Hydrology Report in the analysis files for more information on the process used to assess cumulative effects.

Irreversible/Irretrievable Commitment of Resources

There are no irreversible/irretrievable commitment of resources identified from implementing the forest treatment projects discussed in this environmental assessment.

Mitigating Measures

1) Defer harvest for 2 to 3 years in sections 19 & 30 of T.38S., R.6E. (proposed connectivity area), until the ID Team has had an opportunity to do some postmonitoring of initial NFP timber sales to determine if prescriptions used for these sales satisfies the specific habitat requirements for the Goshawk and the Connectivity Corridors. Frosty One and Too Frosty timber sales should be harvested in 1996 or 1997 and could be used for monitoring.

2) Goshawk Mitigating Measures

Note: Refer to IM No. OR-94-112 - June 22, 1994 - Northern Goshawk Management

Maintain habitat around known goshawk territories.

-Retain 60 percent canopy closure and late seral or old growth conditions in designated 30 acre nest stand. Thinning from below will accomplish this objective.
-Maintain 400 acres around nest site that includes at least:

60 percent in late seral/Mature forest and 40 percent Mid/early forest. Open understory/ plentiful dead and down material and 1-2 acre patch cuts will provide excellent goshawk foraging habitat.

The same standards should be applied to areas within 1/4 mile of known nests and roosts.

3) Connectivity Corridors / Mitigating Measures

Note: Refer to Spencer Creek Watershed Analysis
Maintain a late successional connectivity corridor through section 19 and 30. Design a prescription such that a corridor at least 600 feet wide is maintained that includes:

-2 snags/acre $\geq$ 20" dbh and at least 40 percent of area in late seral; and 60 percent canopy closure.

-The remainder of the corridor area should be at least in a mid-seral state with at least 40 percent canopy closure.

-Retention of large down woody debris, including piles should be emphasized.

4) Special Status Plant Species

Winter harvesting in at least 18 inches of snow is required in timber sale areas within T.39S., R.6E., Sections 17,19, and 20, T.38S., R.6E., Section 19 and 30 (SW1/4 of the NW1/4), and T.38S., R.5E., Section 13.

Appendix A

Project Design Features

The project design features (PDFs) are specific measures included in the design of proposed projects to minimize adverse impacts to the natural and human environment. The PDFs for the proposed action were developed by members of an interdisciplinary team (IDT). Project Design Features that mitigate impacts to watershed, wildlife, fisheries, and other resources are applied as described in the KFRA FEIS.

The PDFs listed below are common to all alternatives unless otherwise specified. Additional PDFs for watershed and soil resources are outlined in Appendix C.

Timber Reserved From Cutting

In the Matrix area (land use allocation as identified in the Northwest Forest Plan), retain a portion of the largest and healthiest green trees (approximately 16 to 25 trees) on each acre. In addition, maintain a sustainable uneven-aged understory so that there is a variety of different sized trees and species represented throughout the stand available for recruitment.

Within mixed conifer, and lodgepole pine zones, retain a minimum of 2.5 snags per acre in the following categories:

-1 snag $\geq$20" dbh; species should be ponderosa pine, sugar pine, or Douglas- fir if available;

-1.5 snags $\geq$12" dbh; species retained should be a mix proportional to the stand composition.

All identified wildlife trees that are cut or knocked down would be reserved and would be left in the cutting area.

Apply 150 foot buffer to edge of wet and dry meadows as specified in the (KFRA ROD page B-4 TABLE R-1). Harvest within buffer would occur to only to improve or maintain specific habitat.

General Riparian Reserve guidelines would include the following:

As per the Northwest Forest Plan standards and guidelines, Riparian Reserves would be identified along all wetlands, seasonally flowing (intermittent), and perennial streams. Riparian Reserves would be flagged and posted within the treatment areas. Each intermittent stream riparian reserve would be 160 feet on each side of the stream. The width of the reserve is based upon the height of one site potential tree. The width of the Riparian Reserve on the perennial streams would be 320 feet, or two site potential tree heights.

Widths of RRs on lakes, reservoirs, and ponds would be measured from the historical high water marks. Widths of RRs on streams and drainages would be measured from high water and/or floodplain boundaries. Width of RR on constructed ponds, reservoirs, and wetlands greater than 1 acre would be 160 feet; on lakes and natural ponds 320 feet.

Some harvest may occur in the RRs as previously described. Any harvest inside a RR would be conducted only to attain Aquatic Conservation Strategy objectives in that RR and only with the concurrence of the Klamath Falls Resource Area Riparian Team.

All snags would be retained in RRs except where sufficient down woody debris are present or safety, fire hazard, or potential resource damage dictate their removal.

The 100 percent snag level requirements for wildlife would be met before any salvage is removed from a Riparian Reserve. The 100 percent levels include retention of at least 3.8 snags per acre. In addition, no salvage would be removed from a RR unless adequate down

woody debris are present (see PDFs). Hazard trees adjacent to roads or recreation sites, would be felled in RRs, including within the no cut buffer. Felled hazard trees would be left in the RRs except where adequate down woody debris exists or where they would create resource damage. Hazard trees felled within the not cut buffer would be left in place except where they would cause resource damage.

Within the Riparian Reserves, no timber harvesting would occur from the natural topographic break to the stream except falling of hazard trees. In areas where topographic break is not evident the following guidelines would be implemented. On intermittent streams with slopes less than 10 percent, a 50 feet no harvest buffer would be established on each side of the stream. On slopes greater than 10 percent, a 80 foot no harvest buffer would be established on each side of the stream. On perennial streams with less than 10 percent slope, a minimum of 100 foot no harvest buffer would be established. On perennial streams with slopes greater than 10 percent, a no harvest buffer of 160 feet would be established.

Generally, harvest/treatment methods that would disturb the least amount of soil and vegetation (yarding over snow or frozen ground, pulling line to each tree, minimizing skid trails) would be used in RRs.

Logging

Falling

Directional falling away from property lines, reserve trees, roads, streams, springs, meadows, cultural resource buffers, RRs, and fences would be required.

Log lengths would be restricted to 41 feet or less in areas where stand damage is occurring.

No limbing would be allowed except where large limbs are causing damage to the residual stand. Tops would remain attached to the last log.

A mechanical harvester with a lateral boom (Timco) of at least twenty-five (25) feet will be required for falling trees twenty (20) inches DBH and smaller. Non sawlog material 3"-7"DBH will be cut at a specified spacing and removed concurrently with sawlog operations. In addition, no mechanical harvester will be allowed within 20 feet of any pine 20 inches DBH or greater.

Yarding

Tractor logging would be the logging system on 90 percent of the treatment areas. A cable/high lead system would be used on about 10 percent of the treatment area.

