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1996

Eagle

Final Environmental Impact Statement

Mt. Hood National Forest
Estacada Ranger District

Eagle

Final Environmental Impact Statement

**Mt. Hood National Forest
Estacada Ranger District
Clackamas County, Oregon**

Lead Agency: USDA Forest Service

Responsible Official: Roberta Moltzen
Forest Supervisor, Mt. Hood National Forest
2955 N.W. Division St.
Gresham, Or. 97030

For Information Contact: John Berry
District Ranger, Estacada Ranger District
Don Davison, Project Team Leader
595 N.W. Industrial Way
Estacada, Or. 97023

Abstract: The Eagle Final Environmental Impact Statement (FEIS) discusses the management of land in the Eagle Creek/South Fork of Eagle Creek drainages on the Estacada Ranger District, Mt. Hood National Forest. The project area is located along the western boundary of the forest and is approximately one-half (1/2) way between the Columbia River and the Willamette National Forest. Additionally, the project area is in the northern portion of the district and is bordered by private and Bureau of Land Management (BLM) lands to the west and the Salmon-Huckleberry Wilderness to the east.

A Draft Environmental Impact Statement (DEIS) for the Eagle Creek Timber Sales was developed and distributed for public review and comment in the summer of 1993. A Supplemental Draft Environmental Impact Statement (SDEIS) was developed and distributed for public review and comment in the spring of 1996. The SDEIS considered all of the substantive comments that were received on the DEIS. The SDEIS incorporated all of the requirements and standards and guidelines as described in the Mt. Hood National Forest Land and Resource Management Plan as amended by the Northwest Forest Plan. The Eagle Creek watershed has been designated as a Tier II watershed under the Northwest Forest Plan and a Watershed Analysis was completed in 1995.

The Eagle Supplemental Draft Environmental Impact Statement (SDEIS) was made available for public review and comment on May 24, 1996 with a 45 day comment period. The comment period ended on July 8, 1996. Substantive comments were received on the SDEIS and responses to those comments are included in the Appendix of this Final Environmental Impact Statement (FEIS).

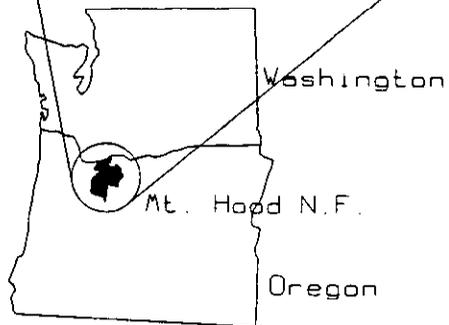
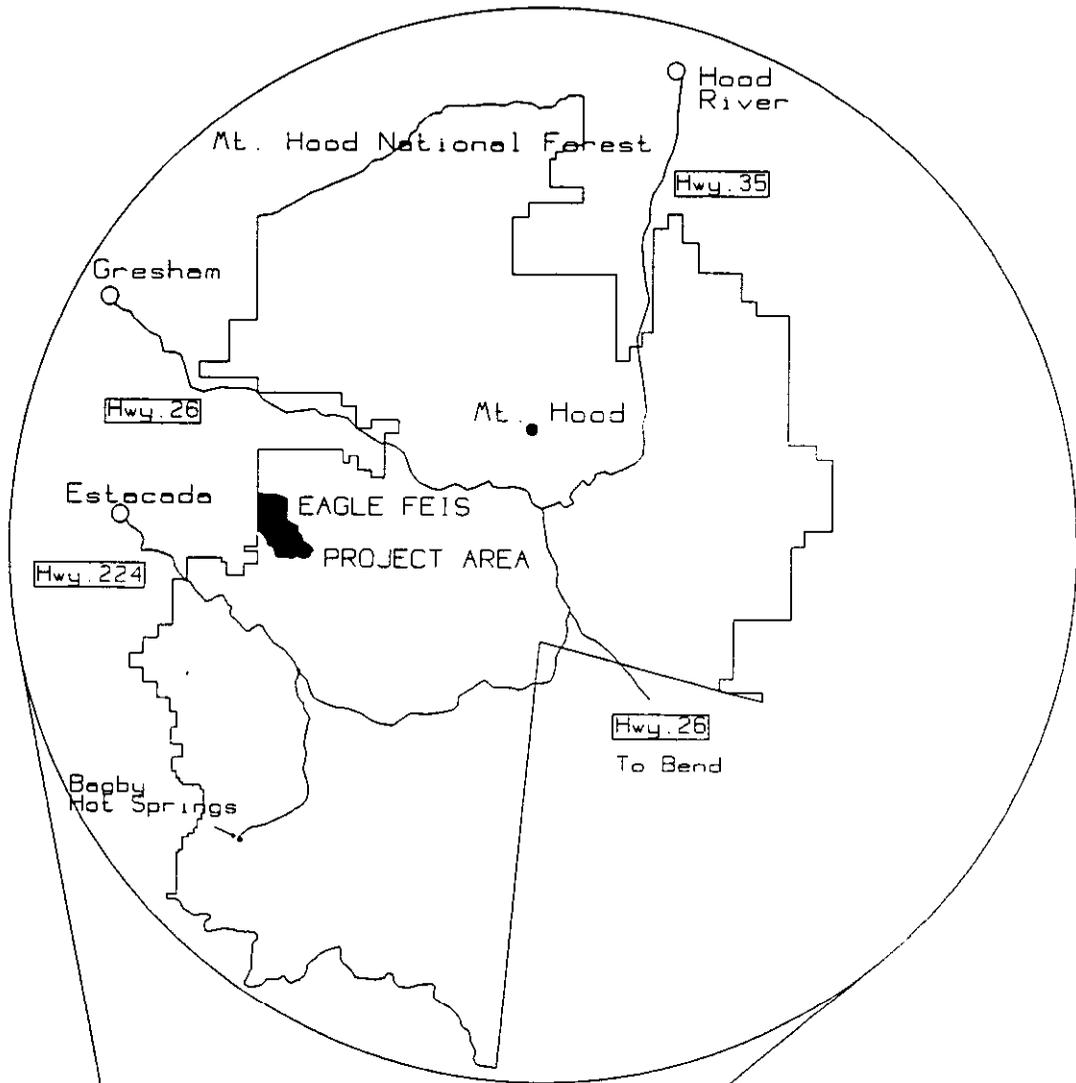
The significant issues for this FEIS are: 1) Water quality and fish habitat; 2) Salmon-Huckleberry Roadless Area; 3) Production of wood products and the local economy; and 4) Ecological Diversity. After review of public input and comments on the SDEIS and review of the Northwest Forest Plan, there are no changes to the significant issues between the SDEIS and the FEIS.

There were five (5) objectives developed for this watershed. They were; 1) Maintain and enhance the long term health of the watershed for the production of high quality water, 2) Enhancing the long term growth potential of the project area, 3) Enhance wildlife habitat diversity, 4) Maintain or improve the riparian conditions for the

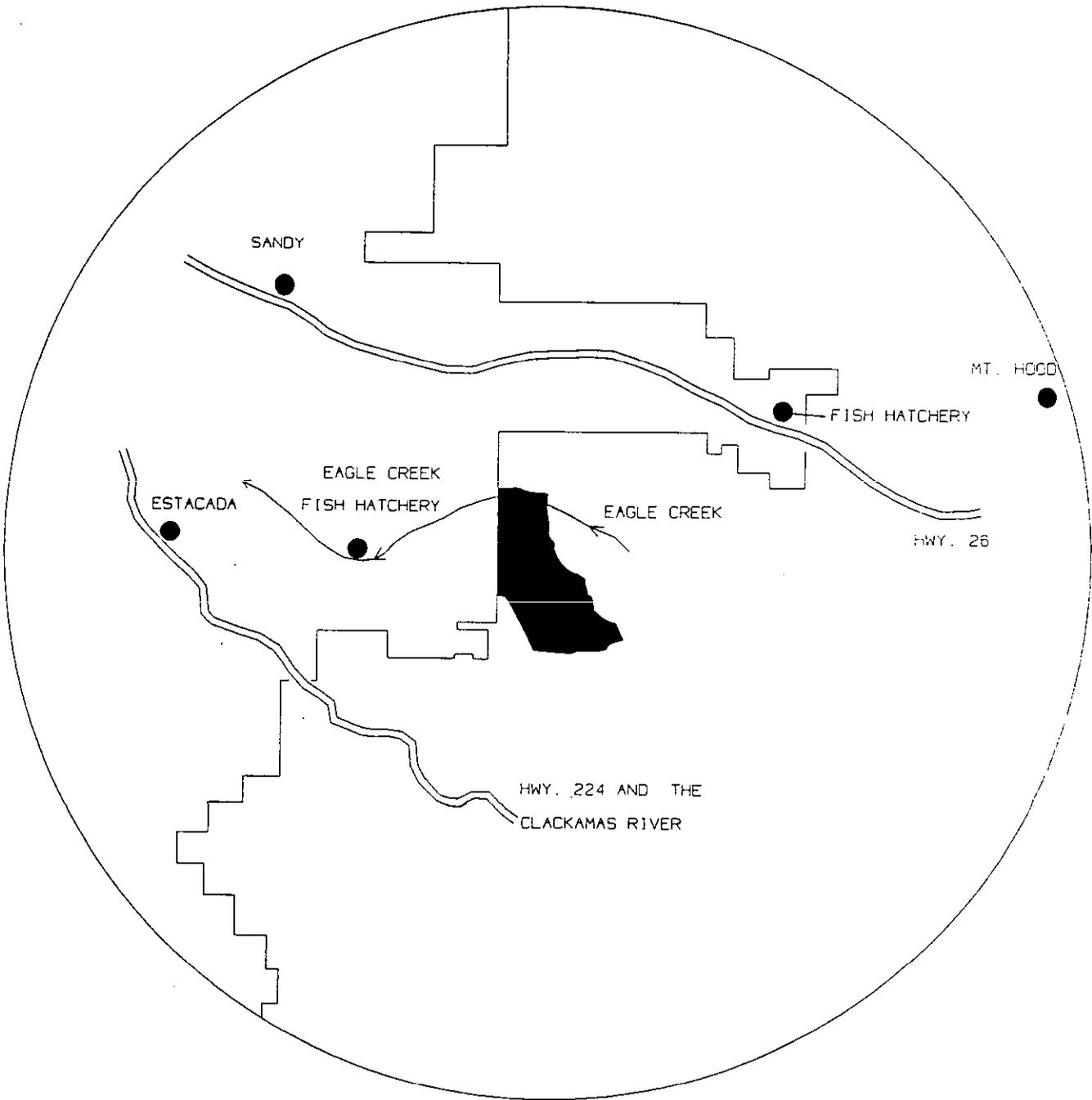
benefit of fish, wildlife, and plants, and 5) Begin restoration activities where there are known resource concerns.

Although there are several methods available for timber stand manipulation, the Forest Service chose to cut and remove timber to meet (in part) the stated objectives. The proposed action includes four projects. These projects are; 1) Silviculturally treat stands in the Eagle drainage, 2) Re-vegetate bare slope areas, 3) Re-structure a segment of road 4614180, and 4) Close several roads.

There are four alternatives (including the proposed action) that were analyzed in this document. These include three (3) action alternatives and a no action alternative.

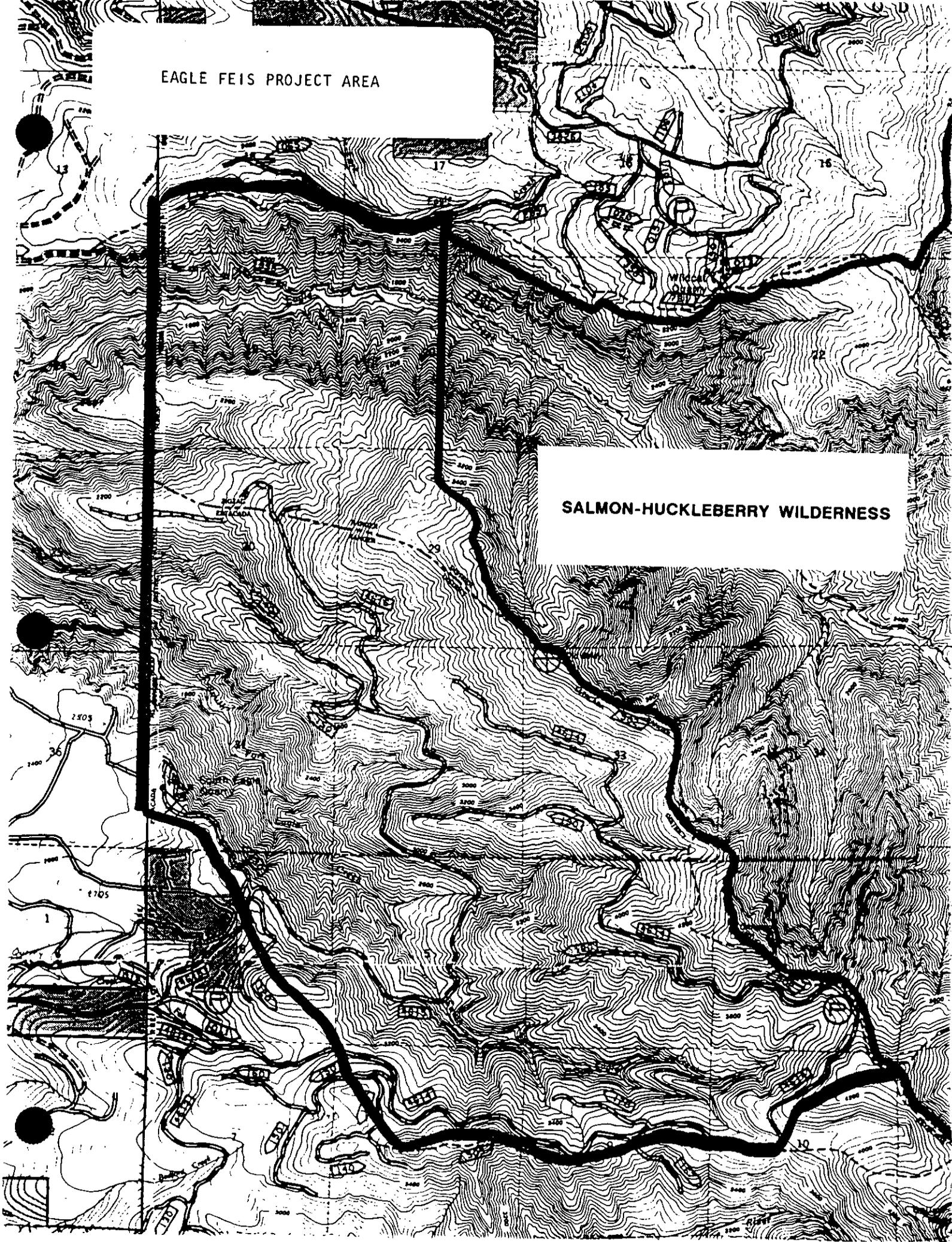


Vicinity Map



EAGLE FEIS PROJECT AREA

SALMON-HUCKLEBERRY WILDERNESS



Summary

Introduction

This is a summary of the Eagle Final Environmental Impact Statement (FEIS). In this discussion, the proposed action and alternatives to the proposed action are displayed. The proposed action and the alternatives to the proposed action deal with the management of National Forest lands in the Eagle Creek watershed on the Estacada Ranger District, Mt. Hood National Forest. This project covers approximately 6,528 acres of National Forest land which is located west of and adjacent to the Salmon-Huckleberry Wilderness in Oregon.

A Draft Environmental Impact Statement (DEIS) for Eagle Creek Timber Sales was published and released to the public for a sixty day review and comment period (1993). Comments on the DEIS were received and reviewed by the Interdisciplinary Team. Following the release of the Eagle Creek DEIS, a "Forest Conference" was convened in Portland, Oregon. Following this conference, a Record of Decision (ROD) was published for amendments to Forest Service and Bureau of Land Management planning documents within the range of the Northern Spotted Owl (Northwest Forest Plan, 4/13/94). After reviewing the Eagle DEIS, it was concluded that the action alternatives did not coincide with the standards and guidelines presented in the Northwest Forest Plan. Thus, as a result of public comments and the Northwest Forest Plan, the Mt. Hood National Forest decided to issue a Supplemental Draft Environmental Impact Statement (SDEIS). The SDEIS incorporated substantive comments to the DEIS as well as requirements and standards and guidelines published in the Northwest Forest Plan. The SDEIS for Eagle was published and released to the public for a forty-five (45) day review and comment period (May 24, 1996). Comments on the SDEIS were received and reviewed by the Interdisciplinary Team. These comments and responses to the comments are contained in the appendix of the FEIS.

Three (3) action alternatives (including the proposed action) and a no action alternative were presented in the SDEIS for public review and comment. These four alternatives (with minor changes) have been carried forward into the FEIS. The FEIS considered public comments on the SDEIS and provides the decision maker with environmental disclosures sufficiently detailed to allow a reasoned choice among the alternatives.

Changes between the SDEIS and FEIS

A few changes have been made between the information provided in the Eagle Supplemental Draft Environmental Impact Statement (SDEIS) and this Eagle Final Environmental Impact Statement (FEIS). Although changes have occurred, the intent, the objectives, and the significant issues have not changed. The following descriptions identify what changes were made in the document:

- 1) Extensive field data indicates that the acreage used for the proposed units in all alternatives were slightly over-estimated. Thus, the acres presented in the FEIS are lower than shown in the SDEIS.
- 2) After riparian reserves were measured on the ground, it was found that units #21 and 22 were too small and were subsequently dropped from consideration in all alternatives. This too has affected total treatment acres described in the alternatives.
- 3) There was a mapping error on unit #10 in alternatives #1 and 3. The SDEIS maps indicated that unit 10 would thin in an area that had already been thinned. This was not the intent for this unit and the mapping has been corrected.
- 4) The proposed road accessing units #27 and 28 has been moved further to the east. Approximately 1/4 of the new road would utilize an existing spur road in an existing clearcut. No trees would be cut for construction until the road reaches the proposed units. In addition, further ground verification indicates that at least two loggers spurs would be required to access units for skyline yarding. These spurs would have a combined length of approximately 0.35 miles. Thus, combined with the road to units 27 and 28, the total mileage would be approximately 1.20 miles of road and spurs. As with the original proposal,

- the new road and spurs would not cross riparian areas.
- 5) The SDEIS did not discuss possible effects from the flooding of 1996. This topic has been added to Chapters III and IV of the FEIS.
 - 6) The SDEIS did not discuss completely, surveys for C3 species. A discussion has been added in Chapters III and IV of the FEIS.
 - 7) The silvicultural prescriptions for units 11 and 28 have been changed in alternative #1. The prescription for these units was shelterwood that would have left 40 trees to the acre. In the FEIS, the prescription for these units has been changed to commercial thinning and removing 40% of the basal area.
 - 8) Extensive cruising of potential units indicates that the volume resulting from the proposed alternatives was under-estimated. This is true even though the number of acres treated have dropped and the silvicultural prescriptions have remained the same (except for the changes noted). The following indicates why the original volume was under-estimated:
 - a) Volumes originally shown were on the conservative side. Result, +2-3MMbf
 - b) Green tree defect was estimated at 30% of the gross, it is actually 5-8%. Result, +6-8MMbf
 - c) Stand exams used, in some cases, are 10 to 15 years old and additional growth was not accounted for. Result, +10MMbf
 - 9) After careful review of the analysis contained in the SDEIS and FEIS, the Forest Supervisor (Deciding Officer) has selected Alternative #1 as the agency preferred alternative. This is a change from the SDEIS where the Deciding Officer selected Alternative #3 as the agency preferred alternative.

Affected Environment

The Eagle project is located on the Estacada Ranger District on the Mt. Hood National Forest. In the early stages of planning, actions were considered that would have managed lands on the Zigzag Ranger District as well as on the Estacada district. With the Northwest Forest Plan, the land administered by the Zigzag Ranger District is within a Late-Successional Reserve (LSR). This document does not propose alternatives that would manage the land within the LSR. The legal description of the project area is: Sections 3, 4, 5, and 6 T.4 S. R.6 E. and Sections 17 through 20 and 29 through 33 T.3 S. R.6 E. W.M. surveyed, Clackamas County, Oregon. The project area is bordered on the west by private and other ownership lands and on the east by the Salmon-Huckleberry Wilderness.

Under the Mt. Hood National Forest Land Management Plan, the entire project is classified as B6-Special Emphasis Watershed. The main goal of B6 lands is to maintain or enhance aquatic habitat and water quality for a variety of resources. Within the B6 lands are B7-General Riparian lands. The main goal is to maintain high quality water and habitat for fish, wildlife, and riparian plants. A secondary goal in these allocations is to maintain a healthy forest condition through a variety of timber management practices.

Under the Northwest Forest Plan, the majority of the lands have a "Matrix" allocation. This allocation is where most timber harvest and silvicultural activities will take place (ROD, page 7). Within the Matrix allocation are "Riparian Reserves". The main purpose of this allocation is to protect the health of the aquatic system and its dependent species. The standards and guidelines under current plans, (Mt. Hood Forest Plan), apply where they are more restrictive or provide greater benefits to Late-Successional Forest-Related Species (ROD, page 8). In the case of the Eagle area, the Northwest Forest Plan standards and guidelines are more restrictive and would take precedence over standards and guidelines in the Mt. Hood Forest Land Management Plan. The entire Eagle drainage is also designated as a Tier 2 watershed. These watersheds are important for high quality water though they do not contain anadromous fish or other "at-risk" species (ROD, page 10). Prior to management activities, a watershed analysis is required in key watersheds. A watershed analysis was completed for the Eagle Creek watershed (1995).

Contained within the watershed is approximately 2,825 acres or 16% of the 17,650 acres of the Salmon-

Huckleberry Roadless Area. This roadless area was part of, and subsequently excluded from, a larger land base that eventually became the Salmon-Huckleberry Wilderness (1984). Alternatives #1 and 3 propose to manage approximately 16% of the 2,825 acres of Roadless Area or 3% of the 17,650 acres contained in the entire roadless area.

The lower elevations contain inventoried deer and elk winter and summer range. These areas are used by big game for forage and shelter depending on the severity of the weather and the seasons.

Eagle Creek flows from the wilderness, through federal lands in the northern part of the project area, and then through other land ownerships before draining into the Clackamas River (Eagle Creek Watershed Analysis, Map 1-1). Eagle Creek is eligible for classification as "recreational" under the Wild and Scenic Rivers Act for approximately 1.1 miles up from the forest boundary. From this point on, it is eligible for classification as "wild" under the Wild and Scenic Rivers Act.

Much of the project area has been accessed by roads for the implementation of management activities both on and off National Forest Lands. Additionally, there are trails along the northern, eastern, and southern boundaries that were once used for fire detection and prevention and are now used for recreation.

The project area as well as surrounding lands have had a history of fire activity. The latest stand replacement fire occurred in the mid-1800's. As a result, the majority of the project area contains trees that are approximately 130 years of age. There is very little old-growth except in small pockets or scattered individuals. These trees are located in or around drainages or wet areas in the northern part of the project area. These trees are estimated to be approximately 300-500 years of age.

Purpose and Need

Five objectives were developed that if met, would begin moving the area towards a more desired future condition as well as address certain concerns voiced by the public.

The following paragraphs describe the five objectives and are followed by purpose and need statement(s):

1) Objective: Maintain and enhance the long term health of the watershed for the production of high quality water.

A single aged stand does not meet the desired future conditions of a B6 watershed or a Tier 2 Key Watershed. In addition, these stands are not expected to reach this desired condition in the near future. Individual trees are losing their vigor due to overcrowded stand conditions. Insect, disease, and the possibility of fire could significantly affect water quality and timber production.

The need exists to manipulate homogenous overstocked timber stands to improve forest health and create a more variable stand structure over the watershed which would maintain or enhance water quality.

2) Objective: Enhancing the long term growth potential of the project area.

Approximately 4,170 acres (78%) of the un-managed stands in the Eagle area are considered *Priority 1* for silvicultural treatment (stands of timber that are past culmination of mean annual increment). The remaining stands (1,177 acres or 22%) are considered *Priority 2* stands. The Eagle area is part of the forest base for calculating the "potential sale quantity" in the Record of Decision for the Northwest Forest Plan. Approximately 5,347 acres (82%) of the Eagle project area has not had any type of management.

The need exists to begin thinning overstocked stands so that the growth potential of the site can be realized. The resultant wood products from these activities would (in part) satisfy the short-term demand for timber as well as contribute to the potential sale quantity for the Mt. Hood National Forest.

3) Objective: Enhance wildlife habitat diversity.

The majority of the stands in the project area are characterized as homogenous, even-aged stands with low levels of structural diversity. Many of these stands lack large snags (greater than 21" in diameter) and do not meet 60% biological potential for cavity nesting birds. Large logs greater than 22" in diameter are also missing from many stands. In addition, small openings of early seral stage habitat which provide forage for deer and elk are becoming scarce as vegetation in existing opening mature.

The need exists to manipulate select stands to improve their structural diversity, promote the development of more complex canopies, and to develop large snags and logs. In addition, small openings are needed in the landscape to provide habitat for early seral dependent species and forage for deer and elk.

4) Objective: Maintain or improve the riparian conditions for the benefit of fish, wildlife, and plants.

The majority of the timber stands in riparian areas are homogenous even-aged trees with a poorly developed understory canopy. In addition, snags and dying trees are less than 21" in diameter and there is a lack of defective green trees and large woody debris. In addition, these stands are not expected to reach this desired condition in the near future. Individual trees are losing their vigor due to overcrowded stand conditions. Insect, disease, and the possibility of fire could significantly affect water quality.

Due to stand age and tree density, a limited number of riparian areas have been identified where treating the stand would improve stand and riparian health.

5) Objective: Begin restoration activities where there are known resource concerns.

Resources in the Eagle area have been altered by both catastrophic events (e.g., fire) and human activities. These altered processes include but are not limited to: 1) Lack of old growth characteristics in the stands, 2) Lack of large trees in early and mid seral stands, 3) Decreased structure and composition of riparian vegetation, 4) Bare soil areas on cut banks of the existing road systems, and 5) Reduction in channel habitat complexity.

There is a need to encourage growth of large trees for riparian and wildlife benefits, to re-vegetate areas along roads that have a potential to produce sediment, and to re-contour and/or re-shape drainage facilities to prevent sediment transport.

The Forest Service recognizes that there are several methods that could be used to manipulate the timber stands so that they would begin to move towards a more desired future condition(s) (e.g., silvicultural treatments, re-introduction of fire, falling select trees and leaving them in place, etc.). Of these different methods, the Forest Service has chosen to use silvicultural treatments to accomplish the objectives for the area and begin moving the land towards a more desired future condition (Landscape Design, Eagle Watershed Analysis, Map 4-2).

At the beginning of the analysis process, a "Notice of Intent" was published in the "Federal Register" on April 15, 1991. A second notice of intent to revise the original was published July 22, 1992. Following these publications, newspaper articles appeared in the Oregonian and in local newspapers as well as a news letter called "Sprouts" that is published by the Mt. Hood National Forest and is mailed to more than 3,000 individuals and organizations.

Two public meetings were held on November 18th and 21st of 1991. A total of 41 people attended these two meetings. Additionally, 39 letters dealing with the proposal were received. Additional information has been received from the Eagle Creek Fish Hatchery, the Confederated Tribes of Warm Springs, and the Confederated Tribes of Grand Ronde.

Following the publication of the Eagle Creek Timber Sales DEIS, three public meetings were held. These meetings were held in Mollala on July 26, 1993, in Gresham on July 27, 1993, and in Estacada on July 29, 1993. On August 11, 1993 a public field review was held. During the public comment period, several newspaper articles dealing with the draft document were published. The Forest Service received 30 comment letters on the DEIS. Substantive comments to the DEIS and responses to those comments were included in the appendix for the SDEIS.

Once the decision had been made to produce a supplement to the DEIS, a notice of intent was published in the Federal Register on October 18, 1995. The Supplemental Draft Environmental Impact Statement (SDEIS) was completed and a "Notice of Availability" was published in the Federal Register on May 24, 1996. The public comment period ran for 45 days and ended on July 8, 1996. Comments on the SDEIS have been received and responses to the substantive comments have been included in the FEIS.

Proposed action

This proposal would include four actions. These actions are:

- 1) Silviculturally treat 1,030 acres of land. All of this land would be in the Matrix allocation.
- 2) Re-vegetate bare soil areas in locations along roads 4614 and 4615 to reduce the potential for sediment delivery into streams.
- 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams.
- 4) Block access to or obliterate roads through ripping and planting vegetation or through the installation of gates or berms that would reduce the potential for wildlife harassment (LMP, page Four-72). Roads to be blocked are: 4614130, 4614140, 4614150, 4614160, 4614170, 4614180, 4614190, and 4615135. Those roads that would be obliterated are 4614167, 4615011 and two un-numbered spurs on the 4615.

Significant Issues

Review of the substantive comments to the SDEIS and review of the Northwest Forest Plan and Watershed Analysis indicates that no new significant issues have been suggested. Thus, the issues presented in this FEIS are the same as presented in the SDEIS.

Significant Issue #1: (Water Quality and Fish Habitat)

Activities that disturb soil and manipulate vegetation may increase stream sediment loading, stream temperatures, and alter the timing and size of peak flows. These occurrences may have affects to the resident fish populations and the national fish hatchery and may have an affect on stream bank stability.

Significant Issue #2: (Salmon-Huckleberry Roadless Area)

Silvicultural activities could reduce, alter, or eliminate some existing roadless area characteristics in the Eagle area. These roadless area characteristics are: Natural Integrity, Apparent Naturalness, Remoteness, Solitude/Primitive Recreation Opportunities, Unique Features, and Manageability/Boundaries.

Significant Issue #3: (Production of Wood Products and the Local Economy)

The Eagle Creek planning area has the potential to supply wood products as well as employment opportunities to the local economy. Receipts from timber harvest would fund local schools and return revenues to the U.S. Treasury.

Significant Issue #4 (Ecological Diversity)

Silvicultural activities could reduce, alter, or eliminate the ability for treated stands to provide habitat for a variety of organisms. In addition, ecosystem productivity could be reduced and connectivity could be disrupted between the late successional stands of timber.

Alternatives Considered

Features Common to All Action Alternatives

- 1) Water quality would be maintained through adherence to state water quality best management practices.
- 2) Air resource values would be maintained through compliance with Oregon State Implementation Plan, Smoke Management Plan, and directive 1-4-4-601.
- 3) OSHA regulations would be met.
- 4) All activities would be in compliance with the National Historic Preservation Act of 1966.
- 5) None of the alternatives would construct roads in the Salmon-Huckleberry Roadless Area.
- 6) None of the action alternatives propose management activities in the Late-Successional Reserve.
- 7) None of the action alternatives would affect the status of Eagle Creek in relation to eligibility under the Wild and Scenic Rivers Act.
- 8) Surveys for T. E. & S. species and proposed T. E. & S. species were conducted.
- 9) Slash disposal would consist of burning landings only for hazard reduction. Site preparation may be necessary in shelterwood units so that these lands could be re-stocked.
- 10) Following activities, plantability surveys would be conducted.
- 11) Up to 240 lineal feet of logs will be left for wildlife considerations.
- 12) Riparian reserves would be established along all streams, ponds, seeps, and wet areas.

Alternative #1 (Proposed Action)

This alternative is the proposed action as presented under purpose and need.

- 1) Silviculturally treat 1,030 acres of land. All of this land would be in the Matrix allocation.
- 2) Re-vegetate bare soil areas in locations along roads 4614 and 4615 to reduce the potential for sediment delivery into streams.
- 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams.
- 4) Block access to or obliterate roads through ripping and planting vegetation or through the installation of gates or berms that would reduce the potential for wildlife harassment (LMP, page Four-72). Roads to be blocked are: 4614130, 4614140, 4614150, 4614160, 4614170, 4614180, 4614190, and 4615135. Those roads that would be obliterated are 4614167, 4615011 and two un-numbered spurs on the 4615, a new road to units #27 and 28, and loggers spurs.

Alternative #2

- 1) Silviculturally treat 562 acres of land. All of this land would be in the Matrix allocation. There would be no management activities in the roadless area.
- 2) Re-vegetate bare soil areas in locations along road 4615 to reduce the potential for sediment delivery into streams.
- 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams.
- 4) Block access to road 4614180 through a gate or berm to reduce the potential for wildlife harassment (LMP, page Four-72). Those roads that would be obliterated are 4615011 and two un-numbered spurs on the 4615, a new road to units # 27 and 28, and loggers spurs.

Alternative #3

- 1) Silviculturally treat 1,229 acres of land. All of this land would be in the Matrix allocation.
- 2) Re-vegetate bare soil areas in locations along roads 4614 and 4615 to reduce the potential for sediment delivery into streams.
- 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams.
- 4) Block access to or obliterate roads through ripping and planting vegetation or through the installation of gates or berms that would reduce the potential for wildlife harassment (LMP, page Four-72). Roads to be blocked are: 4614130, 4614140, 4614150, 4614160, 4614170, 4614180, 4614190, and 4615135. Those roads that would be obliterated are 4614167, 4615011 and two un-numbered spurs on the 4615, a new road to units #27 and 28, and loggers spurs.

Alternative #4

This is the no action alternative. No projects or activities would be implemented as a result of this document.

Environmental Consequences

Significant Issue #1: (Water Quality and Fish Habitat)

Alternatives #1 through 3

- 1) Soils erosion rates would remain at low levels and state water quality standards for turbidity would be maintained.
- 2) The magnitude and frequency of peak flows is not expected to be measurably affected within or downstream from the project area.
- 3) It is estimated that there would be no measurable effect to water quality at the fish hatchery located five miles downstream from the forest boundary.
- 4) In relation to a biological evaluation, these alternatives may effect individuals or habitats but are not likely to contribute to a trend towards federal listing or cause a loss of viability to the populations or species. There would be no impact to the Bull trout or Redband trout.

ARP Values:

- | | |
|----------------|--|
| Alternative #1 | Upper main stem, 94.9 (Same as existing)
South Fork, 85.4 (Down 2.1 % from existing)
Combined upper main stem and South Fork, 92.3 (Down 2.6 % from existing)
Entire watershed, 65.8 (Same as Existing) |
| Alternative #2 | Upper main stem, 94.9 (Same as existing)
South Fork, 85.6(Down 1.9 % from existing)
Combined upper main stem and South Fork, 92.3 (Down 2.6 % from existing)
Entire watershed, 65.8 (Same as Existing) |
| Alternative #3 | Upper main stem, 94.9 (Same as existing)
South Fork, 85.6(Down 1.9 % from existing)
Combined upper main stem and South Fork, 92.3 (Down 2.6 % from existing)
Entire watershed, 65.8 (Same as Existing) |
| Alternative #4 | All ARP values will remain the same as existing. |

Significant Issue #2: (Salmon-Huckleberry Roadless Area)

Alternatives #1 through 3

- 1) Under the analysis criteria of "special places/special activities", none of the alternatives are expected to change or alter these values with one exception, "use of roads". This would occur due to road closures proposed in the alternatives.
- 2) None of the alternatives would construct roads in the Salmon-Huckleberry Roadless Area.

Effects to analysis criteria

Natural Integrity:

- Alternative #1, there would be a 20% reduction in acres that meet natural integrity.
Alternative #2, there would be a 0% reduction in acres that meet natural integrity.
Alternative #3, there would be a 20% reduction in acres that meet natural integrity.
Alternative #4, there would be a 0% reduction in acres that meet natural integrity.

Apparent Naturalness:

Currently, Area I does not look natural due to previous management activities. Currently, Area II still appears natural. With alternatives #1 and 3, anywhere activities occur, the affected lands will not appear natural. There would be no changes to apparent naturalness under alternative #4.

Remoteness:

There are 361 acres that meet the remoteness criteria, none of the alternatives would reduce this number.

Solitude/Primitive Recreation Opportunities:

- 1) There would be no changes to remoteness, size, or evidence of humans under this criteria.
- 2) It is estimated that user density would increase under alternatives #1 and 3 and there would be no change under alternatives #2 or 4.
- 3) Regeneration would increase under all alternatives except alternative #4, no action.

Unique Features:

There would no effect to unique features by any of the alternatives.

Manageability/Boundaries:

With Area I, the ability for the Forest Service to manage size (5,000 acres or greater) is forgone. With Area II, 313 acres are connected to the wilderness and would meet the size requirement of 5,000 acres. None of the alternatives would affect these 313 acres.

Significant Issue #3: (Production of Wood Products and the Local Economy)

The following data is a consolidation of effects of the proposed alternatives.

Alternative #1 -- Volume to be sold, 26.4MMbf
Estimate of Jobs Supported, 713
Estimated Total Income Generated, \$42.2MM
Estimated Income Tax Generated, \$6.3MM

Alternative #2 -- Volume to be sold, 15.8MMbf
Estimate of Jobs Supported, 427
Estimated Total Income Generated, \$25.3MM
Estimated Income Tax Generated, \$3.8MM

Alternative #3 -- Volume to be sold, 30.8MMbf
Estimate of Jobs Supported, 832
Estimated Total Income Generated, \$49.3MM
Estimated Income Tax Generated, \$7.4MM

Alternative #4 -- Volume to be sold, 0.0MMbf
Estimate of Jobs Supported, 0
Estimated Total Income Generated, \$0.0MM
Estimated Income Tax Generated, \$0.0MM

Significant Issue #4: (Ecological Diversity)

The following data is a consolidation of effects of the proposed alternatives.

Alternative #1 -- Acres of suitable Spotted Owl habitat existing -- 2,285, acres after implementation -- 2,159.
Acres of interior habitat existing -- 2,100, acres after implementation -- 1,056
Acres of Late-Successional Forest existing -- 1,435, acres after implementation -- 1,324
Miles of new edge created -- 4 to 5.

Alternative #2 -- Acres of suitable Spotted Owl habitat existing -- 2,285, acres after implementation -- 2,159.
Acres of interior habitat existing -- 2,100, acres after implementation -- 1,640
Acres of Late-Successional Forest existing -- 1,435, acres after implementation -- 1,344
Miles of new edge created -- 4 to 5.

Alternative #3 -- Acres of suitable Spotted Owl habitat existing -- 2,285, acres after implementation -- 2,064
Acres of interior habitat existing -- 2,100, acres after implementation -- 985
Acres of Late-Successional Forest existing -- 1,435, acres after implementation -- 1,290
Miles of new edge created -- 4 to 5.

Alternative #4 -- Acres of suitable Spotted Owl habitat existing -- 2,285, no reduction.
Acres of interior habitat existing -- 2,100, no reduction.
Acres of Late-Successional Forest existing -- 1,435, no reduction.
Miles of new edge created -- no additional miles.

- a) None of the alternatives would cause a loss of viability of this habitat type for dependent species.
- b) On the landscape level, aside from remaining acres after implementation, there are 10,390 acres of interior habitat associated with wilderness and LSR. Thus, habitat would be maintained at this level.
- c) All of the alternatives would meet the "Matrix" standards and guidelines including 15% retention of the area associated with each cutting unit.

Other Considerations

- * None of the alternatives propose the clearcut prescription.
- * There are no foreseeable long-term effects to the Salmon-Huckleberry Wilderness.
- * None of the Eagle area is within a Critical Habitat Unit (CHU).
- * Surveys have been completed for C3 species as described in the Northwest Forest Plan, Record of Decision. Species that have been found include: 1) Red Tree Vole; 2) *Corydalis aquae-gelidae*; and 3) *Allotropa Virgata*. These species would be protected through avoidance or leaving standing trees around the sites. In addition, there have been no sightings nor is there suitable habitat for the Great Grey Owl.

