ROAMING SALVAGE TIMBER SALES

ENVIRONMENTAL ASSESSMENT
EA # OR014-96-04

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CHAPTER 1

Introduction

This environmental assessment (EA) analyzes a resource area (RA) wide timber salvage and limited thinning proposal for the Klamath Falls Resource Area (KFRA). All commercial and noncommercial forest lands within the KFRA would be included in this proposal except administratively withdrawn areas, congressionally withdrawn areas, and Late Successional/District Defined Reserves.

There are approximately 15,330 acres of Commercial Forest Land (CFL) and 6,110 acres of Noncommercial Forest Land (NCFL) on the east side and 42,070 acres of CFL and 5,210 acres of NCFL on the westside of the KFRA. A total of 68,720 acres of forested lands would be considered for salvage under the proposed actions. Salvage and thinning would take place on a small portion of the forest lands considered. The salvage and thinning volume would be widely scattered and discontinuous. This proposal could involve up to five timber sales over a period of up to five (5) years. This proposal would harvest up to 15 million board feet (15 MMBF) of timber.

The purpose of this EA is to provide the public with information about this salvage and thinning and to assist the responsible decision maker in determining if an Environmental Impact Statement (EIS) needs to be prepared.

Conformance With Plans and Environmental Impact Statements
These proposed treatments and projects are being planned in conformance with and under the direction of:

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

-the Final Klamath Falls Resource Area Environmental Impact Statement (KFRA FEIS)

-the Final Supplemental Environmental Impact Statement (FSEIS) on Management Habitat for Late-Successional and Old-Growth forest Related Species Within the Range of the Northern Spotted Owl, also known as the Northwest Forest Plan (NWFP), April 13, 1994.

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

-and the Klamath Falls Resource Area Integrated Weed Control Plan EA #OR-014-93-09, July 21, 1993.

-and the Range Reform FEIS/ROD, March 1995.

The proposed action would address management issues and recommendations identified in the Jenny Creek Watershed Analysis (Tier 1-Key Watershed) and the Spencer Creek Watershed Analysis Tier 1-Key Watershed). The watershed analysis for Jenny Creek was prepared by the Bureau of Land Management, Medford District and updated by the Klamath Falls Resource Area on June 31, 1995. The watershed analysis for Spencer Creek was prepared by an interagency team consisting of USFS, BLM, USF&W, and US Environmental Protection Agency (EPA) personnel, in August of 1995.

Purpose and Need
The primary purpose of the proposed action would be to salvage dead, dying, and recently windthrown timber, before it loses commercial value, and to provide forest products that would help maintain the stability of local and regional economies.

During the mid 1980s and early 1990s much of south central Oregon experienced a severe drought. The drought and other environmental and human influenced factors including insect and disease outbreaks, overcrowded growing conditions, and past management activities have contributed to high levels of tree mortality. Despite the return of more average levels of precipitation, tree mortality has persisted. Resource

Specialists predict that the mortality initially associated with past drought and overcrowding is likely to continue.

In many areas the trees that are succumbing have substantial commercial value. While many of the trees also have other resource values, such as wildlife habitat, the large number of dead and dying trees would allow some of them to be harvested.

The overcrowded conditions that exist in many parts of the KFRA's forest lands would be reduced in some areas through thinning. In localized areas, where mortality is occurring and salvage is planned, limited thinning of overcrowded stands would help to prevent further mortality and could be used to help protect individual high value trees, such as eagle roost or nest trees and under represented species like ponderosa pine, sugar pine, and Douglas-fir. Thinning would capture some additional volume from the overcrowded stands.

The mortality is creating a safety hazard adjacent to many of the Bureau of Land Management's (BLM) forest roads and recreation sites. Large trees that are dead and dying near forest roads and recreation sites are frequently designated as hazard trees and felled. The proposed projects would provide a cost effective method to deal with the hazard trees and allow the salvage of the hazard trees unless they are located in reserved areas.

In some areas, the buildup of dead fuels associated with tree mortality is contributing to increasing fire hazards. The proposed treatments would help reduce the fire hazard in some areas.

Winter storms, similar to the recent storms of December 1995 and January 1996, can cause additional mortality through windthrow and breakage. The proposed projects would allow salvage of recent storm damage and mortality.

The proposed projects would allow for the timely salvage of the previously described mortality and limited amounts of commercial thinning over the next five (5) years. Most conifer tree species rapidly lose value when they die. Salvage needs to take place within 6 months or at most a year if most of the commercial value is to be recovered.
Planning processes can make the timely implementation of salvage difficult or impossible. This proposal would allow salvage to occur in a timely fashion.

CHAPTER 2

Affected Environment

VEGETATION
The forest lands of the KFRA are divided into two general areas, the eastside and westside, with the dividing line being approximately Highway 97 running north from the Oregon-California border to Chiloquin, Oregon. The forest lands on the eastside are generally made up of ponderosa pine associated with sage, juniper, grass species, and minor amounts of other conifer species. The eastside forest areas are drier and less productive than the westside areas. Many of the eastside forest areas are bounded by juniper, sagebrush, and grasslands. For more information see pages 3-10, 3-25 to 31, and 3-58 to 66 of the KFRA FEIS. Forested areas on the westside include a variety of conifer and other vegetative species. Westside forest lands are generally more productive than eastside lands, with more precipitation and deeper, more fertile soils. For more information see pages 3-10 and 3-25 to 3-31 of the KFRA FEIS.

NOXIOUS WEEDS
A variety of noxious weeds exist in the KFRA. Many of the populations are known and are being managed or monitored. For more information about noxious weeds in the KFRA see pages 3-21 to 3-25 and 3-63 to 3-66 of the KFRA FEIS and the Integrated Weed Control Plan and Environmental Assessment, EA # OR014-93-09.

WATER RESOURCES
The entire analysis area is located in the Klamath Basin. Water on the west side of the analysis area drains into the upper Klamath River. On the east side, water drains into the Lost River drainage (a part of the upper Klamath River system) where it is used primarily for irrigation. At this time, none of the eastside watersheds have completed watershed analyses. There are three Key Watersheds in the westside analysis area: Spencer Creek, Clover Creek, and Jenny Creek. Clover Creek is a tributary to Spencer Creek. All three Key Watersheds have "completed" Watershed Analyses. The majority of the analysis area is above the transient snow zone which generally occurs at elevations between 4,500 and 2,500 feet. Snow is the dominant form of precipitation in most years.

There are about 340 miles of streams in the analysis area, of which about 40 miles are perennial and an estimated 70 miles are intermittent. In general, watersheds in the analysis area are stable and in fair to good condition. Water quality in streams ranges from poor to good. Water quality concerns include temperature, sedimentation and dissolved oxygen. Pages 3-11 through 3-20 of the KFRA FEIS describe the condition and quantity of water resources on BLM-managed lands. In addition, pages 3-10 through 3-13 of the KFRA FEIS contain an assessment of current (as of 1992) relative watershed condition for several watersheds in the analysis area.

RIPARIAN-WETLAND RESOURCES
Throughout the Klamath Falls Resource Area there are various riparian-wetland areas that provide a diverse array of resources and habitat values. A description of the various functions, locations and amounts of riparian-wetland areas can be found on pages 3-31 through 3-37 and Tables 3-17 through 3-19 in the KFRA FEIS.