Whole tree yarding would be required in areas of ground based yarding, except where limbing and/or bucking is required to protect residual trees or where large cull logs are left for down woody debris purposes. Tops would remain attached to the last log and would be yarded to landings.

Cull logs greater than 12 inches in diameter at the small end, that are not removed from the landing, would be yarded back into the sale area to locations determined by a resource specialist.

Ground based logging equipment would be restricted to designated skid trails. Line pulling and winching would be required.

All ground based yarding would take place on slopes averaging less than 35 percent.

No yarding would occur directly up or down any stream or drainage.

Designated crossings of RRs and the size of yarding corridors would be minimized.

No new landings would be located within RRs unless approved by the KFRA riparian team.

The maximum width of any yarding corridor through a RR would be 30 feet.

No new skid trails would be located in RRs except at designated crossings. Required crossings would be designated prior to yarding by authorized personnel and would be at right angles to the drainage.

Logging on snow would be allowed in conformance with seasonal restrictions when snow depths average 20 inches or greater and negligible ground surface exposure occurs during the operation. Logging on frozen ground may also be allowed when the ground is frozen to a depth of 6 inches.

In order to reduce impacts to *Asarum wagneri*, winter harvesting would be required in timber sale areas within T.39S., R.6E., Sections 17,19, and 20, T.38S., R.6E., Section 19 and 30 (SW1/4 of the NW1/4), and T.38S., R.5E., Section 13.

The following restrictions would apply to mechanized equipment:

Operations would be restricted to dry conditions (generally less than 15 to 20 percent soil moisture by weight.

The lowest ground pressure machine capable of meeting objectives would be used when available.

No mechanical harvester would be allowed on slopes averaging greater than 35 percent unless approved.

Seasonal Restrictions

Seasonal restrictions would be required to prevent soil erosion and to protect wildlife. Seasonal restrictions would be required in areas where the following wildlife species are actively nesting: bald eagle, northern spotted owl, American marten, survey and manage species, and protection buffer species. Seasonal restrictions for specific species can be found on pages 2-31 to 2-40 of the KFRA FEIS.

To protect riparian areas, soil resources, and water quality while limiting erosion and sedimentation to nearby streams and drainages, logging operations would not be allowed during the wet season (October 15 to May 1). Logging activities would be permitted during this time period if frozen ground or sufficient snow is present, or as approved by a resource specialist.

To protect soil resources and water quality, unsurfaced roads would be closed during the wet season (October 30 to June 1) unless waived by Authorized personnel.

Threatned and Endangered/Special Status Species/ Other Wildlife Protection

Five Late Successional/District Designate Reserves (DDRs) of approximately 100 acres have been established for old growth related species. In addition, four District Designated Reserve Buffers/DDRBs will be located around four of the DDRs.

There is an eagle nest in the analysis area. A 30 acre buffer will be located around the nest site and operations will be restricted near the nest site (KFRA ROD page 38). Within designated eagle habitat area, emphasize silvicultural treatments that encourage maintenance and recruitment of habitat components necessary for nesting and roosting bald eagles. Retain the largest snags (> 24"). Preference should be given to ponderosa pine, sugar pine and Douglas-fir with large open limb structure suitable for perching by eagles (KFRA ROD page 38).

There is one known Northern Goshawk nest site in the analysis area. A 30 acre buffer will be located around the nest site (KFRA ROD page 38).

Great grey owl surveys (a protection buffer specie) will be completed prior to disturbance. If a nest site is located, a 1/4 mile protection zone will established around the nest site area and the area will become an unmapped Late-Successional Reserve which are subject to the Standard and Guidelines for LSRs in the NFP (May 12, 1995, Great Grey Owl Survey Protocol Memo from Regional Ecosystem Office).

Snag mitigation measures (100 percent population potential) for two other protection

buffer species; black-back woodpecker and white-headed woodpecker will be addressed as specified in the NFP (page C-46 NFP). Snag retention requirements would increased from 1.9 to 2.5 snags per acre (see PDF discussed below).

Allow purchaser to pump water only out of designated water sources. Notify the wildlife and hydrology staff at least one week prior to intended pumping dates so that adequate water supplies can be confirmed.

Close roads to reduce wildlife disturbance. Where possible, after treatment is completed, implement road closures to approach objective of 1.5 miles/section open road density.

Apply Special Provision E4 (limited operating season) for Threatened or Endangered Species. These provisions include protection for Federally listed species, Federal Candidates and sensitive or state listed species protected under BLM Manual 6840, protection buffer species, survey and manage species, and specific species listed for protection in the KFRA ROD/RMP.

Apply seasonal operating restrictions to actively nesting raptor species.

Apply seasonal operating restrictions to active elk calving areas if any are located during the duration of this project.

Where possible, maintain visual screening along roadways.

Winter harvesting in those units with A. wagner.

Visual Resources

Within recreation sites, concentrated recreation use areas, or Special Areas, the following design features would be implemented to reduce visual impacts from harvesting: Stumps would be cut close to ground (<4"); small (hand) piles of slash would be dispersed for firewood use; minimal use of tree marking paint would occur on trees identified for harvest; no large landings would be created, skid trails and ground disturbance would be kept to a minimum; damage to residual trees would be minimized through careful timber falling.

As specified in the KFRA ROD/RMP (page 44), all lands within 1/4 mile of Spencer Creek would be managed for Visual Class II(retain the existing character of landscapes). Management activities may be seen but should not attract the attention of the casual observer. Changes should repeat the basic elements of form, line, color, texture, and scale found in the predominant natural features of the characteristic landscape.

Cultural Resources

Cultural protection and management procedures outlined in the KFRA ROD/RMP on page 43 would be followed. Identified sites will be protected by buffering.

Road Construction, Maintenance, Use

Although the EA will analyze for up to one mile of new road construction, none is planned at this time. Any new road construction would be offset with an equal amount of road obliteration. A long term transportation management objective for the analysis area to determine which roads are necessary and which roads can be blocked or obliterated will be addressed in this EA process.

Where required, primary access roads would be maintained, renovated, or improved to facilitate general access. Some secondary roads, not identified for closure, would receive maintenance or improvement in areas of active erosion. Examples of improvements would include spot surfacing and installation of culverts or other drainage features where needed to protect resources. Other, more stable secondary roads, would receive minimal or no maintenance to provide high clearance vehicle recreation opportunities.

Some roads, including spur roads not needed for continued resource management, would be

obliterated or closed after completion of the proposed management activities. Roads to be obliterated or closed would be identified by resource specialist and the KFRA Interdisciplinary Team (IDT).

Currently closed roads that would be opened to facilitate harvest activities, would be closed again after completion of those activities. The roads would be closed in a similar fashion to the currently existing closures.

Dust pallatives or surface stabilizers (water) would be used on roads during dry periods to prevent surface material loss and the buildup of fine sediments that may wash off into water courses. Application of dust pallatives and surface stabilizers, equipment cleanup, and disposal of excess materials would be closely controlled to prevent contamination of water resources.