Table of Contents

Chapter I 1

Purpose of And Need for Action 1

 Introduction 1

 Land Allocations 3

 Purpose and Need 5

Proposed Action 6

Other Management Considerations 6

Regulation and Direction 7

Decisions to be Made 8

Scoping and Public Involvement 8

Issues 9

 A) Significant Issues 9

 Significant Issue #1: (Water Quality and Fish Habitat) 9

 Significant Issue #2: (Salmon-Huckleberry Roadless Area) 10

 Significant Issue #3: (Production of Wood Products and the Local Economy) 10

 Significant Issue #4: (Ecological Diversity) 11

 B) Other Issues 11

 Issue #1.1 (Visual Quality) 11

 Issue #2.1 (Forest Health and Silviculture) 12

 Issue #3.1 (Deer and Elk Habitat) 12

 Issue #4.1 (Increased Potential for Windthrow) 12

 Issue #5.1 (Yew Wood) 13

 Issue #6.1 (Recreation) 13

Chapter II 14

Alternative Descriptions Including the Proposed Action 14

 Introduction 14

 A) Development of the Alternatives 14

 B) Alternatives Considered but Eliminated from Detailed Study 15

 C) Alternatives Considered in Detail 15

 Alternative #1 (This is the Proposed Action) 17

 Alternative #2 22

 Alternative #3 26

 Alternative #4 (No Action) 30

 D) Changes in the Alternatives Between the SDEIS and the FEIS 30

E) Mitigation Measures	32
F) Summary Comparison of the Alternatives	35
G) Agency Preferred Alternative	35
Chapters III and IV	36
Affected Environment and Environmental Consequences	36
Introduction	36
Significant Issue #1) Water Quality and Fish Habitat	36
Affected Environment	36
Effects of Implementation	46
Overview	46
Effects Common to All Alternatives	47
Alternative #1	48
Alternative #2	50
Alternative #3	51
Alternative #4 (No Action)	52
Cumulative Effects	53
Significant Issue #2) Salmon-Huckleberry Roadless Area	55
Affected Environment	55
Overview	55
Effects of Implementation (Roadless)	61
Overview	61
Effects Common to all Alternatives	61
Alternatives #1 through 4	61
Cumulative Effects	65
Significant Issue #3) Production of Wood Products and the Local Economy	66
Affected Environment	66
Overview	66
Effects of Implementation	67
Overview	67
Alternatives #1 through 4	68
Cumulative Effects	68
Significant Issue #4) Ecological Diversity	71
Affected Environment	71
Overview	71
Effects of Implementation	73
Overview	73
Alternatives #1 through 3	76
Alternative #4 (No Action)	76
Cumulative Effects	77
Other Issues	79
Issue #1.1) Visual Quality	79
Affected Environment	79
Alternatives #1 through 3	83

Cumulative Effects	84
Issue #2.1) Forest Health and Silviculture	85
Affected Environment	85
Fungi	85
Alternative #1 (Proposed Action)	86
Cumulative Effects	90
Alternative #2	90
Cumulative Effects	90
Alternative #3	91
Cumulative Effects	92
Alternative #4	92
Cumulative Effects	92
Issue #3.1) Deer and Elk (Big Game) Habitat	94
Affected Environment	94
Alternatives #1 through 4	94
Cumulative Effects	95
Issue #4.1) Windthrow	96
Affected Environment	96
Alternatives #1, 2, and 3	100
Alternative #4 (No Action)	103
Cumulative Effects	103
Issue #5.1) Yew Wood	105
Affected Environment	105
Alternatives #1, 2, and 3	105
Alternative #4 (No Action)	106
Cumulative Effects	106
Issue #6.1) Recreation	107
Affected Environment	107
Alternatives #1 through 4	111
Cumulative Effects	112
Other Discussion Items	115
A) Transportation	115
Alternatives #1 through 3	118
Alternative #4 (No Action)	119
Cumulative Effects	120
B) Cultural Resources (Heritage Resources)	120
Alternatives #1 and 3	121
Alternatives #2 and 4	122
Cumulative Effects	122
C) Fire, Fuels, Air Quality	122
Fire and Fuels	122
Alternatives #1 through 3	122
Alternative #4 (No Action)	123
Cumulative Effects	123
Air Quality	124

Alternatives #1 through 3	124
Alternative #4	126
Cumulative Effects	126
D) Noxious Weeds	126
Alternatives #1,2, and 3	127
Alternative #4 (No Action)	128
Cumulative Effects	128
E) Sensitive Plants	128
F) Animal Species of Concern	129
G) Biological Evaluation	131
H) Effects of Flooding	134
Other Disclosures	134
Minority Groups, Women and Civil Rights	134
Wetlands and Floodplains	134
Climate	134
Unusual Energy Requirements	134
Potential Conflicts with Plans and Policies of Other Jurisdictions	135
Irreversible and Irretrievable Commitment of Resources	135
Probable Adverse Environmental Effects Which Cannot be Avoided	135
Prime Farm Land, Rangeland and Forest Land	136
Summary Table of Effects	137
Chapter V	139
Public Participation	139
Response to Comments	143

Index

Glossary of Acronyms and Terms

References Cited

List of Preparers

Appendices

- Appendix A -- Roadless Area Maps
- Appendix B -- Economics
- Appendix C -- Spotted Owl Habitat
- Appendix D -- Silvicultural Data Sheets
- Appendix E -- Best Management Practices
- Appendix F -- Recreation Information
- Appendix G -- Alternative Maps for the SDEIS

Appendix H -- Blowdown	
Appendix I -- Public Comments	
Appendix J -- Monitoring	
Appendix K -- Riparian Reserves	

Maps

Map I.1	Vicinity Map	2
Map II.1	Alternative #1	18
Map II.1.1	Alternative #1 (Other Projects)	19
Map II.2	Alternative #2	23
Map II.2.1	Alternative #2 (Other Projects)	24
Map II.3	Alternative #3	28
Map II.3.1	Alternative #3 (Other Projects)	29
Map III.1	Land Allocations	42
Map III.2	Roadless Area Segments	56
Map III.3	Roadless Area & Existing Units	57
Map III.4	Roadless that meets SPNM	60
Map III.5	Spotted Owl Habitat	74
Map III.6	Interior Habitat	75
Map III.7	Existing Trails	80
Map III.8	Roadless that meets SPNM for Remoteness	108
Map III.9	Existing Road System	116

Tables

Table II.1a	Alt. #1 Treatment Acres	20
Table II.1b	Alt. #1 Revegetation Areas	20
Table II.1c	Alt. #1 Re-Structuring	20
Table II.1d	Alt. #1 Obliteration	21
Table II.2a	Alt. #2 Treatment Acres	25
Table II.2b	Alt. #2 Revegetation Acres	25
Table II.2c	Alt. #2 Re-Structuring	25
Table II.2d	Alt. #2 Obliteration	25
Table II.3a	Alt. #3 Treatment Acres	27
Table II.3b	Alt. #3 Revegetation Acres	27
Table II.3c	Alt. #3 Re-Structuring	27
Table II.3d	Alt. #3 Obliteration	27
Table II.4	Comparison of the Alternatives	35
Table III.1	Sediment Delivered to Streams	40
Table III.2	ARP after Implementing Alternative #1	49
Table III.3	ARP after Implementing Alternative #2	50
Table III.4	ARP after Implementing Alternative #3	52
Table III.5	Summary of expected ARP Values	54
Table III.6	Natural Integrity Area #1	62
Table III.6.1	Natural Integrity Area #2	62
Table III.7	Changes in acres to Recreation Opportunities	64
Table III.8	Consolidated Effects for Issue #3	68
Table III.9	Cumulative Effects for Issue #3	69
Table III.10	Economic Analysis Summary	70
Table III.11	Summary of Effects to Wildlife Habitat	77
Table III.12	Land Allocations and VQO's	81
Table III.13	VQO's and Existing Conditions	82
Table III.14	Habitat Effectiveness Ratings	94
Table III.15	Open Road per Square Mile	95

Table III.16	Estimated Recreation Visits	110
Table III.17	Existing Roads Data Table	117
Table III.17.1	Road Closure Table by Alternative	118
Table III.18	Emissions from Prescribed Burning	125
Table III.19	Emissions from One Day of Burning	125
Table III.20	Disturbed Acres (Noxious Weeds)	127
Table III.21	Summary of Effects to Animal Species	133
Table III.22	Comparison of Alternatives	137

Figures

Figure #1	Estimated Number of Visitors	66
Figure #2	Volumes Sold	67
Figure #3	Ratio of Returns vs. Expenditures	70
Figure #4	PNW Technical Report GTR-285	72
Figure #5	Example of Layout	99

Chapter I Purpose of And Need for Action

Introduction

A Draft Environmental Impact Statement (DEIS) for the Eagle area was published in the summer of 1993 and public responses were received. During this same time frame, the "Forest Conference" was convened in Portland, Oregon to address the human and environmental needs served by federal forests of the Pacific Northwest and Northern California. As a result of this forest conference, a Record of Decision (ROD) was published on April 13, 1994 for amendments to Forest Service and Bureau of Land Management planning documents within the range of the Northern Spotted owl (Northwest Forest Plan). As a result of public comments and the standards and guidelines listed in the ROD, the Mt. Hood National Forest decided to issue a Supplemental Draft Environmental Impact Statement (SDEIS) for the Eagle Creek Timber Sales. This SDEIS incorporated substantive comments to the DEIS as well as requirements and standards and guidelines published in the Northwest Forest Plan, Record of Decision. The SDEIS was completed, published, and made available for public comments on May 24, 1996. The comment period for this SDEIS was 45 days and ended on July 8, 1996. This Final Environmental Impact Statement incorporates substantive comments to the SDEIS as well as requirements and standards and guidelines listed in the ROD for the Northwest Forest Plan. A Watershed Analysis was completed for the Eagle Creek watershed in 1995.

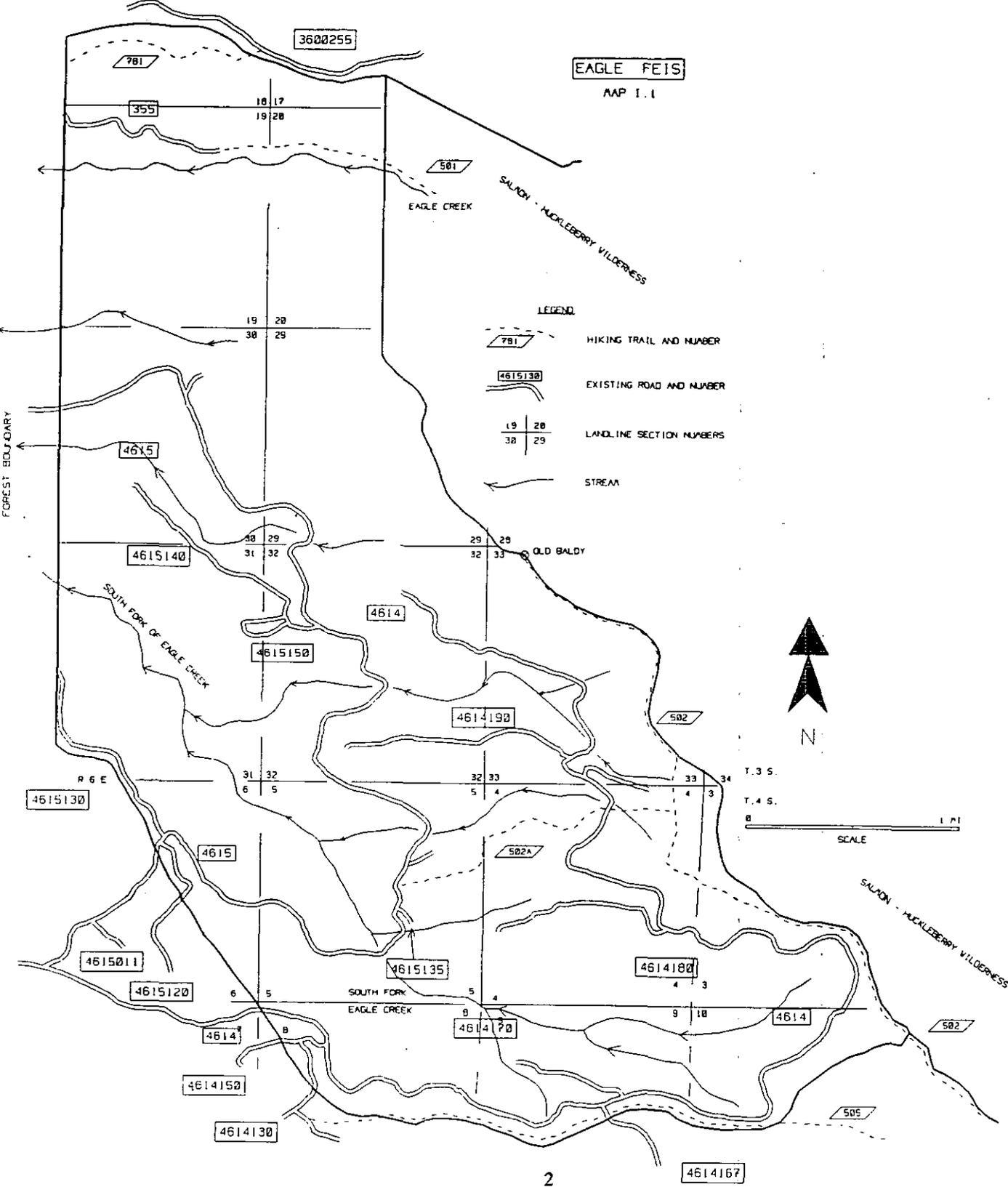
This document falls under Public Law 104-19 (Recission Bill) (1995) however, these lands do not contain a salvage component.

The Northwest Forest Plan has designated the northern portion of the Eagle project area as a Late Successional Reserve (LSR). This document does not consider the lands within the LSR for resource management however, this decision does not foreclose options for land management of the LSR in the future. Thus, this FEIS only considers those lands that are within the Eagle Creek watershed, outside of the LSR, for land management.

The Eagle Creek drainage is tributary to the Clackamas river and encompasses approximately 6,528 acres of land in the Mt. Hood National Forest. Within this watershed, there are mature stands of timber that range from 110 to 130 years of age. The major tree species include: Douglas fir, noble fir, western red cedar, western hemlock, and some Pacific silver fir. These timber stands developed through natural regeneration following large, hot, stand replacement fires that swept the area in the mid to late 1800's. In some areas, remnant old-growth trees (250 to 500 years of age) survived the fires. These trees can be found in and around wet areas in the northern portion of the project area (mainly in the LSR).

Land management activities in the Eagle area have been occurring since the 1960's. To date, approximately 775 acres within the Eagle project area have been clearcut and approximately 406 acres of land have been commercially thinned. Approximately 21.7 miles of road were constructed to provide access to the managed timber stands.

The legal description for the Eagle project is; Sections 3, 4, 5, and 6 T.4 S. R.6 E., and Sections 17, 18, 19, 20, 29, 30, 31, 32 and 33 T.3 S. R.6 E., W.M. surveyed, Clackamas County, Oregon. The Eagle Creek area is approximately 11 air miles east of Estacada, Oregon and 32 air miles southeast of Portland, Oregon. The project area is bounded by private and Bureau of Land Management lands to the west. To the east is the Salmon-Huckleberry Wilderness (Refer to Map I.1). To the north and south are other National Forest lands.



Land Allocations

The Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) (10/90), determined what the land allocations for this project area would be. The forest plan also provides management direction for these allocations and forest-wide standards and guidelines. The allocations contained in the Forest Plan are:

- 1) The entire project area is designated as B6-(Special Emphasis Watershed).
- 2) Within the B6 allocation, there are inclusions of B5-(Pileated Woodpecker/Pine Marten Areas).
- 3) Within the B6 allocation there are inclusions of B7- (General Riparian Areas). The B-7 allocations surround all Class I through IV streams, wet areas, springs and seeps.

In February 1994, the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (FSEIS) was released. In April of 1994, the Record of Decision (ROD) was signed and released. These documents amend the current Mt. Hood National Forest, Forest Plan by determining land allocations and providing standards and guidelines and will be referred to as the Northwest Forest Plan in this document.

The Record of Decision (ROD) for the Northwest Forest Plan recognized that existing plans contained standards and guidelines for different land allocations. The ROD states "Except as otherwise noted in this ROD or Attachment A, the standards and guidelines of existing plans apply where they are more restrictive or provide greater benefits to late-successional forest-related species than do other standards and guidelines in Attachment A" (ROD, page 8). Within the Eagle project area, the ROD has identified three land allocations. These allocations are;

- 1) The Salmon-Huckleberry Wilderness and the northern 1/3 of the planning area has been designated as a Late Successional Reserve.
- 2) Riparian Reserves have been designated around perennial and intermittent streams and wet areas.
- 3) The lands not included in the first two allocations are designated as Matrix.

In addition, to improve the health of the region's aquatic ecosystems, the *Aquatic Conservation Strategy* was developed (ROD, page 9). There are four parts to this strategy; riparian reserves, key watersheds, watershed analysis, and watershed restoration. The entire Eagle project area has been designated as a Tier 2 Key watershed. These are watersheds where high water quality is important (ROD, page 10), (FEIS, Appendices, page B-91).

The following is a description of the land allocations and management direction as described in the Mt. Hood National Forest, Forest Plan.

B6-(Special Emphasis Watershed)

Goal: Maintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long term fish production. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices.

Desired Future Condition: (The following are excerpts from the Forest Plan. For a more complete description, refer to the Forest Plan, page Four-247).

- * Depending on the inherent sensitivity of each special emphasis watershed, no more than 25 percent of the watershed area should be in a hydrologically disturbed condition at any time.
- * Extensive stands of trees at various stages of development, arranged in a mosaic pattern, influenced by drainage patterns, geology, soils and avoidance of sensitive watershed lands are prevalent.
- * Riparian areas approximate natural conditions.
- * Transportation system design may be restricted to avoid sensitive watershed lands.
- * Some roads or trails may be closed part of the year or for several years at a time.

- * Evidence of land instability may be present.

B5-(Pileated Woodpecker/Pine Marten Habitat Area)

There were four (4) B5 areas within the Eagle Creek drainage. With the implementation of the Northwest Forest Plan, these B5 allocations can be returned to matrix unless other allocations and the ROD standards and guidelines will not meet management objectives for these species (ROD, page C-45). A watershed analysis was conducted for the Eagle Creek drainage and it was determined that objectives would be met with current allocations and that B5 lands could revert to matrix (Eagle Creek Watershed Analysis, page 112).

B7-(General Riparian)

As has been stated, when two standards exist for one land allocation, then the more restrictive allocation applies. In the case of riparian areas, the standards and guidelines under the riparian land allocation in the Northwest Forest Plan would be more restrictive. Thus, the standards and guidelines for B7 under the Mt. Hood Forest Plan would not apply.

The following is a description of the land allocations under the Northwest Forest Plan and a description of the Tier 2 Key Watershed designation..

Late Successional Reserve

These reserves are to be managed to protect and enhance old-growth forest conditions. No programmed timber harvest is allowed in a reserve. However, thinning or other silvicultural treatments inside the reserve may occur in stands up to 80 years of age if the treatments are beneficial to the creation and maintenance of late-successional forest conditions. Non-silvicultural activities within these reserves are allowed where such activities are neutral or beneficial to the creation and maintenance of late-successional habitat (ROD page 8).

Riparian Reserves

Riparian reserves are areas along all streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis.

The main purpose of the reserves is to protect the health of the aquatic system and its dependent species; the reserves also provide incidental benefits to upland species. These reserves would help maintain and restore riparian structures and functions, benefit fish and riparian-dependent non-fish species, enhance habitat conservation for organisms dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for terrestrial animals and plants, and provide for greater connectivity of late-successional forest habitat (ROD, page 7).

Matrix

This is the area in the forest where most timber harvest and silvicultural activities would occur. However, the matrix does contain non-forested areas as well as forested areas that may be technically unsuited for timber production (ROD, page 7).

Tier 2 Key Watershed

These watersheds were designated as sources for high water quality. These watersheds do not contain at-risk fish stocks (e.g., salmon) (ROD, page 10). No new roads would be built in inventoried roadless areas in key watersheds. The key watershed designation does not preclude regularly scheduled timber harvest and other management activities. Watershed analysis is required prior to management activities, except minor activities such as those Categorically Excluded under NEPA (and not including timber harvest) (ROD, page C-7).

Purpose and Need

The Interdisciplinary Team (IDT) determined the existing conditions of the area using an Integrated Resource Analysis (IRA). Once the existing condition has been established, it is compared to the objectives for the area or the desired future condition. If these two conditions do not coincide, objectives are developed and then a need for action is determined. Once a need has been determined, then a proposed action can be developed.

The following statements identify objectives for the management of the Eagle watershed.

- 1) Objective: Maintain and enhance the long term health of the watershed for the production of high quality water.
A single aged stand does not meet the desired future conditions of a B6 watershed or a Tier 2 Key Watershed. In addition, these stands are not expected to naturally reach this desired condition in the near future. Individual trees are losing their vigor due to overcrowded stand conditions. Insect, disease, and the possibility of fire could significantly affect water quality and timber production.

The need exists to manipulate homogenous overstocked timber stands to improve forest health and create a more variable stand structure over the watershed which would maintain or enhance water quality.

- 2) Objective: Enhancing the long term growth potential of the project area.
Approximately 4,170 acres (78%) of the un-managed stands in the Eagle area are considered *Priority 1* for silvicultural treatment (stands of timber that are past culmination of mean annual increment). The remaining stands (1,177 acres or 22%) are considered *Priority 2* stands. The Eagle area is part of the forest base for calculating the "potential sale quantity" in the Record of Decision for the Northwest Forest Plan. Approximately 5,347 acres (82%) of the Eagle project area has not had any type of management for timber production.

The need exists to begin thinning overstocked stands so that the growth potential of the site can be realized. The resultant wood products from these activities would (in part) satisfy the short-term demand for timber as well as contribute to the potential sale quantity for the Mt. Hood National Forest.

- 3) Objective: Enhance wildlife habitat diversity.
The majority of the stands in the project area are characterized as homogenous, even-aged stands with low levels of structural diversity. Many of these stands lack large snags (greater than 21" in diameter) and do not meet 60% biological potential for cavity nesting birds. Large logs greater than 22" in diameter are also missing from many stands. In addition, small openings of early seral stage habitat which provide forage for deer and elk are becoming scarce as vegetation in existing opening mature.

The need exists to manipulate select stands to improve their structural diversity, promote the development of more complex canopies, and to develop large snags and logs. In addition, small openings are needed in the landscape to provide habitat for early seral dependent species and forage for deer and elk.

- 4) Objective: Maintain or improve the riparian conditions for the benefit of fish, wildlife, and plants.
The majority of the timber stands in riparian areas are homogenous even-aged trees with a poorly developed understory canopy. In addition, snags and dying trees are less than 21" in diameter and there is a lack of defective green trees and large woody debris. In addition, these stands are not expected to naturally reach this desired condition in the near future. Individual trees are losing their vigor due to overcrowded stand conditions. Insect, disease, and the possibility of fire could significantly affect water quality.

Due to stand age and tree density, a limited number of riparian areas have been identified where treating

the stand would improve stand and riparian health.

5) Objective: Begin restoration activities where there are known resource concerns.

Resources in the Eagle area have been altered by both catastrophic events (e.g., fire) and human activities. These altered processes include but are not limited to: 1) Lack of old growth characteristics in the stands, 2) Lack of large trees in early and mid seral stands, 3) Decreased structure and composition of riparian vegetation, 4) Bare soil areas on cut banks of the existing road systems, and 5) Reduction in channel habitat complexity.

There is a need to encourage growth of large trees for riparian and wildlife benefits, to re-vegetate areas along roads that have a potential to produce sediment, and to re-contour and/or re-shape drainage facilities to prevent sediment transport.

Proposed Action

The Forest Service proposes to silviculturally treat stands in the Eagle Creek drainage so that stated objectives may be met. It is recognized that different methods may be available to accomplish some of the listed objectives. These methods may be: 1) The re-introduction of fire using controlled burns; 2) Felling selected trees and leaving them on the ground; 3) Girdling and blowing tops out of trees; 4) and others. However, so that all objectives may be met, the Forest Service has chosen to propose four projects, one of which is a timber sale(s).

This proposal consists of four actions. These actions would: 1) Silviculturally treat 1,030 acres of land. All of the land in this proposal has the Matrix allocation. The Northwest Forest Plan recognizes that these are the lands where the majority of timber harvest would occur within the forest (ROD, page 7); 2) Re-vegetate "bare" soil areas in three locations along roads 4614 and 4615 (Watershed Analysis, Map 3-11); 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams; 4) Block access to roads through berms or gates to reduce the potential for wildlife harassment (LMP, page Four-72).

Commercial thinning would occur on 868 acres, a shelterwood prescription would occur on 125 acres, and individual tree selection would occur on 37 acres. To accomplish this proposal, approximately .85 miles of road would need to be constructed as well as 0.35 miles of temporary roads. It is estimated that approximately two (2) acres of bare soil areas would be re-vegetated and that approximately one-half (1/2) a mile of road and associated drainage facilities would be re-structured. Road closures would reduce the "open" roads per square mile so that it is equal to or less than the LMP standard of 2.0 miles of open road per square mile in winter range and 2.5 miles of open road per square mile in summer range.

The proposed action would meet (at least in part) four of the stated objectives by:

- a) Beginning to create a more variable stand structure.
- b) Begin realizing growth potential while providing up to 26.4MMbf of timber for the local economy.
- c) Begin to create structural diversity and large snags and logs.
- d) Reducing the potential for sediment delivery through the restoration of bare soil areas and re-structuring of roads and drainage facilities.

The proposed action would not enter riparian reserves thus, objectives for encouraging the growth of large trees and improving stand health and stand structure would not be accomplished.

Other Management Considerations (These are not designated as land allocations in the Forest Plan but are to be considered in specific management plans)

A) Eligible Wild, Scenic and Recreational Rivers

The main stem of Eagle Creek is eligible for classification as both *recreational* and *wild* under the Wild and Scenic Rivers Act. It is beyond the scope of this FEIS to determine or recommend the designation of these segments under the Wild and Scenic Rivers Act. The actual decision to determine the final classifications would be completed in other environmental documentation. The eligible classification of recreational extends 1.1 miles from the western forest boundary, east, toward the Salmon-Huckleberry Wilderness. The eligible classification of "wild" extends from the east end of the recreational portion, upstream for approximately 7.2 miles. These potential classifications extend one quarter of a mile from each bank of the river. For more information, refer to the Mt. Hood National Forest, Forest Plan, pages Four-100 through Four-106 and Appendix E, pages 17 and 18.

With the implementation of the Northwest Forest Plan, the lands surrounding Eagle creek fall within a Late-Successional Reserve (LSR). This document does not propose management activities within the LSR because under the Northwest Forest plan, timber harvest may not occur except in stands that are less than 80 years of age or when salvage operations are necessary, (ROD, page 8). At this time, there are no stands within the LSR under 80 years of age that currently require commercial thinning and there are no known pockets of blowdown or dead trees that would require salvage operations.

B) Inventoried Deer and Elk Winter Range

The lower elevations of the main stem of Eagle Creek and the South Fork of Eagle Creek include inventoried deer and elk winter range (Refer to the appendix of this document and to page Four-73 within the Mt. Hood Forest Plan). The main emphasis in these areas is to maintain or improve habitat (e.g., forage, thermal, optimal and hiding cover) for deer and elk. Timber harvest may occur. Open road densities are to be limited and should be no more than 2.0 miles of open road per square mile by the year 2000. Certain restrictions may be instigated (e.g., hunting and human access).

C) Roadless Area

A portion of the northern one-half of the Eagle project area is within the Roadless Area Review and Evaluation II (RARE II) inventoried "Salmon-Huckleberry Roadless Area" (Refer to Appendix C, pages 51 through 56 of the Mt. Hood, Forest Plan). Due to road construction, this roadless area has been divided into two separate blocks. The roadless area in the south western portion of the Eagle project area is without roads except loggers spurs. However, this land includes previously clearcut and commercial thinning harvest units (pre-1990 harvest activities). The portion of roadless area to the north and east includes one short road and clearcut units (pre-1990 harvest activities). The roadless areas within the Eagle Creek planning area were included in RARE II in 1979. After passage of the Oregon Wilderness Act of 1984, the areas not included in the Salmon Huckleberry Wilderness were released to be managed for multiple use. (Refer to the Forest Plan Final Environmental Impact Statement, pages III-149 and III-150). The Mt. Hood National Forest, Forest Plan, discusses this roadless area and recognized that the selected Alternative "Q" would eliminate the potential for a future wilderness designation of this roadless area. (Refer to the Forest Plan, Appendix C, pages 51 through 55). The standards and guidelines in the ROD for the Northwest Forest Plan are more restrictive than the standards and guidelines in the Mt. Hood Forest Plan. Under the ROD, road construction cannot occur in an inventoried roadless area within a Tier 2 watershed (ROD, page C-7) however, timber harvest may occur.

Regulation and Direction

This Final Environmental Impact Statement has been prepared in accordance with the regulations established under the National Environmental Policy Act of 1969 (NEPA). Direction for managing competing and unwanted vegetation is provided through the Record of Decision, signed by the Regional Forester, USDA Forest Service, 12/8/88, for the Final Environmental Impact Statement (FEIS) for "Managing Competing and Unwanted Vegetation," Pacific Northwest Region, and the Mediated Agreement (supplement to the FEIS) signed 5/24/89. Resource objectives have been established in the Final Environmental Impact Statement (FEIS) for the Mt. Hood National Forest Land and

Resource Management Plan, (10/90) and in the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (FSEIS) and the Record of Decision (ROD) (4/94). Management of Pacific Yew would be consistent with direction provided in the "Pacific Yew Final Environmental Impact Statement" and Record of Decision (September 1993). This document falls under Public Law 104-19 and is subject to all requirements under this law. The resultant timber sales under this document do not contain a salvage component.

Decisions to be Made

This Final Environmental Impact Statement (FEIS) informs the Mt. Hood National Forest Supervisor (decision maker) of the direct, indirect, and cumulative effects to the environment as a result of the proposed action and any alternatives to that proposed action. Additionally, this document informs the public of management proposals and of potential effects to the environment caused by these actions. Within this FEIS, the Forest Supervisor can choose between three alternatives. Two of these alternatives provide for further management of the Eagle project area while one alternative is the "No Action" alternative.

The Supervisor would have to decide:

- 1) Should thinning occur within the Salmon-Huckleberry roadless area?
- 2) Should thinning occur within riparian reserves?
- 3) At what intensity should the affected stands be managed?
- 4) Should further silvicultural treatments be delayed for the time being through selection of the No Action Alternative?

The Supervisor's decision would also include all "connected" activities associated with the chosen alternative (e.g., erosion control, tree planting, and implementing mitigation measures).

Scoping and Public Involvement

At the beginning of the Draft Environmental Impact Statement process, a "Notice of Intent" was published in the Federal Register on April 15, 1991. This notice described the Forest Service intention of managing the Eagle project area. A second notice of intent was published in the Federal Register that revised the original proposal based on a preliminary study of the area. This second notice was published on July 22, 1992. A third notice of intent was published on October 18, 1995 informing the public of the decision to publish a Supplemental Draft Environmental Impact Statement. A Notice of Availability was published in the Federal Register for the Supplemental Draft Environmental Impact Statement on May 24, 1996.

Following the publication of the April 15, 1991 notice of intent, newspaper articles appeared in the Oregonian and in local newspapers. Regular informational articles and time-line updates have been published in Mt. Hood National Forest newsletter called *Sprouts*. This newsletter is regularly mailed to over 3,000 individuals and organizations.

Two public meetings were held on November 18th and November 21st, 1991 in Estacada, Oregon. A total of 41 people attended these two meetings. In addition, the Estacada Ranger District received 39 letters dealing with the proposal.

A representative from the Eagle Creek National Fish Hatchery (Administered by the U.S. Fish and Wildlife Service), regularly attended Steering Committee meetings. Additionally, the Confederated Tribes of Warm Springs, the Yakima Indian Nation, and the Confederated Tribes of Grand Ronde have been contacted concerning this project.

The Draft Environmental Impact Statement (DEIS) for the Eagle Creek Timber Sales was released for public review on July 9, 1993. Originally, the public comment period for the draft document was 45 days and would have been

completed on August 23, 1993. However, due to telephone conversations with interested readers, the comment period was extended for an additional 15 days. The end of the comment period then became September 7, 1993.

Following the release of the DEIS, three public meetings were held. These meetings were held in: The city of Mollala on July 26, 1993, the city of Gresham on July 27, 1993, and the city of Estacada on July 29, 1993. During these public meetings, participants were invited to a public field trip to view the Eagle Creek area. This field review was held on August 11, 1993. During the public comment period (July 9 through September 7) several newspaper articles dealing with the draft document were published in the Oregonian and in the Clackamas County News.

The Forest Service received 30 letters commenting on the draft environmental impact statement (DEIS) for the Eagle Creek Timber Sales. Responses to substantive comments from these letters and other public involvement documentation can be found within the appendix of the SDEIS.

Once the decision was made to produce an SDEIS, regular informational articles and time-line updates have been published in Mt. Hood National Forest newsletter called *Sprouts*. The SDEIS was made available to the public on May 24, 1996 and the public comment period ended on July 8, 1996. Comments were received on the SDEIS and responses to substantive comments from these letters and other public involvement documentation can be found in the appendix of this document.

Issues

This section describes the issues generated as a result of discussions with interdisciplinary team members, resource specialists, other interested parties, letters from public participants, and after considering comments received on the Supplemental Draft Environmental Impact Statement (SDEIS).

Public comments from the 45 day comment period on the SDEIS did not identify any new *significant* issues that the Forest Service should consider. For more information, refer to "Consultation With Others" in the appendix of this document.

This section has been divided into two parts. The first part identifies significant issues that would drive alternatives and the second part deals with those issues that would not drive an alternative, but where environmental effects should still be addressed in this document.

A) Significant Issues

Significant Issue #1: (Water Quality and Fish Habitat)

The Mt. Hood National Forest, Forest Plan, designated most of the Eagle project area as B6 - (Special Emphasis Watershed). This area was designated as B6 in the Forest Plan due to inherent sensitivity, fish populations, and the Eagle Creek National Fish Hatchery that is located approximately 4.0 miles downstream from the forest boundary. The Northwest Forest Plan designated the area as a Tier 2 watershed due to high quality water. Although there are no "at risk" fish populations in the project area, Eagle creek and the South Fork of Eagle creek do support resident populations of fish.

Issue Statement: Activities that disturb soil and manipulate vegetation may increase stream sediment loading, stream temperatures, and alter the timing and size of peak flows. These occurrences may have effects to the resident fish populations and the national fish hatchery and may have an affect on stream bank stability.

The following criteria are to be used to measure the effects of each alternative and provides a method to compare the alternatives to each other:

- 1) The "Aggregate Recovery Percentage" (ARP) methodology would be used on this project. The area for consideration would include the Eagle project area, part of the wilderness, and it would consider private

lands between the forest boundary and the fish hatchery. This methodology is a means of estimating the ability of a sub-watershed to accept a rain-on-snow event.

- 2) Estimated potential sediment production compared in tons per year. An estimate would be made for the potential sediment from roads and harvest units.
- 3) Predicted stream temperatures in Eagle Creek and in the South Fork of Eagle Creek where they leave the forest boundary and at the fish hatchery.

Significant Issue #2: (Salmon-Huckleberry Roadless Area)

Portions of the Eagle area were involved in a "Roadless Area Review and Evaluation II" (RARE II) in 1979. Following the Wilderness Act in 1984, the Salmon-Huckleberry Wilderness was established. Once the wilderness boundaries were established, the lands not included in the wilderness designation were made available for non wilderness uses. The Mt. Hood National Forest, Forest Plan, evaluated the remaining Rare II roadless areas on the forest outside the wilderness areas. It was decided that six would be managed for *preservation* and the remaining five would be considered for timber management. The Salmon-Huckleberry Roadless Area within the Eagle project area is one of the five that would be considered for timber silvicultural activities.

Issue Statement: Silvicultural activities could reduce, alter or eliminate some existing roadless area characteristics in the Eagle area. These roadless area characteristics are: 1) Natural integrity 2) Apparent naturalness 3) Remoteness 4) Solitude / primitive recreation opportunities 5) Unique features and 6) Manageability / boundaries.

The following criteria are to be used to measure the effects of each alternative and provides a method to compare the alternatives to each other:

- 1) Estimated changes in roadless area characteristics through proposed harvest activities.
- 2) Estimated impact the proposed actions would have on the adjacent Salmon-Huckleberry Wilderness.

Significant Issue #3: (Production of Wood Products and the Local Economy)

Many communities are either directly or indirectly affected by the timber production from the National Forest system. During public meetings, this topic repeatedly surfaced. Under this document, the majority of the lands within the Eagle area are available for some form of timber production. The exception would be, the northern section of Eagle that is within a Late-Successional Reserve (LSR) where, prior to stand management, an LSR assessment would be required. It is beyond the scope of this document to produce an LSR assessment. Whenever timber is sold on National Forest lands, the counties where these sales are located, receive 25% of the timber receipts. If these sales are sold within "Oregon:California" (O&C) Revested lands, then the county receives 50% of the timber receipts. These funds are generally used by the local governments to help fund schools and road repair.

Issue Statement: The Eagle Creek planning area has the potential to supply wood products as well as employment opportunities to the local economy. Receipts from timber harvest would fund local schools and return revenues to the U.S. Treasury.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) Volume of timber to be harvested by each alternative.
- 2) Estimated number of people affected through direct or indirect employment because of available wood

products.

3) Estimated revenues available to counties because of available wood products.

4) Economic viability of the timber sales (Present Net Value, PNV), estimated returns to the federal treasury and estimated payments to Oregon counties.

Significant Issue #4: (Ecological Diversity)

The ecological diversity of forest ecosystems includes the occurrence of a full range of successional stages. These stages range from very young "second growth" stands to "late successional" stands. Ecological diversity also includes the distribution of these seral stages throughout the landscape. Within the Eagle project area, there are stands of timber that consist of very young second growth up through the "late successional" stages. These timber types are interconnected so that there is an opportunity for dispersal of organisms and carry over of some species from one stand to the next. Viable habitat and ecosystem productivity does exist within these areas for a variety of organisms. Although lacking in many stands, ecologically valuable structural components do exist. These components include: Down logs, snags, and larger trees.

Issue Statement: Silvicultural activities could reduce, alter, or eliminate the ability for treated stands to provide habitat for a variety of organisms. In addition, ecosystem productivity could be reduced and connectivity could be disrupted between the late successional stands of timber.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) Suitable Spotted Owl Habitat Converted: The measure of the extent to which suitable owl habitat has been converted.
- 2) Acres of Late-Successional Interior Forest Fragmented: The amount of interior habitat that has been fragmented at the project level and at the landscape level.
- 3) Late-Successional or Old Growth Forest Converted: The amount of mature forest that has been converted to a grass/forb or open sapling-pole stand condition.
- 4) Edge: Edge is defined as the easily distinguishable line between two stand types. An example would be between an early seral grass/forb type and a mature forest type. In this document, the measure would be the amount of "new" edge created in residual stands by silvicultural activities.

B) Other Issues

This section deals with issues that did not create alternate management strategies but were addressed similarly in all alternatives.

Issue #1.1 (Visual Quality)

The Eagle area receives many forest visitors during the year. In general, these visitors use the existing roads and five hiking trails constructed in the early 1900's for fire prevention.

Currently, these trails (directly and indirectly) provide access into the Salmon-Huckleberry Wilderness and provide views along the edges of the wilderness that look down into Eagle Creek. Motorized travel is quite frequent. These visitors use the existing transportation system for leisurely driving, bike riding, hunting, snow play, shooting, gathering and other activities. The Eagle area can be seen from selected view points off forest.

Silvicultural activities may change the visual quality of the surrounding landscape. This area can be viewed from existing roads, trails, the eligible wild and scenic corridors along Eagle Creek and from the wilderness. These activities may also affect the quality of the view shed when seen from selected viewpoints outside the project area such as in Gresham, Portland and Estacada.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) Are "Visual Quality Objectives" (VQO's) being met as described in the Forest Plan, (e.g., Retention, Partial Retention and Modification) along trails, roads and other viewer positions, (Refer to the Forest Plan pages Four-107 through Four-117 and Four-103).
- 2) Number of roads, trails or selected view points that do not meet VQO standards.

Issue #2.1 (Forest Health and Silviculture)

The growth and vigor of forested lands in the Eagle area have been reduced due to stand age and the high number of trees per acre. These stands are becoming more susceptible to insects and disease. Approximately one quarter to five air miles north and east of the Eagle area, the Mt. Hood National Forest is experiencing an epidemic of the Spruce Budworm. These attacks are more prevalent in less vigorous stands of trees where the individuals cannot resist this form of attack.

Silvicultural activities can increase the general health of a forest by thinning the existing stands so that residual trees increase their growth and health. This type of stand is better able to resist any attacks by insects and diseases.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) Total number of acres treated.
- 2) Silviculturally, the total number of first priority stands treated.

Issue #3.1 (Deer and Elk Habitat)

Lower elevation areas along Eagle Creek and the South Fork of Eagle Creek are inventoried deer and elk winter range. Currently, these areas are relatively intact with little evidence of human activities. Deer are evident in these areas all year. In addition, there is a herd of elk that move in and out of this area depending on the severity of the weather during the winter months.

Silvicultural activities may change the percentages of forage, hiding cover, optimal cover and thermal cover and disrupt travel ways. Open roads increase the potential for harassment by human activities and allow access to these areas by legal and illegal hunters.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) The "Model to Evaluate Elk Habitat in Western Oregon" is to be used to measure the effects of each alternative on elk and deer and provide a means to compare the alternatives to each other. This model measures three variables that include: 1) Sizing and spacing of forage and cover areas 2) Density of roads open to motorized vehicles and 3) cover quality.

Issue #4.1 (Increased Potential for Windthrow)

The first large sale to develop the Forest Service portion of the Eagle area was a commercial thinning that was logged in the 1970's. Since then, scattered clearcut harvest units have been placed across the landscape. In the past,

light blowdown has occurred, along road systems, along straight clearcut edges and wet areas where trees have developed shallow roots due to high water tables. Often, blowdown has occurred in wet areas that were in the middle of contiguous stands and were not influenced by human activities.

Openings created by roads and harvest units may increase the risk of windthrow in residual timber stands and in riparian areas.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) Miles of new, exposed "edge" created by silvicultural activities.

Issue #5.1 (Yew Wood)

The chemical "Taxol" is currently being extracted from the bark of Pacific Yew trees (*Taxus brevifolia*) for the purposes of cancer research. Generally, on the Estacada Ranger District, the Yew tree is found within riparian areas where site conditions are damp. Through surveys, a few Yew trees have been found along the South Fork of Eagle Creek. Direction for management of the Yew tree is found in interim guides published both in 1992 and 1993.

Road building and other harvest activities in riparian areas may damage or up-root the existing Yew trees.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) The amount of riparian area that could be affected by harvest activities.
- 2) The number of Yew trees affected by harvest activities.

Issue #6.1 (Recreation)

Currently there are areas in the Eagle drainage that contain little evidence of human activities. Commercial thinning, shelterwood harvesting and road building would increase human presence in areas previously not accessible to general forest users. Silvicultural activities and road building could also change the general character of the area.

The following criteria are to be used to measure the effects of each alternative and provide a method to compare the alternatives to each other:

- 1) Estimated changes in the opportunities for recreational experiences. This is measured by using three main components: Setting, Activities and Experience.

Chapter II Alternative Descriptions Including the Proposed Action

Introduction

For the Eagle Creek Timber Sales SDEIS, the interdisciplinary team (IDT) analyzed three action alternatives as well as the no action alternative in response to the issues listed in Chapter I of the document. Comments on the SDEIS were received and the I.D. team responded to the substantive comments. Specific responses to the comments are contained in Appendix I of this document. Although additional information has been added to this Final Environmental Impact Statement (FEIS) due to public comments and further refined field estimates, no comments were received or information gathered that raised additional issues or that would call for the analysis of additional alternatives. Thus, the alternatives presented in this document are basically the same as presented in the Eagle SDEIS but do include a few changes. These changes are noted in section "C" of this chapter. Alternative maps and descriptions from the SDEIS have been included in the appendix of this document.

This chapter has been divided into seven sections. These sections include:

A) Development of the Alternatives: This section discusses the methodologies used for development of the proposed action, issues, and subsequent alternatives to the proposed action.

B) Alternatives Considered but Eliminated from Detailed Study: This section describes alternatives that were eliminated from further study during the developmental process and the rationale for these decisions.

C) Alternatives Considered in Detail: This section describes in detail the proposed action and alternatives to the proposed action.

D) Changes in the Alternatives Between the SDEIS and the FEIS: This section describes the changes in the alternatives between the SDEIS and the FEIS due to ground verification of several units.

E) Mitigation Measures: This section describes the mitigation measures that would accompany the alternatives if implemented.

F) Summary Comparison of the Alternatives:

This is a summary of the management activities that would occur under each of the alternatives. This summary is displayed in "table" form.

G) Agency Preferred Alternative:

This section identifies the agencies preferred alternative.

A) Development of the Alternatives

The Integrated Resource Analysis (IRA) process and landscape ecology principles were used by both teams during the development of the DEIS and the SDEIS for Eagle. In these processes, the "on the ground" existing conditions were determined and reviewed. These existing conditions were then compared to the Forest Plan Desired Future Conditions to see if they "matched". If they did not match, objectives were determined, the need for action was developed, and opportunities to bring the existing condition towards the desired condition were considered. From this point, possible projects were developed from the stated opportunities. Thus, the Forest Service decided to proceed with stand manipulation to address the needs stated in Chapter I.

With the implementation of the Northwest Forest Plan, a watershed analysis was required in any areas where activities would occur within a "Key" watershed. From this process, a conceptual landscape design was developed that illustrates the vegetation patterns desired under the Northwest Forest Plan and the Mt. Hood Forest Plan (Watershed Analysis, beginning on page 75 and Map 4-2). For this analysis, the watershed analysis "interim operating plan" was used to develop projects that would move this area towards the conceptual landscape design (Watershed Analysis, page 78 and Map 4-3).

After considering the information provided in the watershed analysis, the IDT compiled a list of possible projects

that could be included in this document. Those projects are:

- a) Implement stand management activities that would move these areas towards a more desired condition (e.g., Create a timber sale, re-introduce fire, fall and leave selected trees).
- b) Begin to close roads to reduce wildlife harassment.
- c) Provide openings so that view points would be created along trails and roads.
- d) Complete restoration projects that were identified in the Eagle Creek Watershed Analysis.
- e) Construct an extension of trail #502 from Old Baldy, into the wilderness and possibly tie into the existing Eagle Creek trail.
- f) Possibly construct and develop a horse/day camp in the south eastern portion of the Eagle area.

At the end of the process, the deciding officer selected which projects were to be carried forward and which projects would be considered in future environmental documentation. Item "a", (stand management), item "b", (closure of roads), and item "d", (complete restoration projects), were selected as the projects that would be considered in this document. This project selection includes all of the "connected" actions associated with these projects (i.e., road and/or spur construction or rehabilitation, landing construction for yarding equipment, and all associated mitigation measures).