RIPARIAN RESERVES
The FSEIS NWFP established Riparian Reserves (RRs) as part of the Aquatic Conservation Strategy. The KFRA FEIS incorporates the elements of the FSEIS and applies them to the whole resource area (including those areas outside the range of the Northern Spotted Owl). The Riparian Reserves are designed to provide protection for the diverse resources found in riparian-wetland areas by restricting certain activities within a designated buffer along streams and around wetlands.

Using the prescribed guidelines for the RR boundaries, the Klamath Falls Resource Area would have approximately 19,450 west side and 9,100 east side acres of RRs. Changes in these boundaries can only take place following a watershed analysis for the affected area.

SOIL RESOURCES
A large portion of the analysis area is included in the Soil Surveys for Jackson and Klamath County (Southern Part). These soil surveys each contain a General Soil Map which shows the major soil groups occurring in the survey area. A portion of the analysis area (primarily the "Gerber Block") has not been

included in a Soil Survey. The soil groups mapped in the analysis area can be classified into 4 major categories: soils formed in material weathered from igneous rock on plateaus and hill slopes (west side); soils formed in material weathered from pyroclastics and igneous rock on plateaus and hill slopes (west side); shallow soils that formed in residual material derived from tuff and basalt in mountainous areas (east side) and shallow to very deep soils that formed in colluvium and in material weathered from andesite, basalt, tuff, and ash in mountainous areas (east side). In all, fourteen soil associations are known to occur in the analysis area. More detailed information about soils in the analysis area can be found in the Jenny Creek Watershed Analysis, the Spencer Creek Watershed Analysis, in the Soil Surveys published by the Natural Resource Conservation Service (formerly Soil Conservation Service), and in Resource Area files.

An intensive inventory known as the Timber Productivity Capability Classification system (TPCC) 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. Where feasible, fragile soil sites would be avoided during logging activities. If fragile soil sites were encountered, the BMPs outlined in Appendix A designed for protection of fragile soil sites would be implemented.

WILDLIFE AND FISHERIES
A wide variety of wildlife species are present on lands managed by the KFRA. Habitat ranges from sage and grassland deserts with scattered clumps and stringers of Ponderosa pine to high elevation mixed conifer forests with large old growth trees. For a more complete description of the wildlife species and habitats present in the KFRA, see the KFRA FEIS pages 3-37 to 3-47 and the Spencer Creek WA pages 4-98 to 4-102 and 4-113 to 4-121.

Streams, rivers, and other water bodies contain habitat for fish and other aquatic dependent animals. The quality and use of this habitat is dependent on conditions of the adjacent riparian zones. A complete list of fish species in the KFRA can be found in the KFRA FEIS, appendix Q and a description of fish habitat in the KFRA can be found on page 3-41, map 3-6, and Table 3-21.

SPECIAL STATUS SPECIES
Species of concern include the bald eagle, American marten, northern goshawk, and northern spotted owl. "Survey and Manage" species identified in the ROD that are of concern in this area include several local species of bats. "Protection Buffer Species" under the Northwest Forest Plan, include the white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, flammulated owl, and the great gray owl. It is unknown if all of the "Protection Buffer Species" are present in the KFRA.

In the KFRA the BLM has identified nest sites of northern spotted owls, northern goshawks, and eagles and important habitat areas that have a high potential for American marten and great gray owls.

The KFRA ROD/RMP and the NWFP have guidelines for treating habitat containing these species.

SPECIAL STATUS AQUATIC SPECIES AND HABITAT
Federally endangered Lost River and shortnose suckers are located in the Klamath River and in Gerber Reservoir and its tributaries. Other Special status aquatic dependent animals and descriptions of their habitats are detailed in the KFRA FEIS on pages 3-44 through 3-47, table 3-23, and Map 3-7. Additional information on species and sensitive stocks can be found in the FSEIS, pages 3-163-176; 3-190-203; 3-256-257; Appendix B6 (Aquatic Conservation Strategy), and Appendix G (Consultation and Biological opinion, USFWS).

T&E Plant Species
There are no known populations of listed Threatened or Endangered (T&E) plant species within the KFRA. There are however, other special status plant species widely scattered throughout the resource area. A discussion and list of special status plants can be found in the KFRA FEIS on pages 3-42 to 3-44. For more information see pages 3-41 to 3-47 in the KFRA FEIS.

GRAZING
The Klamath Falls Resource Area administers livestock grazing on 95 grazing allotments. There are 10 allotments on the west side and 85 on the east side. These allotments encompass over 95 percent of the Resource Area. There are some wetland and riparian areas that have been closed to grazing to protect the habitat values found there. The seasons of use for these allotments vary, but the earliest grazing begins in mid April and the latest grazing ends in late October. The majority of the allotments have a season of use from the beginning of May through late July.

Numerous structural improvements have been built throughout the Resource Area to facilitate livestock grazing. Table 3-45 on page 3-79 in the KFRA FEIS, gives a listing of the improvements. Fencing is the improvement that could be most affected by timber harvest operations. Currently, there are approximately 175 miles of fencing throughout the resource area.

Additional information on livestock grazing can be found on pages 3-76 through 3-78 in the KFRA FEIS.

CULTURAL RESOURCES
There is evidence of human activity over the past 10,000 years within the proposed project area, particularly in the areas adjacent to springs and along stream channels. Cultural resource surveys would be conducted prior to entering all areas to be harvested by the projects, and mitigation would be accomplished by avoidance of any cultural sites found. For a more thorough discussion of KFRA's cultural resources, see pages 3-49 to 3-50 of the KFRA FEIS.

RECREATION
Recreational use of the proposed project area is generally of a dispersed nature, including sightseeing, hunting, fishing, snowmobiling, wildlife viewing, camping and others. For more information see pages 2-44-48, 3-52-58, and maps 2-8 and 2-10 in the KFRA FEIS.

VISUAL RESOURCES
BLM administered lands are managed to meet various visual quality objectives. The BLM emphasizes management of scenic resources in selected high use areas to retain or preserve scenic quality. See pages 2-40, 3-50, and map 2-5 in the KFRA FEIS for a complete discussion and location of visual resource management classes.

WILDERNESS AND SPECIAL STATUS AREAS
There are no designated wilderness areas in the resource area. The Mountain Lakes Wilderness Study Area (WSA), located adjacent to the existing Mountain Lakes Wilderness, is being considered for designation as wilderness. For more information on wilderness resources, refer to page 2-42, 3-52, and map 3-8 of the KFRA FEIS.

Several special areas, including Areas of Critical Environmental Concern (ACECs) and Research Natural Areas (RNAs) are located within the resource area. They are to be managed to maintain, protect or restore the special features that they contain. See pages 2-37 to 2-39 and map 2-4 of the KFRA FEIS for location of these areas.

WILD AND SCENIC RIVERS
The upper Klamath River was designated a Scenic River and is included in the National Wild and Scenic Rivers system as of September 1994. The riparian reserve is excluded from timber harvest (see page 45 of the KFRA ROD/RMP) and the area between the powerhouse and stateline is not available for planned timber harvest (page 2-38 of the KFRA FEIS).

CHAPTER 3

Alternatives

ALTERNATIVE A - Harvest up to 15 MMBF. Salvage dead, dying, hazard, and windthrown trees and thin green trees in selected areas.

ALTERNATIVE B - Harvest up to 13 MMBF. Salvage dead, dying, hazard, and windthrown trees, no thinning.