Road graders used for road construction or maintenance would grade towards any known noxious weed infestations. If no good turn-around areas exist within one half mile that would allow the operator to grade towards the noxious weed infestation, then the operator would leave the material that is being moved within the boundaries of the noxious weed infestation. The grader would not grade through noxious weed infestations.

Environmental Protection/ Forest Health Features

All equipment and vehicles would be cleaned off prior to moving on site to prevent dispersal of noxious weeds. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts could be accomplished by using a pressure hose.

Noxious weeds in the immediate area of yarding operations would be mowed to ground level prior to the start of activities except where snow logging is occurring.

All logging and construction equipment and vehicles would be cleaned off prior to leaving the job site when the job site includes a noxious weed infestation. Cleaning of equipment and vehicles prior to leaving the job site would not be required if the job site does not include any noxious weed populations. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts could be accomplished by using a pressure hose and would be completed prior to leaving the area containing the noxious weeds.

Monitoring activities related to these proposed treatments would be done as described in the Klamath Falls ROD.

Within laminated root rot (Phellinus weirii) centers, and in a strip 50 feet around, remove susceptible tree species (white fir and Douglas-fir), and reserve resistant tree species (pines and incense cedar). White fir and pine stumps will be treated with borax to prevent the spread of Annosus root rot.

Waterbars would be constructed on roads, spurs, skid roads, yarding corridors, and fire lines prior to fall rains. Waterbars would be constructed according to specifications outlined in the BMPs in Appendix A.

Where feasible and as designated by authorized personnel, spur roads, skid trails, and landings, that are not needed for a permanent logging system, would be ripped to remove ruts, berms, and ditches and/or to reduce soil compaction.

During yarding and piling operations, practices and methods outlined in the BMPs in Appendix A would be adhered to.

The cumulative effects of unmitigated detrimental soil conditions would not exceed 20 percent of the total acreage within an activity area (the total area of ground, such as a timber sale unit or a slash treatment area including roads, skid trails, and landings). Detrimental soil conditions include compaction, displacement, and creation of adverse cover conditions. Sites where the 20 percent standard is exceeded would require treatment, such as ripping, backblading, or seeding.

Riparian Reserves

Allow purchaser to pump water only out of designated water sources. Notify the wildlife

and hydrology staff at least one week prior to intended pumping dates so that adequate water supplies can be confirmed.

Riparian Reserves would be designated according to the guidelines listed in Appendix A.

Refueling, equipment maintenance, fuel storage, or other handling of petroleum products or other chemicals in or adjacent to RRs would not be permitted.

No ripping, piling, or mechanical site preparation (except for designated skid trail crossings, landings, roads, or yarding corridors) would be permitted in RRs, although riparian-wetland enhancement or wildlife projects could be allowed that consist of these types of activities in order to meet Aquatic Conservation Strategy Objectives of the Final Supplemental EIS and objectives listed in the Watershed Management Practices Guide.

In RRs, the removal of down trees and logs would be avoided unless they were causing resource damage. Any removal would be approved by KFRA Riparian Team.

Fire Prevention and Control

All contractors would be required to adhere to Oregon State fire safety and preparedness rules and regulations and Industrial Fire Precaution Class restrictions as directed by authorized personnel.

Slash Disposal / Site Preparation (Machine Ripping & Piling)

The proposed project area is covered under a resource area wide environmental assessment (EA # 014-94-09) to reintroduce fire in forest stands on a random basis. In all alternatives, Prescribed Fire applied mostly as underburning could occur in some of the Matrix and Riparian Reserve area after timber harvesting to improve plant and wildlife diversity and reduce fuel loads in the area. No ignition would occur 50 feet from the stream. Random selection of which areas that will be underburned is discussed in the prescribed fire EA. This EA will not evaluate the impacts of random underburning of this area since it has already been evaluated under EA# 014-94-09.

Within the proposed analysis area, elected prescribe fire would be used on approximately 500 to 2000 acres for hazard reduction on the lower elevation, drier site forest stands. In addition, elected prescribe fire will be used as a site preparation tool to prepare sites for reforestation.

Whole tree yarding with limbs attached will be required. Landing debris not removed for sawlog material will be chipped, shredded or ground and removed from the site. In isolated areas, some burning of residual landing material would occur.

Residual slash and damaged saplings in the units will be lopped and scattered to depths no greater than 12 inches.

All burning would be done in accordance with standards established by the Oregon Smoke Management Plan.

Some reserve trees, particularly high resource value trees, would have slash pulled back by hand and piled at least 20 feet away from the base of the tree.

In RRs, slash would be piled by hand. Excessive concentrations of logging slash in RRs, resulting from the current timber sale, would be removed prior to fall rains and placed above the high water mark.

Within 100 feet above culverts, all logging slash resulting from the current timber sale, would be removed and placed above the high water mark.

Soil moisture would be less than 15 to 20 percent before mechanical site prep activities, such as slash piling, would occur.

Within the analysis area, up to 200 acres could be ripped. Ripping would be done with a winged ripper under specific mositure conditions in isolated areas. No ripping would

occur within one crown width of any tree.

Within the analysis area, down accumulations of fuels on up to 300 acres would be piled with a track mounted excavator. This would occur mostly in areas where existing fuel loads exceed KFRA ROD/RMP objectives.

Down Woody Debris

Where available, a minimum of 120 linear feet of down logs would be retained on the site. The minimum diameter of the down logs would be sixteen (16) inches.

Appendix B

Cumulative Effects Analysis Procedure

Background Information This analysis utilizes information contained in the Spencer Creek Watershed Analysis and the Hydrology Report for the Roaming Salvage Environmental Assessment. These documents describe in detail the current hydrologic condition of the Spencer Creek watershed. The focus of this analysis lies in determining the additional impact to current hydrologic condition if Alternatives A, B or C were implemented. An attempt is made to add the estimated effect of the Shady and Camp Timber Sales and the Roaming Salvage Sale to current conditions. These activities are expected to be implemented before or concurrent to the chosen alternative.

This analysis focuses on the effect of treatment on vegetation, because the greatest potential impact to hydrologic condition is the removal of vegetation (except for soil disturbance and road construction, which are addressed in the EA). The following information is taken from the Spencer Creek Watershed Analysis, which assesses the effect of vegetation removal: "'Recovered in this analysis is considered to be 'hydrologically recovered'. Harvest units are hydrologically recovered when reestablishment of leaf area is sufficient to return transpiration rates to pre-harvest levels and canopy closure is sufficient to prevent excessive snow loading. Leaf area index is the ideal variable to quantify to express recovery; however, considering the size of the watershed leaf area is not feasible and canopy closure was used as a surrogate. To standardize the data and facilitate comparisons among watersheds, recovery was expressed in terms of equivalent clearcut acres (ECA)" (Spencer Creek WA, Appendix 6). This analysis uses the Equivalent Clearcut Acres methodology in a manner similar to the Spencer Creek Watershed Analysis.