The Issues listed within Chapter I of this document were developed and finalized with input from the IDT, specialists, other agencies, two public meetings, letters from individuals, public meetings following the publication of the DEIS, a field visit during the DEIS comment period, public comments on the DEIS, and public comments on the SDEIS. Once the significant issues had been determined and shaped, alternatives to the proposed action were developed. These alternatives are described in detail in Section C of this Chapter.

B) Alternatives Considered but Eliminated from Detailed Study

During the development of this document, a total of five alternatives were considered. However, one of these alternatives was not fully developed. This alternative was:

Alternative A - Initiate projects within the Late Successional Reserve (LSR) at the north end of the watershed. This alternative would have silviculturally treated timber stands within the LSR. This alternative was eliminated from further study because:

- *1) With the exception of recently reforested units, the timber stands are greater than 80 years of age.
- *2) There are no salvage opportunities available.
- *3) It is beyond the scope of this document to develop a "Management Assessment" for this LSR.

* Northwest Forest Plan, ROD, pages C-11, C-12, and C-13 through C-16.

C) Alternatives Considered in Detail

The following items pertain to alternatives #1, 2, and 3 only and not to alternative #4 (No Action).

Features common to the action alternatives

1) Water quality would be maintained through adherence to the state water quality "Best Management Practices" (Refer to the Oregon Administrative Rules Chapter 340-41-001-975), the Mt. Hood National Forest, Forest Plan (Appendix H, pages 1 through 6), and standards and guidelines described in the Northwest Forest Plan and Record of Decision (ROD).

2) Oregon State Implementation Plan (OAR 340-20-047), Oregon State Smoke Management Plan (OAR 629-43-043) and Directive 1-4-4-601 (Operational Guidance For The Oregon Smoke Management Program, P.N. 845), would be employed to maintain air resource values.

- 3) The Oregon Occupational Safety and Health Code for Forest Activities (OAR 437, Division 6) regulations would be met.
- 4) All activities implemented as a result of the action alternatives would be in compliance with the National Historic Preservation Act of 1966, Executive Order 11593, 36 CFR 800.9 (Protection of Historic Properties) and Programmatic Memorandums of Agreement (1979, 1982, Amendment No. 1, 1989) between the Oregon State Historic Preservation Office (SHPO) and the USDA Forest Service, Pacific Northwest Region.
- 5) None of the action alternatives would construct roads in the Salmon-Huckleberry inventoried roadless area.
- 6) None of the action alternatives would commercially thin, construct roads, or otherwise alter the lands within a Late-Successional Reserve.
- 7) *None of the alternatives would affect the outstandingly remarkable values that exist along Eagle Creek that make it eligible for classification under the Wild and Scenic Rivers Act.*
- 8) Surveys for threatened, endangered or sensitive plants and animals and proposed endangered, threatened or sensitive species (PETS) were conducted. Any species that was found would be protected through avoidance of that particular species and/or habitat.
- 9) Proposed prescriptions and recommended mitigation measures minimizes the need for post-harvest fuel treatment of logging residues. Analysis of harvest prescriptions and individual unit characteristics indicates post-harvest fuel treatment in thinnings, individual tree selection units, and light shelterwoods to be unnecessary. It may be necessary to treat slash in the more heavily cut shelterwood areas for hazard reduction and site preparation. This determination coincides with experience of previously harvested units and similar prescriptions within the project area. However, fuel prescriptions are subject to modification following pre- and post-harvest field reviews; should the amount or distribution of logging residues be different than predicted. Roadside concentrations of logging residue would be disposed of by "lop and scatter" or hand piled and burned (depending on the amount of residue to be disposed). Logging residues adjacent to trail systems would be dealt with in such a manner as to maintain present "visual quality objectives" (VQO's). Landing residues would be burned after efforts to utilize the material. In compliance with the "Pacific Northwest" region FEIS for Managing Competing and Unwanted Vegetation (1988) and Mediated Agreement (1989), unit management strategy is "prevention" and disposal of trail system, roadside, and landing residues is "correction". The identity of needed fuel treatment activities is for hazard reduction purposes only (fire protection).
- 10) Following harvest activities, surveys for plantability would be conducted within all areas that have the shelterwood prescription. If adequate planting spots are not available, site preparation activities would be instigated. These activities may include; hand piling slash and leaving the piles in place, hand piling slash and burning those piles, or light under-burning of concentrations.
- 11) Following plantability surveys and any appropriate site preparation work, the Forest Service would depend upon natural re-generation to re-forest the harvest units except in the heavier shelterwood units. These units would be re-planted using Douglas-fir and/or Noble fir seedlings. Monitoring would be conducted to determine if natural re-generation was successful. If it is determined that full stocking has not been achieved, supplemental planting of trees by hand would be accomplished. In either case, reforestation would occur and new stands would be established within five years after harvest activities have been completed. There would be no need to plant trees within areas that have a thinning prescription. This is because enough trees would remain on site so that full stocking would be maintained.
- 12) Under the Northwest Forest Plan, approximately twelve logs (240 lineal feet) at least 20 inches in diameter each

and at least 20 feet in length should be left on site (Northwest Forest Plan, Record of Decision, page C-40). These standards apply to clearcut areas but, the principles still apply in shelterwood areas. This requirement can be modified in a partial cut situation depending on the development cycle of the stand. This guide is more restrictive than the current Mt. hood Forest Plan guide which states that 6 down logs per acre containing a volume of at least 40 cubic feet should be left on site (Forest Plan page Four-74). Thus, the standard and guide under the Northwest Forest plan would take precedence. Currently, there is a lack of this size down log within the project area. In the case of the thinning areas, these units would be monitored for approximately 3 to 4 years to determine if this down log requirement is being met through natural or mechanical means (i.e., blowdown, dead trees falling over or from slash left over from harvest activities). If this requirement is not being met, trees within the residual stand would be felled to accomplish the objective. The above discussion holds true in the case of a shelterwood prescription. However, additional trees may have to be marked, along with the shelterwood leave trees, so that there would be enough residual trees to meet the objective.

13) As described in the Northwest Forest Plan, riparian reserves would be established along all streams and wet areas. Reserve widths would vary depending on site class, stream class, and if they are fish bearing or not (ROD page 9).

Alternative #1 (This is the Proposed Action)

This alternative consists of four actions. These actions would: 1) Silviculturally treat 1,030 acres of land. All of the land in this proposal has the Matrix allocation. The Northwest Forest Plan recognizes that these are the lands where the majority of silvicultural activities would occur within the forest (ROD, page 7). 2) Re-vegetate "bare" soil areas in three locations along roads 4614 and 4615 (Watershed Analysis, Map 3-11). 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams. 4) Block or obliterate access to roads through berms or gates to reduce the potential for wildlife harassment (LMP, page Four-72). Those roads that would be blocked are: 4614130, 4614140, 4614150, 4614160, 4614170, 4614180, 4614190, and 4615135. Those roads that are to be obliterated include: 4614167, 4615011 and two un-numbered spurs on the 4615. With obliteration, the road surfacing would be removed, the road bed would be ripped, and grasses and possibly trees would be planted on the site.

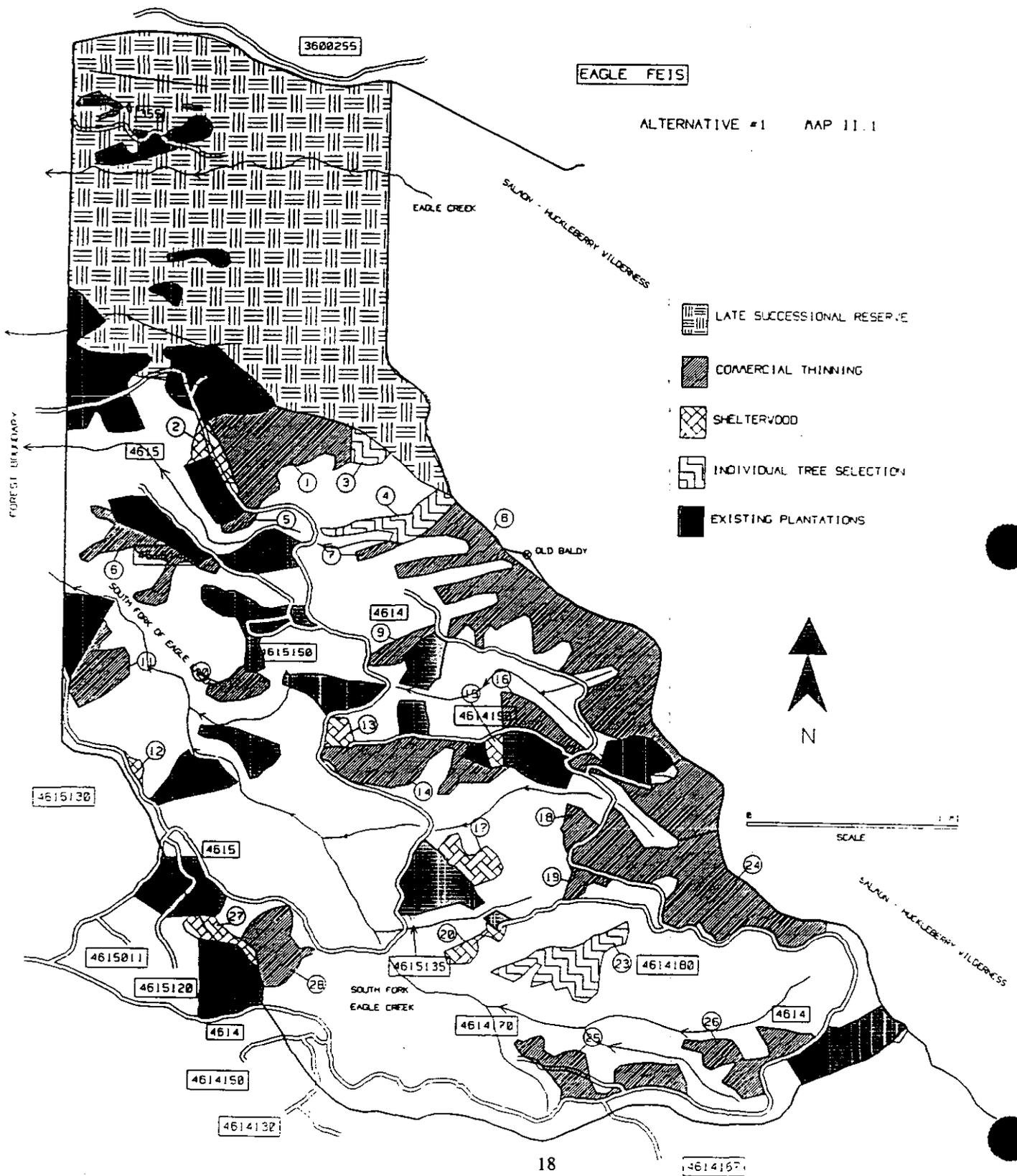
With this project, commercial thinning would occur on 868 acres, a shelterwood prescription would occur on 125 acres, and individual tree selection would occur on 37 acres. To accomplish this project, approximately .85 miles of new road and 0.35 miles of temporary road would need to be constructed. Following the completion of management activities, this new road and the temporary roads would be obliterated. It is estimated that approximately four (4) acres of bare soil areas would be re-vegetated and that approximately one (1) mile of road and associated drainage facilities would be re-structured. Road closures would reduce the "open" road per square mile so that it is equal to or less than the LMP standard of 2.0 miles of open road per square mile in winter range and 2.5 miles of open road per square mile in summer range.

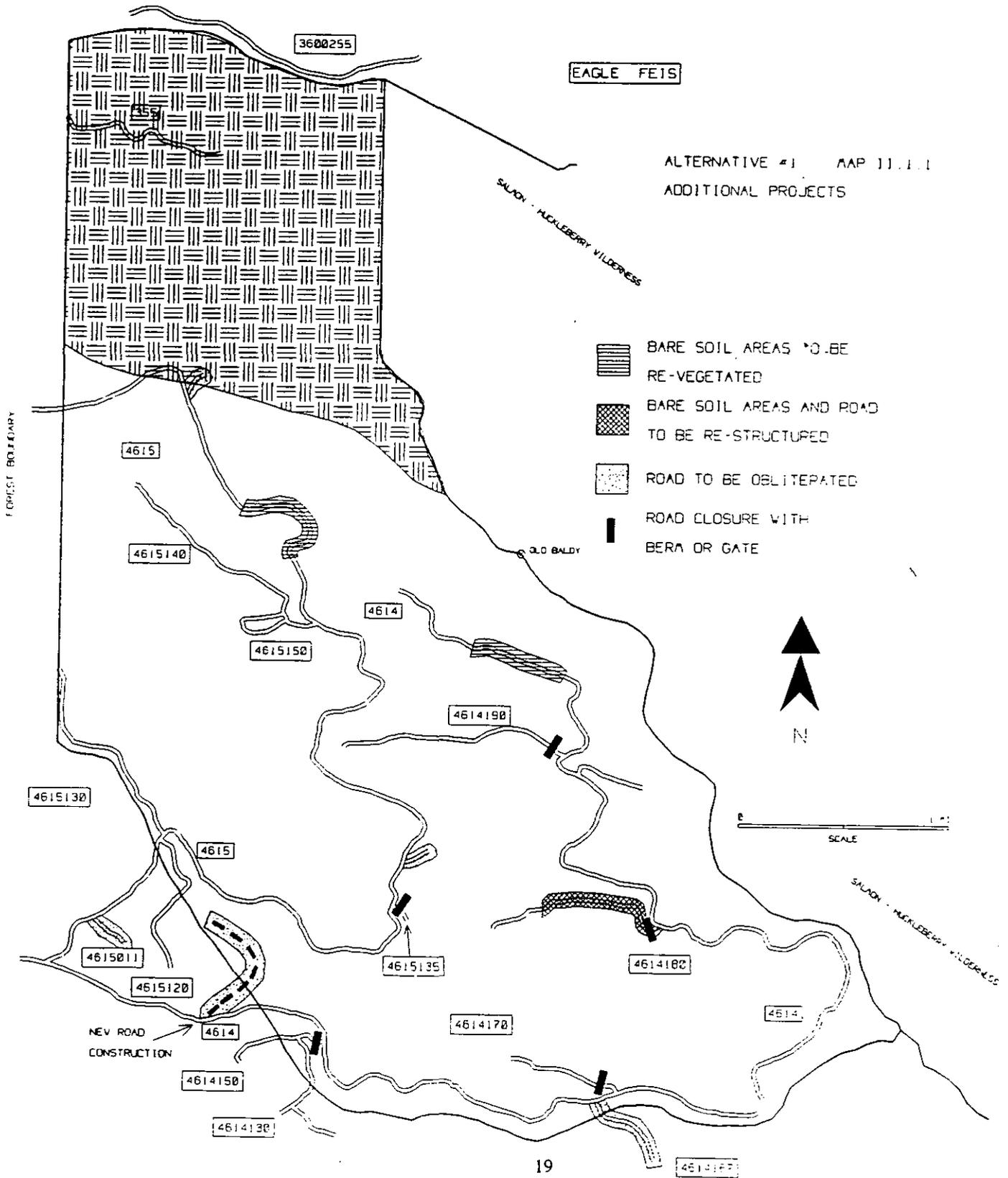
The proposed action would meet (at least in part) four of the stated objectives by:

- a) Beginning to create a more variable stand structure.
- b) Begin realizing growth potential while providing up to 26.4MMbf of timber for the local economy.
- c) Begin to create structural diversity and large snags and logs.
- d) Reducing the potential for sediment delivery through the restoration of bare soil areas and re-structuring of roads and drainage facilities.

The proposed action would not enter riparian reserves thus, objectives for encouraging the growth of large trees and improving stand health and stand structure would not be accomplished.

This alternative proposes thinning trees in stands that are adjacent to trails 502 and 502A (Refer to Map I.1 page 2, Chapter I). For trail 502, the prescriptions for the stands would be consistent with the visual quality objective





of *Retention*. For trail 502A, the prescriptions would be consistent with the visual quality objective of *Partial-Retention* west of road 4614 and *Retention* east of road 4614. These sensitivity levels and visual quality objectives are described in the Forest Plan (Refer to the Forest Plan, pages Four-115 through Four-117 and the glossary of this document).

Following management activities, there would be enough residual standing dead and green trees to maintain a 60% biological potential for primary cavity nesting species (e.g., woodpeckers). The minimum number of required trees to maintain diversity is; at least 2 to 3 hard snags and 2 to 3 live trees per acre to be left following management activities.

The following tables display the attributes of alternative #1:

(Table II.1a) Attributes of Alternative #1

Action	Acres Involved	Acres of Owl Habitat Affected	Roadless Acres Affected	Miles of New Road Const.	Acres of Riparian Area Involved	Miles of New Road in Roadless
Silvicultural Treatment of Stands	*1,030	68	462	.85 plus .35 of Temp. Rd.	0	0

(Table II.1b) Attributes of Alternative #1

Action	Acres Involved	Acres within Riparian	Acres within Roadless Area			
Revegetate Bare Soil Areas	4	3	0			

(Table II.1c) Attributes of Alternative #1

Action	Miles	Acres within Riparian	Acres within Roadless			
Re-Structure 4614180 & Drainages	1.0	2	0			

(Table II.1d) Attributes of Alternative #1

Action	Miles	Approx. Miles Within Riparian	Miles within Roadless Area	Miles of Open Road after Closure	Open Road Density after Closures	
Obliterate Roads	**1.55	1.2	0	17.6	2.0Mi./Sq Mi.	
Block Roads	3.49					

*This alternative does not propose the clearcut silvicultural prescription. Logging would be accomplished by skyline yarding on 260 acres, helicopter yarding on 721 acres, and tractor yarding on 49 acres.

** This total includes 0.70 miles of existing road and 0.85 miles of new road. New spur roads were not included in these calculations.

Alternative #2

This alternative consists of four actions. These actions would: 1) Silviculturally treat 562 acres of land. All of the land in this proposal has the Matrix allocation. The Northwest Forest Plan recognizes that these are the lands where the majority of silvicultural activities would occur within the forest (ROD, page 7). 2) Re-vegetate "bare" soil areas in two locations along roads 4614 and 4615 (Watershed Analysis, Map 3-11). 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams. 4) Block or obliterate access to roads through berms or gates to reduce the potential for wildlife harassment (LMP, page Four-72). There is one road that would be blocked and it is 4614180. Those roads that are to be obliterated are: 4615011 and two un-numbered spurs on the 4615. With obliteration, the road surfacing would be removed, the road bed would be ripped, and grasses and possibly trees would be planted on the site.

With this project, commercial thinning would occur on 458 acres and a shelterwood prescription would occur on 104 acres. To accomplish the sale(s), approximately .85 miles of new road and .35 miles of temporary road would need to be constructed. Following the completion of management activities, this new road and the temporary roads would be obliterated. It is estimated that approximately two (2) acres of bare soil areas would be re-vegetated and that approximately one (1) mile of road and associated drainage facilities would be re-structured. Road closures would not reduce the "open" road per square mile so that it is equal to or less than the LMP standard of 2.0 miles of open road per square mile in winter range and 2.5 miles of open road per square mile in summer range.

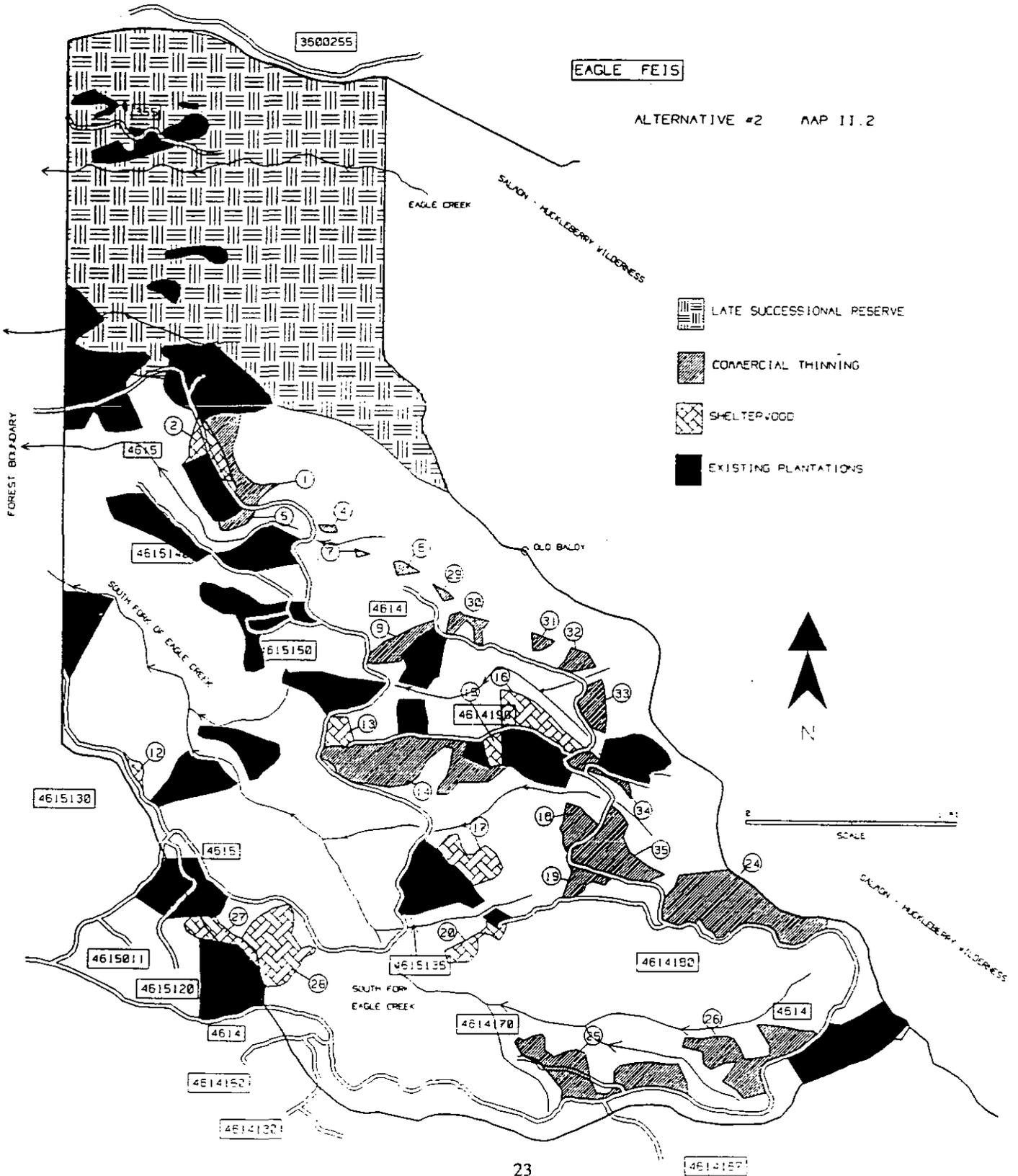
Alternative #2 would meet (at least in part) four of the stated objectives by:

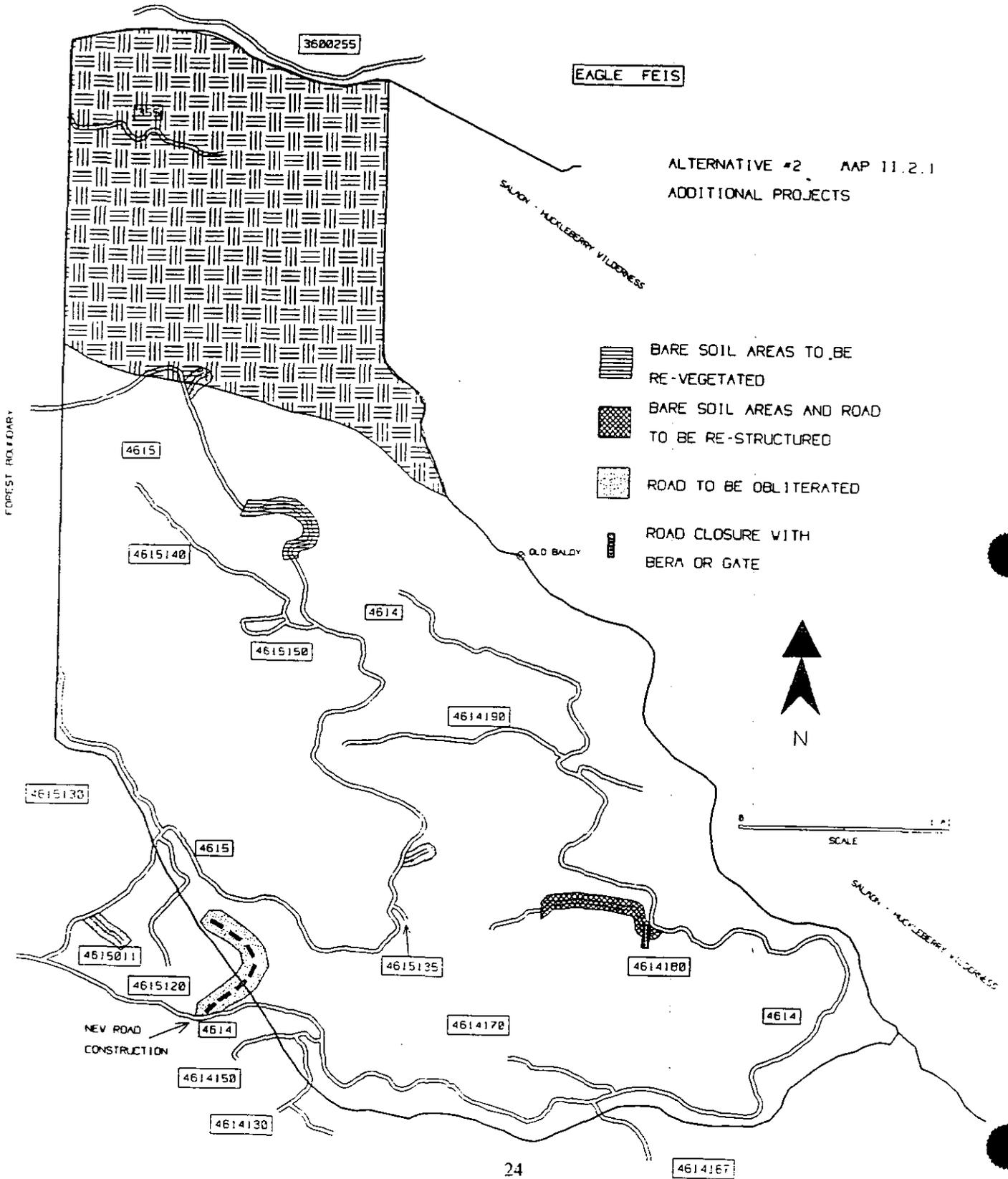
- a) Beginning to create a more variable stand structure.
- b) Providing up to 15.8MMbf of timber for the local economy and begin realizing growth potential.
- c) Begin to create structural diversity and large snags and logs.
- d) Reducing the potential for sediment delivery through the restoration of bare soil areas and re-structuring of roads and drainage facilities.

The proposed action would not enter riparian reserves thus, objectives for encouraging the growth of large trees and improving stand health and stand structure would not be accomplished.

This alternative proposes thinning stands in one area that is adjacent to trail 502 and four units that are adjacent to trail 502A (Refer to Map I.1 page 2). For trail 502, the prescription for the stand would be consistent with the visual quality objective of *Retention*. For trail 502A, the prescriptions would be consistent with the visual quality objective of *Partial-Retention* west of road 4614 and *Retention* east of road 4614. These sensitivity levels and visual quality objectives are described in the Forest Plan (Refer to the Forest Plan, pages Four-115 through Four-117 and the glossary of this document).

Following management activities, there would be enough residual standing dead and green trees to maintain a 60% biological potential for primary cavity nesting species (e.g., woodpeckers). The minimum number of required trees to maintain diversity is; at least 2 to 3 hard snags and 2 to 3 live trees per acre to be left following management activities.





The following tables display the attributes of alternative #2:

(Table II.2a) Attributes of Alternative #2

Action	Acres Involved	Acres of Owl Habitat Affected	Roadless Acres Affected	Miles of New Road Const.	Acres of Riparian Area Involved	Miles of New Road in Roadless
Silvicultural Treatment of Stands	*562	64	0	.85 plus .35 of Temp Rd.	0	0

(Table II.2b) Attributes of Alternative #2

Action	Acres Involved	Acres within Riparian	Acres within Roadless Area			
Revegetate Bare Soil Areas	2	1.5	0			

(Table II.2c) Attributes of Alternative #2

Action	Miles	Acres within Riparian	Acres within Roadless			
Re-Structure 4614180 & Drainages	1.0	2	0			

(Table II.2d) Attributes of Alternative #2

Action	Miles	Approx. Miles Within Riparian	Miles within Roadless Area	Miles of Open Road after Closure	Miles of Road Obliteration	Open Road Density after Closures
Obliterate Roads	**1.25	0	0	20.39	1.18	2.1/Sq. Mi. Unchanged from Current Conditions
Block Roads	0.96					

*This alternative does not propose the clearcut silvicultural prescription. Logging would be accomplished by skyline yarding on 230 acres, helicopter yarding on 283 acres, and tractor yarding on 49 acres.

** This total includes 0.40 miles of existing road and 0.85 miles of new road. Temporary roads were not included in this calculation.

Alternative #3

This alternative consists of four actions. These actions would: 1) Silviculturally treat 1,229 acres of land. Approximately 1,104 acres has the Matrix allocation. The Northwest Forest Plan recognizes that these are the lands where the majority of silvicultural activities would occur within the forest (ROD, page 7). The remaining 125 acres are within riparian reserves. This alternative would apply silvicultural treatments to acquire desired riparian characteristics (ROD, page C-32, "TM-1 (c)") The riparian management would occur in units #16,26, and 29. 2) Re-vegetate "bare" soil areas in three locations along roads 4614 and 4615 (Watershed Analysis, Map 3-11). 3) Re-contour and re-surface the running surface of road 4614180 and re-structure the drainage facilities to reduce the potential for sediment delivery into streams. 4) Block access to roads through berms or gates to reduce the potential for wildlife harassment (LMP, page Four-72). Those roads that would be blocked are: 4614130, 4614140, 4614150, 4614160, 4614170, 4614180, 4614190, and 4615135. Those roads to be obliterated include: 4614167, 4615011 and two un-numbered spurs on the 4615. With obliteration, the road surfacing would be removed, the road bed would be ripped and grasses and possibly trees would be planted on the site.

With this project, commercial thinning would occur on 1,063 acres, a shelterwood prescription would occur on 129 acres, and individual tree selection would occur on 37 acres. To accomplish this sale(s), approximately .85 miles of new road and .35 miles of temporary road would need to be constructed. Following the completion of management activities, this new road and temporary roads would be obliterated. It is estimated that approximately for (4) acres of bare soil areas would be re-vegetated and that approximately one (1) mile of road and associated drainage facilities would be re-structured. Road closures would reduce the "open" road per square mile so that it is equal to or less than the LMP standard of 2.0 miles of open road per square mile in winter range and 2.5 miles of open road per square mile in summer range.

Alternative #3 would meet (at least in part) the stated objectives by:

- 1) Beginning to create a more variable stand structure.
- 2) Providing up to 30.8MMbf of timber for the local economy and begin realizing growth potential.
- 3) Beginning to create structural diversity and large snags and logs.
- 4) Beginning to create vegetative diversity in selected riparian areas.
- 5) Reducing the potential for sediment delivery through the restoration of bare soil areas and re-structuring of roads and drainage facilities.

This alternative proposes thinning timber in units that are adjacent to trails 502 and 502A (Refer to Map I.1 page 2, Chapter I and Map II.2, page 24 in this chapter). For trail 502, the prescriptions for the stands would be consistent with the visual quality objective of *Retention*. For trail 502A, the prescriptions would be consistent with the visual quality objective of *Partial-Retention* west of road 4614 and *Retention* east of road 4614. These sensitivity levels and visual quality objectives are described in the Forest Plan (Refer to the Forest Plan, pages Four-115 through Four-117 and the glossary of this document).

Following management activities, there would be enough residual standing dead and green trees to maintain a 60% biological potential for primary cavity nesting species (e.g., woodpeckers). The minimum number of required trees to maintain diversity is; at least 2 to 3 hard snags and 2 to 3 live trees per acre to be left following management activities.

The following table displays the attributes of alternative #3:

(Table II.3a) Attributes of Alternative #3

Action	Acres Involved	Acres of Owl Habitat Affected	Roadless Acres Affected	Miles of New Road Const.	Acres of Riparian Area Involved	Miles of New Road in Roadless
Silvicultural Treatment of Stands	*1,229	68	462	.85 plus .35 miles of Temp Rd.	125	0

(Table II.3b) Attributes of Alternative #3

Action	Acres Involved	Acres within Riparian	Acres within Roadless Area			
Revegetate Bare Soil Areas	4	3.0	0			

(Table II.3c) Attributes of Alternative #3

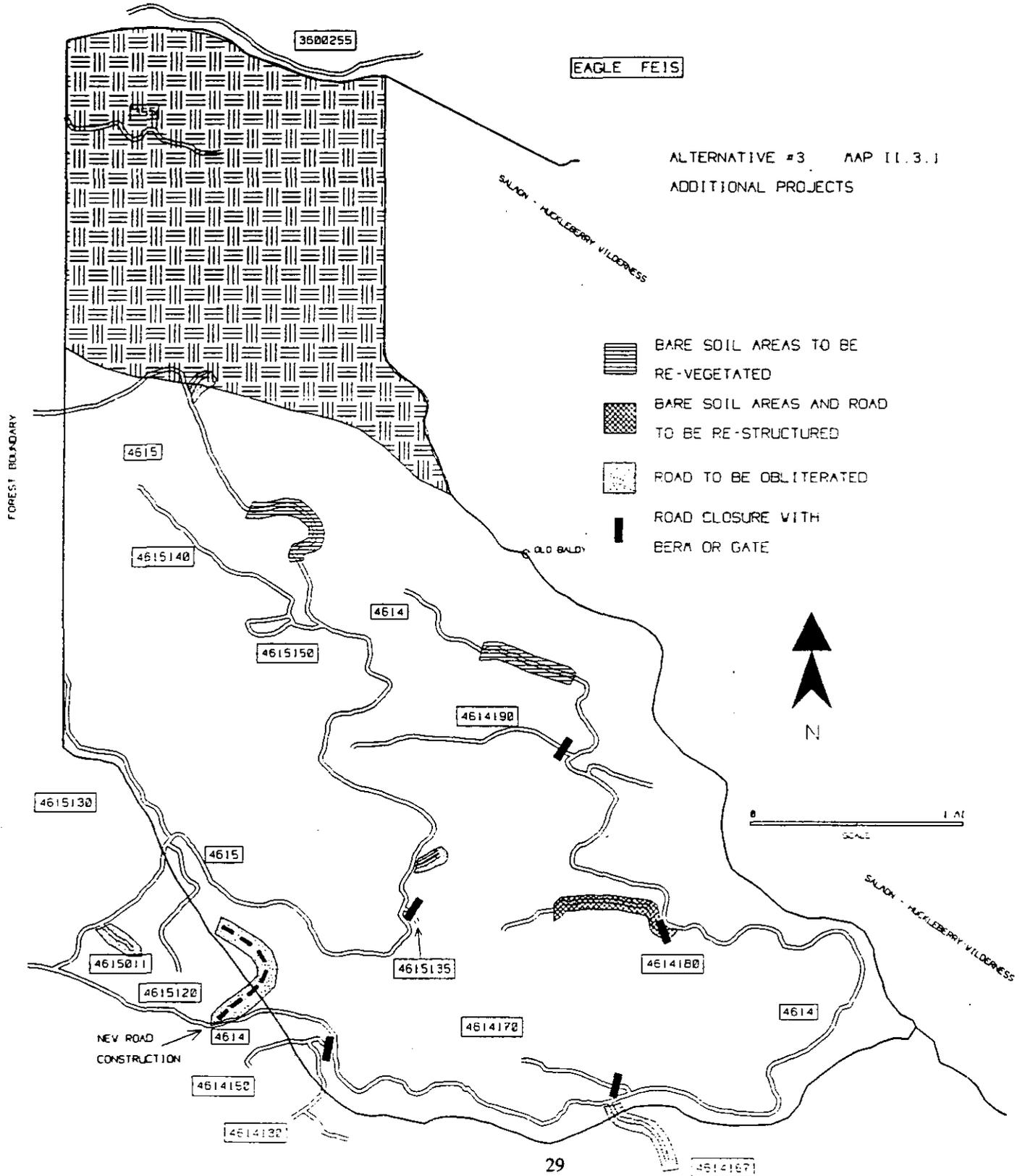
Action	Miles	Acres within Riparian	Acres within Roadless			
Re-Structure 4614180 & Drainages	1.0	2	0			

(Table II.3d) Attributes of Alternative #3

Action	Miles	Approx. Miles Within Riparian	Miles within Roadless Area	Miles of Open Road after Closure	Open Road Density after Closures	
Obliterate Roads	**1.55	1.2	0	17.6	2.0Mi./Sq Mi.	
Block Roads	3.49					

*This alternative does not propose the clearcut silvicultural prescription. Logging would be accomplished by skyline yarding on 287 acres, helicopter yarding on 893 acres and tractor yarding on 49 acres.

** This total includes 0.70 miles of existing road and 0.85 miles of new road. This calculation does not include .35 miles of Temp. road.



Alternative #4 (No Action)

This is the no action alternative. No management activities would take place as a result of this document. This would include: road closures, stand management, riparian management, watershed restoration etc.. Activities that have been scheduled under other environmental documentation would however continue until the requirements of such documentation has been satisfied.

Alternative #4 would not meet any of the five stated objectives. This is because;

- 1) A more variable stand structure would not be created.
- 2) No timber would be available for the local economy and the growth potential of the site would not be realized.
- 3) The alternative would not begin to create structural diversity and large snags and logs.
- 4) The alternative would not begin to create vegetative diversity in selected riparian areas.
- 5) The potential for sediment delivery through the restoration of bare soil areas and re-structuring of roads and drainage facilities would remain at existing conditions.

D) Changes in the Alternatives Between the SDEIS and the FEIS

During the period between the publication of the Eagle SDEIS and the publication of this FEIS, ground verification of several units has occurred. Due to this verification and comments from respondents to the SDEIS, some changes have been made to the alternatives. Although there have been changes to the alternatives, the original intent of the document, the objectives for management, and the significant issues have not changed. The following lists the changes that have been made to the alternatives:

- 1) Field data indicates that the acreage used for the proposed units in all alternatives was slightly over-estimated. Thus, the acreage presented in this document are lower than displayed in the SDEIS.
- 2) After riparian reserves were measured on the ground, it was found that units #21 and 22 were too small to be economically feasible and being so small, management of these units would not contribute much to the overall objectives for the drainage. Thus, units #21 and 22 were dropped from all alternatives which contributes to the reduction in acres for the alternatives.
- 3) The silvicultural prescription for units #11 and 28 would have been shelterwood in the SDEIS. In the FEIS, the prescription has changed to commercial thinning. This change is because the watershed analysis stated that openings should not exceed 20 acres. During ground verification, it was discovered that these units did exceed 20 acres and since the stands do need treatment, it was decided to change the prescription rather than drop acres for consideration. In addition, this change would reduce visual impacts.
- 4) The prescription for unit #27 was to be an evenly spaced shelterwood harvest. This has been changed to a shelterwood where patches of at least 13 trees per patch would be left with individual trees scattered between these patches. This was done due to input from the District and Forest Landscape Architects. This change would reduce visual impacts created by having single trees silhouetted against the skyline.
- 5) The new road accessing units #27 and 28 would be moved farther south than originally planned. This road would now be located in an existing clearcut and would be obliterated and not just blocked. This was done because the road grade would be less and there would be less cutting and filling for the roadbed thus, there would be fewer impacts to soils. Further ground investigations indicate that approximately 0.35 miles of temporary road would be required to access some of the thinning units. Once activities have been completed, these temporary roads would be obliterated. As with the new road, these temporary roads would not cross riparian areas. With obliteration, there would be no net increase in road miles.

6) Through field verifications, it has been determined that volume estimates on individual units on all alternatives was under-estimated. Though there was an increase in volume, objectives for stand management have remained the same. The same acres are being treated and the prescriptions for the units are the same. Volume is not an objective of this document nor does it is a measure for the objectives. The following indicates why volume estimates were low:

- | | |
|---|-----------------------------------|
| a) Volumes originally shown were on the conservative side ----- | Resultant Increase, 2-3MMbf |
| b) Green tree defect was estimated at 30% of the gross,
it is actually 5-8%. | ----- Resultant Increase, 6-8MMbf |
| c) Stand exams in some cases are 10-15 years old ----- | Resultant Increase, 8-10MMbf |

7) After careful review of the analysis contained in the SDEIS and FEIS, the Forest Supervisor (Deciding Officer) has selected Alternative #1 as the agency preferred alternative. This is a change from the SDEIS where the Deciding Officer selected Alternative #3 as the agency preferred alternative.

E) Mitigation Measures

This next section discusses Mitigation Measures. Mitigation Measures are defined as actions taken to avoid, minimize, reduce, or eliminate impacts as a result of implementing an alternative. These mitigation measures are common to the action alternatives. If a mitigation is specific to a particular alternative, it is stated. This document was prepared under the guidance of the Mt. Hood National Forest Land and Resource Management Plan and the Northwest Forest Plan. Standards and Guidelines as described in the Forest Plan and in the Northwest Forest plan (as mitigations) are incorporated into the design of the alternatives in this document. The publication, *General Water Quality Best Management Practices* (USFS, 1988) has been utilized as a guide in developing mitigation measures and site specific Best Management Practices. Alternative #4 is the No Action alternative thus, these mitigations would not apply.

The effectiveness of the following mitigation measures are assessed based upon their ability to reduce possible impacts from proposed activities. All of the proposed measures are considered to be easily implementable with minimal cost.

Those measures marked with (BMP,) indicate which Best Management Practice the particular measure is consistent with. (Refer to appendix G for a list of Best Management Practices).

Mitigation Measures Common to the Action Alternatives

- 1) Consult a Landscape Architect during unit designation, marking and logging cleanup near hiking trails.
- 2) Meet the standards and guidelines of Retention or Partial Retention along hiking trails.
- 3) Maintain foreground screening along main roads, if possible.
- 4) Flush cut stumps within view of trails (Angle cut away from trail).
- 5) No tractor skidding of logs across hiking trails. Tractor yarding prohibited on slopes greater than 35%.
- 6) Full suspension of logs above the ground within 50' on both sides and while yarding over any hiking trail while skyline yarding. One end suspension required on the remainder of skyline units.
- 7) Selectively place slash after harvest to visually screen yarding corridors within sight distance of trails and roads.
- 8) Lop and scatter or pull slash away from hiking trails wherever concentrations exist.
- 9) Reconstruct hiking trail tread if disturbance occurs.
- 10) Skyline corridors should be no closer than 150' apart, as measured from centerline to centerline at the back of the unit. Parallel settings are required whenever possible. Radial settings are to be avoided.
- 11) Skyline corridors should be no wider than 15'; rub trees are to be left in place for wildlife.
- 12) Limited operating season required during peak sap flows and to protect soil and water resources; operations would be limited from 6/1 to 10/31. To minimize the potential for surface erosion, road and landing construction and log haul would not occur during periods of prolonged rain fall. Sale administrators and watershed personnel should evaluate such operations to see if they are appropriate during these times.