ALTERNATIVE C - Harvest up to 5 MMBF. Salvage only windthrown and hazard trees.

ALTERNATIVE D - Defer harvest to a later date.

ALTERNATIVE E - No Action.

ALTERNATIVE A-RA wide salvage and limited thinning (Preferred Alternative)

This alternative would salvage and thin up to 15 MMBF in forest products from 3,000 to 6,000 acres of forest land over the next five years. Up to 5 MMBF could be harvested in any single year. This proposal would include up to five sales. Salvage and thinning would take place over the entire KFRA except withdrawn land allocation areas as identified in the KFRA RMP. Salvage or thinning would take place in some withdrawn land allocation areas if KFRA resource specialists identify the areas as needing treatment and the treatment would meet objectives for that specific area. Most of the salvage would occur in the matrix land use allocation as identified in the Northwest Forest Plan. Salvage would include windthrow, standing dead, dying, and hazard trees. Some vegetation treatments (thinnings) would occur in the Matrix and Riparian Reserves (RRs) in order to enhance or maintain the vegetation and meet Aquatic Conservation Strategy objectives.

Alternative A would salvage dead and dying trees and would include limited amounts of thinning in the immediate area of the salvage. Thinning would be limited to patches of one acre or less. Up to 1000 acres would be thinned over the next five years. Some thinning would be conducted to protect trees with high resource values, such as pines, old growth trees, or eagle nesting or roosting trees, that are being stressed by understory competition. A circle with up to a 60 foot radius would be thinned around the base of the high value trees. At least one leave tree would be left in each quadrant of the circle. Old growth and second growth ponderosa pine, sugar pine, and Douglas-fir would be examples of trees that could be thinned around. Snag and down woody debris requirements, as identified in the KFRA ROD/RMP on pages 26 and 27, would be met.

Actions Within Riparian Reserves
Riparian Reserves would be established according to the guidelines in the BMPs in Appendix A.

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 each side of the stream. On perennial streams with slopes greater than 10 percent, a no harvest buffer of 160 feet would be established on each side of the stream.

Within the RRs, timber harvesting would occur only to meet Aquatic Conservation Strategy objectives (see KFRA ROD/RMP pages 13 and 14). In Alternative A, trees in the RRs with high resource values, such as old growth and second growth pines or wildlife trees, with excessive levels of understory competition, would be thinned around to reduce that competition. A circle with up to a 60 foot radius would be thinned around the base of the high value trees. At least one leave tree would be left in each quadrant of the circle. Such thinning would occur only in the immediate area of salvage operations that are occurring outside of the RR.

No salvage would be removed from a RR unless adequate down woody debris is present in the RR (see Project Design Features section of this EA). Hazard trees adjacent to roads or recreation sites, would be

felled in RRs, including those 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 no cut buffer would be left in place except where they would cause resource damage.

Selected existing landings, skid trails, and roads would be used within the RRs when their use would be less impacting than designating and constructing new ones outside of the RRs.

On the west side of the KFRA, no harvest activities would take place in RRs that are part of a watershed where no Watershed Analysis (WA) has been completed. Special PDFs have been designed for the eastside of the KFRA, where no WAs have been completed (see end of PDF section).

Up to 100 acres would be thinned per year in RRs over the five year life of this EA. Less than two percent of the total KFRA RR acres would be entered over the five year life of this EA.

Actions Outside Riparian Reserves
Some areas with large amounts of mortality and few remaining green trees or reproduction would be planted with a variety of conifer seedlings. Up to 1,000 acres would be planted over the next five years.

Up to (50) fifty acres of scarification would be accomplished over the five year life of this EA. Scarification would be used to facilitate planting where vegetative competition or slash loads are excessive. Areas needing scarification would be determined by resource specialists.

Up to fifty (50) acres of ripping (subsoiling) would be accomplished over the five year life of this EA. Ripping would be used to obliterate roads and to mitigate impacts of compaction. Areas needing ripping would be determined by authorized personnel.

In Alternative A, up to one mile of new roads could be constructed. There would be no net increase in roads, for every new foot of road constructed, a corresponding decommissioning of an equal amount of existing road would take place.

Alternative A could include renovation and/or improvement of up to 50 miles of existing roads. Renovation and improvement would include operations like grading, ditch cleaning, culvert installation, and spot surfacing.

ALTERNATIVE B-RA wide salvage only(no thinning)

Alternative B is the same as Alternative A except that no thinning would occur. This alternative would reduce the harvest over five years by up to 2 MMBF. Only wind throw, standing dead, and dying trees would be salvaged. Up to 13 MMBF would be salvaged under this alternative over the next five years.

ALTERNATIVE C-Salvage only hazard trees and wind throw

Alternative C would be the same as Alternative B except only blowdown and hazard trees would be salvaged. No standing dead or dying trees would be harvested. No thinning would occur. Alternative C would salvage up to 5 MMBF of timber over the next five years.

ALTERNATIVE D-Deferred Salvage

Alternative D would defer salvage to a later date.

ALTERNATIVE E-No Action

The no action alternative would not salvage or thin any of the areas identified in this EA.

CHAPTER 4

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 for both the east and west sides of the KFRA. Additional PDFs for watershed and soil resources are outlined in Appendix A.

Project Design Features that are specific to the east or west side are listed at the end of this section.

TIMBER RESERVED FROM CUTTING
The Fall Creek municipal watershed would be deferred from harvest until a watershed plan is completed by the City of Yreka, California and the Medford District BLM. (Explanatory note: the Fall Creek watershed supplies surface water to the city of Yreka, California's community water system).

On westside Matrix lands, wildlife trees would be reserved at an average of 2.5 trees per acre, with one tree per acre greater than 20 inches DBH (where available). Preferred large snag species would include ponderosa pine, sugar pine, and Douglas fir. The remaining 1.5 snags per acre would be greater than 12 inches DBH (if available) and would be of a species mix proportional to the stand. Live culls, snap-outs, or other defective green trees could be counted as wildlife trees. Information on how the snag levels were determined is available in Appendix C.

On eastside Matrix lands, snags would be reserved at an average of 1.4 per acre, 14 inches DBH and larger. The preferred snag species would be ponderosa pine. Live culls, snap-outs, or other defective green trees could be counted as wildlife trees.

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

Limited harvest buffers of 150 feet would be established adjacent to natural meadows and openings to provide habitat for great gray owls. Harvest within these buffers would occur only to improve or maintain great gray owl habitat. If great gray owls are located, the management implications outlined in Appendix D would be implemented.

All old growth trees would be reserved except trees that are dead, dying, or present a substantial health risk to adjacent old growth trees. Examples of a substantial health risk would include; trees infested with bark beetles, heavy mistletoe concentrations, and trees existing in severely overcrowded positions.

Buffers, referred to as Riparian Reserves (RRs), would be established adjacent to drainages, streams, water bodies, and wetlands. Special standards and guidelines would govern land use in these areas. Special guidelines would include things like logging and road construction restrictions within the RRs. More information regarding harvest activities and management implications in RRs is available in Appendix A.

General Riparian Reserve guidelines would include the following:

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.

Some harvest may occur in the RRs as previously described. Any harvest inside a RR would be conducted only to enhance the water protecting qualities of 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 on the westside and 2 snags per acre on the eastside. 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.

YARDING
All equipment and vehicles that would be used off of maintained roads 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 would be accomplished by using a pressure hose.