Assumptions/Information The following assumptions and information were used in this analysis:

Equivalent Clearcut Acres Acres Hydrologically Unrecovered Acres in Early Seral Condition

The Spencer Creek Watershed Analysis states that "13,945 acres in the watershed are currently in an 'unrecovered state' (equivalent clearcut acres)." The assumed average historical level of ECA in the Spencer Creek watershed is 1500 acres.

The Shady and Camp Timber Sales could increase the ECA in the Spencer Creek watershed by 312 acres.
The Roaming Salvage Sale could increase the ECA in the Spencer Creek Watershed by up to 135 acres, if Alternative A is selected.

ECA factors are based on the land allocation (matrix, Riparian Reserve, LSRB) and the proposed treatment of each in the three alternatives. For the purposes of this cumulative effects analysis, the acres of each land allocation that **c**ould be treated (harvested and/or thinned) under each alternative are as follows:

Up to 70 percent of the total matrix area (4205 acres) would be treated, including Late-Successional Reserve buffers, in alternatives A and B.

Up to 30 percent of the Riparian Reserves (2373 acres) would be treated in Alternatives A and B.

Up to 15 percent of the matrix in Alternative A would be patch cut.

In Alternative C, up to 1,300 acres of matrix lands (including LSR buffers)

would be treated through salvage of dead and dying trees.

Land Allocation	Acres Treated in Alternative A	Acres Treated in Alternative B	Acres Treated in Alternative C
Matrix	2516	2516	1300 (includes LSR Buffers)
Late-Successional Reserve Buffers	428	428	---
Riparian Reserves	712	712	0

The following ECA factors have been assigned to the various treatment alternatives (where clearcuts and roads = 1, no treatment = 0):

Alternative A:	Patch cuts in matrix	0.5 ECA factor x 30 percent of 2516 acres	=	378
	Remainder of matrix	0.3 ECA factor x 70 percent of 2516 acres	=	528
	Riparian Reserves	0.1 ECA factor x 712 acres	=	71
	LSR Buffers	0.2 ECA factor x 428 acres	=	86
Alternative B:	Matrix	0.5 ECA factor x 2516 acres	=	1258
	Riparian Reserves	0.1 ECA factor x 712 acre	=	71
Alternative C:	Matrix+LSRB	0.1 ECA factor x 1300 acres	=	130

Analysis

Alternative	Current ECA*	ECA from the Alternative	Cumulative Total ECA	Percent of Watershed in ECA Currently**	Percent of Watershed in ECA after Alternative**
A	14,390	1063	15,453	27	29
B	14,390	1415	15,805	27	29
C	14,390	130	14,520	27	27

*Includes ECA contribution from the Shady and Camp Timber Sales and the Roaming Salvage Sale, added to current conditions outlined in the Spencer Creek Watershed Analysis.

**The ECA methodology is best suited for assessment of relative effect, not for determining absolute numbers. All percentages are rounded to the nearest whole number.

Appendix C

Best Management Practices

The best management practices (BMPs) described in this appendix are designed to achieve the objectives of maintaining or improving water quality and soil productivity and the protection of riparian-wetland areas. The goal of the practices listed is to prevent or mitigate adverse impacts while meeting other resource objectives.

MAPS/CONTRACT REQUIREMENTS

(1) Specify the water sources available for Purchaser's use on maps and in the timber sale contract(s).

RIPARIAN RESERVE DESIGNATION

(1) Establish Riparian Reserves on streams and water bodies as listed in the table below. To use this table, a) determine if the stream in a proposed activity area is fish bearing; b) determine if the stream is perennial or intermittent; c) determine if the area is unstable or potentially unstable (this will be a rare designation in the KFRA).

(2) Site-specific changes to these Riparian Reserve Widths could be made as recommended by the Spencer Creek Watershed Analysis (p. 5-41).

RIPARIAN RESERVE WIDTHS (IN FEET)

Stream/Waterbody/Wetland Type	Slope Distance of Riparian Reserve
Fish Bearing Streams	**300 feet**, or to a distance equal to the height of **two** site-potential trees
Perennial, Nonfish-Bearing Streams	**150 feet**, or to a distance equal to the height of **one** site-potential tree
Intermittent Streams	**100 feet**, or to a distance equal to the height of **one** site potential tree
Constructed Ponds and Reservoirs and Wetlands greater than 1 acre	**150 feet**, or to a distance equal to the height of **one** site potential tree
Lakes and Natural Ponds	**300 feet**, or to a distance equal to the height of **two** site potential trees
Wetlands and Constructed Ponds less than 1 acre and Unstable and Potentially Unstable Areas	The extent of unstable and potentially unstable areas; or to a distance equal to the height of **one** site potential tree

A site-potential tree is defined as the average maximum height of the tallest dominant trees (200 years old or more) for a given site class.

Minimum widths of Riparian Reserves are expressed as whichever slope distance is greatest. The widths listed in the table are those that would be applied to one side of the stream. For example, a fish-bearing stream would have a 600 foot buffer (300 feet each side). In addition to these widths, Riparian Reserves must extend from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, and to the outer edges of riparian vegetation. Wetland, pond and reservoir Riparian Reserves must include the body of water or wetland and the area from the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable or potentially unstable areas. Reservoir and pond Riparian Reserves are to be measured from the edge of the maximum pool elevation.

(2) Use the following sequence of decisions when establishing Riparian Reserve boundaries:

a. **Identify floodplain boundaries** The entire 100-year floodplain should be included within the Riparian Reserve. The topographic break in slope between hillsides and the relatively flat floor of the stream valley will define a floodplain boundary. Floodplain soils and substrates are characterized by rounded edges on gravels, cobbles, or boulders as a result of being tumbled by streams. In contrast, hillslope substrates are more sharp and angular. Vegetation may change in age or composition at floodplain boundaries; however, many floodplains have forest vegetation as old or older than hillslope stands. Smaller, incised (downcut) streams and lower order (first, second, and third) streams frequently lack floodplains. Also, floodplains may not exist along non-riverine wetlands and lakes. In the absence of floodplains, historical high water levels should be used (see Section b, below).

b. **Locate margins of active channels and shorelines (high water mark)** After floodplains (if they exist) have been identified, Riparian Reserves are delineated. Delineation of the Riparian Reserve starts at the edge of the active channel or mean high water level, and extends outward horizontally on both sides. Active channels consist of all portions of the stream channel carrying water at normal high flows, not just the current wetted channel. This includes side channels and backwaters which may not carry water during summer low flow. All islands and gravel bars are included as part of the active channel. Active channel boundaries are indicated by abrupt topographic breaks where frequent channel scour has steepened streambanks. Frequently, plant abundance is reduced in areas of active channel modification, and plant communities are dominated by herbs and forbs. The high water mark is often marked by the vegetative litter carried in high flows and then deposited or caught in live vegetation.