(BMP, T-5, T-13)

13) Leave all tail trees as wildlife trees on skylines units except where near a trail. If they are adjacent to a trail, they are to be removed.

14) Close all newly constructed roads following use pursuant to established road management objectives. **(BMP, T-8)**

15) Keep all main roads open for administrative and public access during logging activities.

16) Protect all land survey monuments.

17) Protect all identified genetically superior trees.

18) Utilize existing landings and spurs whenever possible. **(BMP, T-10)**

19) Pile and burn all landing slash.

20) Tractor access to tailtrees prohibited. **(BMP, T-9, T-11)**

21) Erosion structures (e.g., filter cloth, sediment traps, etc.) would be installed wherever necessary at stream crossings during road obliteration or re-structuring projects to capture and reduce erosion and sediment transport. **(BMP, R-7)**

22) Skid all logs away from streams and wet areas. **(BMP, T-12)**

23) Seed, fertilize and mulch all bare soil areas that were disturbed as a result of management activities (e.g., corridors, skid roads, landings and cut and fill slopes. Erosion control materials should consist of ; annual rye grass applied at 30lb. / acre, 16-20-0 fertilizer applied at a rate of 200lb. / acres, and rye grass mulch applied at a rate of 3,000lb. / acre. Straw applied at this rate should provide 100% cover of exposed soil to a depth of at least 1 inch. **(BMP, T-14, R-4, R-5)**

24) Limited operating period for completion of new road construction, road obliteration, and road cut and fill repairs is from 7/1 to 9/30 to protect soil and water resources. No work should take place between 10/1 and June 30. **(BMP, R-3, R-8, R-9)**

25) Adhere to the Mt. Hood National Forest 15% policy for detrimental soil conditions.

26) Keep road-related erosion control work (seeding, mulching, water barring, etc.) current and complete all such work prior to 10/1. **(BMP, R-2, R-3, R-9)**

27) Stabilize (rock) road surfaces to minimize surface erosion; utilize special design considerations (Burroughs, E.R. and J.G. King, 1991). **(BMP, R-7)**

28) Scarify or subsoil landings and tractor skid trails prior to erosion control plantings. **(BMP, T-14, T-15, T-16)**

29) Design landings into roads where appropriate. **(BMP, T-10)**

- 30) Designate specific Riparian Reserve areas. Prescriptions would be developed for each unit, identifying size, width, harvest, and yarding prescriptions, and limitations. (BMP T-7)
- 31) Skid roads and landings within tractor skidding units would be located by the purchaser and approved by the sale administrator and watershed specialist prior to the beginning of harvest activities (e.g., falling, bucking, skidding, etc.).
- 32) During project implementation, deviations from established limited operation periods and other specific mitigation measures may be completed after specific input by representative resource specialists. (BMP, T-1, T-22)
- 33) Directionally fall all timber away from riparian reserves, streams and hiking trails. (BMP, T-8)
- 34) All known T. E. & S. species sites would be protected during project implementation. Should any species be found during project implementation, project activities would be halted and appropriate action instigated to protect the new site/habitat.
- 35) Retain a buffer of trees and snags around rock outcrops or talus slopes.
- 36) Adhere to guidelines in the "Elk Winter Range Guidelines for the Clackamas River Drainage, Mt. Hood National Forest" to reduce big game harassment.

The following mitigation measures apply to alternative #3 only where treatment would occur in riparian reserves (Units 16, 26, and 29).

- Alt 3-1) No treatment of any kind would occur immediately adjacent to streams. This distance would be the greater distance of: a) The top of the inner gorge along each side of the stream channel or b) Fifty feet (50) slope distance from the edge of the bank-full channel along each side of ephemeral streams or c) One-half (1/2) the site potential tree height along each side of non-fish bearing or perennial stream channels. A site potential tree height is approximately two-hundred eight feet (208') (Watershed Analysis). A no treatment buffer along seeps, springs, and wet areas less than one (1) acre in size would extend to the outer limits of riparian vegetation (e.g., devil's club, salmon-berry, etc.) and would include the first row of coniferous trees. A no treatment buffer along seeps, springs, and wet areas greater than one (1) acre in size would extend one-half (1/2) the site potential tree height around the full perimeter (1/2 of 208' or 104').
- Alt3-2) Streams and wet areas would be identified on sale area maps and protected.
- Alt3-3) Trees to be felled in the riparian area would be fallen away from the no activity zone.
- Alt3-4) All hardwoods are to be left standing unless there is a safety concern.
- Alt3-5) Full log suspension of logs, during in-haul, required within the riparian reserves.
- Alt3-6) No new landings would be constructed in riparian reserves and existing landings are to be avoided if possible. If this is not possible, landings are to be located at least one-hundred twenty five feet (125') from the edge of the bank full stream channel.
- Alt3-7) Do not remove trees that directly contribute shade to stream channels. This responds to maintaining water temperatures in the South Fork as well as avoiding potential effects to aquatic macro-invertebrates.

F) Summary Comparison of the Alternatives

(Table II.4) Comparison of the Alternatives

Alt → Action	Alternative #1	Alternative #2	Alternative #3	Alternative #4
Acres in Silvicultural Treatments	1,030 (All Matrix)	562 (All Matrix)	1,229 (1,271 in Matrix, 125 in Riparian)	0
Acres of Re-vegetated Bare Soil	4.0	2.0	4.0	0
Miles of Re-structured Road	1.0	1.0	1.0	0
Miles of Closed Road	5.04	2.21	4.0	0
Miles of Open Road After Closures	17.6	20.39	17.6	21.7
Acres of Riparian Treated by Silv. Prescriptions	0	0	125	0
Acres of Riparian Benefiting from Restoration Projects	5.0	3.5	5.0	0
Acres of Roadless Affected by Silv. Prescriptions	462	0	462	0
Miles of New Road	.85 plus .35 miles of Temp. Rd. (None in Roadless)	.85 plus .35 miles of Temp. Rd. (None in Roadless)	.85 plus .35 miles of Temp. Rd. (None in Roadless)	0

G) Agency Preferred Alternative

This section describes the alternative that the Forest Service has determined to best meet the management objectives and needs that have been identified in Chapter I, "Purpose and Need for Action". The Forest Service has also determined that this alternative best meets the issues that have been raised by the public, other agencies, and by organizations.

The Forest Service "Preferred Alternative is #1".

Chapters III and IV Affected Environment and Environmental Consequences

Introduction

The more conventional method of presenting Chapter III, Affected Environment and Chapter IV, Environmental Consequences is to have them separated into two distinct chapters. In this document, these two sections have been combined for a clearer presentation of the subject matter. In these combined chapters, the reader will first find paragraphs describing the affected environment and then the reader will find paragraphs describing environmental consequences to the affected environment. The purpose of the affected environment descriptions is to form a base line so that the reader can compare the existing conditions with the effects or possible changes to the existing condition as a result of implementation of the alternatives.

Chapter IV provides the scientific and analytical basis for the comparison of alternatives that were described in Chapter II. Additionally, Chapter IV deals with direct, indirect, and cumulative effects.

Significant Issue #1) Water Quality and Fish Habitat

The Issue: Activities that disturb the soil and manipulate vegetation may increase stream sediment loading, stream temperatures, and alter timing and size of peak flows. These occurrences may have effects to the resident fish populations and the national fish hatchery and may have an effect on stream bank stability.

Affected Environment

Under the Mt. Hood Land and Resource Management Plan (LMP), the Eagle Creek watershed has a land allocation of B6 (Special Emphasis Watershed). With this allocation, management emphasizes high combinations of riparian resource values and high sensitivity due to generally demanding site conditions and where the goal is to maintain or improve habitat conditions for the sustained long-term production of fisheries and high quality water. The record of decision for the Northwest Forest Plan (NFP) describes the intent of the Aquatic Conservation Strategy (ACS). The ACS was developed to restore and maintain the ecological health of watershed and aquatic ecosystems on public lands (ROD, page B-9). The NFP has established that the Eagle Creek area is a Tier 2 Key watershed. Tier 2 watersheds were established because they are important sources of high quality water even though they do not contain anadromous fish species (ROD, page B-18). While the B6 allocation recognizes riparian and water quality values, the NFP standards and guidelines are more restrictive. Thus, the NFP standards and guidelines have precedence over the LMP standards and guidelines.

In 1995 the Forest Service and Bureau of Land Management completed a comprehensive watershed analysis for the entire Eagle Creek Watershed as a step in the application of the Northwest Forest Plan and the accompanying Aquatic Conservation Strategy (ACS) (ROD, Page B-9). The watershed analysis provides the basis for an understanding of past and current watershed conditions. Hydrologic conditions, sediment delivery, water temperature, riparian and aquatic habitat conditions, etc. are discussed in detail in the document and forms the basis for further project-level analysis for comparison of proposed management alternatives presented in this FEIS.

The area for watershed analysis includes the project area, private lands, and BLM lands. Also included in the analysis area is the Eagle Creek portion of the Salmon-Huckleberry Wilderness. The Eagle Creek watershed, above the National Fish Hatchery, encompasses an area of approximately 30.6 square miles. The elevation ranges from 920 feet at the fish hatchery to nearly 4650 feet just north of Squaw Mountain on the Wilderness boundary. The project area covers about 8 square miles. The Eagle project area comprises about one third of the Eagle Creek watershed upstream from the National Fish Hatchery. The project area lies primarily within the South Fork Eagle Creek subwatershed and includes portions of two unnamed tributaries which enter Eagle Creek outside of the National Forest boundary. Within the South Fork of Eagle Creek, three small perennial tributaries known as Turkey

Creek, Raven Creek, and Crow Creek are wholly included in the project area. The Salmon-Huckleberry Wilderness contains nearly half (46 percent) of the watershed area above the hatchery and exerts a substantial influence on the flow of Eagle Creek to the National Fish Hatchery.

Hydrologic Change -- Base flows

Decreases in base flows may result in a reduction in effective aquatic habitat and degradation of water quality. Reductions in base-flows following timber harvest adjacent to streams may be related to the regrowth of deciduous riparian species which transpire larger quantities of water than natural conifer forests. The watershed analysis concluded that base-flows have not changed as a result of past management activity in the South Fork, upper mainstem, and middle mainstem subwatersheds. In particular, base flows in the upper mainstem of Eagle Creek are within the natural range of variability owing to limited management in the predominantly Wilderness watershed. The South Fork subwatershed has numerous perennial seeps and springs which augment base flows and there has been relatively little management within riparian areas.

Hydrologic Change - Peak Flows and Hydrologic Recovery

Peak flows are critical to a watershed's function as the relatively frequent peak flows (2-year to 25-year events) are the channel maintenance flows and the relatively infrequent peak flows (50-year and 100-year) are floods which can dramatically change the channel and riparian vegetation as a result of scour and sediment transport. Less than 20 percent of the entire Eagle Creek watershed lies within the transient snow zone (Christner and Harr, 1982). As such, current methodologies for assessing the cumulative effects of management activities on peak flows, which are based on assessing "rain-on-snow" events, are appropriate for the Upper Mainstem and South Fork subwatersheds. While these methodologies are not particularly useful for assessing the entire Eagle Creek watershed, they can provide a relative measure of vegetative canopy and ground disturbance. Eagle Creek as a whole, and several of the lower elevation subwatersheds outside of this project area, may have experienced some increases in peak flows due to extensive harvest and vegetation conversion activities over the past 75 years, coupled with a high percentage of soil types having low infiltration and permeability rates in these other subwatersheds. The watershed analysis used a transient snow zone methodology to assess changes in the Upper mainstem and South Fork subwatersheds, where appropriate, and this analysis has concluded that no measurable changes in water available for runoff and subsequent increases in peak flows were evident.

Specific project alternatives in this FEIS are evaluated and compared using the "Hydrologic Recovery Model" combined with interpretation of historic stream/riparian survey data and direct observations by members of the interdisciplinary team. The proposed Eagle Creek timber sale lies almost entirely within the transient snow zone. The Hydrologic Recovery Model is utilized on the Mt. Hood National Forest to assess proposed timber harvest activities in the transient snow zone. The methodology provides an index of watershed condition and cumulative effects. Hydrologic recovery, measured in terms of "Aggregate Recovery Percent" (ARP) values, is a means of estimating the ability of a subwatershed to accept a rain-on-snow event without experiencing adverse impact to streams and riparian areas. Such events occur when heavy rains, accompanied by relatively warm temperatures, cause rapid melting of a snowpack having a high water content. The ARP procedure relies on stand data which include the date the stand originated, either naturally following wildfire or some other incident or by reforestation and regrowth following forest management. The methodology does not quantify the amount of increase to the peak flow or soil moisture nor the potential damage that can result. Rather, it is used to indicate whether or not a watershed is in a recovered hydrologic state. The technique is best used to compare individual alternatives to one another and to the current state. A process paper describing the methodology is included in the analysis file.

Using the ARP model, a stand or created opening is determined to be hydrologically recovered when it achieves an average tree diameter of at least 8 inches diameter and a crown closure of at least 70 percent. In this geographic area, it takes an average of 35 years for a clearcut to attain full hydrologic recovery. Selective harvest prescriptions

are assigned a partial recovery value based on the estimated time to reach crown closure and diameter parameters. In the ARP analysis, roads are considered as unrecovered. ARP values of less than 75 percent raise management concerns that watershed conditions may be such that values and purposes for classification as Special Emphasis Watershed may be at risk of deterioration.

This area is designated as B6 - Special Emphasis Watershed in the Mt. Hood LMP (Refer to the Mt. Hood, Forest Plan, pages Four-246 through Four-252). Regulated timber harvest should occur in this area (Forest Plan, page Four-249) however, a key aspect of this classification is the establishment of a watershed disturbance "threshold of concern", or TOC, at 25 percent. The ARP equivalent of this TOC is 75 percent. The TOC reflects our perceived "sensitivity" of the watershed, based on professional judgment and an interpretation of physical factors (soils, geology, etc.) and stream survey data.

ARP values for the entire Eagle Creek watershed (as a means of comparison, though of limited hydrologic value) have improved from an estimated 56% in 1960 to around 66% currently. The ARP values for lands within the South Fork watershed declined from 100% in 1960 (prior to any management) to about 88% in 1995, well above any value of concern where we might expect to see adverse effects. However, ARP values for the entire upper Eagle Creek watershed, comprising primarily National Forest lands within the combined Upper Mainstem and South Fork subwatersheds, changed little from 1960 to 1995, presently around 95%.

The majority of the lands under private ownership along the western boundary of the project area have been logged and subsequently reforested. Some of these plantations are as much as 40 years of age. It is not known precisely when harvest activities would resume on these private lands. However, it is possible that private land owners could operate on a 55 year rotation basis. If this were the case, then cutting activities would resume on these private lands in approximately 15 years or around the year 2010, perhaps sooner.

Along with private ownership, the BLM owns parcels of timber along the western boundary of the forest. Currently, the BLM has one sale planned on their lands but this sale has not been sold or awarded due to spotted owl habitat protection issues. If this proposed activity should occur within the time frame of implementation of the Eagle project(s), the overall Aggregate Recovery Percentage (ARP) would likely remain the same since the area in question is outside of the transient snow zone.

As discussed elsewhere in this chapter, there is a history of recurring, wide-spread wildfire in the Eagle Creek watershed. Immediately following periods of catastrophic wildfire, ARP values would have been very low for most subwatersheds. Evidence of past wide-spread landslide events (debris slides, etc.) appears to coincide with periods of extensive natural wildfire. This cause and effect relationship would be expected to continue. Current stand structure, dominated by extensive homogeneous stands of closely spaced mature trees, suggests that the potential for another stand replacement fire exists today, with the resultant likelihood of accelerated mass movement, increased peakflows, and adverse affects to riparian ecosystems.

Geology and Soils

Slope gradients within the Eagle area generally range from less than 10 percent to approximately 90 percent, with some small near-vertical slopes along stream and river channels. Slope aspect is highly variable although a majority of slopes face west-southwest and north.

The topography of the eastern boundary of the area (near the wilderness) appears to be primarily glacial influenced. The shape of Old Baldy and Githens Mountain with their circular ridges would seem to suggest that glaciation has predominantly shaped the region's topography above elevations of approximately 3,000 feet. Below 3,000 feet, any glacial activity has been overshadowed by subsequent natural erosive processes. Slopes steeper than 30 percent are cut by numerous, closely spaced drainages, draining into deep V-shaped valleys.

Considering the texture and composition of these lands and the general lack of alteration or intrusive rocks, the valuable mineral resource potential is low. However, use of crushed un-weathered andesite as a common source of low-grade aggregate is considered feasible. No known operating mines or mining claims are located within the project area. There is a common rock "quarry" along the southwestern boundary at the end of road 4615130. This facility is still active and would probably be used as a rock source for several more years.

Soils in the project area are forming in deep glacial till over massive tuff and breccia deposits on all aspects. Soil profiles are generally composed of gravelly and cobbly loams with depths from 11-60 inches. Soils in south facing and higher elevational positions are often skeletal.

Monthly soil moisture data spanning a 7 year collection period reveals that on many sites within the project area, soil moisture rarely falls below 30% even in the driest parts of the year. High soil moisture is apparent through field observations of seasonally high water tables and rapid re-charge of soil profiles following precipitation. Apparent hydrophobic soil moisture conditions can be observed on the south facing slopes above the main stem of Eagle Creek and on few south facing slopes in the South Fork of Eagle Creek. These soils are generally skeletal and shallow to parent material and lack the high moisture holding capacity found on other sites in the Eagle project area.

Along the ridge tops and in upper slope positions along the north, south, and west boundaries, soils are shallow in depth containing 40% by volume rock fragments 3-10 inches in diameter. The site limitations posed by these soil conditions include poor plantability and increased windthrow hazard due to shallow rooting depths. Soil moisture may be limiting on these sites during the growing season. Based on aerial photo interpretation, no areas of large earth flows, landslides, or other deep-seated earth movements appear to be present within the project area.

The andesitic rock and breccias appear sufficiently placed and massive to remain relatively stable for the slope gradients found within the project area. Evidence of recent creep, soil mass movements, and ancient debris flow tracks were observed during our study. These unstable areas were primarily restricted to the major drainages where the down cutting by Eagle Creek mainstem and South Fork of Eagle Creek has over-steepened the side slopes. For the purposes of this project effort, areas considered unsuitable for timber harvest due to slope instability have been withdrawn from harvest consideration in this project. For further information on soils, refer to the analysis file.

Erosion and Sediment Delivery

The watershed analysis for the Eagle area determined that historical sediment delivery has been more episodic rather than continual with high levels of delivery occurring during periods following large scale wildfire and/or floods. Causal agents for the sediment delivery were rain-on-snow events, floods, or landslides. Sixty landslides were identified in the watershed of which eleven are considered "ancient". Most of the landslides (45) are debris flows located in the Salmon-Huckleberry Wilderness and are associated with geologic contact features in the upper mainstem subwatershed. Past and/or present sediment delivery quantities were not estimated for these landslides and it was assumed that these and similar slides have always delivered sediment to streams at these and similar contacts. Sediment from landslides initiated or influenced by management activities are considered an addition to the natural background sediment loading. Management activities such as timber harvest, road construction, and quarrying, has influenced or initiated 14 landslides most of which occur along Eagle Creek in the middle and upper mainstem subwatersheds. Existing stream-adjacent logged areas along the main channel of the lower reaches of the South Fork Eagle Creek, outside of the National Forest, show some evidence of windthrow and erosion.

Since few roads existed in the watershed prior to this century, road-related sediment delivery is considered an addition to the natural background sediment loading. Timber harvest and agricultural activity was also limited at the turn of the century however, forest clearings resulting from wild or human-caused fires existed in large scale. The watershed analysis determined that sediment produced from more recent timber harvest or active agricultural activities may be similar to sediment delivery during the periods of wildfire recovery, but less than that immediately following the large scale wildfires.

Conditions of the existing roads are generally good within the project area. The primitively constructed road 355 to the Eagle Creek trailhead, has diverted water from the natural drainages and channeled the water along the alignment of the road thereby increasing soil erosion and sediment yield. A spur road to an existing harvest unit (Crowfoot unit 2 off of road 4615) has intercepted a spring and contributes sediment to the 4615 road ditch system. Gravel surface roads constructed along the top of ridges, as expected, have a much lesser impact on the adjacent soil and water resources (e.g., road numbers 4614140 and 190). The main asphalt and gravel paved roads (4614 and 4615) are generally well constructed however, areas of small slump failures in the road fill and drainages which have been blocked by road fill without placing a culvert, were observed on Road 4615. Interestingly, during periods of intense, prolonged rainfall experience in the late fall of 1995, little or no surface flow was observed in these "drainages". Road 4614 has some high cut slopes along the southern boundary of the project area which appear to be susceptible to freeze-thaw induced rockfall and erosion of fine soil fractions. However, observations during the aforementioned periods of intense rainfall revealed virtually no sediment-laden or turbid water entering stream courses. The majority of the existing roads are greater than 9 years old and are well constructed and maintained. Road 355 and a spur to Crowfoot 2 (noted above) are estimated to have a greater sediment contribution than any of the other roads. In general, the sediment contribution from roads is estimated to be of a greater magnitude than in existing clearcut areas. Overall, current erosion and sediment delivery from roads and harvest units is not particularly remarkable.

Sediment contribution from existing harvest areas and roads, in the absence of site-specific monitoring data, is difficult to precisely estimate. A summary of studies elsewhere in the western Oregon Cascade mountains, with soil conditions, rainfall amounts, and topography similar to the project area (Swanson and Grant, 1982) estimate natural baseline levels of erosion to average around 0.007 tons per acre per year. Actual baseline rates may vary dramatically reflecting localized conditions, natural disturbance factors, etc.

The following table displays total delivered sediment by subwatershed, as estimated by modeling done in support of the Eagle Creek Watershed Analysis.

(Table III.1) Total Estimated Sediment Delivered to Streams

Subwatershed	Sediment Delivered		Road Length Delivering Sediment	
	Tons/Year	% of Total	Miles	% of Total
*Lower Mainstem	45.3	18	21.4	17
*North Fork	103.0	41	55.7	43
*Delph Creek	62.1	25	27.3	21
*Middle Mainstem	30.0	12	14.5	11
South Fork	8.3	3	7.8	6
Upper Mainstem	2.5	1	1.6	1
Watershed Total	251.2	100	128.3	100

*These subwatersheds are outside of the project area.

The subwatersheds in "Bold" are those that begin or flow through the project area.

Efforts to model sediment delivery from roads for the watershed analysis (an imprecise undertaking at best, given the variables to be considered), determined that approximately two-thirds of the total sediment delivery to streams (related to roads) come from within the North Fork Eagle subwatershed (41%) and Delph Creek subwatershed

(25%). The Lower Mainstem and Middle Mainstem subwatersheds deliver a combined 30% of the total while South Fork and Upper Mainstem contribute only 4% of the road-related sediment delivery to streams. Approximately 128 miles of the total 509 miles of roads in the Eagle Creek watershed have the potential to deliver sediment to streams. Sediment delivery rates range from 0.4 to 15.0 tons/mile/year. Sediment delivery to streams from roads for each Eagle Creek subwatershed range from a low of 0.001 tons/acre/year in the upper mainstem subwatershed to a high of 0.095 tons/acre/year in the Delph Creek subwatershed. For purposes of comparison, 1 ton of saturated soil having approximately equal amounts of sand, silt and clay is approximate equal to 1 cubic yard of material.

Operations at the Eagle Creek National Fish Hatchery have been directly affected by upstream land management activities such as road building and timber harvest. Over the past two decades, hatchery personnel have observed substantial decreases in sediment rates based on the amount of sediment in settling ponds and an accompanying reduction in temperature extremes. Fish hatchery personnel attribute these trends to the re-growth of vegetation on the lands in the lower reaches of the Eagle Creek watershed immediately upstream from the hatchery. Hatchery personnel expect these trends to continue as the young timber stands continue to grow and mature.

Instream and Riparian Conditions

Riparian areas parallel all perennial streams for varying widths back from the channel banks. Overstory riparian trees; western red cedar, western hemlock, alder and big-leaf maple, provide abundant shade and an ample source of future large woody debris. Where the floodplain is relatively wide, shrubs and young alder dominate.

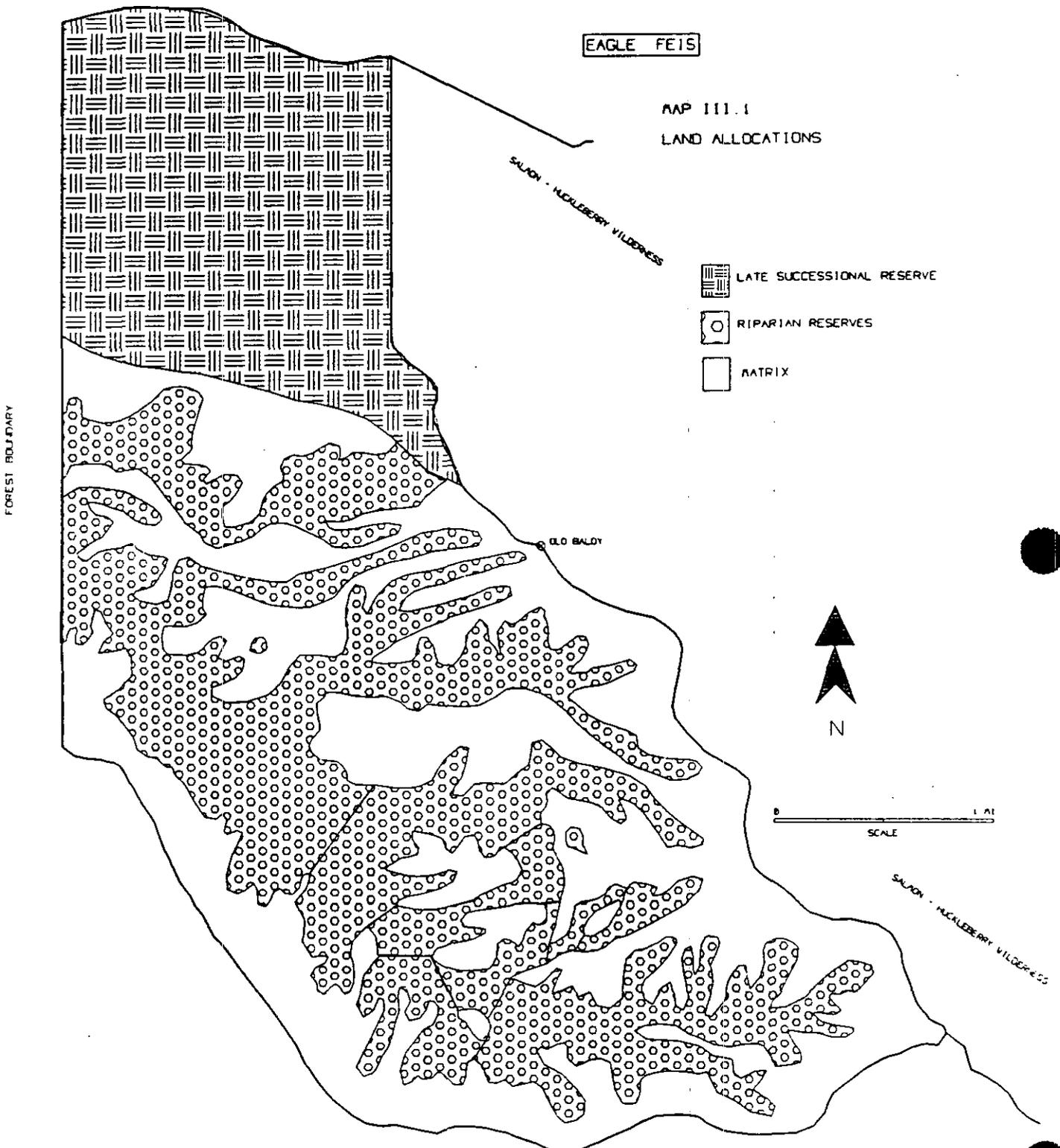
Seeps and springs are common over the entire project area. The most notable of these is in the upper South Fork below Road 4614170. In most cases, seep boundaries are poorly defined and often grow in size during the wet season and shrink during the dry. In some cases, seeps may not be evident during the dry season. While many are dominated by brush, a mix of conifers and hardwoods dominate others. With one exception, these areas are in excellent condition.

Stream surveys for the South Fork of Eagle Creek are on file at the Supervisors Office on the Mt. Hood National Forest. The earliest survey was conducted in August 1981 (Godbout and Boyce). A total of four (4.0) miles of stream were surveyed upstream from the National Forest boundary. The stream was described as having good channel stability with channel bed and banks consisting of boulder/rubble with periodic sections of bedrock. In addition to the boulder/rubble banks and stream bed, stability was also attributed to abundant riparian vegetation. Water flow was estimated to be 7-10 cubic feet per second (CFS) at the forest boundary. Water temperatures were between 53 degrees F. and 58 degrees F. at air temperatures around 68 degrees F.. Vegetation and topography contributed to an average of 75% shading of the stream channel. Fish habitat was rated as good and was described as having a balanced pool/riffle ratio. Resident cutthroat trout populations were estimated to be 20 fish per 100 feet of channel. Fish sampled ranged from 2 to 9 inches (51-228 mm) in length and were well proportioned with small heads and thick bodies. This appearance was attributed to high aquatic insect production as a food source.

Trout numbers decreased as the stream became smaller towards the headwaters. Pool depths, spawning gravel availability, and instream cover decreased as the survey proceeded upstream. Spawning gravels were described as good to excellent in quality suggesting that fine sediments were not present in significant amounts.

In summary, Godbout and Boyce stated that there were limited opportunities for enhancement because of abundant habitat and a thriving cutthroat trout population. The riparian vegetation was described as wide and diverse providing excellent stream shading.

Electrofishing was completed river mile 1.5 (RM 1.5) (approximately the forest boundary) (Cain and Smith 1982). Cutthroat trout were observed ranging from 37-226mm in length and fry were abundant. In addition, sculpin and tadpoles were observed. Water temperatures were 56 degrees F. with an air temperature of 65 degrees F. on August 18. Stream flow was estimated at 9 CFS. Fish were described as in fair to good condition.



Dore and Glover (1990) surveyed 4.7 miles of stream above the forest boundary. Stream flow on August 27 was estimated at 27 CFS at the downstream end of the survey. Water temperatures ranged from 50-55 degrees F.. Habitat for trout was described as good. Canopy closure was estimated at 45% over the entire survey area. (It appears that topographic shading was not included in their estimates). Channel substrate ranged from cobble/small boulders at the downstream end to cobble/gravel at the headwaters. No significant blowdown or erosion sites were observed.

Trask and Pearson (1991) did the most comprehensive survey of the South Fork of Eagle Creek. This survey utilized the Hankin-Reeves methodology for quantifying habitat characteristics. Stream stability was evaluated using the Lohrey Stability Index (Lohrey, undated). All areas that were surveyed were relatively stable however, the headwaters area rated stable/moderately unstable due to steep upper slopes, a decrease in vegetative diversity, frequency of shallow soils, and a decrease in the size of dominant substrate. Cutthroat trout were observed throughout the survey well into the headwaters and several associated tributaries. As was noted in previous surveys, the numbers of trout decreased in the headwaters area. This was attributed to the lack of pool habitat as the stream became smaller and more shallow. One important finding in this survey was that young fish were more prevalent in the headwaters area. This indicates that this is a spawning and nursery area which contributes to downstream populations.

Specific locations for potential slide and debris activity were noted and recommendations were made for the protection of riparian and instream conditions.

There is no survey information available for an unnamed tributary to the main stem of Eagle Creek located in the Northern end of the planning area. However, it is known to be a fish bearing stream

Fish Species and Distribution

The area of consideration for this document includes the upper South Fork of Eagle Creek, Eagle Creek, and unnamed tributaries to these major streams. Stream survey information indicates that native cutthroat trout (*Oncorhynchus clarki*) and sculpin (*Cottus sp.*) are the only fish species found in the immediate project area. A map of fish distribution is displayed in the Eagle Creek watershed analysis. There is a falls at river mile 13 (RM 13) that is impassable to both anadromous and other resident fish species. The falls is approximately five (5) river miles downstream from the National Forest boundary (western edge). There has been no introduction of other salmonid species above the falls.

Species and stocks that are known or are suspected to occur in the Eagle Creek watershed include: 1) Columbia coho salmon (*Oncorhynchus kisutch*), 2) Spring chinook (*Oncorhynchus tshawytscha*), 3) Hatchery origin, early-run steelhead and native late-run steelhead trout (*Oncorhynchus mykiss*), 4) Sea-run cutthroat trout (*Oncorhynchus clarki*), 5) Pacific lamprey (*Lampetra tridentata*), 6) Northern squawfish (*Ptychocheilus oregonensis*), 7) Longnose dace (*Rhynchithys cataractae*), 8) Redside shiner (*Richardsonius balteatus*), 9) Prickly sculpin (*Cottus asper*), 10) Reticulate sculpin (*Cottus perplexus*), 11) Large-scale sucker (*Catostomus macrocheilus*), 12) Mountain sucker (*Catostomus platyrhynchus*), and 13) Brook lamprey (*Lampetra richardsoni*). There is not a complete understanding of the distribution of these fish within the drainage because of lack of survey information. Except in the South Fork of Eagle Creek, rainbow trout (*Oncorhynchus mykiss*) were stocked by the Oregon Department of Fish and Wildlife through 1994 in the watershed. Since there has been no stocking in the South Fork of Eagle Creek, the native Cutthroat trout are a pure genetic strain.

Currently, hatchery production consists of early-run coho salmon and winter steelhead. Additional information on fish species and stock status, hatchery history, hatchery plantings is available in the Eagle Creek watershed analysis. After a thorough review of reference material and stream survey files in the Supervisors office and the Region 6 sensitive species list, it was determined that the only sensitive species that may occur in the watershed is the lower Columbia coho salmon (below the barrier falls). Bull trout (*Salvelinus confluentus*) were once found in the

Clackamas river system but are likely extinct. Eagle creek enters the Clackamas river below the North Fork dam. Considerable angling activity occurs in Eagle Creek and there have been no documented records of bull trout being caught (Massey, personal communication 1995). Redband trout (*Oncorhynchus mykiss*) are found east of the Cascade crest (Behnke 1992) but are not known to occur in the Clackamas River. Electro-shocking and/or stream surveys in the South Fork and upper main stem of Eagle Creek have only found native cutthroat trout (Godbout and Boyce 1981, Cain and Smith 1982, Dore Glover 1990, Trask and Pearson 1991). There are no federally listed Threatened or Endangered fish species that have habitat within the Eagle Creek drainage.

Other Aquatic Biota

Little information is available regarding other aquatic biota. Monitoring of aquatic macroinvertebrates has taken place at two sites on the main stem of Eagle Creek (1992, 1993). Macroinvertebrates found were; Ephemeroptera, Plecoptera, and Trichoptera. The intent of the sampling was to monitor the effect of timber harvest activities below the Salmon-Huckleberry Wilderness boundary. The wilderness boundary had a larger complement of cool/cold water adapted taxa. Taxa richness scores were 10% higher at the wilderness boundary than at another site down stream on the forest boundary. A high percentage of collector streams between the two sites indicate a degradation of habitat integrity between the two monitoring points. There was no indication that substrates were fouled by silt or filamentous algae. The monitoring report is on file at the Estacada Ranger District office.

There are no federally listed Threatened or Endangered aquatic macroinvertebrate species known to occur within the Eagle Creek watershed. A review of the reference library at the Supervisors office and the Region 6 sensitive species list indicates that aquatic macroinvertebrates that have a C2 classification under the Federal Endangered Species Act and are also sensitive species have potential habitat within the project area. They include: 1) The Mt. Hood primitive caddisfly (*Eobrachycentrus gelidae*), 2) Mt. Hood farulan caddisfly (*Farula jewetti*), 3) Cascades apatanian caddisfly (*Apatania tavalala*), and 4) One-spot caddisfly (*Rhyacophila unipunctata*). The only area that they are known to inhabit is on the south slope of Mt. Hood (Wisseman 1990). No field collections have been made in the Eagle Creek drainage. The only species for which there are documented habitat requirements is the Mt. Hood primitive caddisfly (Wisseman 1990). Some of these habitat characteristics may be present in the headwaters of the planning area.

Two sightings of Cope's Giant Salamander (*Dicamptodon copei*) (a Region 6 sensitive species) have been recorded on National Forest lands within the Eagle watershed. Suitable habitat exists for the northern red-legged frog (*Rana aurora*) in the upper watershed but no sightings have been recorded. An evaluation of these species is included in the wildlife report for this FEIS.

Water Temperature Characteristics and Comparisons

Resident salmonids typically thrive in water temperatures in the mid-50's to low 60's F. range. For example, Vinson and Chen (1994) state that optimum water temperature for adult rainbow trout is 56 degrees F. (13 degrees C.) and the upper limit is 72 degrees F. (22 degrees C.). However, local populations can thrive in lower or higher temperature ranges. Behnke (1992) describes Redband trout thriving in 78 degree F. (25.5 degree C.) water temperatures.

The Eagle Creek watershed analysis, analyzed water temperature information compared to state water quality standards of 58 degrees F. (14.4 degrees C.). A data set for the Eagle Creek National Fish Hatchery located 5 miles below the National Forest boundary has a period of record from 1962 to 1994. Mean August water temperatures exceeded state standards in 24 out of 32 years. A more limited data set for other stream reaches using the average seven day high temperature showed that the South Fork at the forest boundary and the South Fork above the confluence with Eagle Creek both met the state standards in 1989 but did not meet these standards in 1990. In both years, both reaches fell within the range of natural variability for streams in the Clackamas River drainage. This range was determined to be 14.5-20.0 degrees C. in an analysis done on a larger scale known as the REAP analysis.

Temperatures of Eagle Creek, at the forest boundary, consistently, exceed temperatures recorded in the South Fork. This suggests that the South Fork plays an important role as a cold water source for the main stem of Eagle Creek.

Forest Service thermograph data usually covers only the warmest time of the year (during the summer months). The most recent data available is from 1990. Measurements taken in Eagle Creek at the Forest boundary indicate 48 days where temperatures exceeded 58 degrees (F.) and no days where temperatures exceeded 68 degrees (F.). For the South Fork Eagle Creek at the Forest Boundary, 27 days exceeded 58 degrees (F.) and again no days exceeded 68 (F.).

Recently, for Eagle Creek below the confluence with the South Fork (located on private land), there were 70 days in which temperatures exceeded 58 degrees and 1 day exceeding 68 degrees. In the case of Eagle Creek, much of the watershed is in Wilderness and that area outside of Wilderness and within the Forest boundary has a natural riparian area along the entire length. The South Fork Eagle Creek, while having been managed, still maintains intact riparian areas along most of its length.

August is the month of greatest concern as stream flows are at or approaching their annual minimum and water temperatures are at their maximum. The moderating influence of the South Fork on Eagle Creek above the National Forest boundary is clear. The maintenance of shade and intact riparian areas along all streams within the project area which flow during the critical months of June through August is essential to maintaining the expected water temperature at the hatchery.

Woody Debris Characteristics and Comparisons

The Eagle Creek Watershed Analysis compared in-channel large woody debris (LWD) numbers from a stream survey in the South Fork against Mt. Hood Land Management Plan (LMP) standards. The large wood size class used was 36 in. in diameter and greater than 50 feet in length. The LMP standard of 20 pieces of LWD/ stream mile was exceeded in all reaches in the South Fork of Eagle Creek. The LMP standard of 80 pieces of small woody debris (SWD) was exceeded only in the headwaters area. The SWD class is 24-36 inches in diameter and greater than 50 feet in length.

The Eagle Creek Watershed Analysis compared the South Fork woody debris numbers to a data set for Willamette Basin un-managed stream reaches of similar stream order. The reaches of the South Fork were in the mid-range or higher for both LWD and SWD when compared to the un-managed stream data.

Presently, on the South Fork and along Eagle Creek, outside the National Forest boundary, there is a notable absence of large wood in the active channels. This is consistent with the history of the area because most of the large wood was removed from the channels during logging and the current stands of regeneration are too young to provide the necessary size classes of dead wood that creates in-channel habitat structures. Overall, stream conditions within the project area are very good to excellent and are near pristine. There is no evidence that would indicate that the 1964 flood, or subsequent events caused more than short term effects to the streams in the project area. If any effects occurred, it is estimated that they were limited to the shifting of large wood within the channel which causes the re-alignment of pools and possible channel realignment on flood plains. However, there is little evidence of these effects today. One exception is found in a reach of Crow Creek, (a South Fork tributary) in a steep banked area immediately upstream of road 4615 where a seepage area slump has formed into the active channel. Two clear cut units, one on either slope above the stream appear to be contributing to the bank instability by making more soil water available to the seepage area than it received prior to the harvest activity. Similar landforms and soils are observed elsewhere in the project area and may be affected by one or more project alternatives.

Pool Frequency Comparisons

The Eagle Creek Watershed Analysis compared pool frequency (pools/mile against) in the South Fork against LMP standards. The standards are expressed as a range based on average bankfull width of the stream reach. The center

portion of the South Fork was within or exceeded the pool/mile standard as stated in the LMP. The lower segment (between the confluence with Eagle Creek and the Forest Boundary) and the headwaters segment were below the LMP standard. The pools/mile in the South Fork were also compared against a data set for un-managed streams in the Willamette basin. The entire length of the South Fork was in the mid-range or higher compared to this set.

Effects of Implementation

Overview

This section provides an analysis of the direct, indirect, and cumulative effects of implementing the various alternatives to aquatic habitats and aquatic biota which includes sensitive species. The following is a summary of possible effects from logging and associated activities.

Logging has the potential to affect aquatic habitat and riparian vegetation in a variety of ways. Possible effects include; sheet erosion, gullying, and mass wasting. Consequently, scouring can occur and streams can be filled with fine sands and silts. This in turn affects aquatic biota such as insects, fish, and amphibians. Aquatic ecosystems can remain affected by episodic or chronic erosion for decades.

Loss of shade may affect water temperatures by allowing more direct solar radiation to the water surface. Instream habitat quality would be affected through increased water temperatures. Both sediment and temperature changes may have effects far downstream from the sites where they originated.

The risk of many of these effects can be minimized by the timing, spatial distribution, and method of logging and road-building. These are guided by Forest Service policies, handbooks, procedures, laws, and professional judgment. The Mt. Hood National Forest Land and Resource Management Plan (LMP), as amended by the Northwest Forest Plan provides the framework in which these activities are developed and implemented. Key elements are land allocations, standards and guidelines, and the Aquatic Conservation Strategy (ACS).

In general, while some are better than others, all the action alternatives are designed to maintain watershed, riparian, and aquatic conditions to meet the Desired Future Condition. This was a decision of the interdisciplinary planning team who made water quality a first priority for consideration in designing the alternatives. The team decided that watershed cumulative effects would be evaluated prior to proposing any action to assure no implementation strategy would exceed water quality levels to protect fish production at the Eagle Creek hatchery and resident cutthroat trout populations within Forest streams. As a result, the team changed several prescriptions for harvest during the planning process to address potential impacts to water quality affecting downstream beneficial uses (the Hatchery) and resident cutthroat populations and their habitat.