Noxious weeds in the immediate area of yarding operations would be cut 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 would be accomplished by using a pressure hose and would be completed prior to leaving the contract area. If cleaning is neccessary, the cleaning area would be designated by authorized personnel.

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.

If a mechanical harvester is used on portions of the proposed harvest areas, the following restrictions would apply:

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 harvesting would be allowed on slopes averaging greater than 35 percent.

SEASONAL RESTRICTIONS
Seasonal restrictions would be required to prevent soil erosion and to protect wildlife.

Seasonal restrictions would be required in areas where wildlife could be impacted, such as eagle nest sites, owl nest sites, and American marten den sites. 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 to logging activities during the wet season (October 30 to June 1) unless waived by Authorized personnel.

THREATENED AND ENDANGERED AND SPECIAL STATUS SPECIES PROTECTION
If a threatened/endangered (T&E) species (plant/animal) is found prior to or during the timber sale, and the timber sale would subject the species of concern to adverse impacts greater than those analyzed in the FSEIS (NWFP) and the KFRA FEIS, all disturbing activity would cease and a Section 7 consultation would be held with the U.S. Fish & Wildlife Service. Activity in the immediate vicinity of either plant or animal T&E species would be resumed only with the Area Manager's approval.

If other special status plant species (federal candidate, state listed, state candidate, Bureau sensitive, or Bureau assessment species) are found and would be subject to adverse impact, mitigation measures for those plant populations would be proposed and submitted to the Area Manager for approval.

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.

CULTURAL RESOURCES
In areas where there has not been a cultural resource survey, and salvage activities are planned, a skid trail into the area to be salvaged and a falling zone twice the height of the tallest tree to be harvested would be surveyed for cultural resources.

The Klamath Tribes have requested a buffer zone of 300 feet be established around Native American cultural sites. Where possible, these buffer zones would be established. If establishing a buffer zone or avoidance is not possible, other measures such as data recovery would be conducted to protect cultural materials. Cultural protection and management procedures outlined in the KFRA ROD/RMP on page 43 would be followed.

ROAD CONSTRUCTION, MAINTENANCE, USE
Up to one mile of new road construction would occur. All road construction (including operator spurs and improvements) and renovation would be limited to the dry season (May 1 to Oct.15) or as determined by the authorized officer. No net increase of roads would occur. For any new construction, a corresponding amount of road would be decommissioned.

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
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
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's 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
Where limbing occurs outside of landings, slash (limbs and tops) would be piled with a brush rake equipped tractor or skidder or hand piled. Where feasible the brush rake equipped tractor or skidder would make only one pass.

All slash within 100 feet of landings would be piled and burned.

All slash, in areas where piling is not required or not accomplished, would be lopped and scattered to a depth of twelve inches or less.

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

Chipping and scattering of chips or removal of chips from the site would be an acceptable slash disposal method.

Some reserve trees, particularly high resource value trees, would have slash pulled back by hand and piled or lopped and scattered 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.

Follow-up underburning would be consistent with the Klamath Falls Resource Area, Fire Management Environmental Assessment, #OR-014-94-09.

DOWN WOODY DEBRIS
Where practicable, ten tons or more of nine-inch diameter or smaller woody material per acre would be maintained. In ponderosa pine forest land, 9 tons per acre of duff and litter (approximately 0.5 inch deep) and 2.2 tons per acre of material 0.25 to 3 inches in diameter would be maintained. These target loads are designed to meet soil productivity and fire suppression objectives.

Eastside Down Woody Debris
Where available, fifty lineal feet of down logs with a 12 inch minimum diameter at the small end and greater than 8 feet in length would be reserved per acre to meet eastside down woody debris requirements.

Westside Down Woody Debris
Where available, 120 lineal feet of down logs with a 16 inch minimum diameter at the small end and greater than 16 feet in length would be reserved per acre to meet westside down woody debris requirements.

PDFS SPECIFIC TO SUCKER AND EAST-SIDE TROUT STREAMS
Endangered Suckers and depressed populations of redband trout require special attention because of their vulnerability to sedimentation. The following PDFs are designed to protect east side RRs, streams, and the wildlife that inhabit them.

1. Logging equipment would cross ephemeral channels only where adequate armoring is present or artificial armoring would be provided if necessary. Examples of artificial armoring would be large logs or rocks.

2. No removal of trees within 15 feet of ephemeral streams that are within 1/4 mile of an intermittent or perennial stream.

3. Do not use roads which have inadequate drainage features unless all potential problems can be corrected before the wet season. These roads would have prior evidence of erosion or rutting.

4. Review stream and riparian assessments to determine which sucker and trout streams are non-functional or functional at risk. No harvest activity would occur upstream of these areas until a site inspection is made to ensure that no impacts occur that would contribute to existing problems.

CHAP 5

ENVIRONMENTAL CONSEQUENCES

This chapter briefly summarizes the environmental consequences of implementing the alternatives described in Chapter 3. All impacts expected from the proposed alternatives have been described and analyzed in the KFRA FEIS and are approved in the KFRA ROD/RMP. More information regarding specific environmental consequences and cumulative effects within the KFRA from these types of forest treatments can be found on pages 4-1 through 4-143 of the KFRA FEIS.

The following resources are not present, or would not be impacted by any of the proposed alternatives: prime and unique farmlands, mining claims, paleontological resources, wilderness areas, 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.

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 for 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/riparian vegetation (see KFRA FEIS pages 4-35 to 4-42)
-special forest/natural products (see KFRA FEIS pages 4-39 to 4-124)
-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)

SITE SPECIFIC IMPACTS

VEGETATION
Due to the widely scattered and selective nature of the proposed harvests, impacts to vegetation would be minimal under all alternatives. The proposed alternative, Alternative A, would harvest some green trees through thinning and the harvest of dying trees. The amount of green trees harvested would be minimal and would be of a localized and selective nature. The thinning would benefit some high resource value trees by removing understory and adjacent competition. Alternatives B, C, D, and E would not provide a thinning benefit.

Alternatives A, B, and C, would reduce fire hazards to some extent by removing some of the fuels that have been building up in forested areas. The benefit would be minor due to the widely scattered and discontinuous nature of the proposed harvests.

Alternatives D and E would not reduce fuel buildups or provide forest products for local and regional economies.

NOXIOUS WEEDS
Implementation of the PDFs outlined in this proposal should limit the dispersal of noxious weeds as a result of the activities proposed in Alternatives A, B, and C.

Alternatives D and E would have no effect on current rates of noxious weed dispersal.

SOIL AND WATER RESOURCES (All Alternatives)
The following activities associated with the proposed alternatives are included in this analysis:

> Up to 1 mile of new spur roads would be constructed. No net increase in road mileage would occur in the Spencer Creek, Clover Creek, and Jenny Creek Key Watersheds.
>
> Patches of up to one acre would be thinned. No limit to the number of 1 acre thinnings has been assigned.

Up to 500 acres of thinning around selected high resource value trees could occur in Riparian Reserves. The diameter of the thinned areas around each tree would be up to 60 feet.

Up to 15 MMBF of salvage and thinning would occur in the analysis area over the next five years.

Up to 50 acres of scarification would occur.

Up to 50 acres of subsoiling (ripping) would occur.