Riparian Reserves around reservoirs, ponds and lakes should be measured from the high water level. This level may be indicated by evidence of erosion by wave action, reduced plant cover, topographic features and sharp transitions in plant community composition.

c. **Lay Out Riparian Reserve Boundaries** For optimal management of riparian and other resources, Riparian Reserves should have variable widths that are delineated at ecological boundaries, not at arbitrary distances from the stream, lake or wetlands. Riparian-wetland areas are naturally irregular or asymmetrical in shape, in response to local topography, geology, groundwater, and plant communities. Consideration of topographic irregularities can both protect riparian resources and simplify harvest unit layout. Avoid straight, uniform Riparian Reserve boundaries.

RIPARIAN RESERVE PROTECTION

(1) Timber harvest within Riparian Reserves will be designed to meet Aquatic Conservation Strategy objectives, as described in Chapter 2 of the Environmental Assessment.

(2) Retain all snags in the Riparian Reserve except where safety or fire hazard dictate removal **(RA-2)**.

(3) Avoid refueling, equipment maintenance, fuel storage, or other handling of petroleum products or other chemicals in or adjacent to Riparian Reserves.

(4) No slashing, ripping, piling or mechanical site preparation (except for designated skid trail crossings, roads, or yarding corridors) will occur in Riparian Reserves.

(5) Directionally fell trees away from Riparian Reserves when harvesting within a tree length of any stream or Riparian Reserve.

(6) Where feasible, leave in place unbucked and unlimbed any hazard trees felled within a Riparian Reserve, consistent with management for fish habitat or other resource protection.

(7) Avoid yarding through Riparian Reserves when possible.

(8) Designate yarding corridors prior to yarding.

(9) Minimize number and width of yarding corridors. The maximum width of any corridor will be 30 feet. No more than 25 percent of the overstory canopy within the corridor will be removed to facilitate yarding operations.

(10) Leave vegetation in Riparian Reserves that is cut for yarding corridors to meet stream and riparian objectives. Consider falling conifers into the stream and leaving them to contribute to the stream ecosystem.

(11) Do not place skid trails in Riparian Reserves except at designated crossings. Where feasible, locate skid trails perpendicular to Riparian Reserves and stream channels. Avoid tractor yarding across fishery streams and associated Riparian Reserves. All skid trails that enter Riparian Reserves will be seeded with native species after use or prior to first rains, whichever comes first.

(12) Install temporary stream crossings across Riparian Reserves of nonfishery streams prior to tractor

yarding operations. Stream crossings will be selected and designed with input from a hydrologist, fish biologist or riparian specialist. Select stable, naturally armored areas. Minimize the area of disturbance. Use a culvert and clean rock or logs for temporary stream crossings. Install during low flows and remove prior to fall rains in the same season.

(13) Avoid removal of down trees or logs in stream channels and Riparian Reserves.

(14) Remove excessive concentrations of logging slash in streams for a distance of 100 feet above culverts. Hand pile slash above high water mark.

(15) Avoid locating landings within 50 feet of Riparian Reserves.

LIMITING DETRIMENTAL SOIL CONDITIONS

The cumulative effects of detrimental soil conditions are not to exceed 20 percent of the total acreage within an activity area (the total area of ground, such as a timber sale unit or a slash treatment area including roads, skid trails, and landings). Detrimental soils conditions include detrimental compaction, displacement, and creation of adverse cover conditions. Sites where the 20 percent standard is exceeded will require treatment, such as ripping, backblading or seeding.

SOIL COVER RETENTION AND ESTABLISHMENT

(1) Minimum guidelines for the retention of effective ground cover will be prescribed as outlined in the following table for all soil-disturbing activities. Exceptions to these guidelines may be made due to site-specific resource considerations (e.g. brush field scarification projects where bare soil is a specific objective). Effective ground cover is all living or dead herbaceous or woody materials and all rock fragments greater than 0.5 inch in diameter in contact with the ground surface.

Soil Surface Erosion Potential	General Slope Range (percent)	Minimum Effective Ground Cover (percent)	
		First Yr.	Second Yr.
Low	0-20	20-30	30-40
Moderate	20-35	30-45	40-60
High	35-50	45-60	60-75
Severe	50+	60-75	75-90

(2) Use native vegetation which allows natural succession to occur. Avoid interference with reforestation operations. Include application of seed, mulch, and fertilizer as necessary. Complete prior to fall rains.

RETENTION OF SMALL WOODY MATERIAL

Where practicable, maintain 10 tons or more of nine-inch diameter or smaller woody material per acre. In ponderosa pine forest land, 9 tons per acre of duff and litter (approximately 1/2 inch deep) and 2.2 tons per acre of material 1/4 to 3 inches in diameter will be maintained. These target loads are designed to meet soil productivity and fire suppression objectives.

SOIL RESOURCE PROTECTION

Use of a Mechanical Harvester

Mechanical harvesting will generally meet the following minimal conditions:

a. Operations will be restricted to dry conditions (generally less than 15 to 20 percent soil moisture by weight).

b. The lowest ground pressure machine capable of meeting objectives will be used when available.

c. Other conditions outlined in the Soil Resource Protection will be met, if applicable.

Yarding--Tractor

(1) In previously unentered stands, use designated skid roads to limit soil compaction to 12 percent or less of the harvest area.

(2) In previously entered stands, utilize existing skid roads. Establish a network of permanent, designated skid trails not to exceed 12 percent of an activity area. Where feasible, rip or plant all skid roads not needed as part of the network of permanent, designated skid roads.

(3) Rip skid roads discontinuously, preferably with winged ripper teeth when the soil is dry (generally 15-20 percent or less soil moisture content at a six inch depth). Rips should be spaced no more than 36 inches apart and from 12 to 18 inches deep or to bedrock, whichever is shallower. Subsoiling should generally result in 80 percent of the compacted zone being fractured with 80 percent of the fractured soil material as clods of less than six inches in size.

(4) Minimize the width of skid roads.

(5) Avoid placement of skid roads through areas with high water tables.

(6) Use appropriate seasonal restrictions that would result in no off-site damage from designated skid roads. Operation on both new and existing skid roads will minimize soil displacement and will occur when soil moisture content provides the most resistance to compaction.

(7) Allow logging on snow whenever practicable when snow depths average 20 inches or greater and negligible ground surface exposure occurs during the operation. Logging on frozen ground may also be allowed when the ground is frozen to a depth of 6 inches or more.