An important part of the Northwest Forest Plan and the ACS is the establishment of Riparian Reserves. Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply (ROD, page B-12). Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of the ACS objectives (ROD, page B-12). Based upon a complete ground survey of proposed logging units, a network of Riparian Reserves has been established around perennial and intermittent streams, springs, seeps, and wetlands within and adjacent to proposed logging units.

The width of riparian reserves vary by category (e.g., fish bearing, non-fish bearing, etc.). The Eagle Creek watershed analysis has recommended that the riparian widths should be approximately four-hundred sixteen feet (416') on either side of a fish bearing stream and two hundred eight feet (208') on either side of a non-fish bearing stream. This distance can be refined, on the ground, during project level planning (Watershed Analysis, page 95). Other recommendations have been included for expanding these distances depending on site specific criteria.

Alternative #3 of this document proposes commercial thinning in 125 acres of riparian reserves. This would fall

under TM-1 (Timber Management within riparian reserves) (ROD, page C-31 through C-32). The proposed commercial thinning addresses TM-1, part "C". "Apply silvicultural practices for riparian reserves to control stocking, re-establish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives". With alternatives #1, 2, and 4, riparian reserves would be established but management activities would not take place in these reserves. Additionally, none of the alternatives propose roads that would cross over or be within riparian reserves.

This discussion of effects assumes that all management prescriptions and mitigation measures are incorporated during project implementation, regardless of the selected alternative. Mitigation measures developed by the ID Team are described in detail in Chapter II of this document. There is always a measure of risk associated with any action alternative. Human error, the magnitude of individual action proposed by each alternative, and un-predictable natural occurrences could influence the actual outcome, effects, and risk to riparian and aquatic resources. In general, alternatives which propose greater amounts of activity, in closer proximity to potentially affected resources, are at relatively greater risk of adversely affecting those resources (streams, water quality, aquatic habitat, etc.).

Effects Common to All Alternatives

Water Quality (Temperature, Sediment, and Water Clarity): Water temperature is a critical component of water quality. Riparian Reserve designations apply to all streams and wet areas in all alternatives. Riparian areas along the South Fork drainage contain a number of seeps and areas with shallow soils. The aquifers surfacing within this area help maintain cool temperatures and high water quality for fish production. The proposed treatment (or non-treatment) prescriptions and mitigation measures for all alternatives are designed to either protect, enhance, or avoid these areas. Treatments within and adjacent to riparian areas range from no treatment to light commercial thinning to improve terrestrial and long term aquatic habitat components of these areas. The water temperature regime both on-site and at the National Forest boundary would remain essentially unchanged with the implementation of any of the alternatives. With the steady improvement of streamside conditions on private lands, water temperatures at the hatchery should experience additional improvement over time. Due to the protection that would be provided riparian areas and the mitigation measures to minimize soil disturbance and erosion in treatment areas outside of riparian areas, it is anticipated that soil erosion rates would remain at very low levels and State water quality standards for turbidity would be maintained for all alternatives during and following timber harvesting and road construction.

Hydrologic Change --Peak flows and Base flows: While the "ARP Analysis" has been made to assess the relative risk associated with each alternative, all values remain substantially above the estimated threshold level of concern (75%). ARP values for all action alternatives are only slightly lower than values for current conditions. Thus, the water available for runoff is not measurably increased by any of the proposed management alternatives. The magnitude and frequency of peak flows is not expected to be measurably affected for any of the subwatersheds within or downstream from the project areas. Nor would peak flows at the National Forest boundary, the hatchery, or for the entire Eagle Creek be measurably affected by any of the proposed alternatives. All action alternatives are intended to improve the health and vigor of existing homogeneous stands. The long term effects of moving toward a stand structure characterized by larger diameter and less densely packed trees would be to minimize the risk of large-scale stand-replacement fires. This in turn could reduce the long-term potential for wildfire-induced watershed impacts related to low ARP values, increased peakflows, and the increased occurrence of landslides. While the near-term effects of the no action alternative appear very favorable, there is still an elevated risk however small, of catastrophic wildfire and related watershed impacts.

Similarly, summer low flows (base flows) would not be measurably affected by any proposed actions.

Blowdown: Windthrow has been identified throughout the project area. The occurrence of windthrow appears to

be most prevalent in wet areas and within or adjacent to riparian areas along perennial and intermittent streams. All of the action alternatives include units which may, upon further field examination, include such high risk windthrow-prone areas. The variable thinning prescription is proposed to accomplish beneficial management of vegetation within and adjacent to these areas. However, further on-the-ground examination by silviculturists and watershed specialists prior to boundary placement and alternative implementation, would be required to develop site-specific prescriptions for individual riparian areas.

Fisheries and Aquatic Biota

It is estimated that there would be no measurable effect to cutthroat trout habitat or populations nor would there be effects to other aquatic biota. This includes lower Columbia coho salmon and four sensitive species of aquatic macroinvertebrates. It is also estimated that there would be no measurable effect to water quality at the fish hatchery located five miles downstream.

In the context of the biological evaluation, this is a finding of "May impact individuals or habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species". This applies to the lower Columbia coho salmon and for aquatic macroinvertebrates for all of the alternatives in this document. It is a finding of "no impact" for Bull trout and Redband trout for all alternatives.

Both the conclusion of effects and findings for the biological evaluation are based upon the following considerations:

- 1) Placement of logging units and proposed logging methods relative to riparian reserves.
- 2) Proposed silvicultural treatments (i.e., thinning, individual tree selection, and shelterwood) both within units and in riparian reserves.
- 3) No road building within riparian reserves.
- 4) Watershed restoration proposals for each action alternative.
- 5) The findings within the hydrology and soil resource report.
- 6) Implementing the riparian reserve recommendations in the Eagle Creek Watershed Analysis.
- 7) Proposed mitigation measures.
- 8) Low intensity thinning and mitigation measures within riparian reserves of units 16, 26, and 29 have a high likelihood of protecting potential habitat for the Mt. Hood primitive caddisfly and other sensitive aquatic macroinvertebrates.
- 9) The limited use of fire in treating slash.
- 10) Units proposed for thinning in alternative #3 in riparian areas are well upstream from fish-bearing streams.
- 11) Potential habitat for lower Columbia coho salmon is at least five (5) miles away from the downstream end of the project area.
- 12) The Northwest Forest Plan is a conservation strategy for the lower Columbia coho salmon and the four sensitive macro invertebrate species. All alternatives for this FEIS are consistent with the ACS objectives and standards and guidelines within the Northwest Forest Plan.

This is not a finding that there is no risk of implementing any of the action alternatives. Human error and the magnitude of individual action alternatives can increase the possible risks. Given this consideration, the alternatives are ranked from least risk to greater risk; Alternative #4 (No Action), Alternative #2, Alternative #1, and Alternative #3.

Alternative #1

This alternative would directly effect approximately 1,030 acres primarily within the South Fork subwatershed. Approximately 0.85 miles of new road and 0.35 miles of temporary road would be constructed. The proposed new road is essentially a mid-slope road, constructed on upper slope positions, and avoiding all stream, springs, seeps, and wet areas. The temporary roads would be constructed within harvest units and they would avoid streams, springs, seeps, and wet areas. The South Fork Eagle Creek and two unnamed tributaries (A and B) to the upper main stem Eagle Creek subwatersheds would be entered with proposed activities.

Though this alternative would result in a slightly lower value for hydrologic recovery (as measured by ARP values) compared to present conditions, values for all subwatersheds would remain substantially above the estimated threshold of concern. Overall values for the combined Upper Main stem and South Fork subwatersheds and the entire Eagle Creek watershed would remain virtually unchanged.

Table III.2, displays what the expected ARP values are for the individual subwatersheds and for the Eagle Creek watershed as a whole. In a B6 watershed (applicable to subwatersheds on National Forest lands), a value of 75% is estimated to be a "threshold of concern". Values below 75% may increase stream peak flows where stream channel condition and bank stability may be expected to deteriorate. In reality, the exact number is meaningless and the whole methodology is intended to illustrate the relative condition and relative "risk" of watersheds and subwatersheds in the transient snow zone. While intended to be applied to portions of watersheds within the transient snow zone, ARP values have been displayed for the entire Eagle Creek watershed for comparative purposes.

(Table III.2) Expected ARP after implementing Alternative #1

Watershed	Existing Condition	Alternative #1
Upper Mainstem, Eagle Creek	94.9%	94.9%
South Fork Eagle Creek	87.5%	85.4%
Upper Mainstem & South Fork (Combined)	94.9%	92.3%
Entire Eagle Creek Watershed (For comparison only)	65.8%	65.8%

Portions of Units 25 and 27, where ground based logging (i.e. tractor) is proposed, are on soils which past experience has demonstrated to be susceptible to soil compaction. However, specific mitigation measures identified by the interdisciplinary team, limiting skid trails and ground disturbance in tractor units would minimize or eliminate the risk of resource degradation.

Units 17, 20, and 25 have a group shelterwood or commercial thinning prescriptions. These units include or are adjacent to landforms where an increased occurrence of instability related to previous clearcut harvest has been observed elsewhere in the project area. Such accelerated movement appears related to loss of root strength and increases in soil water content related to clearcut harvest. However, with this alternative, the light shelterwood and variable commercial thinning for these units would retain cover, promote stand health, and retain root structure and slope stability. Unit boundaries and riparian management areas would be located so as to avoid unstable areas and susceptible landforms.

Unit 16, originally considered for shelterwood harvest, was changed to commercial thinning by the ID team, to minimize risk of blowdown and soil displacement, due to it's relative proximity to a perennial stream and riparian reserve. As a result, no impacts to the riparian reserve area are anticipated.

Unit 23, individual tree selection, lies in upper slope positions but within close proximity to riparian reserves recommended in the watershed analysis. The light prescription would ensure that silvicultural objectives can be achieved without adversely affecting the upper South Fork.

Should a major storm event occur within five years after implementation of this alternative, some short term effects may occur in the lower and middle South Fork corridor and Crow Creek. These effects could include elevated on-

site soil displacement within the shelterwood units. There is a very small likelihood that any sediment would reach active stream courses since these units are located well away from any streams, which are afforded protection by the designated riparian reserves. More over, because no activity would occur within the riparian reserves, there is little likelihood of any alteration of stream channel stability or aquatic habitat.

The 0.85 miles of new road and 0.35 miles of temporary road construction are located on upper slope positions and are well away from any surface drainage features thus, there is essentially no potential to deliver sediment to streams within the area. While some immediate short-term soil displacement from road surfaces, cutslopes, and fillslopes is likely, it would diminish within one complete growing season with no observable or measurable off-site effects. No measurable increases in sediment delivery to streams are anticipated.

Any effects to riparian areas, upland wet areas, and wetlands is anticipated to be minimal. The inclusion of mitigation measures, including riparian reserve designations, reduced harvest prescriptions adjacent to sensitive areas, etc., would minimize any effects.

Alternative #2

Of the action alternatives, alternative #2 would effect the least amount of area (562 acres) when compared to the other action alternatives. Additionally, alternative #2 would construct the same amount of road as other action alternatives. With alternative #2, the watershed would likely remain in excellent condition though at slightly greater risk as compared to Alternative #4 (No Action). This is largely attributable to the absence of clearcut harvest prescriptions and the preponderance of various commercial thinning prescriptions in addition to the minimal new road construction. As with other action alternatives, the road construction associated with this alternative is located on relatively gentle upper slope positions away from any streams or wet areas.

Table III.3 displays what the expected ARP values are for the individual subwatersheds and for the Eagle Creek watershed as a whole. In a B6 watershed (applicable to subwatersheds on National Forest lands), a value of 75% is estimated to be a "threshold of concern". Values below 75% may increase stream peak flows where stream channel condition and bank stability may be expected to deteriorate. In reality, the exact number is meaningless and the whole methodology is intended to illustrate the relative condition and relative "risk" of watersheds and subwatersheds in the transient snow zone. While intended to be applied to portions of watersheds within the transient snow zone, ARP values have been displayed for the entire Eagle Creek watershed for comparative purposes.

(Table III.3) Expected ARP after implementing Alternative #2

Watershed	Existing Condition	Alternative #2
Upper Mainstem, Eagle Creek	94.9%	94.9%
South Fork Eagle Creek	87.5%	85.6%
Upper Mainstem and South Fork (Combined)	94.9%	92.3%
Entire Eagle Creek Watershed (For Comparison Only)	65.8%	65.8%

The ARP indices would decline slightly for the South Fork since the preponderance of harvest activity occurs in this watershed. Similarly, potential erosion and sediment indices for each subwatershed and the area overall are among the lowest of the action alternatives. As a result of the various thinning prescriptions, the entered units would retain much of their ability to absorb the effects of major storm systems as the stand inventory would remain growing and much of the ground cover and understory vegetation would remain intact.

Potential for soil erosion and the risk of sediment delivery to streams for this alternative are the lowest overall as compared to the other action alternatives due to the predominance of thinning prescriptions, fewer acres of proposed timber harvest, implementation of skyline or helicopter logging systems, and location of proposed harvest areas well away from any streams or wet areas. As in alternatives 1 and 3, only minor new road construction is proposed, none of which would be in areas where soils, landforms, slope position, or proximity to streams could result in accelerated soil erosion and potential delivery to streams. New road construction in this alternative is limited to low risk areas on upper slope positions having lower slope gradients and located some distance from streams and wet areas within the South Fork watershed.

As in Alternative 1, portions of units 25 and 27, where ground based logging (i.e. tractor) is proposed, occur on soils which past experience has demonstrated to be susceptible to soil compaction. However, specific mitigation measures identified by the interdisciplinary team, limiting skid trails and ground disturbance in tractor units would minimize or eliminate the risk of resource degradation.

As in Alternative 1, units 17, 20, and 25 include or are adjacent to landforms where an increased occurrence of instability related to previous clearcut harvest has been observed elsewhere in the project area. Similarly, variable thinning is proposed for all units to retain cover, promote stand health, and retain root structure and slope stability. Units and riparian management areas would be located as to avoid unstable areas and susceptible landforms.

Unit 16, originally considered for shelterwood harvest, was changed to commercial thinning by the ID team, to minimize risk of blowdown and soil displacement, due to it's relative proximity to a perennial stream and riparian reserve. As a result, no impacts to the riparian reserve area are anticipated.

This alternative drops several units as compared to alternative 1, including units 3, 6, 10, 11, and 23. Units 1, 4, 7, 24, are greatly reduced in size. The former unit 8 has been broken down into the much smaller units 8, 29, 30, 31, 32, 33, and 34, where variable commercial thinning is prescribed to retain stand cover, promote health, and retain root structure and slope stability. With the exception of unit 16, most proposed harvest areas are located well away from the riparian reserve areas recommended in the watershed analysis, further reducing any potential risk to streams or water quality.

If alternative #2 were implemented, effects to fish habitat and to sensitive riparian and upland wet areas and wetlands (beyond natural occurrences and those created by existing conditions) should be essentially nil. Buffers beyond those recommended in the watershed analysis and reduced harvest levels adjacent to any sensitive areas as well as careful placement of yarding corridors should protect the integrity and function of riparian areas. No measurable increases in sediment delivery to streams (beyond those estimated for the watershed analysis) are anticipated.

Alternative #3

This alternative would effect the largest amount of land (1,229 acres) as compared to the other action alternatives (1,030 for Alt. #1 and 562 for Alt. #2). Alternative #3 would construct the same amount of road as the other action alternatives. Differing from the other action alternatives, Alternative #3 proposes to commercially thin approximately 125 acres from areas within and/or immediately adjacent to designated riparian reserves (units 16, 26, and 29) in the upper South Fork subwatershed. This prescription is being proposed in riparian reserves associated with first order perennial and intermittent non-fish-bearing streams in the upper portions of the South Fork, to reduce stocking, improve stand structure, and acquire desired vegetation characteristics in order to attain Aquatic Conservation Strategy objectives. With alternative #3, the watershed would likely remain in very good condition, though at slightly greater risk as compared to all other alternatives. The risk would be associated with the potential for human error in actively managing forest stands within the riparian reserves. The implementation of commercial thinning prescriptions and various mitigation measures to prevent ground disturbance would minimize this risk while promoting long-term riparian objectives. As with other action alternatives, the road construction associated with

this alternative is located on relatively gentle upper slope positions away from any streams or wet areas.

This alternative causes watershed condition (as measured by ARP values) to decline slightly below current levels for the South Fork of Eagle Creek (ARP of 85.2%, down from a current 87.5%). Values for all subwatersheds would remain substantially greater than the threshold of concern for this Special Emphasis Watershed. Storm, peak flows and summer base flows would not be measurably affected by proposed activities.

Table III.4 displays what the expected ARP values are for the individual subwatersheds and for the Eagle Creek watershed as a whole. In a B6 watershed (applicable to subwatersheds on National Forest lands), a value of 75% is estimated to be a "threshold of concern". Values below 75% may increase stream peak flows where stream channel condition and bank stability may be expected to deteriorate. In reality, the exact number is meaningless and the whole methodology is intended to illustrate the relative condition and relative "risk" of watersheds and subwatersheds in the transient snow zone. While intended to be applied to portions of watersheds within the transient snow zone, ARP values have been displayed for the entire Eagle Creek watershed for comparative purposes.

(Table III.4) Expected ARP after implementing Alternative #3

Watershed	Existing Condition	Alternative #3
Upper Mainstem, Eagle Creek	94.9%	94.9%
South Fork Eagle Creek	87.5%	85.6%
Upper Mainstem and South Fork (Combined)	94.9%	92.3%
Entire Eagle Creek Watershed (For Comparison Only)	65.8%	65.8%

As in alternatives #1 and 2, portions of units 25 and 27, where ground based logging (i.e. tractor) is proposed occur on soils where past experience has demonstrated to be susceptible soil compaction. However, specific mitigation measures identified by the interdisciplinary team, limiting skid trails and ground disturbance in tractor units would minimize or eliminate the risk of resource degradation.

Should a major storm event occur during or immediately following implementation of this alternative, coupled with a failure to implement recommended mitigations to retain cover and prevent soil disturbance (e.g. log suspension in riparian areas, etc.) short term effects may occur in the upper reaches of the South Fork. These effects could include elevated on-site soil displacement and the potential for sediment delivery to streams. However, this risk is low, given the light prescription and recommended practices.

No measurable increases in sediment delivery to streams (beyond those estimated for the watershed analysis) are anticipated. No measurable changes in water quality, peak flows, or summer base flows are anticipated. The effects on riparian areas, upland wet areas and wetlands would be minimal.

Alternative #4 (No Action)

With no new timber harvest or road construction taking place under this alternative, the project area would steadily improve from an already good condition to a very good condition as the tree cover in existing harvest units approach a dense crown closure. This would increase the area's resiliency to absorb major runoff producing rain-on-snow events without noticeable effects to the terrestrial, aquatic, and riparian areas, or to upland wet area and wetland habitats.

As watershed condition improves, aquatic habitat would remain unchanged or marginally improve.

In the long-term, the history of relatively frequent, widespread stand replacement fires, and the current homogeneous stand structure suggests that the recurrence of a large wildfire within the watershed is inevitable. Aggressive fire suppression would likely reduce the size of such an event, however there is still an increased likelihood that history would repeat itself. Such an event would result in much lower ARP values than the modeling currently indicates, with the likelihood of increased peakflows and the increased incidence of landslide activity following the wildfire event. This concern is born out by our understanding of the fire and landslide history of the watershed interpreted from the study of vegetation and landforms in the watershed. Such risk appears to be greater for this alternative, as compared with the action alternatives which strive to reduce stocking and increase the size and vigor of residual trees.

Cumulative Effects

Alternative #1: While short term localized effects may occur, downstream cumulative effects at the National Fish Hatchery and elsewhere downstream is unlikely and would be difficult to observe or quantify (e.g., Stream flow increases, temperature and sedimentation). This is due, in part, to 1) the likely renewal of logging at a long term sustainable rate on private lands outside the national forest boundary, 2) to the continued and accelerating recovery of riparian areas along Eagle Creek and its tributaries on BLM and private lands, 3) to the small short term decline in watershed condition as a result of this alternative, and 4) to the substantial influence of the wilderness portion of Eagle Creek upstream of the Project area.

Alternative #2: Downstream effects at the national fish hatchery would continue to improve. Effects associated with this alternative would not be discernible at the National Fish Hatchery (i.e., Temperature Increases, Turbidity/Sedimentation or increase in flow) or elsewhere downstream. In particular, there would be no changes in the magnitude and frequency of peak flows at the hatchery. This is due, in part; 1) to the renewal of logging at a long term, sustainable rate on private lands outside the national forest boundary, 2) to the continued and accelerating recovery of riparian areas along Eagle Creek and its tributaries on BLM and private lands, 3) to the very small short term decline in watershed condition under this alternative and 4) to the substantial influence of the wilderness portion of Eagle Creek upstream of the Project area.

Alternative #3: While short term localized effects may occur, downstream cumulative effects at the National Fish Hatchery and beyond would be difficult to observe or quantify (e.g., Stream temperature differences, stream flow increases and sedimentation). This is due, in part; 1) to the renewal of logging at a long term, sustainable rate on private lands outside the national forest boundary, 2) to the continued and accelerating recovery of riparian areas along Eagle Creek and its tributaries on BLM and private lands, 3) to the small short term decline in watershed condition and 4) to the substantial influence of the wilderness portion of Eagle Creek upstream of the Project area.

Alternative #4: Downstream effects at the national fish hatchery would continue to improve. However, effects in response to improvement in watershed conditions in the Project area would be negligible at the National Fish Hatchery. This is due, in part to; 1) to the renewal of logging at a long term, sustainable rate on private lands outside the national forest boundary, 2) to the continued and accelerating recovery of riparian areas along Eagle Creek and its tributaries on BLM and private lands and 3) to the continuing and substantial influence of the wilderness portion of Eagle Creek upstream of the Project area.

As was mentioned in "Affected Environment" for this issue, private land owners could begin further harvest activities of "off-forest" lands in approximately 15 years. However, this time frame is speculative and it would not be possible to estimate effects from such future activities with any accuracy. Thus, effects from such activities were not considered in this analysis.

Likewise, the Bureau of Land Management currently has a planned sale on their land holdings outside of the

National Forest. The size and location of this proposed project has been estimated by the BLM, however, it has not been sold or awarded due to spotted owl issues. It is not possible to estimate effects from this sale with any great accuracy because once the spotted owl issues have been resolved, it is more than likely that the current planned units would change.

Table III.5, displays what the expected ARP values that have been presented in the previous text. This chart was developed so that the reader could readily compare the alternative ARP values. These ARP values are depicted for the individual subwatersheds and for the Eagle Creek watershed as a whole.

(Table III.5) Summary of expected ARP values

Watershed	Alternative #1	Alternative #2	Alternative #3	Alternative #4 (Existing Condition)
Upper Main stem Eagle Creek	94.9%	94.9%	94.9%	94.9%
South Fork Eagle Creek	85.4%	85.6%	85.6%	87.5%
Upper Main stem and South Fork (combined)	92.3%	92.3%	92.3%	94.9%
Entire Eagle Creek Watershed (for comparison only)	65.8%	65.8%	65.8%	65.8%

Significant Issue #2) Salmon-Huckleberry Roadless Area

The Issue: Management activities could reduce, alter or eliminate some of the existing roadless characteristics in the Eagle area. These roadless characteristics are: 1) Natural Integrity 2) Apparent naturalness 3) Remoteness 4) Solitude/primitive recreation opportunities 5) Unique features and 6) Manageability/boundaries.

Affected Environment

Overview

The Mt. Hood National Forest, Land and Resource Management Plan (Forest Plan) (1990), discusses the inventoried roadless areas located in the Eagle Project area. The analysis of roadless areas (Refer to the forest plan, Appendix C) describes; the resources and values considered, the range of alternative land uses, and the effects of management under each alternative. As a result, some of the roadless areas were recommended for preservation while others were assigned various non-wilderness prescriptions. This document pertains to two parcels designated section "E" adjacent to the forest boundary and west of "Wildcat" mountain (Refer to Appendix "A" at the back of the document, Map III.2 in this chapter, and Appendix C, page C-51, in the Forest Plan). The Salmon-Huckleberry Roadless Area consists of 17,650 acres. The Eagle FEIS considers approximately 2,825 acres of the roadless area which is 16% of the 17,650 acres. Within the Forest Plan, these 2,825 acres have been assigned a "B6"-Special Emphasis Watershed designation (Forest Plan, pages Four-246 through Four-252).

With the signing of the Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (1994), additional requirements were implemented for the management of roadless areas.

In the ROD, standards and guidelines that refer to inventoried roadless areas apply only to those portions of such areas that would still qualify as roadless under the guidelines used to originally designate the areas under the second Forest Service Roadless Area Review and Evaluation (RARE II) (ROD, Page B-19). With these standards and guidelines, no new road construction could take place in roadless areas within Key Watersheds (ROD, Page B-19).

In this document, the analysis of proposed actions in inventoried roadless areas concentrate upon impacts on six characteristics and wilderness features. These six characteristics are: 1) Natural integrity 2) Apparent naturalness 3) Remoteness 4) Solitude / primitive recreation opportunities 5) Unique features and 6) Manageability / boundaries. An additional component of the roadless resource is special places and/or activities as well as cumulative impacts in relation to the remainder of the Salmon-Huckleberry roadless areas.

The section "E" lands that are involved in this project area are two separate parcels that were isolated from each other by road construction and harvest activities that took place in the 1960's and 1970's (Refer to Map III.2) of this document and Appendix C, Map C-9, page 51 in the Forest Plan). The western segment (Area I on Map III.2) is approximately 868 acres in size and has no common boundary between other roadless areas or with the Salmon-Huckleberry Wilderness. The eastern segment (Area II on Map III.2) is approximately 1,957 acres in size and does have a common boundary with the Salmon-Huckleberry Wilderness.

The first areas to be managed on National Forest land in the Eagle Creek/South Fork of Eagle Creek drainage was in section 19, T.3 S. R.6 E. and section 30, T.4 S. R.6 E.. This was a helicopter sale and no roads were constructed at that time. During this same era, a road was extended up Eagle Creek to access harvest units. In the late 1960's and during the 1970's, roads 4614 and 4615 were extended into the Eagle area. Road 4615 was the first to cross Forest Service land and it accessed BLM and private timber lands as well as National Forest land. The first harvest activity to occur on National Forest land along this road was the "Raven" thinning which was approximately 406 acres in size. A portion of this thinning overlaps Area I and affects 76 acres. A few years after the Raven thinning, road 4614 was extended to access the "Baldy" sale area. The Baldy sale had a combination of

commercial thinning and clearcut prescriptions. However, this sale was involved in the "Buy Back" legislation in the 1980's and was not harvested as planned (Refer to the Glossary for a definition of Buy Back). After the Baldy sale was returned to the government, a wind storm occurred that blew over several acres of timber in the Eagle area. Thus, the original sale plans were abandoned, a new planning effort began, and as a result, the "Quilt" and "Gossamer" salvage sales were developed and sold.

After the salvage sales were harvested, and prior to the signing of the Forest Plan (1990), environmental assessments for other harvest activities were developed and the resultant timber sales were logged. With the exception of logger spurs, no other roads enter Area I. One gravel road and one loggers spur enter the southern portion of Area II (Refer to Map III.3). Due to the effects of existing roads, approximately 361 acres of the original 2,825 acres or 13% of the land designated as roadless can still be classified as "Semi-Primitive, Non-Motorized" (Refer to the Recreation Opportunity Spectrum (ROS) for definition(s)).

The following paragraphs describe the existing conditions of the Salmon-Huckleberry Roadless Area in relation to the six roadless characteristics and wilderness features.

Natural Integrity

Natural Integrity is the extent to which long-term ecological processes are intact and operating. Impacts are measured by the presence and magnitude of human induced change to an area.

As a result of the planning efforts that took place prior to the signing of the Forest Plan in 1990, harvest units with a clearcut prescription were placed in the areas that are designated as roadless. This type of prescription affects the "Natural Integrity" of the roadless areas. Approximately 142 acres have been affected in Area I and approximately 116 acres in Area II (Refer to map III.3).

Apparent Naturalness

Apparent Naturalness means that the environment looks natural to most people using the area. Even though some of the long-term ecological processes have been interrupted, the landscape generally appears to be affected by the forces of nature.

It is noticeable to most visitors that in Areas I and II, the land has been modified by human activities and that visual perception has been altered. The "Apparent Naturalness" has been impacted to a degree that allows human activities to predominate over general effects caused by the forces of nature.

Remoteness

This character is a perceived condition of being secluded, inaccessible and out of the way. A user's sense of remoteness in an area is also influenced by the presence or absence of roads, their condition, and whether they are open to motorized travel. This criteria requires a distance of 1/2 mile from existing roads.

Due to the effects of the current road system, none of the 868 acres in Area I meet the characteristic for "Remoteness". Within Area II, 361 acres of the 1,957 acres, meet the characteristic for "Remoteness". Remoteness is measured as a distance away from roads, railroads, or trails with motorized use. The remaining 2,464 acres in both Areas I and II do not meet the distance criteria from roads. Ridges and steep terrain in the area do however, provide pockets where there is a perceived condition of being secluded, inaccessible, and out of the way.

Solitude/Primitive Recreation Opportunities

This characteristic can be evaluated by the Recreation Opportunity Spectrum (ROS). The "ROS Setting Criteria" used for classification include 1) Remoteness, 2) Size, 3) Evidence of humans, 4) User Density, and 5) Managerial regimentation and noticeability. Other indicators important to feelings of solitude include access and on-site

development (Refer to the ROS primer and field guide). Solitude is best represented in the Primitive and Semi-Primitive Non-Motorized classification. The ROS classification for the roadless areas involved in Eagle are; Roaded Natural (RN) with the exception of approximately 361 acres being classified as Semi-Primitive Non-Motorized (SPNM) (Refer to Map III.4).

1) Remoteness

All of the inventoried roadless lands are bordered by better than primitive roads. None of the inventoried roadless acres in Area I meet the "Primitive" or "Semi-Primitive, Non-Motorized" classification criteria. This criteria requires a distance of 1/2 mile from existing roads. Approximately 361 acres of Area II meet the criteria for classification as "Semi-Primitive, Non-Motorized".

2) Size

To meet the size criteria for the "Semi-Primitive, Non-Motorized" classification, an area needs to be 2,500 acres in size. As previously mentioned, 361 acres of the roadless areas meet the criteria for remoteness. Of these 361 acres, 313 acres meet the "Size" criteria because this land shares a common boundary with the Salmon-Huckleberry Wilderness.

3) Evidence of Humans

Evidence of humans is used as an indicator of the opportunity to recreate in environmental settings having varying degrees of human influence or modification. Previous harvest activities adjacent to the Semi-Primitive, Non-Motorized areas have made subtle modifications that could be noticed. However, these modifications do not draw the attention of the observer wandering through the area. The remaining roadless lands have areas with modifications which are easily noticed (e.g., clearcuts).

4) User Density

User density reflects the amount and type of contact between individuals or groups. This is an indication of the degree of solitude. Both Areas I and II meet the social setting criteria for the "Primitive" ROS classification. There are usually less than six parties per day encountered on trails and less than 3 camping parties visible.

5) Managerial Regimentation

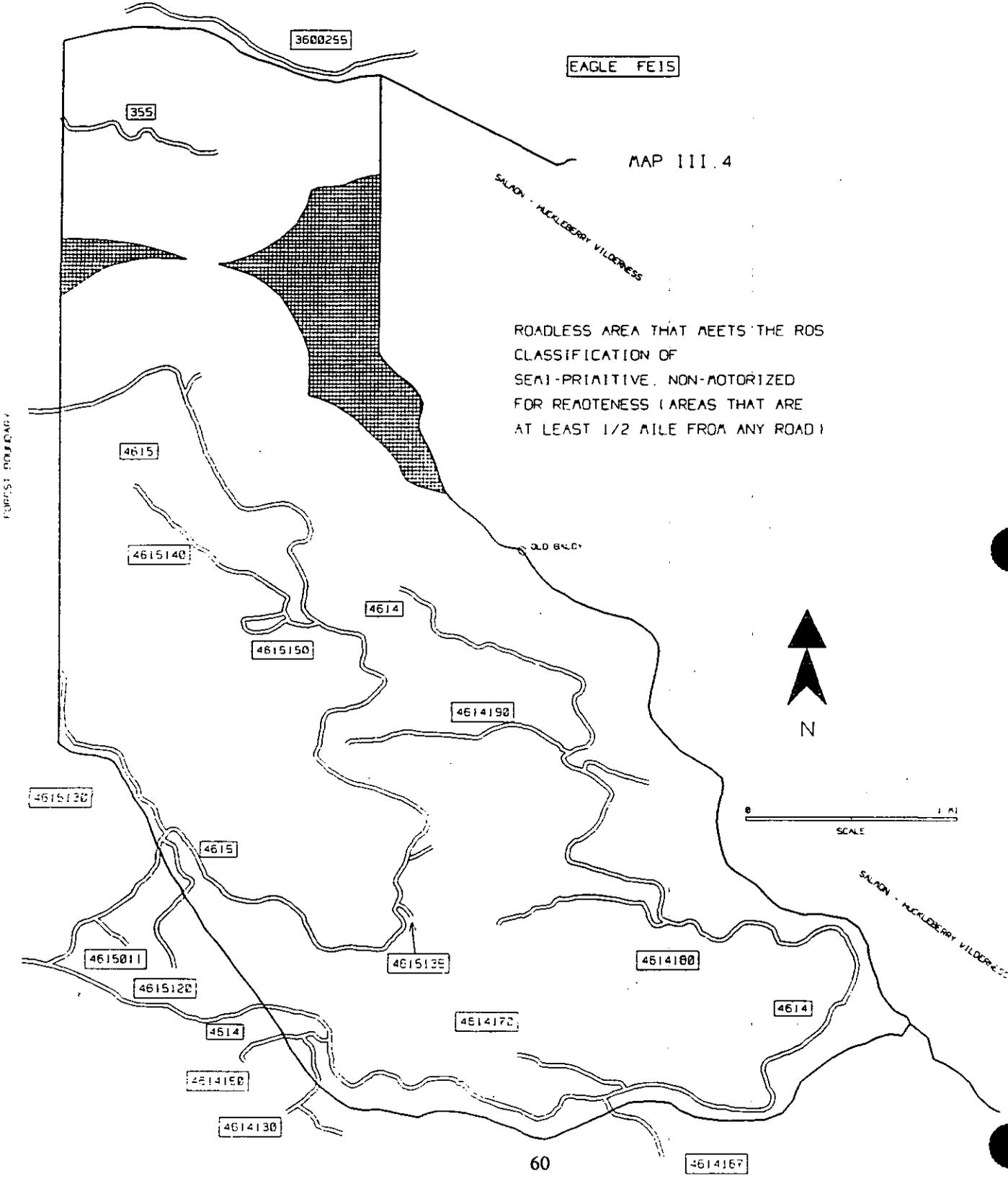
Managerial regimentation reflects the amount and kind of restrictions placed on peoples actions by the administrating agency or other land owners which affect recreation opportunities. On-site regimentation is low with controls primarily in the off-site areas. Roads and trails are signed on major roadways. Visitor management is minimal to none and there are no improvements (e.g., campgrounds, picnic areas etc.). Thus, the Primitive classification is being met.

Unique Features

Unique features are geological, biological, ecological, cultural, or scenic features that may be located in roadless areas. There are three features that fit within this category. 1) The mountain known as "Old Baldy" is a prominent land feature along the Eagle/wilderness boundary. 2) An early American cultural resource site is located within Area II and a natural spring is also located at this site. 3) Scattered viewpoints looking into the adjacent wilderness area exist along the Old Baldy Trail #502.

Manageability/Boundaries

This characteristic relates to the ability of the Forest Service to manage an area to meet size criteria and the five characteristics previously mentioned. This is the sixth characteristic and wilderness feature. The roadless areas I and II were separated when roads 4614 and 4615 were constructed (during the 1960's and 1970's). The above mentioned characteristics of wilderness sought in inventoried roadless lands were compromised because neither of the two areas are 5,000 acres in size. Both Areas I and II contain un-roaded slopes outside of the wilderness. A



boundary between the designated wilderness and Area II is formed by a distinct ridgeline. As previously mentioned, Area I is isolated and does not connect with either Area II nor with the wilderness.

Special Places/Special Activities

Subjective values have been expressed during scoping by members of the public who know of "Special Places" and enjoy "Special Activities". Some of these include:

- 1) Travel off of the trail systems and roads is physically demanding in the roadless areas but it is possible.
- 2) The old, non-maintained, "Bissell" trail.
- 3) An old abandoned campsite.
- 4) Cross country travel between Old Baldy trail #502, Douglas trail #781 and the wilderness has been accomplished by a few recreationists.
- 5) There is a favored timber stand of large Noble Fir near Githens Mountain along the Old Baldy trail.
- 6) Roads in the Eagle area are used for winter sports (e.g., skiing, snow mobiles etc.).
- 7) Mushrooms can be found as well as other miscellaneous forest products.
- 8) There is a site within Section 6, T.4 S. R.6 E. that contains the Clackamas Iris (*Iris tenuis*). This area is of interest to the Native Plant Society and the Western Iris Association. The interest lies in the fact that the area is convenient for viewing due to its location and the plant can be viewed in various habitats (e.g., Clearcuts, natural openings and mature timber). The Forest Service has agreed to avoid this area with this project. However, this agreement does not foreclose on future options for stand management in the area.

In general, this area does provide recreational opportunities for those who are seeking a primitive experience with very little managerial control. The un-roaded areas provide for certain activities in a wilderness setting that are not allowed in a designated wilderness (e.g., Mountain biking).

Effects of Implementation (Roadless)

Overview

This document deals with 2,825 acres of Section "E" inventoried roadless land. As stated in the standards and guidelines for the Mt. Hood National Forest, Forest Plan, most of the non-wilderness unroaded areas would be roaded during the first 15 years (the Salmon-Huckleberry Roadless Area included). However, this has been amended by the Northwest Forest Plan so that no new roads would be constructed in roadless areas in Key watersheds. No new areas are recommended for designation as Wilderness under this Forest Plan or as amended by the Northwest Forest Plan. Not including the Salmon-Huckleberry, about 81,000 acres out of the 118,000 acres that are designated as roadless are to be managed to maintain their unroaded characteristics (Refer to the Forest Plan Standards and Guidelines, page Three-5).

Effects Common to all Alternatives

Special Places/Special Activities

Several subjective values have been discussed in previous paragraphs. None of the action alternatives are expected to change or alter these values with the exception of one. The value(s) that could be changed are the "use of roads for winter sports, motorized camping and access, and others". In the action alternatives, roads would be closed because of wildlife habitat concerns and by standards discussed in the Northwest Forest Plan for Key Watersheds (ROD Page B-19).

In implementing this action, the number of open road miles available for activities would be reduced (Refer to "Transportation" in this chapter for a more detailed discussion of location and miles of road that are to be closed under the alternatives).

Alternatives #1 through 4

None of the alternatives propose constructing new roads into the Salmon Huckleberry Roadless Area. However, alternatives #1 and 3 begin managing timber stands in roadless areas I and II using three silvicultural prescriptions. These prescriptions are; commercial thinning, individual tree selection, and shelterwood. Alternative #2 and Alternatives #4 (No Action) do not propose road building or timber harvest in the roadless areas.

The following paragraphs describe the effects to the six roadless area characteristics that have been described under "Affected Environment"

Natural Integrity

Currently, there are approximately 868 acres in Area I and 1,957 acres in Area II. Of these acres, 650 acres in Area I and 1,841 acres in Area II still meet the criteria for "Natural Integrity". This acreage change is due to previous management activities that have involved timber harvest and road building. Tables III.6 and Table III.6.1 depicts the further reduction in acres (effects) of each alternative on the acres that meet the natural integrity criteria.

(Table III.6) Reduction of acres that meet Natural Integrity (Area I)

Location	Alt #1	Alt #2	Alt #3	Alt #4
Existing Acres in Area I	650	650	650	650
Affected Acres in Area I	85	0	85	0
Remaining Acres in Area I	565	650	565	650

(Table III.6.1) Reduction of Acres that meet Natural Integrity (Area II)

Location	Alt #1	Alt #2	Alt #3	Alt #4
Existing Acres in Area II	1,841	1,841	1,841	1,841
Affected Acres in Area II	420	0	420	0
Remaining Acres in Area II	1,421	1,841	1,421	1,841

Apparent Naturalness

Areas I and II: Currently, 258 acres of land in these two roadless areas have been clearcut. Additionally, one spur has been constructed into Area II. Overall, where these activities have taken place, the roadless areas do not look natural to the casual observer. The general perception of the 76 acres of commercial thinning in Area I is that it is beginning to look natural. This is due to the growth of under-story trees and brush to the extent that they are screening the evidence of human intervention (e.g., cut stumps, skyline skid roads, and landings). When viewing this area in conjunction with the landscape, it looks natural. With alternatives #1 and 3, the areas involved in the shelterwood prescriptions would not look natural. However, these prescriptions are located near existing clearcuts and would soften the existing straight-line edge appearance and the stands would appear to blend in from a state of no trees, to 20 or 40 trees per acre, to a full stand.

In the thinning or individual tree selection areas, site specific effects would be noticed by the casual observer (e.g., cut stumps, skyline skid roads, and landings) as the observer travels on the open roads. However, the over all perception of the landscape (involved in thinning) would appear natural. This is because residual trees would remain on site in such quantities so that the forest appears intact. In some cases, the thinning would "soften" the effects of previous clearcutting activities because this activity would reduce the current line and form distinction of the previous cutting.

Eventually (within 5 to 10 years) site specific evidence of activities (within the thinning areas) could be expected to be screened by growing vegetation. There would be no road building in the roadless area thus, there would be no effect to apparent naturalness with these alternatives due to roads.

Remoteness

Currently, there are zero (0) acres in Area I and 361 acres in Area II that meet the criteria for "Remoteness". This is due to the proximity of roads and other activities influencing the 2,464 acres of un-managed land that is in the Salmon-Huckleberry Roadless Area. None of the action alternatives would reduce or increase the total acres that meet the remoteness criteria. This is because there would be no additional road building in the roadless areas. Conversely, none of the main roads are scheduled for obliteration thus, the 361 acres would be maintained.

Solitude/Primitive Recreation Opportunities

This characteristic can be evaluated by the Recreation Opportunity Spectrum (ROS) guidelines. The ROS setting criteria that have been evaluated are:

- 1) Remoteness Currently, all of the acres in Area I are classified as "Roaded Natural" (RN) and do not meet the remoteness criteria. In Area II, 361 acres meet the classification of "Semi-Primitive, Non-Motorized" (SPNM) and do meet remoteness. The action alternatives would not change these acres from their current classification (The 361 acres in area II would remain as SPNM).
- 2) Size Area I contains no land under this classification due to it's separation from Area II and the wilderness. Area II contains 313 acres that are adjacent to the wilderness that meet the SPNM classification and would meet the size criteria of 5,000 acres when combined with the wilderness. The action alternatives would not reduce these acres.
- 3) Evidence of Humans Within the 361 acres of land that is currently classified as "Semi-Primitive, Non-Motorized" in Area II, an observer wandering through the area may take note of the subtle modifications that have occurred in the lands surrounding this site. However, these modifications do not draw the attention of the observer. The action alternatives would not reduce these acres.
- 4) User Density New access often correlates with increased visitor use in an area. No new roads would be constructed in the roadless areas. Thus, with the implementation of the action alternatives, the level of use should remain the same. However, this does not account for increases in the populations of urban areas that could increase the use of a particular site. This document does not attempt to address this issue since little is known of the recreation tendencies of these new-comers to the metropolitan area. For this analysis, the action alternatives would maintain the classification of "Primitive" and not move it towards "Semi-Primitive".
- 5) Managerial Regimentation The entire roadless area (2,825 acres) meets the classification of "Primitive" under this factor. Implementation of the action alternatives could alter this classification because some of the existing roads may be closed thus increasing "regimentation". Additionally, road signs may be added to increase user awareness in the area.