The potential adverse impacts to soil and water resources resulting from the activities outlined in Alternatives A, B and C are described in the KFRA FEIS (pages 4-11 through 4-24; Appendix P, Water Resources and Basic Hydrologic Principles; and Appendix S, Soil Resources). The Aquatic Conservation Strategy in the KFRA FEIS and in the FSEIS (NWFP) and the best management practices/project design features selected for this analysis area (see Appendix A) would reduce or avoid adverse effects resulting from the implementation of the alternatives. The following information summarizes the specific impacts to soil and water resources from the proposed alternatives.

Direct and indirect adverse impacts to soils and soil productivity include compaction and displacement, removal of soil surface cover, and changes in nutrient status. The relatively flat topography and low erodibility of forest soils in the analysis area reduce the probability of impacts resulting from changes in soil surface cover to low. 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 KFRA FEIS.

However, there are areas south of Highway 66, for example the Grenada area, that have special soil and site productivity concerns. Soils in these areas generally have a thin organic horizon and, therefore, are susceptible to further organic horizon reduction and compaction from logging activities. Because long-term site productivity is associated with soil organic reserves, ground-based logging equipment such as tractors and skidders need to be limited as much as possible to existing skid roads in these areas in order to minimize further impacts to soils. Existing skid trails would be used whenever possible. New skid trails would be designated by authorized personnel. Adhering to the PDFs in the Logging section would protect the soil resources.

Direct and indirect impacts to water quality would be minimal. Some sediment could enter streams as a result of soil disturbance on roads that cross or are in close proximity to streams and by skidding across streams. Soil disturbance and sedimentation to streams could result from road maintenance, renovation and obliteration activities and hauling activities on existing roads within Riparian Reserves and in proximity to ephemeral streams. No new roads would be constructed in the Riparian Reserves.

Salvage activities would likely not occur in the transient snow zone, because the majority of commercial forest land 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 (salvage and/or limited thinning), there would be little or no potential for increasing annual water yields. Because only one mile of new roads would be built (and any new roads would be built outside of Riparian Reserves), the potential to adversely affect groundwater recharge and aquifer function would be low to none. No net increase in road mileage would occur in Key Watersheds (Jenny Creek, Spencer Creek and Clover Creek).

RIPARIAN-WETLAND RESOURCES (Alternatives A, B, and C)
The analysis of impacts is based on the following proposed activities in Alternatives A, B, and C:

Some harvest of salvage (Alt. A, B, and C) and thinning of green trees (Alt. A only) could take place within Riparian Reserve boundaries, outside of a no cut buffer which would be determined for each stream or wetland by riparian resource specialists. This activity could only take place in watersheds that have a completed watershed analysis.

Hazard trees would be cut and left in place within Riparian Reserves, except where adequate down woody debris exists or where the felled hazard trees would cause resource damage. Hazard trees felled within the no cut buffer would be left in place except where they would cause resource damage.

Existing roads and skid trails within Riparian Reserves could be used for harvest operations. No new roads or skid trails would be built within Riparian Reserves.

Any harvest of trees within Riparian Reserve boundaries would comply with Aquatic Conservation Strategy guidelines, PDFs, and the BMPs in Appendix A. This would result in minimal adverse impacts to riparian vegetation. Potential impacts to soils and water quality are addressed under the Soil Resources and Water Resources sections of this EA.

Equipment travel would be limited to existing roads and skid trails and new skid trails designated by the Authorized Officer in compliance with the PDFs and BMPs for all alternatives. This would result in minimal adverse impacts to riparian-wetland vegetation. Potential impacts to soils and water quality are addressed under the Soil Resources and Water Resources sections of this EA.

On the west side of the KFRA, cutting of trees within the boundaries of Riparian Reserves, in areas where a Watershed Analysis has not been completed, would be limited to hazard trees only. The hazard trees would be left in place to provide down woody debris unless they were causing resource damage or increased fire danger.

On the east side of the KFRA, the Special PDFs listed at the end of the PDF section for RRs, would ensure that eastside riparian-wetland areas are protected.

Through implementation of the PDFs and BMPs listed in Appendix A, the proposed actions would have minimal affects to the riparian-wetland areas and the corresponding Riparian Reserves.

TERRESTRIAL WILDLIFE
Harvest activities associated with implementation of Alternatives A and B could impact wildlife in several ways. One common problem associated with timber harvests is the reduction of snags available for wildlife. For example, fluctuations in population numbers of woodpeckers may occur in response to the fluctuation in snag levels resulting from harvest. Short term impacts to species such as the black-backed woodpecker could occur if large congregations of dead trees are harvested . However, the PDFs for snag retention described in this EA provide for more and larger snags than required in the KFRA FEIS and FSEIS (NWFP) guidelines. The impacts to snag dependant species from implementing Alternative A would be similar to or less than those described in the KFRA FEIS on pages 4-44 to 4-65 and in the FSEIS (NWFP) on pages 4-177 and 4-190.

The proposed salvage and thinning would remove only a small portion of any existing stand. The potential for recruitment snags would remain high and continuing mortality should provide immediate snag recruitment.

Harvesting only a small portion of any existing stand would have minimal impacts on other wildlife species. Logging activities have the potential to cause wildlife disturbances through impacts to nesting, fawning, and calving activities. However, soil moisture restrictions limit logging activities to dates later in the season when most of the critical hatching and birthing activities have already occurred. Further protection is provided through seasonal restrictions around known raptor nest sites.

Since the proposed sale would only enter a small portion of any given stand, there would be natural reserves and escape areas for a variety of wildlife. The existing RRs and other protected land allocations including DDRs, PHABs, ACECs, and RNAs, would leave considerable areas of undisturbed habitat.

The effects of implementing alternatives B and C (no thinning treatments and less volume harvested) would be similar to but proportionally less than those described for Alternative A. Less volume would be harvested and less area would be impacted. These alternatives would not have the benefits associated with silvicultural treatments around high resource value trees. Some high resource value trees would remain at risk in overcrowded conditions. Further mortality of old growth and second growth pines could have significant impacts upon ponderosa pine associated species (see Spencer Creek WA).

Implementation of Alternative D or E would result in no immediate logging activities and therefore, no immediate impacts. Some minor impacts would include no thinning accomplished around some high resource value trees and potentially an increase in fire hazard in some areas. These two alternatives would postpone impacts to a later date and potentially to a more conventional type of timber harvest. Impacts to wildlife would be greater in a conventional green tree sale than under the proposed salvage sales.

FISHERIES AND AQUATIC WILDLIFE (All Alternatives)
The Riparian Reserve standards and guidelines (KFRA FEIS and ROD/RMP) provide conservative protection for most species with significant aquatic components in their life cycles. The proposed action adheres to those standards and guidelines. Limited entry into RRs and adherence to BMPs (see Appendix A) would minimize impacts to fish, amphibian, and other aquatic animals. Adoption of the recommendations in the Spencer Creek WA for buffering springs, seeps, and pump chance ponds (Spencer Creek WA, page 5-41) would insure low 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 (NWFP) (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 occurred on the redband trout or the Jenny Creek sucker because of insufficient information on ecology of these species (see FSEIS, page 4-193). Impacts should be low based on analysis of other species with similar life histories.

Based on the soil and water resources analysis contained in this EA, the impacts to westside aquatic species, including the redband trout and Jenny Creek sucker, from implementation of Alternative A would be low. If it is assumed that this analysis can be applied over the entire analysis area, then impacts to the rest of the analysis area would be similarly low.