(8) Restrict tractor operations to slopes less than 35 percent.

(9) Construct waterbars on roads, spurs, skid roads, yarding corridors and fire lines according to guidelines listed below:

(a) Construct fire lines prior to fall rains.

(b) Use the following table for waterbar spacing, based on gradient and erosion class:

	Water Bar Spacing (in feet)[1]		
	Erosion Class[2]		
Gradient(%)	High	Moderate	Low
3-5	200	300	400
6-10	150	200	300
11-15	100	150	200
16-20	75	100	150
21-35	50	75	100
36 +	50	50	50

[1] Spacing is determined by slope distance and is the maximum allowed for the grade.

[2] The following guide lists rock types dominant in the analysis area, according to erosion class:

High: volcanic ash, pyroclastics;
Moderate: basalt, andesite.

(c) Use the following techniques to construct waterbars:

a. Open the downslope end of the waterbar to allow free passage of water.
b. Construct the waterbar so that it will not deposit water where it will cause erosion.
c. Compact the waterbar berm to prevent water from breaching the berm.
d. Skew waterbars no more than 30 degrees from perpendicular to the centerline of the trail or road.

(10) Consider end-lining and felling to the lead to minimize the effects of tractor yarding.

Yarding--Cable

(1) Cable yard when average slopes exceed 35 percent.

(2) Use full or partial suspension when yarding on erodible or ravel prone areas where practical.

(3) Use full or partial suspension with seasonal restrictions on areas of high water tables.

(4) Use seasonal restriction if required suspension cannot be achieved by yarding equipment.

(5) Avoid downhill yarding.

Site Preparation

(1) No slashing within Riparian Reserves.

(2) Directionally fell trees away from Riparian Reserves when slashing within a tree length of any stream or Riparian Reserve, except in cases where trees must be yarded across Riparian Reserves. In this instance, full tree yard to the lead.

(3) Where practicable, avoid tractor piling by requiring the removal and utilization of excessive biomass and residual slash.

(2) No tractor piling operations within Riparian Reserves.

(3) Restrict tractor operations to dry conditions with generally less than 15-20 percent soil moisture content in the upper six inches of soil.

(4) Restrict tractors to slopes less than 35 percent.

(5) Construct small diameter piles or pile in windrows using brush blades.

(6) Avoid piling concentrations of large logs and stumps.

(7) Pile small material (3 to 8 inches diameter size).

(8) Avoid displacement of duff and topsoil into piles or windrows.

(9) Make only two machine passes (one round trip) over the same area wherever practicable.

(10) Use the lowest ground pressure machine capable of meeting objectives.

(11) Burn piles when soil and duff moisture are high.

(12) Rip selected areas to maintain soil productivity except that occupied by piles. Use winged ripper teeth and rip on contour to minimum depth of 12 inches. Minimize ripping on skeletal or clayey soils.

(13) Use alternative equipment or techniques for site preparation or slash treatment, such as excavators to pile slash or low ground pressure chippers, to minimize compaction.

FRAGILE SOILS

The BMPs in this section are to be used in addition to those in other sections.

Three categories of fragile soils sensitive to surface disturbing activities are identified in the Klamath Falls Resource Area Timber Production Capability Classification (TPCC):

Fragile Slope Gradient (FG) - These sites consist of steep to extremely steep slopes that have a high potential for surface ravel. Gradients commonly range from 60 to greater than 100 percent.

Fragile Mass Movement (FP) - These sites consist of deep seated, slump, or earth flow types of landslides with undulating topography and slope gradients generally less than 60 percent. Soils are derived from volcanic tuffs or breccias.

Fragile Groundwater (FW) - These sites have high water tables where water is at or near the soil surface for sufficient periods of time that vegetation survival and growth are affected.

(1) Avoid disturbance to fragile soils, where practicable.

(2) Minimize ditch cleaning on FP soils to retard slumping of road and cutbanks.

(3) Block unsurfaced roads on fragile soils to prohibit motorized vehicle use.

(4) Use full or partial suspension when yarding on FG and FW soils.

(5) Restrict yarding and hauling to dry season (generally May 15 to October 15) on FP and FW soils.

(6) Put slash in yarding corridors on FG soils to control erosion, allowing adequate space to plant trees.

(7) Burn piles on FG soils only if they prevent planter access.

(8) Avoid machine piling or ripping on FP and FW soils.

LANDINGS

(1) Minimize the size and number of landings.

(2) Locate landings at approved sites.

(3) Avoid placing landings adjacent to or in meadows or other wetland areas.

(4) Clear or excavate landings to minimum size needed for safe and efficient operations.

(5) Select landing locations considering the least amount of excavation, erosion potential, and where sidecast will not enter drainages or damage other sensitive areas.

(6) Deposit excess excavated material on stable sites where there is no erosion potential.

(7) Restore landings to the natural configuration or shape to direct the runoff to preselected spots where water can be dispersed to natural, well vegetated, gentle ground.

(8) Return landings not needed for future resource management to resource production through ripping

and/or revegetation with native species. Apply weed free mulch and fertilizer where appropriate.

SPUR ROAD CONSTRUCTION

(1) Locate roads away from Riparian Reserves **(RF-2)**.

(2) Locate roads on stable positions (e.g., ridges, natural benches, and flatter transitional slopes near ridges and valley bottoms). When crossing unstable areas is necessary, implement additional mitigation measures.

(3) Avoid headwalls, midslope locations on steep unstable slopes, seeps, old landslides, slopes in excess of 60 percent, and areas where the geologic bedding planes or weathering surfaces are inclined with the slope.

(4) Locate roads to minimize heights of cutbanks. Avoid high, steeply sloping cutbanks in highly fractured bedrock.

(5) Locate roads on well-drained soil types. Vary the grade to avoid wet areas.

(6) Locate stream crossing sites where channels are well defined, unobstructed and straight. Minimize the area of road that enters a Riparian Reserve. Stream crossings will be designed with input from a hydrologist or riparian specialist.

(7) Limit road construction to the dry season (generally between May 15 and October 15). When conditions permit operations at the limits of the dry season, keep erosion control measures current with ground disturbance, to the extent that the affected area can be rapidly closed/blocked and weatherized if weather conditions warrant.

(8) Manage road construction so that any construction can be completed and bare soil can be protected and stabilized prior to fall rains. Protective measures may include water bars, grass seeding, planting deep rooted vegetation, and/or mulching. Armor or buttress fill slopes and unstable areas with rock which meets construction specifications. Revegetation with native species is preferred, except where overriding concerns to reduce sediment dictate the use of annuals or other quickly establishing species.

(7) Avoid sidecasting where it will adversely affect water quality or weaken stabilized slopes. Place excavated material away from Riparian Reserves.

(8) Place surface drainage prior to fall rains.