Table III.7 depicts the changes (in acres) to the above listed characteristics as a result of the alternatives under "Solitude/Primitive Recreation Opportunities".

(Table III.7) Changes in acres in relation to Solitude/Primitive Recreation Opportunities

Character	Possible Changes	Alt #1	Alt #2	Alt #3	Alt #4 (No Action)
Remoteness	Ac Changed to RN	0	0	0	0
	Ac Remaining as SPNM	361	361	361	361
Size	Ac Changed to RN	0	0	0	0
	Ac Remaining as SPNM	313	313	313	313
Evidence of Humans	Ac Changed to RN	0	0	0	0
	Ac Remaining as SPNM	361	361	361	361
User Density	Increased Visitor Use	Yes	No	Yes	No
Regimentation	Increase in Regimentation	Yes	Yes	Yes	No

Unique Features

These are unique geological, biological, ecological, cultural or scenic features that may be located in roadless areas.

Areas I: There are no known "Unique Features" within Area I.

Area II: Within Area II, there are geological, cultural and scenic features. These features are; Old Baldy Mountain, an early American cultural resource site and spring, and scattered viewpoints of the Salmon-Huckleberry Wilderness along trail #502. With the implementation of the alternatives, there are no planned activities that could affect these areas.

Manageability/Boundaries

This characteristic relates to the ability of the Forest Service to manage an area to meet "size" criteria and the five elements discussed above. Alternatives #1 and 3, would increase the amount of broken narrow corridors or small islands interspersed with areas of non-conforming management practices and many of the 6 elements may be compromised.

Areas I and II: As has been discussed earlier, existing roads and other activities have divided this area into two distinct segments. Area I does not meet the size requirement of 5,000 acres. However, Area II, currently contains 313 acres that have connectivity with the wilderness and can meet the 5,000 acres requirement. With all alternatives including no action, the ability for the Forest Service to manage Area I to meet the size requirement is forgone. If alternative #1, 2, or 3 were implemented, the 313 acres in Area II could still be managed for wilderness characteristics and would remain attached to the wilderness (No changes from existing conditions).

Cumulative Effects

The majority of the 2,825 acres of the Salmon-Huckleberry Roadless Area discussed in this document have been compromised by harvest and road building activities in relation to the six roadless characteristics and wilderness features. Currently, 313 acres remain along the Salmon-Huckleberry Wilderness that have not been compromised in all aspects. Implementation of the alternatives would not reduce these 313 acres and wilderness characteristics would be maintained. Of the 17,650 acres involved in the entire Salmon-Huckleberry Roadless Area, alternative #1 and 3 would manage timber on 420 acres or 2% of the roadless lands. As of this writing, no other projects exist or are plans being developed that would further affect the other portions of the Salmon-Huckleberry roadless area.

Although there are no activities proposed within the remaining roadless acres in the Salmon-Huckleberry area, future activities, if implemented, when added to activities proposed here, could result in a further reduction of lands that contain, at least in part, the six roadless and wilderness characteristics. Further, existing unique features would not be directly affected by proposed activities because there would be no new access from the construction of roads. However, easier access to these features due to thinning could allow an increase in use. This could alter the unique qualities of these features.

Within alternatives #1 and 3, helicopter yarding has been prescribed on units adjacent to the wilderness boundary. The sound and presence of this yarding machinery could effect the noise quality within the wilderness and in the roadless areas. This effect would however, be short-term and limited to the time it takes to complete the logging operations.

Significant Issue #3) Production of Wood Products and the Local Economy

The Issue: The Eagle Creek planning area has the potential to supply wood products as well as employment opportunities to the local economy. Receipts from timber harvest would fund local schools and return revenues to the U.S. Treasury.

Affected Environment

Overview

The Eagle project area is located entirely in Clackamas County, Oregon and is considered to be the county that would be most affected by the proposed harvest activities. Other counties that surround the area and may be indirectly affected are; Hood River, Multnomah and Marion. There are other counties in Washington State such as Clark and Klickitat that could be affected but, for purposes of this analysis, only Oregon counties are considered.

Several cities or communities surround the immediate geographic area. Those population areas that could be most affected by harvest activities are; Barton, Beaver Creek, Boring, Carver, Clackamas, Colton, Damascus, Eagle Creek, Estacada, Fishers Mill, Mollala, Redland, Sandy, Viola and others. Individuals that live in these areas would be most affected by the proposed action through employment as loggers, mill workers, mill owners, drivers, retail store owners, forest product users and others. The major population areas that would be most likely to be indirectly affected are Gresham, Oregon City and the Portland area which includes Beaverton, Gladstone, Milwaukie etc. Individuals that live in these larger areas would most likely be affected by the availability of forest products and the effect that would have on quality, quantity, and price.

For purposes of this analysis, the effects of harvest activities would be those related to the amount of timber removed. It is assumed that other non-wood using industries (such as recreation and tourism) would not be directly affected by timber harvesting. These assumptions are not unrealistic given that timber has been harvested from the Estacada Ranger District since the 1940's and recreation and tourism has been increasing. For example, Figure 1 indicates the estimated number of visitors the district has had from 1989 through 1992. As can be seen from the table, visitor numbers have increased and it is expected that this trend would continue due to the increasing popularity of recreational activities and to the increase in populations in the urban and rural areas. (These figures are based on district recreational staff estimates). Figures for 1993 - 1995 were not available at the time of this writing however, initial counts indicate that recreational use in this area was down from previous years. It is thought that this decline in use was attributed to wet and un-seasonably cold weather during the spring and summer months of these years.

Fiscal Year	Visitors
1989	410,660
1990	463,720
1991	516,780
1992	570,000

Figure 1 (Estimated number of visitors to the Estacada Ranger District)

Based on the "Twenty Five percent Fund Act of 1908" and the "Weeks Law of 1911", 25% of all revenues returned to the Federal Treasury from the sale of resources or user fees collected from the Forest Service lands are returned to counties. On areas that are "Oregon-California" Revested lands, 50% of all revenues returned to the Federal Treasury from the sale of resources or user fees collected from the Forest Service lands are returned to counties. These funds are to be used for roads and public schools. Income as a result of the proposed timber harvest in this document affect all counties listed as well as other counties in the state.

For Fiscal Year 1991, Clackamas County received \$4,210,638 dollars from the Federal Treasury as a result of selling forest resources on the Mt. Hood National Forest. The other counties (Multnomah, Hood River, Wasco, Marion and Jefferson) received a total of \$4,714,370. Thus, as a result of selling forest products, 5 Oregon counties

received a total of \$8,925,008 to be used for roads and schools. (These figures are per the Mt. Hood National Forest, Monitoring and Evaluation Report for Fiscal Year 1991). In 1992, payments to local counties totalled approximately \$11,174,089.00 (Reference the Mt. Hood National Forest, Timber Sale Program Information Reporting System (TSPIRS) report for 1992). In 1993, payments to local counties totalled approximately \$10,550,918.00 (Reference the Mt. Hood National Forest, Timber Sale Program Information Reporting System (TSPIRS) report for 1993). In 1994, payments to local counties totalled approximately \$10,599,635.00 (Reference the Mt. Hood National Forest, Timber Sale Program Information Reporting System (TSPIRS) report for 1994).

Since the mid-1980's, the amount of timber volume sold on the Estacada Ranger District has been declining. Figure 2 indicates the volume sold from the district for eight years: (A Fiscal Year begins on October 1st and ends on September 30).

Forest Service harvest activities could affect a broad spectrum of industries other than timber. These may include; tourism, trade, manufacturing and others. However, what effects harvest activities would have on these industries would be difficult to discern with data that is available. As an example, little is known about what effect timber harvesting would have on the dispersal of recreational activities. It could be assumed that people would change their recreational habits as a result of harvest activities. However, little is known as to how much they would change, where they would go, or what the duration of the effects would be.

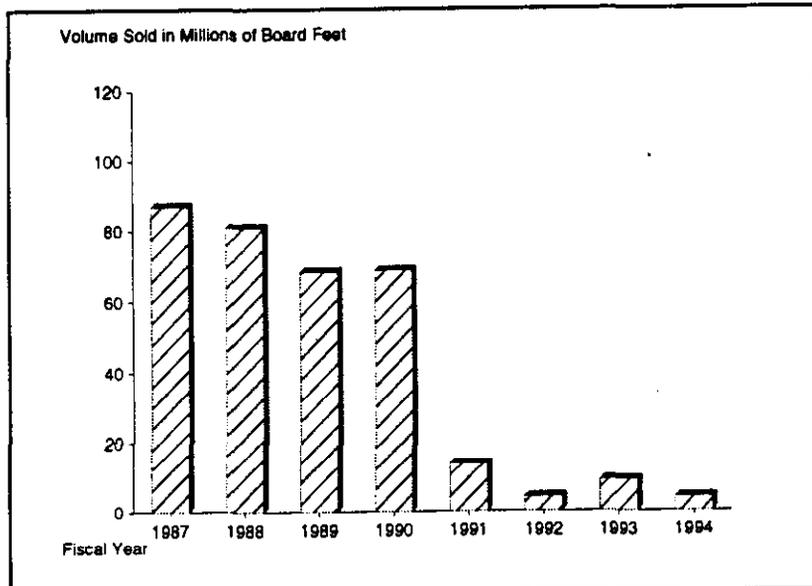


Figure 2 (Volume Sold on the Estacada District from 1987 to 1994)

The Eagle watershed contains approximately 57,510 acres of land (Watershed Analysis, Map 1-3 and Page 5). Of these acres, the Forest Service owns approximately 30% or 17,272 acres. The Northwest Forest Plan has designated various land allocations for the Eagle area. These land allocations are: Matrix, Riparian Reserves, and Late Successional Reserves. This FEIS is concerned with 6,320 acres of Forest Service land that has been identified as matrix and riparian reserve (approximately 37% of the Forest Service ownership). These lands are south of a designated late-successional reserve (Watershed Analysis, Map 1-1). Within this matrix designation, there are approximately 2,950 acres of riparian reserves (Watershed Analysis, Map 4-2). This document proposes harvest activities within these 6,320 acres but does not propose activities within the late-successional reserve.

Effects of Implementation

Overview

This document makes no attempt to quantify the actual price to society associated with job loss, forced relocation and career changes, unemployment costs, and additional tax burden on the working middle class for welfare and food stamp programs. Quantification of these costs could be subjective.

Alternatives #1 through 4

The production of wood products from the stump to the consumer involves many people either directly or indirectly. The people that are most directly affected are those that actually produce a log and then deliver it to the mills for production. These people include logging crews, truck drivers, mill operators and others. Other people that are affected would be wholesale outlets, retail outlets, specialty mills, and others. Those indirectly affected may include; slash cleanup crews, reforestation crews, and others.

In fiscal year 1992 (Oct. 1 through Sept. 30) the Mt. Hood National Forest sold and awarded approximately 43.4 MMbf of timber. Due to this sale of timber, the timber related employment was 1,879 jobs (1992 Timber Sale Program Information Reporting System - TSPIRS). In fiscal year 1993, the Mt. Hood National Forest sold and awarded approximately 43.0 MMbf of timber with an estimated timber related employment of 912 jobs (1993 Timber Sale Program Information Reporting System - TSPIRS). In fiscal year 1994, the Mt. Hood National Forest sold and awarded approximately 48.9 MMbf of timber with an estimated timber related employment of 895 jobs (1994 Timber Sale Program Information Reporting System - TSPIRS). In fiscal year 1992, approximately 43.3 jobs were supported for every 1 million board feet sold. In fiscal year 1993, approximately 21 jobs were supported for every 1 million board feet sold. In fiscal year 1994, approximately 18 jobs were supported for every million board feet sold. This averages out to 27 jobs being supported per 1 million board feet sold.

With the sale of 43.4 MMbf in fiscal year 1992, it is estimated that approximately \$125 million dollars of total income was generated. It is also estimated that approximately \$18.7 million dollars was paid in federal income taxes. With the sale of 43.0 MMbf in fiscal year 1993, it is estimated that approximately \$63 million dollars of total income was generated. It is also estimated that approximately \$9.5 million dollars was paid in federal income taxes. With the sale of 48.9 MMbf in fiscal year 1994, it is estimated that approximately \$29 million dollars of total income was generated. It is also estimated that approximately \$4.3 million dollars was paid in federal income taxes. This averages out to a total income of approximately \$1.6 million dollars for every 1 million board feet sold. In addition, approximately \$0.24 million dollars was paid in federal income tax for every 1 million board feet sold.

Table III.8 was developed to consolidate the effects of implementation of the alternatives into an easily understood format. The contents of the chart were based on the figures given above.

(Table III.8) Consolidated Effects of the Proposed Alternatives for Issue #3

Alternative	Proposed Volume to be Sold	Estimate of Jobs Supported	Estimated Total Income Generated	Estimated Income Tax Generated
Alt #1	26.4	713	\$42.2	\$6.3
Alt #2	15.8	427	\$25.3	\$3.8
Alt #3	30.8	832	\$49.3	\$7.4
Alt #4 (No Action)	0	0	\$0	\$0

(Volume harvested and revenue figures are expressed in millions)

Cumulative Effects

In Fiscal Year 1993, the Mt. Hood National Forest sold approximately 43.0 Million board feet of timber. Of this 43.0 MMbf., the Estacada district contributed 20% of the volume. In 1994, the Mt. Hood Forest sold 48.9 MMbf and the Estacada district contributed 14% of the volume. There is a potential that approximately 147 MMbf would be sold on the Mt. Hood National Forest for fiscal years 1996 and 1997 (Sales Tracking and Reporting System, "STARS", 12/04/95). There is the potential that the various alternatives for this FEIS could contribute from 11 to 21% of the total volume sold. However, this contribution would be zero if alternative #4 were selected.

The projected volume of timber to be sold in the Clackamas River drainage for fiscal years 1996 and 1997 is approximately 56 MMBf (Sales Tracking and Reporting System, "STARS", 12/04/95) which equates to approximately 1,512 jobs. Depending on which alternative is selected, the Eagle proposal could contribute from 28 to 55% to the total jobs affected. However, if alternative #4 were selected, no jobs would be supported as a result of this document.

Table III.9 Summarizes the cumulative effects by alternative.

(Table III.9) Cumulative Effects

Alternative	Volume	*Projected Sale Revenue to the Government	Projected # of jobs Supported	** Projected Income Generated	** Projected Taxes Collected	** Projected Revenues to the Counties
Alt #1	26.4	\$14.5	713	\$42.2	\$6.3	\$3.2
Alt #2	15.8	\$8.7	427	\$25.3	\$3.8	\$3.0
Alt #3	30.8	\$16.9	832	\$49.3	\$7.4	\$5.9
Alt #4 (No Action)	0	\$0	0	\$0	\$0	\$0
Projected Forest Totals for F.Y. '96 & '97	147.0	\$80.9	3,969	\$235.2	\$35.3	\$27.0
% Contributed to the Forest Totals	Alternative #1 would contribute approximately 18% to the Forest totals displayed above. Alternative #2 would contribute approximately 11% to the Forest totals displayed above. Alternative #3 would contribute approximately 21% to the Forest totals displayed above. Alternative #4 would contribute approximately 0% to the Forest totals displayed above.					

* This number was calculated using an average sell bid of \$550/Mbf

** Revenues are expressed in millions.

As can be seen from the tables and descriptions above, the action alternatives in this document could add cumulatively to the total outputs, revenue generation, and job support in the surrounding communities. If on the other hand, the no action alternative were selected, then this proposal would contribute 0.0 dollars to the local economy and would not support local jobs. If no volume were generated, then the predicted total for the forest could be somewhat less because this volume would probably not be made up from the remainder of the district or from the remainder of the forest.

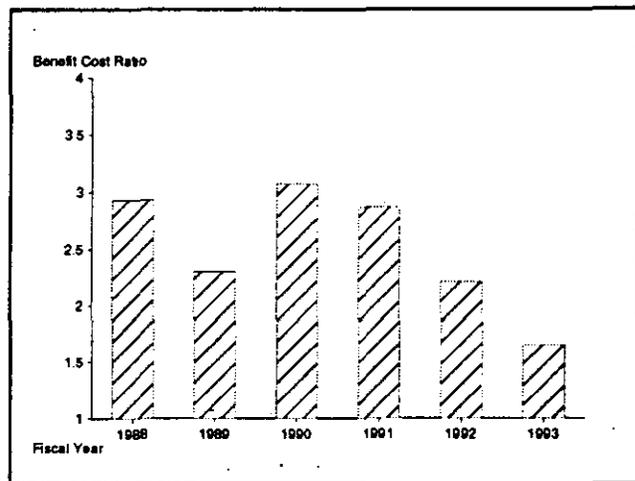
As can be deduced, people not involved with the wood products industry can too be affected by the selection of any one of the alternatives. The above charts and tables depict possible effects to workers both directly and indirectly. However, they do not touch on local populations that use wood products. As has been shown, the Estacada District outputs of wood products has declined over the last several years. The effects of this, when added cumulatively with other districts and forests, can cause a decline in the availability of wood products to local populations. Possible

effects of this could be; 1) Shortages of certain products (e.g., lumber, paper, etc.) due to lack of the availability of raw logs; 2) Higher prices due to the availability of local logs and having to buy logs from other countries (e.g., Canada); 3) Lower quality of products due to the lower quality of trees produced on other than National Forest Lands (i.e., Second Growth trees have more knots that effect the strength of the wood and do not make good cores for peeling veneer); 4) Increased cutting on private and small wood lot owner lands to try to make up for any shortfalls on National Forest lands.

During fiscal year 1993, it cost the government approximately \$14,211,654.00 to run the entire timber program on the Mt. Hood National Forest. These expenses include such things as sale planning, sale preparation, administration, brush disposal, engineering, reforestation and many others. However, revenues received totalled \$23,462,702.00. Thus, there was a net gain of \$9,251,048.00 returned to the federal treasury, (Reference the 1993 TSPIRS report).

As has been true for several years, the total costs of producing timber sales on the district and on the forest has been less than the monetary returns. As can be seen in Figure #4, the benefit cost ratio for returns vs. expenditures has ranged from a high of 3.07 in 1990 to a low of 1.65 in 1993. Thus, for 1993, for every dollar spent, 1.65 dollars was returned to the government. (Reference the 1993 TSPIRS report).

Figure 3 (Ratio of Returns vs. Expenditures by Fiscal Year for the Mt. Hood National Forest)



The sale(s) generated from the proposed alternatives would not be sold as "deficit" sales. It is expected that there would be a "positive net return" to the government.

Table III.10 depicts the summary results of an economic analysis completed for each of the alternatives within this document. The assumption was made that not all costs and benefits would occur at the same time but rather, they would occur in different years. Thus, these dollar amounts have been discounted from the future to present day net worth. Benefits noted below are as a result of selling forest products. Costs are a result of the dollars spent not only to produce products but also to complete mitigation measures, treat slash, future stand treatments, reforestation where appropriate, and others. (For more information on economics, refer to the Appendix).

(Table III.10) Economic Analysis Summary

Alternatives	Benefit/Cost Ratio	Present Net Value	Present Value Benefit	Present Value Cost
Alt. #1	1.74	\$5.68	\$13.35	\$7.67
Alt. #2	2.13	\$4.26	\$8.03	\$3.77
Alt. #3	1.69	\$6.36	\$15.54	\$9.18
Alt. #4 (No Action)	0	-\$0.39	\$0.0	\$0.39

(All revenue totals are expressed in Millions)

Significant Issue #4) Ecological Diversity

The Issue: Harvest activities could reduce, alter, or eliminate the ability for treated stands to provide habitat for a variety of organisms. In addition, ecosystem productivity could be reduced and connectivity could be disrupted between the late successional stands of timber.

Affected Environment

Overview

Biodiversity: National Forest documents identify 290 species (excluding invertebrates) that potentially may occur in the project area. Sustaining these wildlife populations is a management objective of the current land use plans for this area. In particular, the late seral associates and aquatic species have been identified for special management in the late seral reserves and riparian network in the Northwest Forest Plan.

The majority of the proposed activities in this project would occur in Matrix lands. Matrix standards and guidelines contain specific objectives addressing the retention of coarse woody debris, green tree and snag retention, guidelines for the retention of remnant old growth patches, and minimum levels of late seral habitat. The Eagle project would be implemented in a manner consistent with the Record of Decision (ROD) for the Northwest Forest Plan resulting in the retention of key components necessary for the maintenance of ecosystem functions and retention of diversity of habitats across the landscape.

Diversity has been defined by Boyce and Cost (1978) as; "The meaningful differences in the elements of biological communities". Siderits and Radtke (1977) define diversity as; "Variety of plant and wildlife communities within a given area". They further point out; "... all components of the ecosystem; plant, animal, fish, and bird life; along with soils and climate, comprise the factors to be evaluated in sound land management programs". Maintenance of ecological diversity is thought to be directly related to ecosystem stability and as such, would help to ensure the system against disaster (Jenkins 1976, Margalef 1969, Thomas et.al. 1978). For many wildlife species, stand diversity is lost when natural forest stands are removed. Creation of horizontal stand diversity in adjacent stands, may partially compensate for these losses.

The dispersion of edges¹ are important in determining the richness of habitat for wildlife. As the amount of edge in an area increases, habitat diversity increases however, this is true only to a certain point. For example, a single habitat block of 50 acres can support a much greater variety of wildlife species than can 50, one acres blocks. This is because habitat requirements of a much larger number of species can be met in the larger block. Even though it would appear there is greater diversity of habitat with 50 small blocks, there is a point where increasing stand (horizontal) diversity tends towards homogeneity and is counter-productive to biodiversity.

The number of wildlife species in an area in an indicator of habitat diversity. The number of species usually increases along with the size of the habitat block up to the point where increasing size results in decreasing diversity (Soule and Wilcox 1980). Galli et al. (1976), working with bird species found that the number of species increased significantly with increasing blocks sized up to 60 acres. The rate of increase in number of species slowed significantly between the 60 acres and a block of 110 acres. This indicated larger block sizes would result in only limited increases in species.

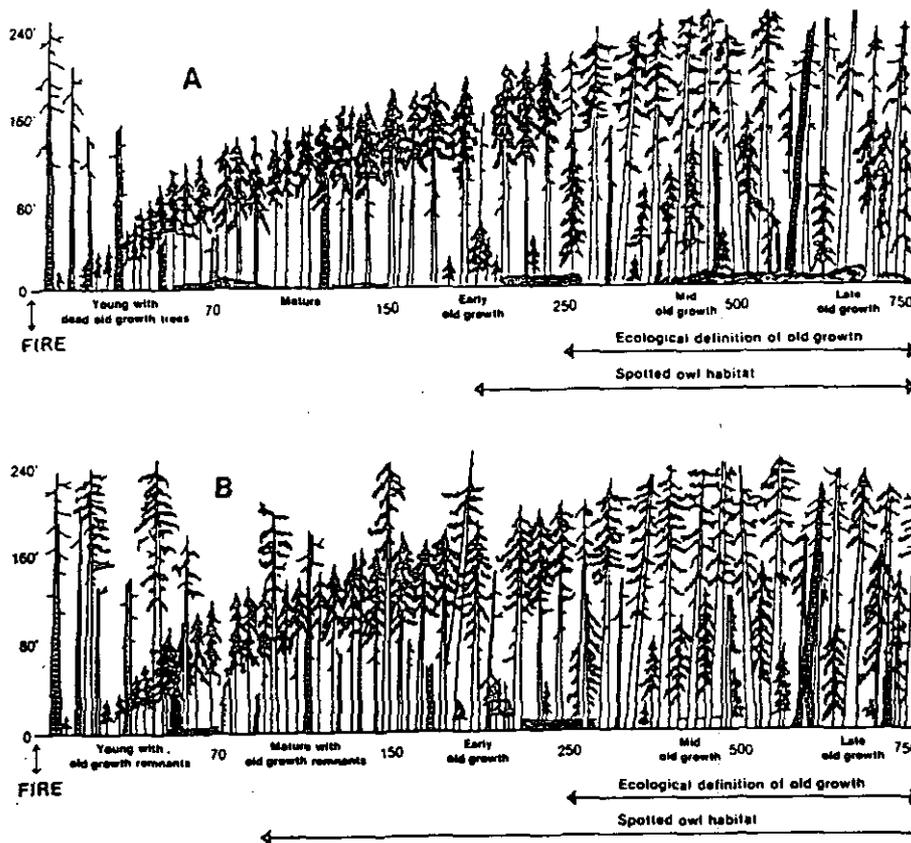
¹For the purposes of this analysis, "edge" is defined as the straight line that is created when a clearcut has been harvested leaving a distinct boundary between a newly created stand of timber and the remaining residual stand of trees.

Fragmentation: Some species, particularly those not associated with edge habitats may require large contiguous habitat blocks. For example, Bull (1975) found that the Pileated woodpecker in northeastern Oregon used at least 300 acres of older forest during the nesting season. More recent work by Forsman (1981) in western Oregon, with the Northern Spotted owl, indicates that this species needs a very large territory. Although extensive stands may not have maximum diversity, they do provide sufficient habitat for many species such as the Pileated woodpecker and Spotted owl which do require large areas of similar habitat and could suffer if extensive suitable habitat was not provided. Conversely, other species, such as the Roosevelt elk may simply require solitude or protection from the intrusion of humans.

The drawings below (Figure #4) (PNW Technical Report, PNW-GTR-285, 1991) are intended to give the reader a visual representation of what the Eagle area looks like. As has been mentioned, the previous stands in this area were generally killed by fire and replaced by second growth timber that is now approximately 120 years of age. If the reader were to find the 130 year mark on both parts A and B, then one can get a good idea of the stand structures that currently exist.

The majority of the land fits under part "A". This is natural succession after total destruction of the previous timber stand.

In some of the riparian areas, (mainly along the northern and western boundaries), part "B" represents what the stands look like. These stands were partially destroyed but not all of the old growth died.



Effects of Implementation

Overview

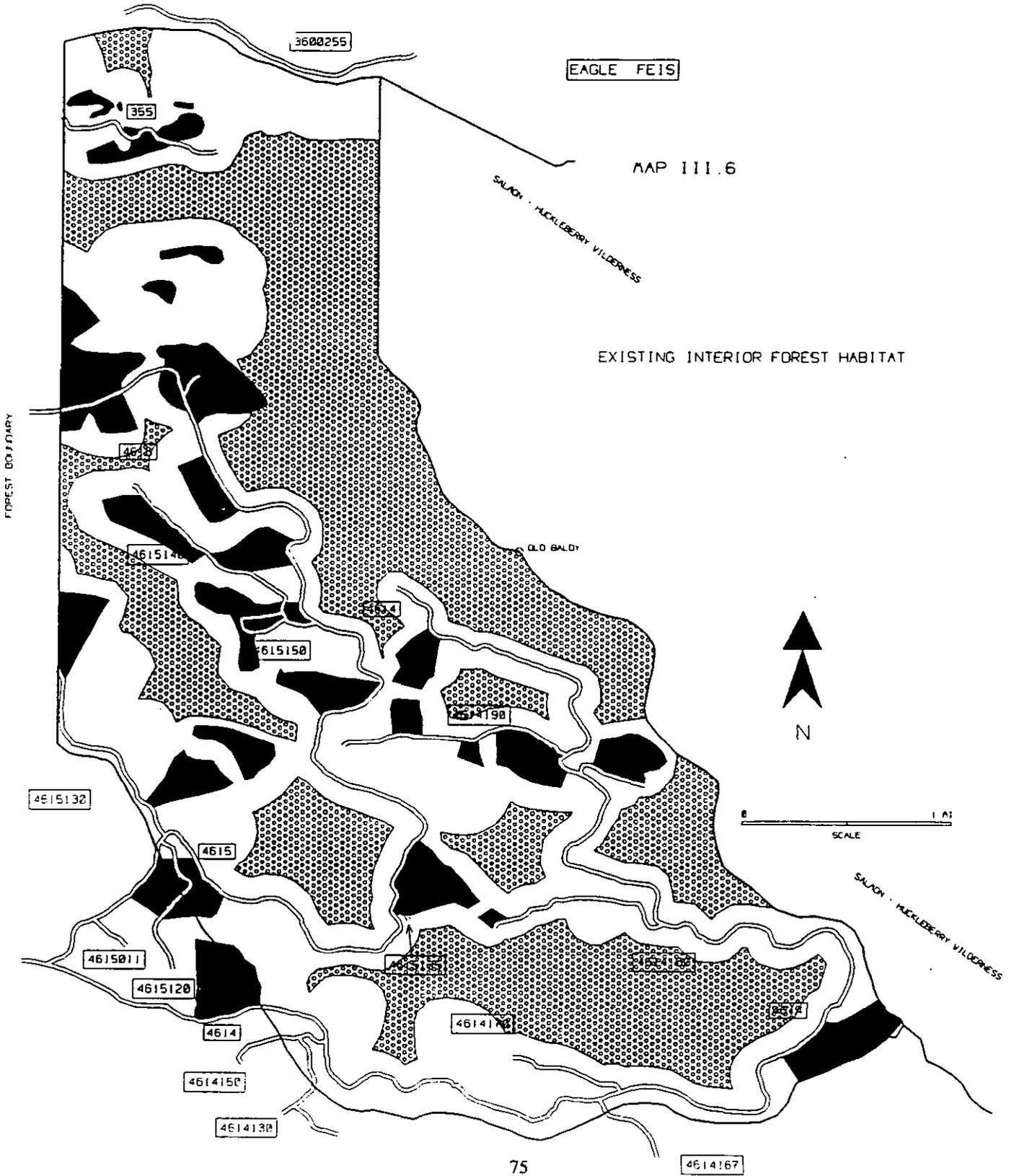
The issue of biological diversity and fragmentation is extremely complex. For the Eagle project area, four indexes were selected to compare the environmental effects of the proposed alternatives on biological diversity and fragmentation. The four criteria include:

- 1) Suitable Spotted Owl Habitat Converted. The Spotted owl habitat is used as an indicator to predict whether an area of habitat is suitable for a variety of species having similar habitat requirements. The Northern Spotted owl is closely associated with late seral stand characteristics featuring the following attributes: a) Large, tall, live trees with cavities; b) Trees with broken tops; c) high levels of large snags; d) Fallen and decaying trees to support abundant populations of prey species; and e) Multi-layered tree canopies with moderate to high canopy closure. The amount of suitable habitat converted to non-habitat would give an indication of how each alternative would effect species dependant on late-seral habitat. Currently, approximately 35% of the project area provides suitable Spotted owl habitat. The majority of this habitat is located along major riparian areas of Eagle Creek, the South Fork of Eagle Creek, and Raven Creek.

- 2) Acres of late successional interior forest fragmented. For this analysis, late successional interior habitat was defined as contiguous late succession forest stands no less than 500 feet from the stand edge or a road. Interior habitat is important for those species that require large home ranges within timber of a late seral stage. These species use the interior forest for moderate climate, find unique nest structures, seek protection from predators, and find prey that also use the interior forest. Most notable of these species is the Spotted owl. Fragmentation of interior habitat results in habitat loss for dependant species and renders these species susceptible to increased predation. Currently, most of the late successional interior habitat is found along Eagle Creek in the Late-Successional Reserve (LSR) in the northern portion of the project area and south along the eastern edge of the project area boundary to Old Baldy and the Githens mountain area. Habitat is also found along the South Fork of Eagle Creek. Approximately 33% of the project area is considered interior habitat.

- 3) Late successional or old growth forest converted to a grass-forb/shrub or open sapling-pole stand condition. Placement of harvest units may reduce the diversity of plant and animal habitats within the planning area if timber harvest removes multi-aged, multi-storied stands containing a rich complex of plant and animal species and replaces them with more even-aged stands having less structural and species diversity. The amount of acres shifted from the late seral forest stage can be used as an index to compare how each alternative reduces the biodiversity which is contributed by late seral stand conditions. Currently, approximately 22% of the project area is in late successional and old growth stand conditions.

- 4) Edge. An "edge" is where successional stages within plant communities come together. The area influenced by the transition is called an ecotone. Edges and their ecotones are usually richer in number of species of wildlife compared to adjacent stand conditions. Habitat richness is a term used to express the diversity of habitat in terms of species associated with the habitat. The more species associated with the habitat, the richer it is. Edges are rich because of the additive effect on the fauna when two plant communities or stand conditions come together. In the ecotone, species common to either of the adjacent stand conditions may be found as well as other species that may be products of the ecotone itself. Edge is the linear distance around the perimeter of a plant community or stand condition within that community. Today, there are approximately 26 miles of edge that has been created as a result of past timber harvest and blowdown in the Eagle area.



Alternatives #1 through 3

Suitable Spotted owl habitat converted.

A team of Forest Service biologists mapped 35% (approximately 2,285 acres) of the Eagle area as being suitable Spotted owl habitat. Alternatives #1, 2, and 3 would result in a reduction of suitable Spotted owl habitat. Alternatives #1 and 2 would reduce habitat by 126 acres. This is a 5% reduction of currently existing habitat. Alternative #3 would reduce habitat by 221 acres which is approximately a 10% reduction of habitat. Although there is a reduction, none of the alternatives would cause a loss of viability of this habitat type for dependent species.

Acres of late successional interior forest fragmented.

Currently there are 2,100 acres of interior habitat in the Eagle project area. Alternative #1 would reduce this acreage by 1,044 acres. This is approximately a 50% reduction. Alternative #2 would reduce this acreage by 460 acres which is approximately a 22% reduction. Alternative #3 would reduce this acreage by 1,115 acres which is approximately a 53% reduction. Although there would be a reduction in interior habitat, the adjacent wilderness (8,770 acres, *watershed analysis*, page 6) and LSR (1,620 acres, *watershed analysis*, page 6) would help to ensure this habitat is maintained at the landscape level in the overall Eagle Creek watershed.

Late-Successional or old growth forest converted to a grass-forb/shrub or open sapling-pole stand condition.

Currently, approximately 22% of the project area provides late-successional forest habitat (approximately 1,435 acres). Alternative #1 would affect 111 acres of habitat (8%), alternative #2 would affect 91 acres of habitat (6%), and alternative #3 would affect 145 acres of habitat (10%). None of the action alternatives would affect the remnant old growth patches or isolated trees that exist in the area. The majority of timber harvest would occur on Matrix lands. All action alternatives would meet the Matrix standards and guidelines of 15% retention of the area associated with each cutting unit (ROD, page, C-41). This does not apply to thinning because leaving untreated stands would retard development of the stands and would be detrimental to the objective of creating late-successional patches (ROD, page C-41).

Edge.

Implementation of alternatives # 1 through 3 would result in slight increases in the amount of edge. Since edges are usually richer in numbers of wildlife species compared to adjacent habitat areas, this additional edge may increase the number of wildlife species in the area. Benefiting species may include: the rubber boa, white-crowned sparrows, black-tailed deer, and pocket gopher to name a few. Currently there are 26 miles of created edge in the project area. There would be an increase of 4 to 5 miles of edge through the implementation of the 3 action alternatives.

Alternative #4 (No Action)

This is the no action alternative. If this alternative were implemented, there would be no conversion of Spotted owl habitat, no changes to interior habitat, no conversions to grass-forb/shrub or open sapling-pole stand conditions, and no increases in the amount of created edge.

The following table summarizes the effects of the alternatives on wildlife habitat:

(Table III.11) Summary of Effects to Wildlife Habitat

Index	Alternative #1	Alternative #2	Alternative #3	Alternative #4 (No Action)
Acres of Suitable Owl Habitat Converted	126	126	221	0
Suitable Owl Habitat Remaining after Implementation	2,159	2,159	2,064	2,285
Acres of Interior Habitat Converted	1,044	460	1,115	0
Interior Habitat Remaining after Implementation	1,056	1,640	985	2,100
Acres of Mature Forest Converted to Grass/Forb	111	91	145	0
Mature Forest Remaining after Conversion	1,324	1,344	1,290	1,435
Miles of New Edge Created	5.0 Miles	4.5 Miles	4.3 Miles	0
Miles of Edge Following Implementation	31.0 Miles	30.5 Miles	30.3 Miles	26.0 Miles

Cumulative Effects

Private and BLM administered lands border the Eagle project area to the west. The majority of this land has been converted to second growth forests. Forest stand conditions on private lands are characterized by relatively homogeneous stands of pole and saw timber. These lands do not contain diverse stand conditions and are lacking in mature forest stands. To the east is the Salmon-Huckleberry Wilderness which provides a highly diverse landscape with abundant levels of mature stands, riparian habitats, talus slopes, rock outcrops, ponds, and other natural features. Within the project area, there are mature timber stands, grass/forb areas, natural openings, and riparian habitats. Alternatives #1 through 3 would not result in a great change over existing successional stages because many of the units would be treated with a relatively light silvicultural prescription and would retain many characteristics of the existing stands. These characteristics include a high amount of canopy closure and a large amount of tree basal area. Overall, the action alternatives would increase the levels of early successional stage stands. In addition, the silvicultural prescription of commercial thinning would help to create structural diversity within the mature forest stands. This would be done by creating small openings which encourage the development of vegetative layers, the recruitment of down wood, wildlife trees, and through the increased vigor of the residual trees.

On April 21, 1995, a biological assessment was sent to the U.S.D.I. Fish and Wildlife Service for instigating formal consultation in regards to the spotted owl. Several projects were submitted in this assessment of which, the Eagle project was one. On June 7, 1995, a biological opinion was given for the list of sales submitted in April. The biological opinion stated; "It is the biological opinion of the Service that the proposed FY 95 and FY 96 Forest Management Activities on the Mt. Hood National Forest are not likely to adversely affect the spotted owl or its designated critical habitat".

The biological opinion of June 7th was based on the alternatives as presented in the Eagle Timber Sales DEIS and not the alternatives presented in the SDEIS. Thus, in January of 1996, the Eagle SDEIS was re-submitted to the Fish and Wildlife Service for another formal consultation. A biological opinion was received from the Fish and Wildlife Service on May 24, 1996 for the SDEIS. This opinion is the same as the opinion received on the DEIS (not likely to adversely affect the spotted owl). Since the alternatives in the SDEIS and the FEIS are the same (with the exception of dropping units and changing prescriptions on two units) the opinion is valid for this FEIS.

Other Issues

This section deals with issues that did not suggest there was an alternative management strategy but were still considered in the analysis.

Issue #1.1) Visual Quality

Affected Environment

The Issue: Management activities may change the visual quality of the surrounding landscape as viewed from existing roads, trails, the eligible wild and scenic corridors along Eagle Creek, and from the wilderness. These activities may also affect the quality if the viewshed when seen from selected viewpoints outside the project area such as in Gresham, Portland, and Estacada.

Overview

Scenic quality within the Eagle project area is assessed through a comparison of the existing visual condition (EVC) and the visual quality objectives (VQO) for each harvest area as described by the MT. Hood Land Management Plan (LMP). The VQO is part of the desired future condition (DFC) for each harvest area. Anticipated harvest activities as well as the sensitivity of the viewing positions were used in the LMP to determine the VQO for each land allocation.

When evaluating the existing visual condition, there are four classifications that a particular view can be assigned. The four classifications are:

- 1) Natural Appearing: A stand of timber that appears to be undisturbed and has reached the present condition through natural processes.
- 2) Slightly Altered: Some management has occurred but is hardly noticeable to a viewer.
- 3) Moderately Altered: Management has occurred and is apparent to the viewer.
- 4) Heavily Altered: Management has occurred and dominates the scene.

In the forest plan, visual quality objectives were described for particular settings across the forest. These objectives are:

- 1) Retention: Management activities may occur but these human activities are not evident to the casual observer.
- 2) Partial Retention: Management activities have occurred but these activities are subordinate to the characteristic landscape.
- 3) Modification: Management activities have occurred and these activities dominate the landscape.
- 4) Maximum Modification: Management activities dominate the landscape but should appear natural in the background.

Within the LMP, hiking trails have been given a "Sensitivity Level" rating. These ratings state the VQO for distance zones in relation to these trails. A sensitivity level of "I" means that these trails have prescribed VQO's of retention, partial retention, and modification in the foreground, far foreground, and the middle ground distance zones, respectively. A sensitivity level of "II" means that these trails have prescribed VQO's of partial retention and modification in the near foreground and middle-ground distance zones, respectively.

The Eagle project area includes portions of Eagle Creek and the South Fork of Eagle Creek drainage adjacent to the Salmon-Huckleberry Wilderness. The entire Eagle project area has been designated as a B6 Special Emphasis Watershed. Overlaying the B6 allocation is a B7 General Riparian allocation. In addition, a portion of Eagle Creek is eligible for classification under the wild and scenic rivers act. Each of these allocations have been assigned a VQO and a distance zone.

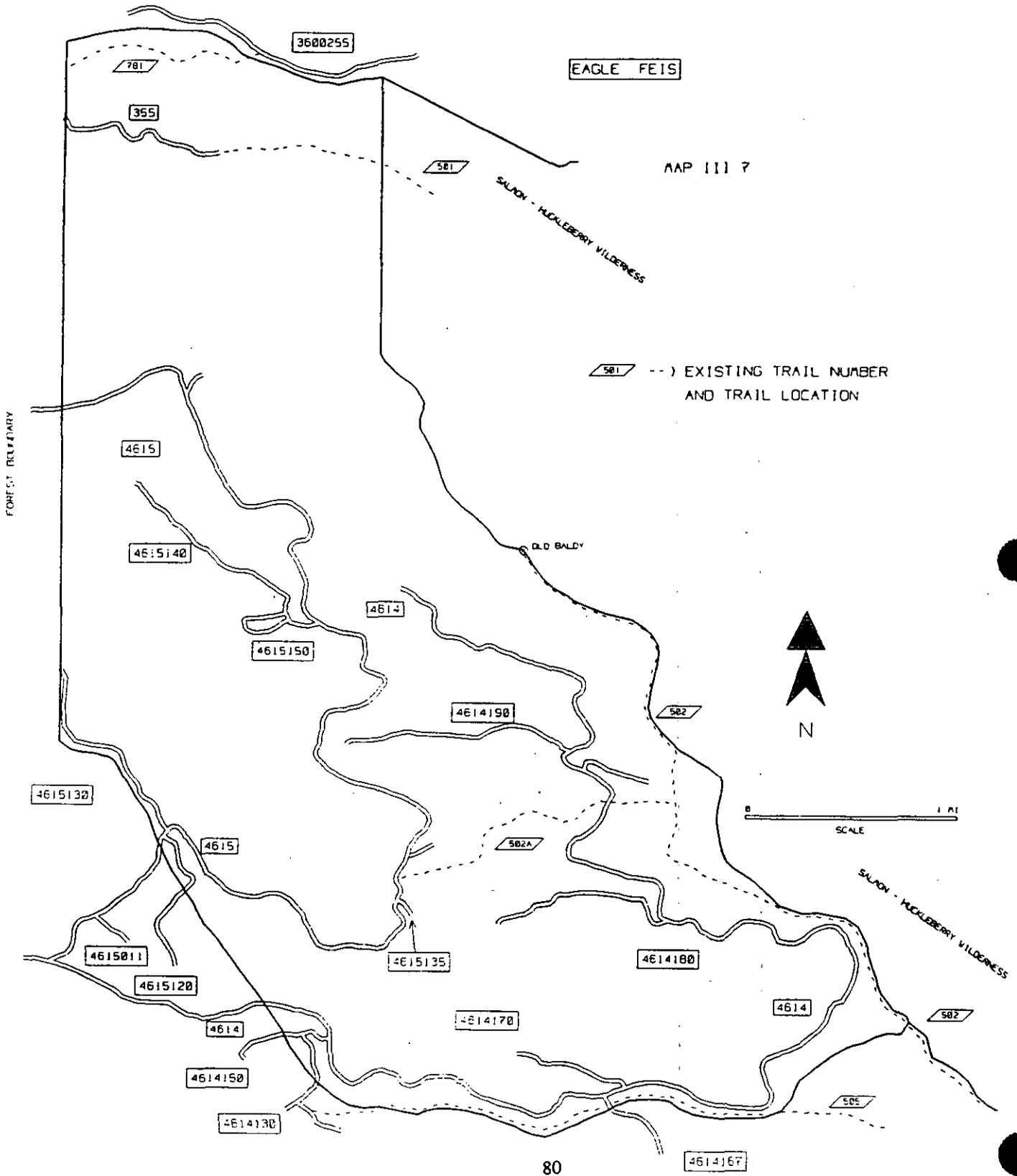


Table III.12 indicates land allocations assigned in the Eagle area as described by the LMP and what VQO was assigned to the allocations.