Sivicultural treatments around large pine and Douglas-fir trees within riparian reserves is consistent with Aquatic Conservation Objectives. Large pine and Douglas-fir are important components of long-term disturbance regimes in riparian areas and streams. Treatments which allow these large trees to persist would provide stream shading and would maintain large woody debris recruitment potential.

SPECIAL STATUS SPECIES
Implementation of the PDFs including seasonal restrictions, buffers, and habitat retention designed to protect eagles, spotted owls, and great gray owls would result in minimal impacts to those species.

Surveys have not located any great gray owls to date. If great gray owls are located, the management practices listed in Appendix D would be implemented.

In Alternative A, thinning around high resource value trees, including nest and roost trees, would help to retain those trees and should provide a benefit to raptor habitat.

Implementation of the snag retention guidelines in the PDFs for general forest areas and Riparian Reserves would retain more and larger snags than required under the KFRA FEIS and ROD/RMP guidelines. Therefore, impacts to snag dependant species would be similar to or less than those described in the FSEIS (NWFP) on pages 4-177 and 4-190.

Bald Eagle
Alternatives A, B, and C would result in minimal impacts to bald eagles or their habitat. Implementation of the Project Design Features that include a limited operation period for harvest within .5 mile of active nest sites would prevent impacts associated with logging activities.

Alternative A would include some thinning around potential bald eagle roost or nest trees that would be beneficial to the long term development of eagle habitat. Thinning treatments would be very limited in extent. Alternatives B and C would not provide a thinning benefit.

In the short term, all potential roost and perch trees would be maintained within all potential bald eagle habitat under Alternatives D and E. However, no benefits from thinning around potential habitat trees would result from these alternatives. No change in the current buildup of fuel loads would be expected under these alternatives.

Northern Spotted Owl
Under Alternatives A, B, and C, the harvest of salvage volume would have minimal effect upon canopy closure. Dead trees provide little in the form of canopy closure. Alternatives B and C should not affect the overall quality of spotted owl nesting, foraging, or dispersal habitat. No green trees would be harvested under Alternatives B and C.
Under Alternative A, the limited amount and discontinuous nature of the proposed thinning should not affect spotted owl habitat. Thinning would not take place within the District Designated Reserves which have been set aside for spotted owl habitat.

Northern Goshawk
The salvage of dead and dying trees and limited thinning proposed in Alternative A should have minimal impact upon northern goshawk habitat. Thinning of limited areas with overstocked stands may provide a benefit by allowing goshawks access to additional areas for hunting. Over the long term, thinning would decrease the time needed for the overstocked stands to become suitable goshawk habitat. Thinning activities would be very limited in extent. Down woody debris requirements and snag retention levels should ensure adequate prey habitat.

Implementation of Alternatives D and E would have no effect on current goshawk habitat.

American Marten
Under Alternatives A, B, and C, implementation of the Project Design Features should protect the minimum levels of dead and down woody debris needed for this species. The PDFs for snag retention should also provide for down woody debris recruitment potential.

Under Alternatives D and E, the levels of dead and downed material would increase over time and provide for the habitat needs of the marten. However, in areas where fuel buildups become excessive, the stands could become more susceptible to wildfire.

SUCKERS
The east side of the analysis area is of special concern because it contains critical spawning habitat for endangered suckers. Because no watershed analysis has been conducted there, some additional PDFs were created as mitigating measures to address areas within proposed critical sucker habitat. The PDFs designed to protect RRs and the PDFs Specific to Suckers and East-side Trout Streams (see PDFs) would ensure that little or no additional detrimental impacts to suckers would result from the proposed action.

Plants
No impacts to special status plants are anticipated because of the localized nature of the impacts of the proposed action, implementation of the PDFs outlined within the proposed action, and other recommendations resulting from clearance surveys. These recommendations would be designed to avoid any negative effects to special status plant species.

GRAZING
For Alternatives A, B, and C, timber harvesting activities within grazing allotments during the season of use would have minimal adverse impacts.

All allotments within the resource area have fence lines that divide the allotments into separate pastures and/or define the boundary of the allotments. Fence lines also have been built to exclude livestock from areas to provide for resource protection. Gates have been included within these various fence lines to facilitate the movement of livestock and/or to provide access for vehicles. Potential adverse impacts to vegetation, water, and soil resources from unmanaged livestock grazing could occur if these gates are left open during timber harvest activities or if fence lines are cut to access timber and not immediately repaired. Fence line integrity is critical to the grazing management systems currently in use that are designed to maintain or enhance the various vegetation communities and protect water and soil resources. A discussion on the impacts to these resources resulting from excessive or untimely grazing can be found on pages 4-12, 4-14, 4-19, 4-20, 4-26, 4-33, 4-34, 4-36, and Appendix L in the KFRA FEIS.

The impact of the proposed timber harvest levels on available livestock forage quantity and condition would be negligible.

CULTURAL RESOURCES
Impacts to cultural resources from implementation of any of the alternatives would be minimal. Project Design Features requiring surveys of proposed project areas and buffering or avoidance of cultural sites would reduce or eliminate impacts.

If any cultural or archaeological resources are identified on the site during timber harvest, operations would be immediately halted and the Area Manager notified. Operations would not resume until the Area Manager approves a protection plan.

RECREATION
Timber harvesting activities described in the proposed actions would have minimal adverse impacts on recreation activities. In addition to the effects on recreation from timber harvest activities as described in

KFRA FEIS, pages 4-104 to 4-108, there would be minimal, short term disruption to recreation. The primary areas where salvage or hazard tree harvest activities would have short term effects on recreation are in and around developed recreation sites (Surveyor, Topsy, Gerber, etc.) and concentrated recreation use areas, such as the Klamath River canyon. Recreation sites and areas may be temporarily closed due to safety hazards associated with harvest activities, which may inconvenience or displace some recreationists. Additional short term disturbances from noise and dust associated with harvest activities in these areas is also expected.

VISUAL RESOURCES
The timber harvest activities proposed for alternatives A, B and C would continue to maintain the visual and scenic quality in the harvest areas. These alternatives propose harvest through resource area salvage and/or limited thinning, and minimal road building. There would be no additional adverse effects to visual resources, than previously described in the KFRA FEIS, pages 4-97 to 4-101. However, some additional project design features have been proposed to reduce the visual impact of harvesting within recreation sites, concentrated recreation use areas, and Special Areas.

WILDERNESS
Implementation of any of the proposed alternatives would result in no impacts to wilderness areas. No harvest activities would occur within the Wilderness Study Area.

SPECIAL AREAS
Portions of the Miller Creek, Upper Klamath River, and Yainax Butte ACECs, Clover Creek and Surveyor Forest Area Environmental Education Areas, and Tunnel Creek Wetlands could receive salvage and/or hazard tree harvesting. The Pacific Crest National Scenic Trail would receive no timber harvesting within 50 feet either side of the trail. The Old Baldy ACEC/RNA is to receive no timber or salvage harvesting. The environmental effects from salvage timber harvesting in Special Areas is adequately described in the KFRA FEIS, pages 4-91 to 4-93. It is anticipated that removal of hazard trees, while adhering to the PDFs for Visual Resources, would have minimal impact on Special Areas. A positive effect is possible from the removal of visually contrasting dead or dying trees which present a safety hazard.