ROAD USE, IMPROVEMENT, MAINTENANCE, CLOSURE AND OBLITERATION

Use

(1) Use seasonal restrictions on unsurfaced roads.

(2) Remove snow on haul roads in a manner which will protect roads and adjacent resources. Remove or place snow berms to prevent water concentration on the roadway or on erodible sideslopes or soils.

(3) Use dust palliatives or surface stabilizers to reduce surfacing material loss and buildup of fine sediment that may wash off into water courses.

(4) Closely control application of dust palliatives and surface stabilizers, equipment cleanup, and disposal of excess material to prevent contamination or damage to water resources.

Improvement

(1) Identify potential water problems caused by off-site disturbance and add necessary drainage facilities.

(2) Surface inadequately surfaced roads that are to be left open to traffic during wet weather.

(3) Keep road inlet and outlet ditches, catchbasins, and culverts free of obstructions, particularly before and after winter snowfall and spring runoff. However, hold routine machine cleaning of ditches to a minimum during wet weather.

(4) Grading operations are to be conducted to prevent sedimentation and to dispose of surface water without ponding or concentrating water flow in unprotected channels. Schedule grading operations during time periods of the least erosion hazard (generally during the dry season, May 15 to October 15).

Maintenance

(1) Retain vegetation on cut slopes and ditches unless it poses a safety hazard or restricts maintenance activities. Cut roadside vegetation rather than pulling it out and disturbing the soil.

(2) Inspect areas subject to road or watershed damage during periods of high runoff.

Closure and Obliteration

(1) Barricade or block roads using gates, guard rails, earth/log barricades, boulders, logging debris, or a combination of these methods. Avoid blocking roads that will need future maintenance (i.e., culverts, potential slides, etc.) with unremovable barricades. Use guardrails, gates, or other barricades capable of being opened for roads needing future maintenance.

(2) Provide maintenance of blocked roads in accordance with design criteria.

(3) Install waterbars, cross drains, cross sloping, or drainage dips on blocked roads (if not already) to assure drainage.

(4) Scarify, mulch (weed free), and/or seed blocked natural surface roads for erosion control.

(5) Return roads or landings not needed for future resource management to resource production through ripping and/or revegetation with native species. Apply weed free mulch and fertilizer where appropriate.

Appendix D: Figure of Riparian Reserve Layout

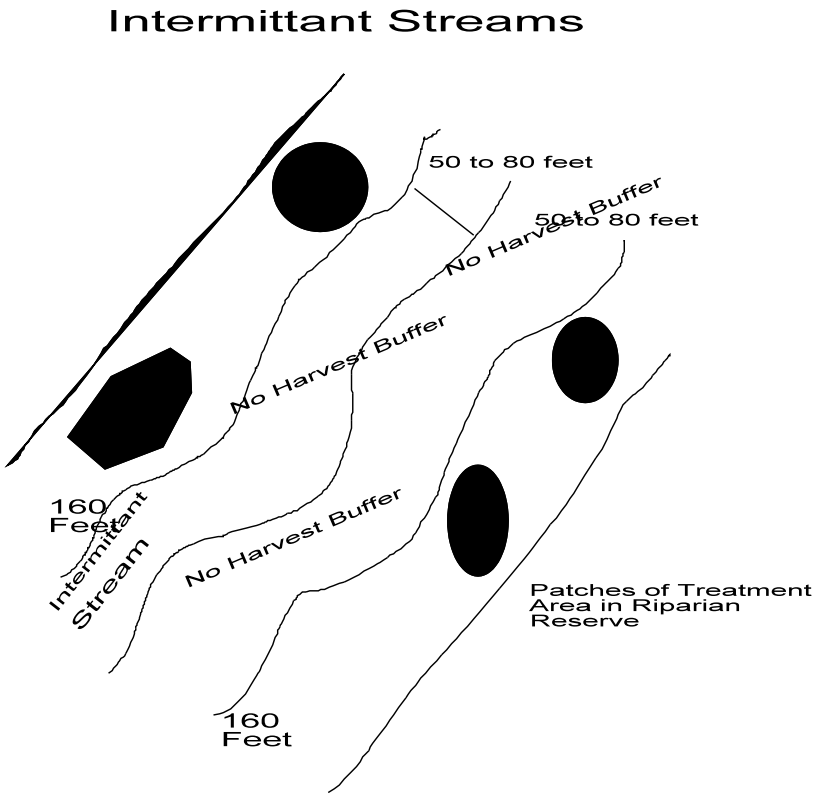

Figure 4 Layout Diagram of Intermittant Riparian Reserve

Appendix E

Bar Graphs Showing Number of Trees and Volume to be Removed by Diameter Class.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)
for the
Lower Spencer Creek Forest Health Treatments EA
EA No. OR 014-96-02

FONSI DETERMINATION

The Bureau of Land Management, Lakeview District, Klamath Falls Resource Area, has analyzed the following proposal and the alternatives related to:

-forest health treatments in the Lower Spencer Creek Watershed Area.
-using a number of timber sales to achieve objectives stated in the Klamath Falls Resource Area Record of Decision/Resource Management Plan and the Spencer Creek Pilot Watershed Analysis.
-treating up to 5000 acres and removing up to 12MMBF of timber from the Analysis Area.

Based on the information in the EA, it is my determination that none of the alternatives analyzed constitutes a significant impact affecting the quality of human environment greater than those addressed in the:

-the Klamath Falls Resource Area Record of Decision (ROD) and Resource Management Plan (RMP) (June 2, 1995). (KFRA ROD/RMP)
- the Final - Klamath Falls Resource Area Management Plan and EIS (FEIS) / (Sept. 1994). (KFRA FEIS)
- the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. / (April 1994 / Also known as the Northwest Forest Plan (NFP).
-the Final Supplemental Environmental Impact Statement on Management Habitat for Late-Successional and Old-Growth forest Related Species Within the Range of Northern Spotted Owl, Feb. 1994 (FSEIS).
-the Klamath Falls Resource Area Fire Management EA#OR-014-94-09 (June 10, 1994)
-the Klamath Falls Resource Area Integrated Weed Control Plan (EA July 21, 1993).
-the Spencer Creek Pilot Watershed Analysis (WA) (August 1995)
-Spencer Creek Coordinated Resource Management Plan (June 1994)
-Range Reform FEIS

Impacts to the environment would be similar to or less than those disclosed in the above mentioned documents. Therefore, an Environmental Impact Statement is unnecessary and will not be prepared.