(Table III.12) Land Allocations and VQO's

Allocation	Distance Zones	VQO
B6 Lands	All Distance Zones	Modification
B7 Lands	Foreground	Partial Retention
Eagle Crk. Recreation Section	Foreground	Partial Retention
"	Middle-ground	Partial Retention
Eagle Crk. Wild Section	Foreground	Preservation
"	Middle-ground	Retention
Level I Trails	Near Foreground	Retention
"	Far Foreground	Partial Retention
"	Middle-ground	Modification
Level II Trails	Near Foreground	Partial Retention
"	Far Foreground	Partial Retention
"	Middle-ground	Modification

Existing Conditions

Existing visual conditions are presented in the form of summary ratings. The summary rating describes the general impression of the landscape as a visitor passes through the viewshed on an established travel route. The ratings are determined by the amount and type of alteration to the landscape due to management activities. Each viewshed has been evaluated using four ratings. These ratings are: 1) natural appearing; 2) slightly altered; 3) moderately altered; and 4) heavily altered.

The following narrative discusses viewsheds/viewpoints that could be affected by management activities under this document. Management activities are not proposed that would affect other viewsheds/viewpoints that exist in the Eagle area (e.g., Eagle Creek).

Trail 502 Viewshed

This trail begins at Squaw Mountain and enters the project area in the northwest corner of section 10, township 4 south, range 6 east and then runs along the western boundary of the Salmon-Huckleberry wilderness. This trail eventually ends at Old Baldy peak. Sample viewer positions were located along the trail to determine visual quality. Along this trail, there are two minor disturbances in the trail foreground. A shelterwood harvest unit in section 10 extends within 200 feet of the trail (foreground) and small openings were created in the zone between the shelterwood and the trail (foreground). These activities do meet the VQO of retention and it is natural appearing.

Between section 10 and Old Baldy mountain, there is a regeneration harvest unit in the foreground of this trail. This unit is classified as modification. Although there is a buffer of timber between the unit and the trail, it does not meet

retention and the viewshed is moderately altered. Other than this one unit, the existing visual condition is natural appearing and is consistent with retention.

Trail 502A Viewshed

This trail begins on forest road 4615 near the center of section 5 and runs uphill to the east for approximately one mile. The trail then crosses road 4614 and then continues uphill where it intersects with trail 502. The portion of trail between 4615 and 4614 is not heavily used because it does not access viewpoints or other interesting features. Forest visitors usually drive to where trail 502A intersects road 4614 and then hike up the hill to trail 502. This reduces hiking time to those wishing to access Old Baldy mountain.

There is a recent regeneration harvest unit at the beginning of the trail on 4615. This unit extends across the trail and goes uphill along the trail for approximately 1/4 mile. The trail has been rerouted and follows a "fill" slope of a spur road. This regeneration unit is classified as modification along the trail and road 4615. This rating is consistent for B6 lands however, the standard for level I trails is retention. Thus, this unit does not meet retention and the summary rating would be considered heavily altered.

Trail 505 Viewshed

This is the only sensitivity level II trail in the Eagle area. It is located on a ridge which forms the southern boundary of the project area and parallels road 4614 for about 1 3/8 miles and it is one of the few trails in the Clackamas River drainage that allows off-highway vehicle use. Spur road 4614167 crosses the trail in section 9 which provides access to landings for two regeneration harvest units to the south. These units are outside of the Eagle project area. The trail is crossed again approximately 1/4 of a mile east by another spur road which again accesses a landing for another regeneration harvest unit. Approximately 10% of the trail has been altered to the level of modification. This gives it a summary rating of moderately altered and it does not meet the standard of partial retention for trails.

Road 4615 Viewpoint

This viewpoint is at a recent harvest unit north of the intersection of road 4614 and road 4614130 which provides a middle-ground view of the mountains Old Baldy and Githens. The view of forested ridges with previous geometric cutting units, road construction, and thinning, meets the VQO of modification, moderately altered which is consistent with the Mt. Hood Land Management Plan (LMP).

McIver Park Viewpoint

Views of the Eagle project area are visible from selected locations outside the National Forest near the town of Estacada. These views are background views (10-15 miles from the viewing positions) and meet partial retention and appear slightly altered which is consistent with the LMP.

Table III.13 lists viewpoints within and outside of the Eagle project area. The table also lists the VQO for the viewpoints and the existing visual condition.

(Table III.13) Visual Quality Objectives and Existing Conditions

View Point	Visual Quality Objective (VQO)	Existing Condition
Trail 502	Retention	Retention, Natural Appearing
Trail 502A	Retention	Modification, Heavily Altered
Trail 505	Partial Retention	Modification, Moderately Altered
Road 4615	Modification	Modification, Moderately Altered
McIver Park	Modification	Partial Retention, Slightly Altered

Effects of Implementation

Alternatives #1 through 3

The following analysis describes changes to the scenery within selected viewsheds and from selected viewpoints due to actions under the proposed alternatives.

Trail 502

Alternatives #1 and 3 have proposed thinning units within the viewshed for almost the entire length of the trail (Within 660' of the trail). This trail has a sensitivity level of I and a VQO of retention and it should remain natural appearing. The most obvious changes to the foreground scenery could include: stumps, slash, ground disturbance, cable corridors, rectangular openings, and regular tree spacing. The silvicultural prescription of commercial thinning allows the flexibility to feather the intensity of timber harvest away from the trail with the least intense treatment occurring within the near foreground. This coupled with leaving a 100' buffer along the trail and utilizing an aerial logging system should be adequate to meet the objective of retention. The silvicultural prescription favors structural and species diversity and is consistent with the landscape analysis and design in the watershed analysis. A temporary deviation from the VQO can be expected in the short term however, the trail would be expected to fully meet the VQO of retention after the understory regeneration and vegetation has grown.

Alternative #2 includes only one unit within the 660' foreground of trail 502. The effects of implementation would be similar to alternatives #1 and 3 except that the length of affected trail is much smaller.

Trail 502A

This trail has a sensitivity level of I and does not currently meet the visual quality objective of retention because of the prominent regeneration harvest unit at the trail head has changed the viewshed to modification. All of the action alternatives propose units within 660' of the trail (alternatives #1 and 3, 4 units, alternative #2, 3 units). Additional changes to the existing viewshed can be expected because; there is no specified buffer along this trail, the prescription for unit #17 is shelterwood which would remove a greater number of trees than a thinning unit, and cable corridors could be visible from the trail. Although unit #17 would be visible from the trail, it was designed to "soften" the edge effect of an existing regeneration unit along the trail. This action would feather the edge.

Impacts from logging could be made less obvious through implementation of specific mitigation measures. These measures may include: a) directional felling of trees away from the trail; b) flush cutting stumps; c) limit ground disturbance and disturbance to residual vegetation; and d) limit the width and layout of skyline corridors to make them less obvious.

All three of the proposed alternatives have approximately the same effects although alternative #2 has one less proposed unit. With unit design and the silvicultural prescriptions, it is expected that the proposed harvest units would meet partial retention. It is anticipated that the current status of modification, heavily altered would remain the same. As the understory vegetation grows, it can be expected that evidence from logging would become less obvious.

Trail 505

This trail has a sensitivity level of II and currently does not meet the VQO of partial retention. All of the action alternatives propose commercial thinning units within the viewshed of this trail. The silvicultural prescription for these proposed units is thinning and they are separated from the trail by a buffer area and road 4614. These proposed thinning should make minor changes to the viewshed but would not lower the visual quality of the trail over the long term. Conversely, the proposed actions would not improve the visual condition to meet the objective of partial retention.

Road 4615 Viewpoint

The middle-ground view of Old Baldy mountain and the associated ridgeline currently meet the VQO of modification with several apparent geometric regeneration units visible and only minor variations in texture and line from previous thinning and road construction. Expected changes to the viewshed from the proposed alternatives include; size, shape, number, and placement of the units as well as the type of logging system used and canopy closure. Harvest units with a canopy closure greater than 60% should cause only minor changes to forest texture. The use of aerial logging systems would eliminate straight lines that would be cut through the stands for cable yarding corridors. Units utilizing ground based logging methods can cause bare soil to be exposed which would be visible due to the color contrasts between soil and the surrounding vegetation.

Units that have a canopy closure that is less than 60% have the greatest potential for becoming visible on the landscape. With the alternatives, alternative #1 contains 11 units that have a <60% canopy closure after implementation. Alternative #2 has 10 units with a canopy closure of less <60%, and alternative #3 has 9 units with a <60% canopy closure. A few units were designed to visually reshape existing regeneration harvest units so that the edges would blend into the surrounding residual stands. Units #2 and 17 in all alternatives and unit 11 in alternatives #1 and 3 would accomplish this objective (Simon Bell, 1995). Other units were also considered for edge blending but were not pursued due to a high potential for blowdown. The units in the proposed alternatives that have the highest potential to alter the viewshed are: units 13, 15, 16, 20, 21, 27, and 28. These units would probably be visible from this viewing point but their size and placement should limit their visibility.

McIver Park Viewpoint

The Eagle area is considered "background" when viewed from McIver Park and from other viewpoints around Estacada. The units with a commercial thinning prescription or those with an individual tree selection prescription are not expected to be visible from this distance. Proposed units with a canopy closure of <60% would probably be visible at this distance but would not dominate the scenery due to their size, placement, and distance from this viewing position.

Alternative #4 (No Action)

Under this alternative, there would be no management activities implemented as a result of this document. Thus, there would be no changes to the existing visual quality of the Eagle area.

Cumulative Effects

The visual quality along individual trails and on the general landscape has been altered through past harvest activities. Since the regeneration harvest prescription has not been proposed under any of the alternatives, none of the action alternatives would add cumulatively to or further change the visual quality objectives in the area. It is anticipated that some of the harvest units would slightly alter surrounding terrain especially around trail 502A for the short-term. However, this alteration would not dominate over the general visual perception of the area. In the long-term, after vegetation grows, these short-term effects would disappear from the landscape.

Since the proposed alternatives do not prescribe the regeneration harvest prescription, the appearance of the landscape from distant viewpoints would not change.

Existing regeneration units are easily seen across the landscape from distant viewpoints. The shelterwood units prescribed in these alternatives were designed not only to meet silvicultural prescriptions but to also soften the straight line that was created after these units were harvested. This action is intended to reduce the impact of viewing these edges so that they do not continue to dominate the general landscape as much. These shelterwood units would not add cumulatively to the affected viewshed but would improve the general perception of the area.

Issue #2.1) Forest Health and Silviculture

Affected Environment

The Issue: Harvest activities can increase the general health of a forest by thinning the existing stands so that residual trees increase their growth and health. This type of stand is better able to resist any attacks by insects, diseases, and windthrow.

Forest health may be defined as a condition in the forest in which the risk of present and future damage by human and natural caused stressors is minimized to meet site-specific resource objectives. A "healthy forest" is one that is resilient to changes and is characterized by tree species and landscape diversity that provides a sustained habitat for fish, wildlife, and humans. Stand densities, windthrow, disease pockets, fire exclusion and drought conditions contribute to increasing stresses on these forest stands. As a result, stand vigor declines making the stand more susceptible to insects and disease.

Objectives have been developed that if accomplished, would begin moving the timber stands in the Eagle area towards a healthier more diverse forest. The objectives for the Eagle area are:

1. To increase the present level of stand health by reducing stocking levels to lessen stress on individual trees.
2. To increase structural diversity on a landscape basis.
3. To maintain or increase species diversity at a landscape level.
4. To increase the present level of stand health, including riparian reserves (alternative #3 only), by reducing the stocking levels to lessen stress on individual trees.

The method selected to treat these stands to improve forest health is through a timber sale. The proposed action (alternative #1) involves treating 1,030 acres of land while alternatives #2 and 3 would treat 562 and 1,229 acres respectively. All three of these "action" alternatives address a major concern raised by the Eagle Creek Watershed Analysis (1995): "The biggest threat to stand vigor is overstocking. If stands are left to natural thinning, trees may start to experience stress by competing for needed sunlight. This would expose the stands to higher susceptibility to insects such as spruce budworm and root rot. Presently many of the stands are near or above stocking levels recommended for optimum vigor." (WA, page 80)

Fungi

The relationship between forest management practices and the forest fungal community is poorly understood. To address concerns, the ROD for the Northwest Forest Plan documents 234 fungus species (Table C-3) determined to be "of special concern" due to their apparent affinity for older coniferous habitats and their rarity. Conservation measures for these species include the management of known sites as well as extensive regional surveys. These surveys should begin before 1997 and are expected to take up to 10 years for completion. None of the listed species that require management are known to exist in the Eagle area.

Commonly gathered edible mushrooms represent the fruit (sporocarp) of mycorrhizal fungi. It is generally agreed that forest age, composition, and structure likely influence wild edible mushroom production (Pilz and Molina 1996). Clearcutting of trees affects mycorrhizal fungi in the short-term by removing the photosynthetic host. Likewise, it is thought by some that heavy mushroom harvesting year after year may also affect sporocarp production. A number of studies are currently underway to address these questions. Mitigations developed for the Eagle project to address a number of resource concerns would reduce impacts to fungi. These include: 1) Limiting soil compaction; 2) Limiting ground disturbance; and 3) Leaving live trees on the site.

The Eagle project does not propose the clearcut prescription however, shelterwood cutting would occur. Although the majority of the trees would be removed in the shelterwood areas (125 acres in Alt. #1, 104 acres in Alt. #2, and 129 acres in Alt. #3) several live trees would be left and as required in the Northwest Forest Plan, 15% of the cutting area is to be left un-cut. By leaving these trees, the photosynthetic host(s) would remain at least in part over the majority of the cutting area. It can be expected that fungi would still grow in these areas however production would most likely be reduced over natural levels due to disturbance and the introduction of sunlight. These effects would be short-term until vegetation begins to grow again. There should be little or no effect to fungi production in the thinning areas because: 1) The tree canopy layers would be left intact thus limiting the introduction of sun light; 2) No slash disposal would occur in the stands thus leaving host material intact; and 3) Helicopter logging creates very little if any ground disturbance and no compaction.

The only areas in the thinning units that could affect mushroom production is in skyline and tractor units. The affected areas would be in the skyline corridors or skid trails. Past experience indicates that disturbance in skyline and tractor units is no more than 15% of the cutting area. In the case of the Eagle alternatives, Alternative #1 would skyline or tractor 309 acres, Alternative #2 would skyline or tractor 279 acres, and Alternative #3 would skyline or tractor 336 acres. Thus, for the alternatives, it can be expected that no more than 46 acres in alternative #1, 42 acres in alternative #2, and 50 acres in alternative #3 would be disturbed through logging. It can be expected that mushroom production would decline in these disturbed areas over the short-term but would again re-grow once vegetation becomes re-established.

Alternative #1 (Proposed Action)

Prescriptions

This alternative silviculturally treats 1,030 acres. Three prescriptions would be employed in this alternative. A commercial thinning (CT) with variable spacing would be applied to 868 acres. This would employ uneven thinning of the conifer stands where a combination of the following treatments may occur: 1) The creation of small openings 1/4 to 1-1/2 acre in size. Up to two (2) acres of openings for every ten acres may be created. A more uniform thinning which removes 30% to 50% of the basal area would be applied in other portions of units; 2) Areas may be left untreated due to rocky conditions, advanced regeneration, wildlife needs, or buffers. Riparian areas would not be treated under this alternative; 3) Trees from the suppressed and intermediate canopy layers would be removed in preference to those located in the codominant or dominant positions.

A shelterwood prescription (SW) with three intensities of cutting would be applied to 125 acres.

1) The most intense prescription would leave an average of between 20 and 30 standing trees per acre. Leave trees would be grouped or unevenly distributed to accomplish specific resource objectives. These leave groups would have all trees left on the site (regardless of size or crown position). There are no plans to remove these trees once the new stands are established (Northwest Forest Plan, C-41). In addition, scattered individual leave trees would be left over the remainder of the unit. These trees would be the largest, most vigorous, best formed, and the most windfirm. Leave trees would consist of different species so that a species composition is maintained. Some seedlings of the more intolerant species would be planted to help ensure that present diversity would remain, especially in the units with groups and openings. If it is determined that individual leave trees are affecting the health and growth of the seedlings about five years following harvest, some of the overstory may be girdled or removed in order to reduce competition and improve stand health (Oliver and Larson 1990, Smith 1962). The girdled trees would become wildlife habitat (snags).

2) A second shelterwood prescription would leave an average of about 50 trees per acre in grouped patterns. These groups would leave all trees on the site and regeneration would be accomplished as described above. In addition, scattered individual leave trees would be left over the remainder of the unit. These trees would be the largest, most vigorous, best formed, and the most windfirm. Leave trees would consist of different species so that a species

composition is maintained. It is anticipated that after regeneration has been established, the majority of the leave trees would be removed.

3) The third type of shelterwood prescription would leave an average of approximately 40 or 50 evenly spaced trees on each acre (grouping would not occur). The leave trees would be spaced an average of 32' and 29' apart. It is anticipated that after regeneration has been established, the majority of the leave trees would be removed.

A third type of silvicultural prescription proposed for this alternative is individual tree selection (ITS) on 37 acres. The objective of these prescriptions is to create structural diversity for late seral wildlife species.

The basal area would be reduced by approximately 5-20% on three units. Some small openings, less than one-quarter acre in size would be created. With this prescription, individual trees from all crown classes would be removed rather than just trees from the lower positions. There would be a maximum of one acre of openings per ten acres within the unit.

All but one of the proposed units in this alternative are silviculturally high priority units. The remaining unit is second priority. All of the silvicultural prescriptions meet the criteria described by the "Landscape Analysis and Design" section of the Eagle Creek Watershed Analysis (1995) (Maps located between pages 78 and 79).

Effects of Implementation

Commercial Thinning (CT): This type of treatment would help to increase short-term vigor of the stand by reducing competition for moisture and sunlight (Kimmims 1987, Oliver 1990), until the crowns close once again. It is expected that present diameter and height growth rates would be maintained or slightly increase after ten to fifteen years. The growth rates are expected to be maintained or slightly increase after leave trees expand their root systems and increase their needle complement (Williamson 1982). The greatest growth gains are expected in the true firs. Another entry into these stands is anticipated in approximately twenty years to maintain stand health. Without this second entry, the vigor of the trees would again decline. The CT prescriptions allow for the greatest management flexibility in the future while maintaining overall stand health.

A large proportion of the lower-level canopy would be removed by thinning from below, or removing suppressed and intermediate trees. Trees from these canopy positions tend to be under more stress than their counterparts in the upper levels. By removing the individuals under more stress, the residual trees are expected to be released and consequently become more healthy. A viable understory is important to maintaining the health of the whole stand because weaker trees can attract insects into the area and then move into the overstory.

From the stand scale, structural diversity would be decreased by thinning from below. This would be particularly true when looking at the vertical structure. By creating small openings and reducing canopy closure, both horizontal and vertical structure would be increased in the future. A new canopy layer would be created in the small openings and some young trees are also expected to become established under a more open overstory. As these trees mature, they are anticipated to form a new mid-layer canopy. Hence, there would be a short term decrease in vertical diversity, but in the long term, vertical diversity is expected to increase. (This can be evidenced by the existing "Raven" thinning along the western side of road 4615). At the landscape scale, structural diversity would be increased by changing the present homogeneous nature of the area.

There is expected to be some logging damage to the residual trees during harvest activities. Some of this damage would be to tree crowns and roots while the remainder would be to the boles. Crown damage is less serious because new limbs can grow to replace the injured or missing branches. However, damage to the bole or roots is more serious because it is permanent and opens the tree's system up to infections by pathogens (Oliver 1990, Smith 1962). These infections would weaken the trees and have an impact on tree health. Stand damage using this prescription

is anticipated to be minor. Any trees that are damaged would be left in place and would be considered wildlife trees.

Shelterwood Prescription (SW)

The first shelterwood reserve prescription would leave approximately 20-30 trees per acre. These leave trees would provide a very adequate seed source for natural regeneration. Whether or not the residual trees are uniformly spaced or clumped, there would be enough ground disturbance to provide a good seed bed for a new generation of conifers. The remaining canopy cover would be sufficient to provide protection from both the sun and frost to ensure seedling survival.

With the large increase in sunlight, the residual shrub and herb layers would display more vitality (Smith 1962, Walstad and Kuch 1987), although their numbers would have been reduced by harvesting and site preparation activities. If the residual stand produces an adequate crop of seed, it is expected that there would be an overabundance of seedlings established (Oliver 1990, Smith 1962). Then, there would be considerable competition between the seedlings. Without stocking control during the first decade or two of life, there would be stagnation and health problems for the new generation of trees (Kimmins 1987, Oliver 1990, Smith 1962). If the leave trees do not produce an adequate seed crop within the first year or two following harvest, the undergrowth is anticipated to get a head start on occupying the site and could provide strong competition to the young seedlings before they become satisfactorily established and could cause mortality (Smith 1962). If it is envisioned that this might be the case, these units could be planted a year following harvest so that there would not be the lapse in time.

As with the thinning prescription, there would be logging damage during harvest. It is expected that there would be less injury to the residual trees because there would be more room for maneuvering logs during yarding. Although, there is a greater chance for damage during slash burning operations. There are fewer potential impacts with this prescription from insects and disease than CT because fewer trees remain and there would be less chance of pathogens moving between the trees.

Animals are expected to be drawn to these new openings because of resprouting vegetation. As a result, there is expected to be some animal damage to new seedlings. With enough of the trees are affected, a seedling health problem could arise. However, it is not expected that this situation would occur. If this were the case, individual seedlings could be protected so that the new stand would remain healthy.

The second shelterwood prescription leaves an average of about 50 grouped residual trees per acre and is designed to move the present overstocked stand to an earlier successional state. In the process several goals are achieved: 1) The overall health of the stand is expected to improve with reduced competition. 2) An abundant natural seed source would be left in place. 3) Enough ground disturbance would take place to provide a good mineral seed bed for the next generation of trees. 4) A considerable amount of canopy would be retained for seedling protection from frost and the sun which ensures survival. 5) Structural diversity would be increased and a beginning stage of a multi-aged, multiple-storied stand would take place between and among the leave trees and groups. and 6) More management options would be available in the future than with the first shelterwood prescription.

One effect deals with the amount of shade provided by the crowns of the residual trees. The more tolerant conifer species tend to survive better in a shady environment than their intolerant counterparts. While stocking control and the careful selection of intolerant trees as seed sources would help to reduce the severity of this possibility, there is the chance of a species conversion of some degree. In the western Cascades, the more intolerant species tend to be found in the earlier successional stages. By favoring the intolerant conifers, a part of the natural sequence of vegetative stages would be maintained.

The need for planting seedlings, stocking control, and anticipated damage from logging and animals with the resultant effects would be the same as those described for the first shelterwood prescription.

There are many similarities between the first two shelterwood prescriptions and the third prescription. Unless otherwise stated, the effects from the first two shelterwood prescriptions would apply to this third prescription.

As with the first prescription, there would be the release of shrub and herb species when the canopy is opened by the harvest. By leaving about twice as many residual trees per acre than with the first prescription, less site preparation may be needed because there may not be as much slash created. There is a possibility of more damage to leave trees (compared to the first prescription) because there are a greater number of stems and smaller spacing.

With the large amount of trees left in place under this prescription, there would be an overabundance of seedlings established and a corresponding high level of competition between the individuals. Seedling competition from the remaining overstory would become very evident within a short period of time (Oliver 1990, Smith 1962). Both of these factors could lead to stagnation, health problems, and mortality if stocking control of the seedlings is not maintained in the future (Walstad and Kuch 1987). Some of the residuals may either be removed or girdled and left in place to reduce competition from the overstory. This action would be necessary within five to ten years following harvest. (See *Future Timber Management Options* in the Analysis File for more discussion).

Individual Tree Selection (ITS)

The individual tree selection prescriptions are very similar in nature with the main differences being the size and number of the openings. As a result, the effects of this ITS treatments on stand health would vary depending upon the size and orientation of the patches and the number of openings created. It anticipated that with a larger patch cut, there would be a greater improvement of long-term stand vigor. Conversely, smaller groups would have the least influence on long-term stand health.

The establishment of a new generation of seedlings would also vary with the amount of tree removal. In all cases, stocking control at an early age would be necessary to reduce competition and mortality and aid in the development of a healthy layer of trees. In addition, the tolerant species would be the most successful in surviving in these situations. Larger openings would have the best chances for establishing new seedlings while smaller openings would have the least chance for successful establishment of trees. Intolerant trees would have the best chances of survival and growth in the areas with heavier removal while tolerant species would tend to have higher survival rates in a more closed canopy (Oliver, 1990, Walstad and Kuch 1987). However, these rates are expected to drop as the canopy closure and competition increases.

The vigor of the undergrowth would increase with a more intense treatment and would not be as prolific where smaller groups are removed. This treatment would have a positive impact on stand health around the created openings but less favorable than the commercial thinning strategy. The vigor for the rest of the untreated stand would continue in its present direction of decline. For further analysis, see the discussion of effects of implementation for Alternative 4. Logging damage and subsequent effects would be similar to that described for the CT treatments.

Other Effects

The application of the commercial thinning prescription over such a large area would tend to maintain the present general horizontal structure of the landscape because few larger openings are being created. While vertical diversity would be decreased in individual stands because most of the trees in the lower canopy positions would be removed, vertical diversity at the landscape scale would increase due to changes in the present homogeneous structure.

Natural seedlings that become established within small openings would most likely be of the more tolerant varieties (Oliver 1990, Walstad and Kuch 1987). This would change the species composition of the stands over time to a more homogeneous makeup which might lead to more potential health problems due to insects and diseases. (e.g., Douglas-fir is currently the dominate species and this may change to hemlock over time).

The CT prescription would reduce the number of stems per acre and leave the largest and most windfirm trees in place. However, the canopies of the stands would not be opened up to a great degree. This would allow the residual trees a chance to gradually become more windfirm but still provide them with shelter and support from the rest of the stand (Groome 1988, Oliver 1990). The stability would come as crown size, crown ratio, diameter-to-height ratio, and vigor increased and these benefits would be passed on to an expanding root system (Oliver 1990). In addition, the stems of the trees would slowly become more accustomed to the stresses of the wind. All of these factors combined would help to establish healthier and more windfirm stands.

There is a possibility that there would be some blowdown in the open stands of the shelterwood treatments. If the windthrow was severe enough and no salvage took place, there would be the probability that an insect buildup would occur that could affect the residual trees in the area.

Cumulative Effects

The lack of fire and other natural disturbances over the past 110 to 140 years has brought this area to its present state. It would be impossible to guarantee the long term health of this area without some kind of management activities (Oliver 1990). It would be only a matter of time before disturbance would set an area back to an earlier stage of succession (Daniel et. al. 1979). Since ecosystems are dynamic, not static, changes would take place (Oliver 1990). With the fire protection that this area has been given over several decades, the "natural" balance has been upset. As a result, in the present situation, it may not be possible to let nature take its course because the expected effects of such a strategy would cause losses to many resources (e.g., fisheries, wildlife, and others).

Alternative #2

Prescriptions

Alternative #2 proposes to treat 562 acres, which is 468 fewer acres than alternative #1 and 667 fewer acres than alternative #3. Of this total, 458 acres would have the commercial thinning prescription and 104 acres would have the shelterwood prescription. With the shelterwood prescription, approximately 40 or 50 evenly spaced trees would be left on each acre (grouping would not occur). The leave trees would be spaced an average of 32' and 29' apart. It is anticipated that after regeneration has been established, the majority of the leave trees would be removed.

The commercial thinning prescriptions would be the same as those described in alternative #1.

All but one of the proposed units in Alternative 2 are considered to be silviculturally high priority units while the remaining unit is priority two.

Effects of Implementation

Because of the reduced number of acres treated by this alternative, the least amount of changes in structural diversity would occur over the entire landscape. Otherwise, the effects for the various treatments would be the same as discussed in alternative #1.

Other Effects

Other effects listed in alternative #1 would hold true for alternative #2.

Cumulative Effects

The cumulative effects presented in alternative #1 would also apply for the prescriptions described in this alternative. However, since fewer acres would be treated, benefits derived from management activities would have less of an effect at the landscape level. The health of the untreated stands would continue to decline. Thus, with this alternative, there is more of a chance of mortality and infestations of insects and pathogens when compared to the other alternatives.

Alternative #3

Prescriptions

Alternative #3 prescribes activity on 1,229 acres. Of the three action alternatives, alternative would treat the greatest number of acres. The commercial thinning treatment would be applied to 1,063 acres, the shelterwood prescription to 129 acres, and the individual tree selection prescription on 37 acres.

With the shelterwood prescription, an average of about 50 trees per acre in grouped patterns would be left. These groups would leave all trees on the site and regeneration would be accomplished as described above in alternative #1. In addition, scattered individual leave trees would be left over the remainder of the unit. These trees would be the largest, most vigorous, best formed, and the most windfirm. Leave trees would consist of different species so that a species composition is maintained. It is anticipated that after regeneration has been established, the majority of the leave trees would be removed.

A second type of shelterwood prescription would be leaving approximately 40 or 50 evenly spaced trees on each acre (grouping would not occur). The leave trees would be spaced an average of 32' and 29' apart. It is anticipated that after regeneration has been established, the majority of the leave trees would be removed.

Like alternative #1, this alternative stresses stand maintenance with the majority of stands being treated with the commercial thinning prescription. However, unlike the first alternative, alternative #3 would treat three units which contain riparian reserves. The riparian reserves would be treated with a modified commercial thinning prescription. The objectives for entering riparian areas include:

- 1) Remove individual trees or small groups of trees to maintain or improve forest health within riparian reserves.
- 2) Provide for small openings that are beneficial for riparian vegetation.
- 3) Provide for future coarse woody debris by increasing diameter growth of the residual trees.
- 4) Increase structural diversity within riparian reserves for wildlife.

Units 16, 26, and 29 would include commercial thinning within riparian reserves. These riparian areas would be along Class 4 intermittent streams and/or around small seeps or wetlands. Scattered individual trees or small groups of up to six trees would be removed within these reserves with no more than an average of 10% of the basal area would be removed. Directional falling would take place so that trees would not cross either the stream courses or wet areas. The only exception to this might be where it is determined that coarse woody debris is presently lacking in the area and trees are needed to fulfill this function. In this situation, trees may be intentionally fallen across stream courses and left in place. Outside of riparian areas (Matrix lands), up to 30% of the basal area would be removed.

All but one of the proposed units in Alternative #3 are considered to have a silviculturally high priority while the remaining unit is priority two.

Effects of Implementation

The effects listed in alternative #1 for all treatments is expected to be same for this alternative. However, instead of limiting treatments to improve forest health only on matrix lands, this alternative takes more of an ecosystem approach. Insects, diseases, and other stressors in the environment do not recognize boundaries between matrix and riparian lands. Light treatment in riparian areas would help to improve the health of residuals in these zones. It is expected that the present diameter growth rate of the residual trees would increase in the future thereby enhancing the potential for coarse woody debris in riparian areas. In addition, it is anticipated that some of the riparian vegetation may become more vigorous because of increased sunlight due to tree removal. This vegetation may be beneficial to wildlife for forage. Small openings would be created adding to the structural diversity of the riparian zones.

Other Effects

A description of the anticipated effects of the three types of treatments is the same as described alternative #1. The exception to this is that alternative #3 treats a larger number of acres and treats riparian areas.

Cumulative Effects

The effects of these actions would be the same as those described in alternative #1, with the exception that acres would be treated in riparian reserves.

Alternative #4

Effects of Implementation

With alternative #4 (no action), none of the high priority stands found in the Eagle project area would be treated. Forest health would continue to decline in the overstocked stands. These stands would continue to experience mortality (Daniel et. al. 1979, Kimmins 1987), possibly at an increasing rate because of the series of below normal annual precipitation levels in the past decade. There are also indications that one or two years of normal or above normal precipitation would correct this situation. This condition has increased the physiological stress level of the forest. Root disease can be found in the area and insect populations are presently at endemic levels. However, the insect-disease complex multiplies the impacts of either factor alone especially in overstocked stands that are in stressed conditions which makes them more susceptible to damaging agents. Without reducing the stocking, and subsequent stress levels of the trees, increased mortality can be foreseen until present conditions change (Kimmins 1987). This is because trees that have grown in crowded stands tend to have smaller stems, narrow crowns, weak root systems, and are relatively less vigorous than trees that have grown with sufficient space (Abetz 1982, Kramer 1966, Kangur 1973).

A positive benefit of this alternative may be that natural selection is taking place through the process of stress and mortality. However, the overall management direction of this area, as spelled out in the Northwest Forest Plan, is to actively manage matrix land. This includes creating a mosaic of stand conditions throughout the area. The selection of this alternative would not allow this to happen. In addition, some of the results of natural selection can be seen in this area. For example, natural selection usually eliminates the smaller and weaker individuals of a population rather than the larger ones. This fits with the general existing conditions of a lack of large downed wood debris and large snags.

Because no harvest activities would take place with alternative #4, there would be no harvesting injuries to the trees that might cause additional forest health problems. Animal damage would remain at its present level.

Other Effects

Since the timber stands in the Eagle project area and those stands the Salmon-Huckleberry Wilderness have grown in an overstocked condition, they tend to be less windfirm than their more open-grown counterparts. If a moderate to large wind storm occurred and salvage operations were not prompt, there would be a very strong likelihood that a large insect outbreak would occur. In this case, green trees would be attacked. Trees that are not healthy would have few, if any, reserves to resist the assault of insects and mortality would take place. The damaged area could be extensive and damage to resources could be substantial. Such an outbreak occurred following a catastrophic wind storm in 1989/1990 in the southern part of the Estacada District. Due to outside influences, an aggressive salvage program was not possible thus, several hundred acres of live standing trees died through attacks by insects (bark beetles). The beetles not only attacked Douglas-fir but they also attacked Noble-fir.

Cumulative Effects

It is expected that the present forest health conditions would become worse with time if no corrective action is taken to address the present overstocking problem. This is especially true on the areas with root diseases. These pathogens tend to spread at a rate of about 1 foot per year and remain virulent for about fifty years (Hadfield, et.al.,

1986).

If moisture-deficient conditions were to occur, a large insect outbreak would become more probable because the trees are less vigorous (Walstad and Kuch 1987). An event such as this has the potential to affect not only the Eagle Project but would have an impact at the landscape level. This is especially critical since the Eagle Project is located immediately adjacent to the Salmon-Huckleberry Wilderness where the western spruce budworm, has in the recent past, impacted a large area of coniferous trees. This is a large block of land where management options are limited due to LMP allocation and access. A considerable build-up of insects could occur within the wilderness before corrective management would be taken.

Issue #3.1) Deer and Elk (Big Game) Habitat

Affected Environment

The Issue: Harvest activities may change the percentages of forage, hiding cover, optimal cover, and thermal cover and disrupt travel ways. Open roads increase the potential for harassment by human activities and allow access to these areas by legal and illegal hunters.

Big game species that are known to occur in the watershed include Roosevelt elk, blacktailed deer, black bear, and cougar. Due to high local and national interest, size, and herding behavior, elk are the most visible of this group. There is at least one elk herd that is known to make use of the Eagle watershed. The elk population is thought to be under the areas carrying capacity in part due to inadequate forage (type and amount). One Management objective for the Forest Service and Oregon Department of Fish and Wildlife (ODFW) for elk is to increase populations by increasing forage. Meeting this objective would not only benefit the species but would aid in reducing damage complaints from private land owners (ODFW 1994). Currently, elk populations are low and hunting pressure is light because of the low number of elk, difficult access, and the densely forested nature of the area.

Blacktailed deer are present and seem to concentrate and use the interfaces of openings, brush areas, and timber. Black bear occur in low numbers possibly because of the lack of snags and large down logs in the watershed. Cougar are also found in low numbers. They are probably more common in the adjacent wilderness because of their preference for remoteness and are found in close association with blacktailed deer.

Deer and elk habitat was analyzed using the "Elk Habitat in Western Oregon Model". This model takes into consideration; forage, hiding cover, optimal cover, thermal cover, and roads. The model then assigns a habitat "effectiveness" index value to the area. Currently, the Eagle project area is considered to have a habitat effectiveness of 58.5% which is considered viable. The following is a guide to interpret results of habitat effectiveness scores:

- 1) A score of 100% is optimal habitat.
- 2) A score of 60-99% is highly viable habitat.
- 3) A score of 40-59% is viable habitat.
- 4) A score of 20-39% is marginal habitat.
- 5) A score of less than 19% is considered non-viable.

Effects of Implementation

Alternatives #1 through 4

Table III.14 indicates the habitat effectiveness scores for the various alternatives if they were implemented.

(Table III.14) Habitat Effectiveness Rating Following Implementation

Alternative #1	Alternative #2	Alternative #3	Alternative #4 (No Action)
61.3%	59.0%	60.5%	58.5% (Existing Condition)

As can be seen from table III.14, the existing habitat effectiveness of the area is viable. Implementation of any of the alternatives would move the area towards a "highly viable" score as a result of additional forage availability and road closures. It is estimated that elk populations should increase slightly with the implementation of any of the action alternatives.

Another factor that could affect big game populations are roads that are open to vehicular traffic. When vehicles approach these animals, they tend to flee. The Mt. Hood National Forest Land Management Plan indicates that by the year 2,000, there should be no more than 2.0 miles of open road per square mile of land in inventoried winter range and no more than 2.5 miles of open road per square mile in inventoried summer range (Forest Plan, page Four-72). Since both winter and summer range exist within the Eagle project area (Forest Plan, page Four-73) this area should meet both standards. Currently, the open road density for winter range is 1.3 miles of open road per square mile and 2.6 miles of open road per square mile. This is a combined open road density of 2.1 miles of open road per square mile. All of the action alternatives include the closure of various lengths of road of which they mainly occur in summer range.

Table III.15 summarizes the miles of open road per square mile after implementation of the alternatives.

(Table III.15) Open Road Per Square Mile After Implementation

Action	Alternative #1	Alternative #2	Alternative #3	Alternative #4 (No Action)
Miles of Road Closed	4.2	1.36	4.2	0
Miles of Open Road After Closures	17.7	20.54	17.7	21.9
Open Road Density After Closures	1.7 Miles/Sq. Mile	2.0 Miles/Sq. Mile	1.7 Miles/Sq. Mile	2.1/Sq Mile

Cumulative Effects

After the last stand killing fire and maintenance fires that occurred in the 1800's, it is thought that the habitat effectiveness of the Eagle area was less than 39% (marginal). As vegetation grew, this effectiveness improved to a point where harvest activities began. As to what the effectiveness was prior to harvest activities is unknown. Currently, the Eagle area provides viable deer and elk habitat. With the implementation of alternatives #1 through 3, the habitat effectiveness would improve to highly viable because more forage would be made available and harassment would be reduced. Conversely, if alternative #4 were selected, habitat effectiveness would remain unchanged. However, effectiveness would begin to go down as timber stands continued to grow. This is mainly because forage would be overgrown by trees and would be less available and vehicular harassment would continue and probably increase as population centers continue to grow and more and more people visit the area.

Issue #4.1) Windthrow

Affected Environment

The Issue: Openings created by roads and harvest units may increase the risk of windthrow in residual timber stands and in riparian areas.

Trees blowing over during a catastrophic wind storm is not an uncommon event in either a managed or un-managed stand condition such as exists in the Eagle area. Evidence indicates that blow down has occurred in the past in the Eagle area both in managed and un-managed stands. These blow down events are synonymous with wet areas, stream banks, shallow soiled ridges, poorly drained slopes, or openings. This is the case whether these areas are surrounded by contiguous stands or are next to managed stands. Management of the Eagle area started in the 1960's and up until 1983, blow down was not a considered an issue. However, in 1983, the district experienced a storm from the east that blew over trees in this drainage. The 1983 storm event mainly affected trees in and around wet areas but also affected trees adjacent to roads and along clearcut edges.

From past experience, the storms that most affect the Eagle area come from the east or south east. It is most likely that this is due mainly to topography where the wind blows over the top of the ridge tops and then creates eddies on the leeward side of the hill. The following suggestions are by (Harris 1989) indicating possible topographic features that affect the probability of blowdown that apply to Eagle:

- 1) Decreased windfirmness can occur if stands are on westerly aspects where storm winds are accelerated around ridges and where stands are on low ridges or upper leeward slopes.
- 2) Increased windfirmness can occur if stands are located on northerly aspects with topographic protection from storm winds and where stands are located on lower leeward slopes.
- 3) Large wind eddies created when smooth flowing wind encounters a forest edge (such as a clearcut) are responsible for most of the damage caused by the wind. These eddies can extend ten to fifteen tree heights into the stand and can cause extensive damage to stands that are old and have grown in close proximity throughout their lives (Savill, 1983).

Not only do easterly winds affect the Eagle area, but also westerly winds hit the Eagle area directly. However, these westerly winds have not caused blow down in catastrophic proportions even though clearcuts have been in existence since 1983/1984. This is evidenced by two factors; 1) A wind storm occurred in the late 1980's and one pocket of blow down equaling 2 acres was found adjacent to the 4614180 spur. Other wise, no damage occurred due to this event. 2) A survey for blowdown was completed in December 20, 1995 following the wind storm that occurred along the west coast of Oregon on December 12, 1995. Even though these winds were very strong and caused wide spread damage in and around Portland, no damage occurred in the Eagle area. Several "edges" along existing clearcuts were exposed to these winds and only occasional trees were affected. Of the trees that were observed, approximately 50% were broken out from 20 - 50 feet above ground level leaving the lower bole and root system intact. In the majority of these trees that were broken, rot was observed in the bole which weakened the stem. In a few cases, the entire tree was blown over where the root system did not support the tree. In the vast majority of these cases, the trees were in or near wet areas. The most obvious damage was to existing dead trees. These snags were in a stage of decomposition where any movement (either by wind currents or surrounding trees bumping them) caused them to break out anywhere from 20-50 feet above ground level. The area with the largest concentration of blow down was along a clearcut at the end of the 4614187 road. Approximately 12 trees along the northern and eastern edge were blown over. However, these trees were not in a concentrated area nor were they inside the residual stand but were scattered along both of the clearcut edges.