WILD AND SCENIC RIVERS
The RMP does not allow for planned timber harvest within the Wild and Scenic upper Klamath River corridor. However, some limited hazard tree removal/salvage along roads, and within recreation use areas is permitted. The environmental effects of a salvage timber harvest in the Klamath River are adequately described in the KFRA FEIS, pages 4-93,95 and 103. It is anticipated that removal of hazard trees following the PDFs for visual resources, would have minimal impact on the scenic or recreation resources in the river corridor. A positive effect is possible from the removal of visually contrasting dead or dying trees which present a safety hazard.

Cumulative Impacts

Soil Resources - Alternative A
Soil productivity has been altered as a result of past management activities on much of the commercial forest land in the analysis area. As a result of past harvest activities, compaction and soil displacement have increased over historic levels. Other impacts, such as loss of soil cover and changes in nutrient status have also occurred, but vary greatly depending on site conditions. Because the proposed activities are dispersed over a wide area, it is unlikely that the 20 percent threshold for detrimental soil conditions would be reached from implementation of Alternative A (see Appendix A for more information on the 20 percent threshold). However, some areas that would be treated currently exceed this threshold. Some subsoiling and obliteration of roads in conjunction with implementation of the alternative would reduce existing levels of detrimental soil conditions for a limited number of acres.

Implementation of the proposed alternative could disturb or re-disturb up to 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 less than one percent of the analysis area and two to four percent of all the commercial forest land in the analysis area. This assessment is a worst-case scenario. See Water Resources section below for an explanation about how the acreage of the treatment area was estimated.

Water Resources - Alternative A
The procedure followed to determine cumulative effects for the proposed actions is described in Appendix B. The following assumption was made for this cumulative effects analysis:

In the next 5 years, 3,000 to 6,000 acres in the analysis area could be treated.

A quantitative assessment of current hydrologic and soil condition for the analysis area is lacking, except for two watersheds where a watershed analysis has been completed (Jenny Creek and Spencer Creek watersheds). The Jenny Creek Watershed Analysis analyzed current hydrologic condition by subwatershed. One of these subwatersheds, Johnson Creek, lies in the analysis area. Current hydrological conditions in the Johnson Creek watershed were updated in the Frosty Forest Health Treatments and Recreation Site Enhancements Environmental Analysis (EA No. OR 014-95-03). Therefore, the cumulative effects of this proposed alternative on the Spencer Creek and Johnson Creek watersheds is assessed using information from that EA and the two Watershed Analyses. Because a higher proportion of the proposed activities could occur in these two watersheds (due to the relatively higher amounts of commercial forest land and salvage volume occurring there), this analysis represents a "worst case" scenario. The analysis results obtained for these two watersheds can then be interpolated for the remainder of the analysis area. The assumptions used for the analysis are as follows:

There are 23,563 acres of commercial forest land on the west side, which is roughly 75 percent of all the commercial forest land in the analysis area. It is assumed that 75 percent of the treatment acres would occur on the west side. Of this 75 percent, roughly 50 percent could be treated in the Johnson Creek and Spencer Creek watersheds. Of this 50 percent, about 60 percent would occur in the Spencer Creek watershed and 40 percent in the Johnson Creek watershed.

75 percent of 3,000 to 6,000 acres=2250 to 4500 acres treated on west side commercial forest land.

50 percent of 2250 to 4500 acres=1125 to 2250 acres treated in the Johnson Creek and Spencer Creek watersheds.

60 percent of 1125 to 2250 acres=675 to 1350 acres treated in the Spencer Creek watershed.

40 percent of 1125 to 2250 acres=450 to 900 acres treated in the Johnson Creek watershed.

Based on the information above, it is estimated that this alternative could increase the area considered "hydrologically unrecovered" or in "equivalent clearcut condition" as follows, by watershed:

Spencer Creek Watershed: 135-270 acres (<1 percent of the watershed area).

Johnson Creek Watershed: 90-180 acres (2 percent of BLM lands, <1 percent of the watershed area).

The remainder of the analysis area would be affected by a proportionate amount that is less than that analyzed for these two watersheds. Therefore, the cumulative impacts from implementing Alternative A are low. Please refer to the Hydrology Report in the analysis files for more information on the process used to assess cumulative effects.

Soil and Water Resources - Alternatives B and C
Implementation of Alternatives B and C would harvest less volume than Alternative A. The lower harvest levels would result in fewer skid trails and landings than Alternative A. The impacts resulting from implementation of Alternatives B or C would be similar to, but proportionally lower than those expected from Alternative A.

Riparian-Wetland Resources - Alternatives A, B, and C

The analysis of cumulative impacts is based activities proposed in Alternatives A, B, and C. The activities and analysis are the same as those listed under the environmental consequences section for Riparian-Wetland resources.

WILDLIFE
Long term impacts to most wildlife species would be minimal. The proposed projects would have little or no impact on habitat conditions over the long term. Snag levels, canopy closure, and species composition, would likely be unaffected if any of the alternatives are implemented. Alternatives A, B, and C may reduce the recruitment potential for down woody debris, but they would not reduce it below levels prescribed in the FSEIS (NWFP).

In Alternative A, the thinning treatments around high resource value trees would help to maintain the old growth component of some stands. This treatment would also provide some long term protection to raptor habitat trees.

Alternatives A, B, and C should provide a minor fire hazard reduction over the long term.

Landscape Analysis

The proposed harvest activities would be widely dispersed and discontinuous. Distances between areas of significant harvest would range from a few hundred feet to several miles. All of the harvest trees would be individually selected and primarily salvage. Implementation of the proposed alternative, would, in the worst case analysis, enter less than nine percent of the analysis area over the next five years. Of the area entered, less than 20 percent would be impacted.

Canopy closure over the analysis area would not be significantly impacted by the harvest of dead and dying trees. Snag levels would be maintained above KFRA FEIS and ROD/RMP guidelines. No net increase in roads would occur. Impacts to watersheds would be low.

The proposed activities have been considered in association with existing timber harvest impacts and additional proposed harvest impacts. The proposed activities have been analyzed collectively with all other proposed activities including harvesting, grazing, prescribed fire, and recreational use.

One of the primary objectives of this project is to accomplish the salvage in a manner that would not preclude any future ecosystem-based management objectives. The anticipated impact of this project would not significantly change the landscape nor significantly affect future landscape analysis.

APPENDICES

APPENDIX A

Best Management Practices and Project Design Features
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.

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 would be a rare designation in the KFRA).

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 less than 1 acre and Unstable and Potentially Unstable Areas	The extent of unstable and potentially unstable areas; or The wetland to the outer edges of the riparian vegetation

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. In FEMAT, the average height of site-potential trees on forests east of the Cascades was estimated at 110 feet for the purposes of analysis.

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 would 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) No salvage would be planned within a Riparian Reserve except as follows:

No salvage activities would occur in a Riparian Reserve if a watershed analysis has not been completed for the watershed in which a Riparian Reserve is located.

Within Riparian Reserves addressed in a completed watershed analysis, thinning activities could occur to meet Aquatic Conservation Strategy Objectives. No thinning would occur in that portion of the Riparian Reserve located between a stream and the natural topographic break in slope adjacent to the stream. Trees with high resource values (such as old growth pines or wildlife trees) that have excessive levels of understory competition, would be thinned around to reduce that competition. A circle of up to a 60 foot radius could be thinned around the base of these high value trees. Treatment of a Riparian Reserve would occur only if salvage operations are being conducted in the immediate area outside of the Riparian Reserve.