Signed____Barron Bail_____ Date___5/17/96_____
A. Barron Bail, Area Manger
Klamath Falls Resource Area

DECISION RECORD

for the
LOWER SPENCER CREEK FOREST HEALTH TREATMENTS
ENVIRONMENTAL ASSESSMENT #OR014-96-02

DECISION

My decision is to implement the Proposed Action Alternative (Alternative A) of the Lower Spencer Creek Forest Health Treatments Environmental Assessment, EA #OR-014-96-02. The treatment area is within the known range of the Northern Spotted Owl and the area analyzed in the Northwest Forest Plan. Consultation has been completed with the USFWS on the Kakapo Stew Timber Sale for the Northern Spotted Owl and a "no effect" determination was made for this sale only. The Kakapo Stew Timber Sale is the first advertised sale within the Lower Spencer Creek Forest Health Treatment EA analysis area. Consultation will be completed on additional timber sales from this analysis area as they are prepared.

DECISION RATIONALE

The decision is consistent with the goals and objectives of the Final Klamath Falls Resource Area Resource Management Plan and Record of Decision (June 1995), the Final Supplemental Environmental Impact Statement on Management Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl (Northwest Forest Plan), the Klamath Falls Resource Area Fire Management EA (OR-014-94-09), and the Klamath Falls Resource Area Integrated Weed Control Plan EA (OR-014-93-09). The impacts created by the above decision do not require further analysis as noted in the FONSI determination.

In addition, because the Lower Spencer Creek Forest Health Treatment EA analysis area lies within the overlap area of the Northwest Forest Plan and the ICBEMP, the decision was considered within the context of the Scientific Assessments associated with ICBEMP but no additional analysis was deemed necessary.

Alternative A was selected because it represents the major prescription provided by the Klamath Falls RMP. Further, the Proposed Action (Alternative A) is consistent with findings of ICBEMP's Scientific Assessments, which demonstrate the need to restore forest terrestrial habitat that continues to experience forest health problems across the project area.

Alternative B (retain *only* 16 to 25 large trees per acre), while also meeting requirements under the Northwest Forest Plan and Klamath Falls Resource Management Plan, was not selected because of its inadequacy in addressing forest health at a significant scale due to concentrating treatment on fewer acres. Also, Alternative B does not address health treatments needed in riparian reserves.

Alternative C (harvest only salvage volume) was rejected due to its inadequacy to address density control needed to improve stand resiliency. The Roaming Salvage Timber Sale Environmental Assessment (EA #OR-014-96-02) addresses salvage harvest in the Klamath Falls Resource Area, including immediate mortality problems.

No Action (Alternative D) was rejected because it would not resolve the immediate need to address density control concerns for improved forest health in the areas covered under the environmental analysis. Deferring harvest would result in continued suppression and loss of existing shade-intolerant species (ponderosa pine, sugar pine, and Douglas-fir). Existing conditions would not significantly improve if the areas were deferred from harvest; also, the impacts of future harvest would not vary substantially from those anticipated under the proposed action. Under No Action, the ongoing mortality in many existing stands would result in deteriorated stand conditions, increased fuel loads, and a corresponding increased risk of stand-replacing wildfires.

DISCUSSION

Treatments will be implemented using BLM timber sale procedures. The treatments are expected to occur during the next 3 to 6 years in up to 7 timber sales to treat the areas proposed in the EA. The total harvested sale volume and acres will not exceed those analyzed in the EA, 12 MMBF and 5,000 acres respectively, unless the EA is amended.

Thinning prescriptions will address not only larger trees, but also stems between 3 and 7 inches in diameter because many concerns about density, fuel loading, and stand-replacing fires are correlated to trees within this diameter range.

Mitigating Measures

Four mitigating measures were proposed:

Proposals 1 and 3: Connectivity Corridors

Defer harvest for 2 to 3 years in Sections 19 and 30 of T. 38 S., R.6 E. (proposed connectivity area) to allow for postmonitoring of initial timber sales under the Northwest Forest Plan. The intent of monitoring is to determine if prescriptions satisfy specific habitat requirements for the Goshawk and Connectivity Corridors. Frosty One (in progress) and Too Frosty timber sales (completed) are being monitored.

Recommendations from the Spencer Creek Watershed Analysis:

- Maintain a late-successional connectivity corridor through Sections 19 and 30.
- Design a prescription that:
  Maintains a corridor at least 600 feet wide and including 2 snags/acre equal to or greater than 20 inches dbh, with at least 40 percent of the area in late-seral stage and 60 percent having canopy closure; and the remainder of the corridor area at least in a mid-seral stage, having at least 40 percent canopy closure.
  Emphasizes retention of large down woody debris, including piles.

Decision: Implement Proposal 1. The Klamath Falls Resource Area Interdisciplinary Team decided to implement these proposals delaying harvest in the proposed corridor area in Sections 19 and 30 for up to three years. Existing Northwest Forest Plan Timber Sales under contract will be monitored when complete to assess post-harvest stand characteristics. Post-harvest monitoring will help determine the necessity for additional constraints on Matrix lands within the proposed corridor.

Proposal 2: Goshawk

Recommendation from IM No. OR-94-112 (dated June 22, 1994) regarding management of habitat for Northern Goshawk:

- Maintain habitat around known goshawk territories, as follows:.
  Retain 60 percent canopy closure and late seral or old-growth conditions in designated 30-acre nest stand. Thinning from below will accomplish this objective.

- Maintain 400 acres around nest site, at a minimum, as follows:
  Retain 60 percent in late seral/mature forest and 40 percent mid/early forest. Open understory/ plentiful dead and down material and 1-2 acre patch cuts will provide excellent goshawk foraging habitat.

The above measures should be applied to areas within 0.25-mile of known nests and roosts.

Decision: Implement Proposal 2 as stated. Some instances may exist where habitat requirements for Threatened/Endangered species, such as Bald Eagles or Northern Spotted Owl, will take precedence over habitat requirements of the Northern Goshawk in areas when their habitats overlap.

Proposal 4: Special Status Plant Species

Winter harvesting in at least 18 inches of snow is required in timber sale areas within T. 39 S., R.6 E., Sections 17,19, and 20; T.38 S., R.6 E., Section 19 and 30 (SW¼ of the NW¼); and T. 38 S., R. 5 E., Section 13 to protect *Asarum wagneri* (Green-flowered ginger).

Decision: Implement Proposal 4, with allowance for summer logging, as described herein. Winter harvesting will be scheduled , where feasible, for areas containing concentrated populations of *Asarum wagneri.* However, due to variable snow depths and accessibility to these areas in the winter, some summer logging may be allowed to accomplish harvest objectives. Past experience with winter operations in the area indicate some difficulty in keeping access roads open during heavy snow years. Any summer operations will be conducted with caution to minimize impacts to concentrated populations of *A. wagerni.*

In addition to the above mitigating measures, the Klamath Falls Resource Area Interdisciplinary Team determined that no harvesting equipment would be allowed within the Spencer Creek Riparian Reserve Area, except on existing roads.

_____/s./ Barron Bail_____ _5/17/96___
A. Barron Bail Date
Klamath Falls Resource Area Manager