(2) Retain all snags/standing dead trees in Riparian Reserves except where safety dictates removal (such as hazard trees adjacent to roads or recreation sites). Any felled trees/snags would be left in Riparian Reserves except where they would create resource damage.

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

(4) No ripping, piling or mechanical site preparation (except for designated skid trail crossings, roads, or yarding corridors) would 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 would be 30 feet. No more than one yarding corridor per 200 linear feet of stream would be allowed.

(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 would be seeded with native species after use or prior to first rains, whichever comes first or would be planted with conifers.

(12) Install temporary stream crossings across Riparian Reserves of nonfishery streams prior to tractor yarding operations. 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 <u>excessive</u> concentrations of logging slash from all streams prior to fall rains and place above high water mark.

(15) Avoid locating new 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 would require treatment, such as ripping, backblading or seeding.

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 would be maintained. These target loads are designed to meet soil productivity and fire suppression objectives.

SOIL RESOURCE PROTECTION

<u>Yarding</u>

(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 selected skid roads discontinuously 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 would minimize soil displacement and would 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.

(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 waterbars 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 occurring 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 would not deposit water where it would 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.

Site Preparation

(1) 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.

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

(3) No tractor piling operations within Riparian Reserves.

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

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

(6) Construct small diameter piles using brush blades.

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

(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) 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 fragile soils during salvage activities.

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

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

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

(7) 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 new 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 would 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

(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 would 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 would 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 would 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 potential.

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 would 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 B

Cumulative Effects Analysis Procedure

Background Information This analysis utilizes information contained in the Spencer Creek Watershed Analysis, the Jenny Creek Watershed Analysis, and the Hydrology Report for the Frosty Forest Health

Treatments and Recreation Site Enhancements Environmental Assessment. These documents describe in detail the current hydrologic condition of the Spencer Creek and Johnson Creek watersheds, which were chosen for analysis in the Roaming Salvage EA. The focus of this analysis lies in determining the additional impact to current hydrologic condition if Alternative A were implemented. In the Johnson Creek watershed, an attempt is made to add the estimated effect of the Frosty Forest Health treatments to current condition, as they are expected to be implemented before or concurrent to Alternative A (if chosen). In the Spencer Creek watershed, the effects of the Shady and Camp Timber Sales are estimated and added to current conditions.

This analysis focuses on the effect of proposed action 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

Up to 3000-6000 acres would be treated in Alternative A.

The Frosty Forest Health Treatments could increase the ECA in the Johnson Creek watershed by 400 (2000 acres x 0.2 ECA factor).

The Frosty Forest Health EA Hydrology Report states that "of the 10,344 acres of BLM management 1400 (are) considered in early seral condition".

Information in the Shady Camp Timber Sale EA and Watershed Report was used to determine the potential ECA from these sales. The Shady and Camp Timber Sales could increase the acres of ECA in the Spencer Creek watershed by 312.

The Spencer Creek Watershed Analysis states that "13,945 acres in the watershed are currently in an 'unrecovered state' (equivalent clearcut acres)."

An ECA factor of 0.2 was used to estimate the number of Equivalent Clearcut Acres (ECA) resulting from implementation of Alternative A. The ECA resulting from treatment activities in each watershed was estimated using the ratios outlined in the Environmental Consequences section of this EA.

Analysis

Watershed	Current ECA*	Alternative A ECA	Cumulative Total ECA**	Percent of Watershed in ECA Currently	Percent of Watershed in ECA after Alt. A***
Spencer Creek	14,257	135-270	14,527	26	27
Johnson Creek****	1,800	90-180	1,980	17	19

*Includes ECA contribution from Frosty Forest Health Treatments and the Shady and Camp Timber Sales, added to current conditions outlined in the Spencer Creek Watershed Analysis and the Frosty Forest Health EA Hydrology Report.

**The higher ECA figure resulting from Alternative A was used in the cumulative total.

***The increases in each watershed are less than one percent, but rounding causes a full one percent increase to be recorded. The ECA methodology is best suited for assessment of relative effect, not for determining absolute numbers.

****Only BLM land is assessed, due to a lack of information on non-BLM lands. Pages 81 and 82 in the Jenny Creek Watershed Analysis, and the Frosty Forest Health EA Hydrology Report describe current hydrologic conditions on non-BLM land in the Johnson Creek watershed.

APPENDIX C

GREAT GRAY OWL HABITAT REQUIREMENTS

Where habitat is found to be occupied by the great gray owl, it is recommended the following characteristics be maintained in an area determined by the biologist to be the nest stand:

- Retain leaning trees;

- Retain 4 to 5 of the largest (≥24" dbh) snags or green snap-outs greater than 50 feet tall per acre in the stand;
- Retain ≥60 percent canopy closure;
- Retain known and potential nest trees.

Further recommendations for the great gray owl are included in the NWFP ROD on pages C-9, 19, and 21. One of note is that a 300 foot buffer be maintained around meadows and natural openings. Any harvest to occur within this buffer should be to meet the habitat objectives for the great gray owl.

Suitable meadows and natural openings for the great gray owl should have the following characteristics:

1) Be at least 10 acres in size;

2) Be a natural opening or meadow, wet or dry.

In addition to the 300 foot buffer, the memo from the Regional Interagency Executive Committee Members (RIECM) dated 5/12/95, requires the establishment of a 1/4 mile protection zone around known nest sites. These areas would become unmapped, Late-Successional Reserves.

APPENDIX D

SNAG RETENTION LEVELS

WESTSIDE

The "protection buffer" species listed in the Record of Decision (ROD) for the Northwest Forest Plan are the white-headed woodpecker, black-backed woodpecker, pygmy nuthatch, flammulated owl, and great gray owl.

Snag requirements specified in the NWFP ROD for the white-headed woodpecker and the black-backed woodpecker call for management at 100 percent of the population potential of these species. Management for these population levels must be provided in stands of ponderosa pine and mixed pine/Douglas-fir for the white-headed woodpecker, and in mixed conifer and lodgepole pine for the black-backed woodpecker. According to the NWFP ROD, provision of snags for other cavity-nesting species, including primary cavity nesters, must be added to the requirements for the above two woodpecker species. The provisions for snags for the white-headed woodpecker, black-backed woodpecker, and other primary cavity nesters are assumed to provide for the needs of the pygmy nuthatch and the flammulated owl, according to the NWFP ROD.

To derive the number of snags recommended for the salvage sale plan, several sources were considered including the existing levels of snags recommended for primary cavity nesters in the KFRA ROD/RMP, the NWFP ROD, Thomas et al. (1979), Brown (1985), Blair (1993), Marshall (1992), and the latest on pileated woodpeckers from Bull and Holthausen (1993) in northeastern Oregon.

The snag recommendations for this salvage sale are as follows:

A minimum of 2.5 snags per acre should be retained in the following categories:

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

1.5 snags ≥12" dbh; species retained should be a mix proportional to the stand composition;

If snags are not available, spike-tops, snap outs, and green culls may be substituted. It would also be desirable to leave some of these types of trees as recruitment snags.

EASTSIDE -

Guidelines established in the KFRA ROD/RMP prescribe a snag retention level of 1.4 per acre for eastside forests.
This level corresponds to maintaining a minimum of 60 percent of optimal cavity nester populations. For more information see the KFRA ROD/RMP pages 26 and 27.