Dominant trees within stands tend to be more windfirm than trees in lower crown classes, even though the dominant trees are taller and have large crowns. Dominant trees have developed under exposed conditions because their

crowns are above the general stand level (Harris, 1989). Trees in the lower crown classes rely on mutual protection from the surrounding stand. These trees have not been exposed to the winds like the dominant trees have and generally are not as windfirm. Work in other areas suggests that opening both uneven-aged old-growth stands and older even-age stands by thinning or partial cutting, can reduce windfirmness. Conversely, windfirmness of a young stand might be increased by frequent light thinning that begin early in the life of the stand. In general, thinning of stands where the tree canopy has closed may reduce windfirmness. However, controlling stand density through frequent thinning beginning at an early age can improve windfirmness. This is accomplished by encouraging good root development. Evidence suggests that thinning must begin early in the life of a stand to be effective. (Harris, 1989). In general, loose sandy soils lead to the formation of deep, spreading root systems having few branches, whereas in dry clay soils, the root systems are shallower and less wide spreading. It has been shown that the increased exposure of trees to bending stresses has increased the growth of stems and roots in such a manner that windfirmness is increased. If trees are to be made windfirm, they should be exposed to the wind while they are still young, before the main part of height growth has been made. Young stands should be subjected to repeated crown thinning to expose them to a liberal amount of wind. The trees will develop strengthening tissues in the lower part of the stem as well as a strong supporting root system. While normal stand damage can be minimized by good silviculture, there is no way of completely preventing loss caused by gusts of hurricane force (Mergen 1954).

The roots that strengthen trees against windstorms are not the long slender feeding roots but the stout, short, horizontal or oblique roots of the bracket-angle type. Roots of this type become especially well developed on the leeward sides of trees in exposed situations. In a detailed study, Fritzsche emphasized the importance of root development on the windfirmness of trees. Fritzsche concluded from his observations that the anchoring ability of a tree is determined by the stiffness and cross-breaking strength of the roots on the leeward side and not by the tensile strength on the windward side, or the shear value of their attachment with the soil (Mergen, 1954).

The resistance of a soil to pressure, thrust, and pull varies with texture, organic matter, colloidal material and especially the moisture content. The most important physical forces determining the consistency of a particular soil are its cohesive and adhesive strength and the angle of internal friction. Non-cohesive materials, such as dry sands, anchor trees through frictional forces only and these sandy soils are most resistant when their moisture content is at or close to field capacity. Clay soils in contrast to sandy soils, exhibit their greatest cohesion when dry (Mergen, 1954).

Summary of tree factors that affect blowdown.

These are factors for trees that tend to be windfirm; (Harris, 1989).

- a) Trees are open-grown and have been exposed to storm winds throughout their life.
- b) They are dominant trees with crowns well above the average stand height.
- c) They have a tapered stem and low form class and are short.
- d) They are straight trees without lean and have a well-formed stem.
- e) They have sound roots and a sound stem with no evidence of decay or swelling on the stem.
- f) They are deep rooted on well-drained sites with soil over fractured bedrock.

These are factors for trees that tend not to be windfirm; (Harris, 1989)

- a) They are in dense stands.
- b) They have intermediate and suppressed trees and are sheltered within the stand.
- c) The stems have little taper, have high form class, and are tall.
- d) They lean, are root-sprung, are pistol-butted, have a forked top, have swelling on the stem, or have an infestation of dwarf mistletoe.
- e) They have shallow, plate like rooting, and grow where drainage is poor or on shallow soil over smooth, unbroken bedrock.

Air may move across the landscape either as laminar or turbulent. With a laminar flow, layers of air move over each other with little mixing however, in natural situations, this type of flow is rare. The most common flow is turbulent, with large-scale mixing of air from different layers, and repeated changes in the direction of the movement of the body of air. Turbulence results from friction between air and the surface or because of obstructions to a laminar flow. Turbulence can also occur as a result of convectional currents that arise from different heating of the earth's surface (Kimmins 1987).

Mountain topography produces large eddies in the lee of ridges, especially during high winds. Air flows tend to be more laminar upwind and downwind of such features; the slower the wind, the more laminar the flow in the lee area. The narrowing of valleys accelerates winds and can lead to eddying. Rough vegetation surfaces and the heating of the land surface can also give rise to turbulence (Kimmins, 1987).

As wind passes over the leading edge of a logged area, the wind drops from canopy height to move over the ground. In order to leave the clearcut again, the wind must regain its original height by rising up over the uncut stand at the downwind end of the opening. This involves some acceleration of the wind. The degree of acceleration depends upon the shape of the clearcut. Where the cut is wedged shaped with the narrow end pointing upwind, there may be little or no acceleration; the wind enters the clearcut along a narrow front and leaves on a broad front. Where the broad point points upwind, a large volume of wind enters the area along the broad front, but has only a narrow area through which it must exit. This results in an acceleration of the air mass in the same way that a broad, slow-moving river speeds up as it passes through a narrow gorge. The increased velocity increases the kinetic energy of the wind and some of this energy is transferred to the trees as the wind leaves the area. This can result in wind throw (Kimmins 1987).

On the Estacada District, it is not reasonable to assume that future blow down events can be predicted with any great accuracy. However, factors that do contribute to increased frequency and intensity are known and can be adjusted so that these factors do not enhance the probability of blow down.

Through past experience, some of the factors that enhance the possibility of blow down are as follows:

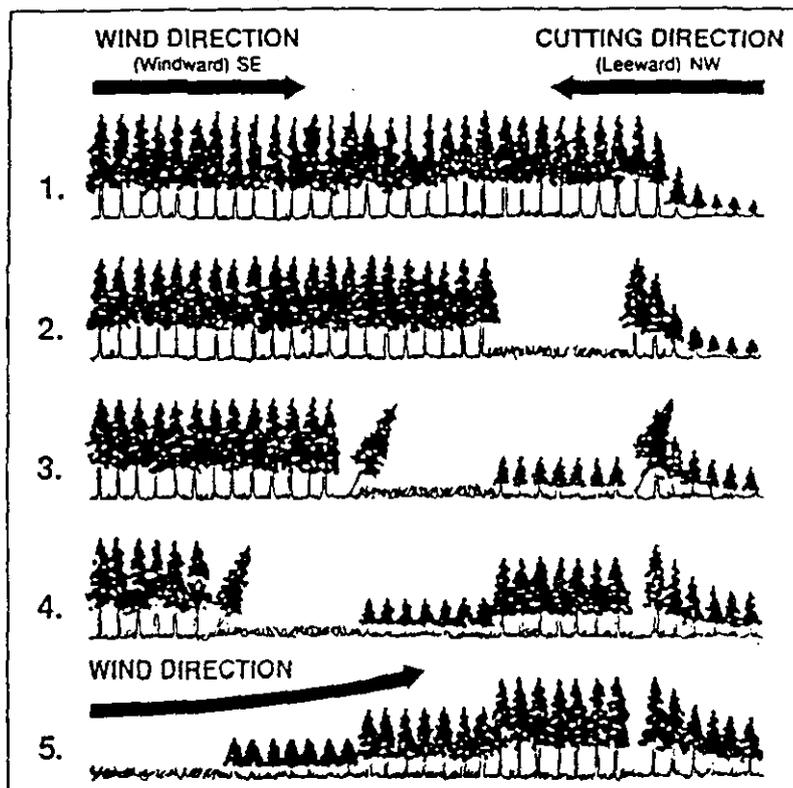
- 1) Leaving a wall of trees along a clearcut edge. This allows the wind to drop into the cleared area below the canopy layer and then the full force of the wind hits the full length of the tree.
- 2) Wide clearing limits on roads can create a wind tunnel effect where the winds are allowed to go below the canopy and be accelerated (as in a venturi) as they pass through a narrow opening among the trees. In this case, trees would up-root along the road edges and then at the end of the road or in a curve, and the winds would slam up against exposed tree boles (from district experience and Kimmins 1987).
- 3) Removal of too many trees in a thinning prescription or the removal of the dominant trees, leaving behind the suppressed and intermediate.
- 4) Allowing a diseased or overstocked stand to go un-managed. In this scenario, shallow root systems, shallow soils, and tall spindly trees with little taper are more prone to blow down (Harris 1989).
- 5) Trees growing in a wet area or along stream banks. In this instance, trees do not develop good root systems due to the high water tables. This factor combined with saturated soils makes the individual trees more vulnerable to wind than in a drier site. It also appears that as the trees grow, they reach a certain height to where the root systems cannot support the weight of the stem when these trees are exposed to intense winds or wind gusts.

Blow down occurs naturally in wet conditions however, removing trees adjacent to these wetter areas can allow the wind to go below the canopy layer and blow over the weak rooted trees. It is not presumed that these are all of the factors that can create a condition for blow down. However, from past experience both in the Eagle area and in other parts of the district, these factors are the greatest contributors.

Six general recommendations for thinning and partial cutting (Harris 1989)

- 1) Examine stands carefully for evidence of past blow down. If past damage appears to be major, partial cutting or commercial thinning may be inadvisable.
- 2) Avoid partial cutting of stands exposed to storm winds. Such stands include those on exposed sites such as saddles, ridge tops, noses of ridges, or upper leeward slopes.
- 3) Avoid excessive thinning of closed-canopy even-aged stands. Removal of more than 30 percent of the basal area is usually considered unsafe.
- 4) Thin from below to remove trees in lower crown classes or trees that are leaning, are stilt-rooted, have indications of decay, or have been damaged by logging.
- 5) Avoid damage to the residual stand.
- 6) Heavily thin young stands at an early age. If feasible, re-thin often and remove a small amount of basal area each time. Windfirmness of a stand may be increased over time if root space is provided as trees develop.

Figure #5 from (Harris 1989) provides an example of how to lay out clearcut areas to minimize blow down. Through experience in the Eagle area, this method could apply not only to clearcut units but to the shelterwood prescription too.



—Cutting is done progressively in strips, into the wind, to develop a windfirm stand border: 1—Situation shown is a stand windward of a naturally windfirm feature, in this example, a scrub-cedar stand. 2—The first strip is cut as close to the more windfirm stand as economics will allow. 3—The second strip is cut windward of first strip. Any blowdown that has occurred at the leeward edge of the uncut stand is salvaged. 4—Strips are cut to the windward; blowdown on the windward edge of uncut stand is salvaged. 5—As strip cutting continues to windward, the increasing height of the developing stand helps to lift the wind gradually, thereby eliminating an abrupt windward edge.

Forest managers in Europe have made many attempts at creating windfirm edges for the purpose of protecting the remaining residual stands (Hade 1969, Neckelman 1981 & 1982, Oto 1976). They have been unsuccessful. The edges remain intact but the stand(s) they were designed to protect were wind damaged. This also holds true from past experiences on the Estacada District.

Many recommendations for reducing losses from blowdown have appeared in literature. Most recommendations are concerned with clearcutting, especially with locating windfirm boundaries and general advice on management strategy. The recommendations are based on observation and common sense with little or no experimental data. To what extent application of these recommendations has reduced damage is not known because accurate methods of evaluation have not been devised. Field foresters should document management decisions about blowdown, periodically evaluate the results, and improve these recommendations based on their experience (Harris 1989).

The following are guidelines that could be used as a general cutting strategy (Harris 1989).

- 1) Estimate the relative risk of blowdown in a management area by mapping areas of relatively high and low hazard. The maps can be used to define the degree of management intensity appropriate for a given location.
- 2) Determine the expected direction of the damaging storm winds.
- 3) Layout clearcutting units during the first entry so that leeward cut lines that are most exposed are as windfirm as possible, and locate subsequent adjacent cutting units windward (moving towards the direction of the wind).
- 4) Plan to reduce length of rotation in areas of high wind hazard. Young, short trees are not as likely to blowdown.
- 5) When blowdown occurs along cutting boundaries, salvage only down or weakened trees and leave well-rooted damaged and un-damaged trees.

Recommendations for unit design specific to Eagle: (The following recommendations not only incorporate published data but also known physical attributes present in the Eagle and Southfork of Eagle creek drainage).

For this entry:

- 1) Avoid establishing shelterwood harvest units on exposed ridge tops or adjacent to existing clearcut units where windthrow has occurred in the past.
- 2) When shelterwood harvest units are prescribed, locate these units on drier sites, on the lee side of hills and ridges, and leave the dominant trees with good form and are in a healthy condition.
- 3) Avoid heavy tree removal with shelterwoods or thinning adjacent to riparian areas.
- 4) When thinning in areas that have been identified as having a high potential for windthrow, avoid removing more than 30% of the basal area in a particular stand.
- 5) When cutting adjacent to or at the end of roads with a history of blowdown events, leave the dominant trees that are most wind resistant.
- 6) When units are located near the wilderness boundary (area with a high windthrow potential) leave an uncut area adjacent to the boundary and gradually remove more and more basal area as the units extends down the leeward side of the hill. In either case, remove the suppressed and intermediate trees leaving the dominant types.

Effects of Implementation

Alternatives #1, 2, and 3

Each of these alternatives was designed to improve forest health. This would be accomplished by removing suppressed, intermediate, and in some cases dominant trees from the stand allowing the residual stems to increase both their crown and root systems. This increase not only provides for a healthier stand but it also improves the trees ability to withstand the wind. The ability to withstand the wind comes from an increased root mass. The action

alternatives prescribe three different silvicultural prescriptions. These prescriptions include; 1) Commercial Thinning, 2) Shelterwood harvesting, and 3) Individual Tree Selection.

Commercial Thinning: This prescription would remove a portion of the basal area within each stand. Alternative alternative #1 would affect 868 acres, alternative #2, 458 acres and alternative #3, 1,063 acres. With this silvicultural method, the tree removal would occur evenly over the entire landscape leaving a contiguous stand but with fewer trees per acre than currently exist. This action would not leave "holes" larger than 1.5 acres in the stand that would allow the wind to drop below the canopy layer. With commercial thinning, the chances of catastrophic windthrow are almost non-existent. It is expected that there would be a few trees blown over after implementation because there are pockets of root rot and individual trees with rotten boles (refer to previous text) in the stands and these trees do not have the root strength nor bole strength to withstand a storm. It should be noted that the trees with rot would fall over eventually anyway, but this treatment may accelerate the rate that these diseased trees fall. If individual trees fall over, they would be left in place for down wood and wildlife purposes. The exception to this would be if they are a hazard to public health.

In some instances, skyline corridors would exist within the residual stand. These corridors would be approximately 15 feet wide and would begin at the landing and end at the unit boundary. From past experience in the existing thinning along road 4615 skyline corridors were basically aligned east to west. These corridors did not enhance the possibility of blow down and it is expected the same would be true with Eagle.

Shelterwood : This prescription would remove the majority of the stems within a unit but would leave 20 to 50 trees per acre after implementation. Alternative #1 would affect 125 acres, alternative #2, 104 acres, and alternative #3, 129 acres. Of the three harvest prescriptions, this method of treatment has the greatest potential for blowdown. This is because the trees would be spread far enough apart that the wind could drop below the canopy layer and push against the tree boles. It is estimated that there would be blow down in these treated areas however, these units are located on drier sites and wet soils would not be a factor. To estimate which trees and how many would blow over is almost impossible. However, through past experience in this area and through general observations, it can be expected that about 10% of the trees would fall down. There are four examples (units) in the area that resemble this type of cutting. However, these examples contain fewer leave trees than is prescribed in the Eagle units. One unit is along forest road 4614 and three units are along road 4615. In these example units, the larger more dominant trees were left for wildlife and site productivity purposes. The residual trees did sustain some damage (i.e., loss of limbs and tops breaking out). However, objectives for these units were met because the majority of the trees are still standing and approximately 10% blew over. These units have been cut for approximately 3-8 years and with a few exceptions, the residual trees survived the December 12, 1995 wind storm.

The main purpose for this type of prescription is twofold. First, these affected stands are of a high silvicultural priority and this method is best for stand treatment. Second, some of these units are located next to existing clearcut units and this prescription was used due to visual concerns. These units are expected to blend in the straight line edge that was created by the existing clearcuts. These existing clearcuts have been in place for approximately 5 to 8 years. Since that time, there have been a few major storm events in the area. Other than a few individual trees, there has been no catastrophic blowdown as a result of the "wall" of trees remaining after the units were cut. Thus, other than a few individuals, it is anticipated that these shelterwood units would remain intact over the long-term due to the proven windfirmness of the residual stand. As for the other shelterwood units that are not adjacent to existing clearcuts, catastrophic blow down is not expected in these units because they are in "safer" topographically protected areas and they are located in the vicinity of existing clearcuts and catastrophic blow down has not occurred along these previously cut areas. Thus, it is estimated that the chances of blowdown as a result of this prescription is low.

In some stands, the shelterwood prescription would leave 40-50 trees per acre (verses 2 - 3 trees per acre in the existing example units described previously). This is being prescribed so that other specific resource concerns can

be addressed (e.g., visuals, canopy closure for watershed, and others). Even though this method was selected as the best treatment for these stands, leaving 20 trees per acre may be the preferred silvicultural prescription (in some instances) than leaving 40-50 trees. Due to unit placement on drier sites and due to their position on the landscape, other than a few individuals, it is anticipated that these shelterwood units would remain intact over the long-term. These shelterwood sites are not adjacent to existing clearcuts however, they are located in the vicinity of existing units and catastrophic blow down has not occurred along the clearcut boundaries. Thus, the chances of blowdown as a result of this prescription is low.

Individual Tree Selection : This prescription would remove trees in either small clumps or as individuals across the landscape. Alternative #1 would affect 37 acres, alternative #2, 0 acres, and alternative #3, 37 acres. The main purpose for this type of prescription is to improve wildlife habitat by providing a diversity of plant life both horizontally and vertically. Of all of the harvest prescriptions, this method of treatment has the least potential for blowdown. This is because tree removal is very light and the stands would remain essentially as they are over the landscape. It is estimated that there would be blow down in these stands but, it is thought that the affected trees would blow over eventually anyway (with or without treatment) because they would probably have root disease or they are in wet areas where blow down has occurred in the past. These proposed areas are in contiguous stands and are not adjacent to clearcuts.

Road Construction: Wide clearing limits along roads can contribute to blow down. The amount that could be created would depend on the size of the opening, alignment, and placement on the landscape. The action alternatives propose the construction one road totalling .85 miles and 0.35 miles of temporary road. Through past experience in the area, those roads that are aligned running east and west have the greatest potential for wind throw (e.g., 4614190). In the case of the Eagle alternatives, the road to be constructed is almost entirely within an existing clearcut. The road would be constructed in the timber only when it enters units 27 & 28. With this alignment and location, it can be anticipated that blow down would not occur along this road and no catastrophic events are predicted. The temporary roads are within harvest units and blowdown should no be a problem due to alignment.

Edge: Blow down is commonly associated with the straight line edge created after a clearcut prescription has been implemented. In the case of the Eagle alternatives, clearcuts have not been prescribed thus, no new straight line edges (or walls) would be created from this type of prescription. In the case of the action alternatives, the prescribed treatments of thinning, shelterwood, and individual tree selection would create a certain amount of edge (Refer to Significant Issue #4 for miles of newly created edge). These walls or straight line edges would be the most likely area that one would expect blowdown to occur. Of these prescriptions, the shelterwood units come the closest to creating an "edge" that could be synonymous with a clearcut. However, unit placement is such that the chances of blow down are low even with these prescriptions due to unit placement and the fact that the residual trees within these cutting areas would act as a buffer to slow the wind down before it reaches the areas where the edges are located. With thinning and group selections, it is anticipated that the *laminar flow* of wind over these stands would remain at current levels (after harvest) and would not cause or increase the turbulent flow. This is because the canopy layer would basically remain intact and wind would not be allowed to drop below the canopy layer.

Riparian Reserves (Alternatives #1 and 2): Throughout the Eagle area, there are several wet areas and intermittent streams. As has been mentioned, these areas are prone to blow down. If riparian reserves are adjacent to the thinning units, the intensity of cutting would taper up to the boundary of these areas. That is, the most intense cutting would occur at least 660' from the riparian reserve and then get lighter as it approaches the different sites. Eventually, when the prescription gets close to the reserves, very few if any trees would be removed. The riparian reserves would be 208' on either side of a non-fish bearing stream and 416' on a fish bearing stream. The thinning units would not enter these riparian reserves.

(Alternative #3): This is the one action alternative that proposes entering riparian reserves (within the 208' on either

side of a non-fish bearing stream). No timber harvest is proposed within riparian reserves of fish bearing streams. In this alternative, a light thinning would occur within approximately 100' of the affected streams. The most intense cutting would occur outside of the riparian reserve and then get lighter as it approaches the no harvest zone located at least 100' from the stream(s).

A study of blowdown has been completed for the Eagle area. This study included a search of the management records on the district and a search of available literature. In addition, field visits have verified conclusions and hypotheses that have been developed over time. Through this study, a blowdown potential map has been created for the Eagle project area (Refer to Appendix J of this document). Several of the riparian areas in the upper watershed have been given a high potential for blowdown. With alternatives #1 and 2, cutting units are not proposed that would enter the riparian areas. Thus, it is anticipated that there would be no effect by wind to these reserves. This is because only thinning would occur near the sites, thinning are more prone to withstand blowdown events, thinning would occur on dry sites, and topographic features would protect the residual stands near the riparian reserves.

Alternative #3 proposes to thin stands within riparian reserves. These thinning units would be located in the upper South Fork of the Clackamas headwaters. As indicated by the blowdown potential map, that portion of the riparian reserves near the South Fork have a high potential for blowdown. The areas outside of the riparian reserves is classified as having a moderate to low potential for blowdown. As has been discussed previously, blowdown has occurred in wet areas in the Eagle drainage in both un-managed and managed stands. The risk or potential for blowdown is relative to the amount of disturbance that is most likely to occur adjacent to these wet areas. The proposed management activity in these reserves is to remove select trees in the stand to improve health and promote late seral stand conditions (Map 4-2, Watershed Analysis). The more trees that are removed, the higher the risk for blowdown. It is estimated that with the proposed thinning prescription, the potential for blowdown would be moderate. This is because; thinning would not allow winds to go below the canopy layer, no activities would occur in the wettest portion of the riparian reserve, and topographic features would protect the residual stands.

Alternative #4 (No Action)

Under this alternative, there would be no harvest activities associated with this document or analysis. The general health of these stands are declining due to overstocking. With this condition, it can be expected that blow down would eventually occur due to tall, small diameter trees, with shallow small root systems and with root diseases that are present across the landscape. As to the amount of blow down and the time that these anticipated events would occur is impossible to predict. Additionally, blow down in the Eagle area would continue to occur (as in the past) in wet areas whether they are in a contiguous stand or near a managed stand. This is true for existing clearcuts also. Whether harvest activities continue or not, blow down could occur along existing units although it is anticipated that these events would not be catastrophic in nature (as has been shown due to the age of the existing clearcuts). (Refer to the analysis file which contains photos of existing clearcut edges and the lack of blowdown).

Cumulative Effects

Past blowdown events for the last 15 years, in the Eagle area, have been mapped. Additionally, an analysis has been conducted to determine the factors that caused these specific areas to blow over. Once the analysis was completed, a map was generated that identifies high, moderate, and low potential areas for blowdown. This potential blowdown map took into consideration published data and known causes of blow down specific to the Eagle area. These factors include:

- 1) Location in relation to ridges, saddles, or exposed points.
- 2) Location in relation to narrow draws.
- 3) Wet areas and stream courses.
- 4) Soil composition (i.e., shallow, rocky, etc.)
- 5) Past blow down events
- 6) Slope position (i.e., low down in the drainage versus near the ridge top)

7) Which way the slope faces (i.e., north, south, east, or west)

Once this analysis was complete, unit placement and prescriptions were adjusted so that the risk of blow down would be minimized.

None of the alternatives would add cumulatively to the amount of clearcut "edge" that currently exists in the area. It is anticipated that the new road would not add cumulatively to the existing road edges (except where it enters two units) and that blow down would not increase in frequency or intensity. This is due to its location and alignment. With the action alternatives, an edge of sort would be created around each of the cutting areas. For the purposes of this analysis, this edge is where a managed stand meets an un-managed stand and is not necessarily a straight line boundary between the two areas or a "wall" such as would be encountered along a clearcut edge. Additionally, with the prescriptions, these units in most cases would not allow the wind to drop below the canopy layer and hit the boles of the trees. In the case of thinning, the proposed intensity of tree removal is light and would be a thinning from below (i.e., removing intermediate and suppressed trees). Thus, because of age and the light intensity of thinning and leaving the dominant trees, it is anticipated that blowdown in catastrophic proportions would not occur. The areas with the highest probability for blowdown would be in the shelterwood units. With past experience, it is anticipated that none of the alternatives would add cumulatively to the blow down intensity of the area (number and increased size of catastrophic events). This is because the intensity of thinning and group selections would be adjusted due to blowdown risk, shelterwood areas are lower on the slope and/or are in protected areas, and riparian reserves would be established and avoided during harvest. However, the frequency of blow down in small scattered numbers could increase due to the shelterwood prescriptions.

Issue #5.1) Yew Wood

Affected Environment

The Issue: Road building and other management activities in riparian areas, may damage or up-root the existing Yew trees.

The Pacific Yew, (*Taxus brevifolia*), is a species of tree that can be found on the west side of the Cascade mountains. This tree was and still could be useful to Native Americans but has been considered a species of little value by our modern society. Within the past few years however, it has been discovered that the Pacific Yew contains a substance named "Taxol" that can be used in fighting different forms of cancer.

Due to the potential of Taxol in fighting cancer, the Forest Service has agreed to make available, quantities of Yew bark from which Taxol is extracted. In 1990, initial management guidelines were established to manage the collection of the bark while maintaining the viability of the species. In 1992, *An Interim Guide to the Conservation and Management of Pacific Yew* was developed to further aid in management of the Yew tree while preserving the species on particular sites for current and future needs other than Taxol production. In April of 1993, a document named *Interim Guidelines for Yew Harvest* was issued. This new document contains supplemental documentation for 1993 yew harvest activities until a Final Environmental Impact Statement for the Pacific yew is implemented. These 1993 guides are to be used in conjunction with the 1992 interim direction but would supersede the 1992 guides as specified. In all other areas of yew management, the March 1992 guides would apply.

In September of 1993, the Record of Decision (ROD) was signed for the *Pacific Yew Final Environmental Impact Statement* (FEIS). The scope of this decision applies to the harvest of Pacific yew for Taxol while there is a valid demand for Pacific yew biomass for use in research and treatment of cancer. This decision would be implemented only when there is a demand for Pacific yew from federal lands for Taxol (ROD, page 5). The Eagle FEIS is consistent with all applicable guides and direction.

It is known that yew trees on the Estacada District are generally found in riparian zones along streams and wet areas. In the Eagle project area, yew tree surveys were completed and a hand full of trees were located along one stream in the South Fork of Eagle Creek sub-basin. It is assumed that these trees seeded in naturally and that they are no more than 100-130 years of age. This is due to the susceptibility of the tree to damage from fire and the fire history of the area.

The preferred alternative (B), in the yew FEIS allows harvest of any part of the Pacific yew for Taxol production from timber sale units and where it might otherwise be destroyed. Timber sale units are defined as "clearcut, shelterwood, or seed tree". Pacific yew can be harvested from other areas where the yew would otherwise be destroyed. Special genetic reserves would not be established; however, all acres not committed to timber sales would function as genetic reserves. In late 1992, Bristol-Meyer, Squibb (principle recipient of Yew bark) announced that it would not be harvesting bark from National Forest lands in Calendar Year 1993 and 1994. As was announced, no yew bark was harvested in 1993 or 1994 as well as 1995 or 1996. To date, there are no known plans to harvest Yew in 1997. Though bark has not been harvested over the past several years, none of the alternatives in this document foreclose the options for bark harvest in future years.

Effects of Implementation

Alternatives #1, 2, and 3

As has been mentioned, the only yew trees that have been found were in the South Fork of Eagle Creek sub-basin

and in only one location. The action alternatives do not have a potential to affect this group of trees or their habitat because no activities are planned in or near the growing site.

It is anticipated that there would be no effect nor would there be a benefit to the yew trees present or to their habitat. This is because no roads would be constructed in riparian areas, riparian reserves would be established along streams (including the yew site), and no harvest activities are planned in or adjacent to the site. In addition, since there are so few trees in this area, yew harvest would not occur even if a harvest program were established on the district. Conversely, none of the alternatives propose enhancement or site improvement projects that could further propagate the species.

Alternative #4 (No Action)

Under this alternative, there would be no harvest activities as a result of the document. This alternative would not effect or benefit the yew trees or their habitat.

Cumulative Effects

The yew trees present in the Eagle area would not be harvested nor would they be affected by management activities. Thus, there would be no cumulative effects in relation to the harvesting of yew wood in this area or across the district. Likewise, there are no planned activities to enhance the yew trees in this area nor to affect habitat. Thus, there would be no effect cumulatively to the enhancement or propagation of the tree or its habitat in relation to the specific site, the Eagle area, or to the district as a whole. If a yew harvest program were to begin on the district, this area would not contribute yew products to the established harvest levels under any of the alternatives.

Issue #6.1) Recreation

Affected Environment

The Issue: Currently, there are areas in the Eagle drainage that contain little evidence of human activities. Commercial thinning, shelterwood harvesting, and road building could increase human presence in areas previously not accessible to general forest users. Additionally, activities could change the general character of the area (e.g., remoteness, size, evidence of humans, user density and manageability).

Overview

By managing the natural resource settings and activities which occur within it, the land manager is providing the opportunities for recreation experiences to take place. Therefore, for both the manager and the recreationist, recreation opportunities can be expressed in terms of three principle components. These components are: Setting, Activities, and Experience (For further information, refer to the Forest Service "Recreation Opportunity Spectrum Users Guide").

1) Setting

The setting can be analyzed using three different criteria. These criteria are: Physical, Social, and Managerial.

A) The physical setting can be defined by the absence or presence of human sights and sounds, by the size of the area, and by the amount of environmental modification caused by human activity. Measurement of physical setting uses the following criteria; remoteness, size, and evidence of humans.

B) The social setting reflects the amount and type of contact between individuals or groups. It indicates opportunities for solitude, for interactions with a few selected individuals, or for large group interactions. Measurement of social setting uses the criteria of "user density".

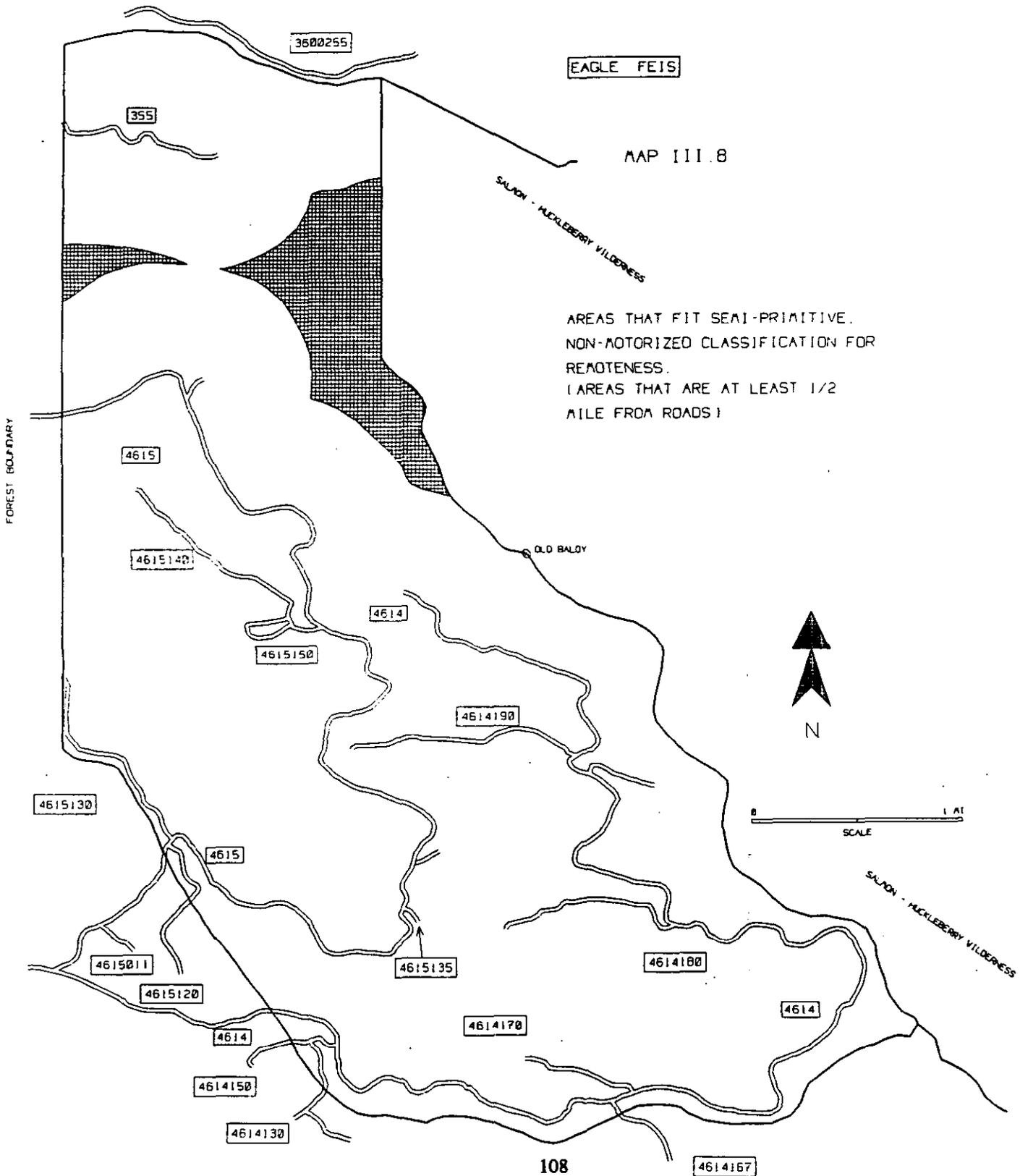
C) The managerial setting reflects the amount and kind of restrictions placed on peoples actions by the administering agency or private land owner which affect recreation opportunities. Measurement of the managerial setting uses the criteria of "managerial regimentation and noticeability".

A) The Physical setting criteria

a.1) Remoteness: Currently, there are approximately 21.9 miles of road in the Eagle project area. The majority of these roads are in the southern portion of Eagle although roads do exist along the western and northern boundaries. To be classified "semi-primitive, non-motorized", a segment of land should be at least one-half (1/2) mile from any existing road. In the Eagle area, there are two separate segments that meet this classification (Refer to map III.8). Area I is approximately 48 acres in size. Area II is approximately 313 acres in size. The remaining 6,167 acres in the Eagle project area are within 1/2 mile of well maintained roads and can be classified as "Roaded Natural".

a.2) Size: For a segment of land to meet the size criteria for "semi-primitive, non-motorized", it must be 2,500 acres in size or larger. Area I is 48 acres and is isolated from Area II and the Salmon-Huckleberry Wilderness. Thus, Area I would be classified as roaded natural. Area II is 313 acres however, it is connected to the Salmon-Huckleberry Wilderness and due to this position, meets the size classification for "semi-primitive, non-motorized".

a.3) Evidence of Humans: Currently, there are 775 acres of existing clearcuts in the Eagle area. Additionally, there are 21 miles of existing road. In the southwestern portion of the project area, is an existing 334 acre commercial thinning. To the west lies private and BLM land holdings which have been intensively managed since the 1960's. Due to these activities, evidence of human activities can be



seen over the majority of the project area. The Eagle area has been modified to the point where it would be classified as "roaded natural/rural". The exception to this classification would be the 362 acres classified as semi-primitive, non-motorized under the remoteness criteria.

B) The Social setting criteria

b.1) User Density: Within the Eagle area, there are no developed campsites and there are no developed areas of interest. Activities are of a dispersed nature and there are no current or future plans for development. There are several special interest areas however, these areas of interest would not draw large numbers of recreationists (e.g., hot springs, historic sites, etc.).

Due to the proximity to a large metropolitan area, recreational opportunities are geared around seasonal activities. Such uses include: hunting, mushroom gathering, fire wood cutting, and others. Seasonal fluctuations in visitor populations do occur with the majority of use occurring from April through October. When multiple dispersed activities do occur, there is very little conflict reported between these visitors. As an example, hunters are rarely disturbed by mushroom pickers.

The majority of recreational use is associated with accessibility provided by roads and trails which tends to concentrate these activities in certain areas. In general, the Eagle area can be classified as "Primitive". This means that during most of the year, less than 6 parties are encountered on trails and less than 3 parties are visible at dispersed camp sites. When seasonal fluctuations do occur, this area would tend to move towards the classification of "semi-primitive, non-motorized".

C) The Managerial setting criteria

b.1) Managerial Regimentation: Since there are no developed interest or use areas, there are minimal public information or interpretation facilities and there is not a large amount of regulated usage. The only apparent signs of management are; trail identification signs, road signs, and traffic control signs. Currently, recreation specialists deduce that this area is attracting an increasing number of users due to minimal regimentation and controls and due to the close proximity to population areas.

2) Activities

For the purposes of this analysis, "Activities" can be analyzed using the appropriate "Recreation Information Management System" (RIM) definition and codes. (Refer to the appendix for more information on these definitions and codes).

A) Existing Activities

The coded RIM activities that currently exist in the Eagle area are: Viewing, travel, sports/games, fishing, camping, winter sports, hunting, nature study, and gathering. (Travel includes all motorized and non-motorized land travel). No effort has been made to date to identify specifically, the number of users in each coded activity for the Eagle area. However, through reports and specific studies of road usage, estimates of the number of forest users have been calculated in general terms.

B) Potential Activities

Discussions with forest users during the public involvement process brought forth ideas that would expand recreation opportunities in and around the Eagle area. One suggestion was to consider building a "loop" trail that would connect the end of the Old Baldy trail #502 with the Eagle Creek trail #501. Another suggestion is to build a mountain bike trail "loop" that would tie roads 4614 and 4615 together. A third suggestion is to develop a horse camp near the 4614 / 4614170 road junction.

Table III.16 indicates the estimated usage in recreation visits. Numbers of visitors are estimates only. These numbers do not include administrative or commercial vehicle use.

(Table III.16) Estimated Recreation Visits

Activity	Recreation Visits	Recreation Visitor Days
Viewing	1.5 Hrs/Visit X 500 Visits = 750 Hours	750 Hrs. / 12 Hr. per Day = 63 Days
Travel (All Motorized Land)	3.5 Hrs/Visit X 2000 Visits = 7000 Hours	7000 Hrs. / 12 Hr. per Day = 583 Days
Travel (All Non-Motorized Land)	4.5 Hrs/Visit X 3000 Visits = 13500 Hours	13500 Hrs. / 12 Hr. per Day = 1125 Days
Sports/Games	1.4 Hrs/Visit X 500 Visits = 700 Hours	700 Hrs. / 12 Hr. per Day = 58 Days
Fishing	4.3 Hrs/Visit X 500 Visits = 2150 Hours	2150 Hrs. / 12 Hr. per Day = 179 Days
Camping	11.0 Hrs/Visit X 1000 Visits = 11000 Hours	11000 Hrs. / 12 Hr. per Day = 917 Days
Winter Sports	4.0 Hrs/Visit X 2500 Visits = 10000 Hours	10000 Hrs. / 12 Hr. per Day = 833 Days
Hunting	6.0 Hrs/Visit X 1500 Visits = 9000 Hours	9000 Hrs. / 12 Hr. per Day = 750 Days
Nature Study	2.7 Hrs/Visit X 500 Visits = 1350 Hours	1350 Hrs. / 12 Hr. per Day = 113 Days
Gathering	4.7 Hrs/Visit X 7500 Visits = 35250 Hours	35250 Hrs. / 12 Hr. per Day = 2938 Days

3) Experience

Experience is related to setting and activities. These values are subjective depending on the expectations and the perceived expectations of the recreational user, the land manager, or the reader of this document. For the purposes of this analysis, the lack of managerial controls in the Eagle area was considered to be an attribute that draws recreation use to the area. The general recreationist can carry out planned activities in roaded areas or in areas where human activities are not apparent. In either case, these recreationists can have the feeling of solitude, can be independent and un-inhibited, and can have a high degree of interaction with the environment without the risk of intervention by other users or managerial controls. Within this scope, the experience for the recreationist can range over several classifications. These classifications are: 1) Primitive, 2) Semi-primitive, non-motorized, 3) Semi-primitive, motorized, and 4) Roaded natural. The classification that is experienced depends on the selected activity and the chosen setting. In some cases, a forest user can experience all four classifications depending on the chosen activity. An example would be hunting.

Salmon-Huckleberry Wilderness

The wilderness is to the east of the Eagle project area and there is a common boundary between these two sections

of land. The Eagle area provides the main roaded access to trail staging sites for access to the wilderness trail systems. Access is considered part of the wilderness experience. Trail #502 parallels the wilderness and does provide viewpoints into the wilderness basin. However, trail #502 does not provide direct access to the wilderness.

Effects of Implementation

Alternatives #1 through 4

1) Setting

A) The Physical setting criteria

a.1) **Remoteness:** Currently there are 361 acres in the project area that are classified as "Semi-Primitive, Non-Motorized" (SPNM) on the Recreation Opportunity Spectrum (ROS). With the implementation of alternatives #1 through 4, these total acres would not change. This is because there would be no road construction near these segments of land. Thus, these areas would still be at least one-half (1/2) mile from any roads.

a.2) **Size:** Currently there are 313 acres that meet the size criteria for SPNM because of a common boundary with the Salmon-Huckleberry Wilderness. There would be no change, in relation to the size criteria, to these 313 acres with the implementation of alternatives #1 through 4. This is because all of the 313 acres are within a late-successional reserve that was established under the Northwest Forest Plan.

a.3) **Evidence of Humans:** Proposed alternatives #1 through 3 would modify the natural settings in the Eagle area. The affected acres are: 1,030 acres under alternative #1, 562 acres under alternative #2, and 1,229 acres under alternative #3. These modifications could be visually dominant from existing roads and from segments on trail #502A. This modification could change classifications such as "roaded natural" towards a lower classification under the ROS spectrum. Harvesting shelterwood units along; existing clearcuts could have positive effects in the future on the distinct line and form of prior clearcut units. With time, this could improve the natural setting to a visually un-noticed or subordinate human alteration.

B) The Social setting criteria

Alternatives #1 through 3 propose building one new road that would be .85 miles in length and 0.35 miles of temporary road. These roads would not allow new motorized access because they would be obliterated following use. However, this road could still be used for non-motorized recreation (hiking). Based on previous patterns of activity after road building and harvesting, recreation activities could begin to occur in places where such activities may have been non-existent. This recreation use could lead to an increase in social encounters. Though an increase in encounters is possible, it is not expected to increase to the point where the classification of roaded natural would be lowered to rural under the ROS guides.

C) Managerial

With the exception of alternative #4 (no action), on-site regimentation and controls would increase and be noticeable. The closing of roads would increase regimentation and could move the ROS classification from semi-primitive, motorized to roaded natural. This would change the attraction of the area of being a minimally controlled environment.

2) Activities

The types of existing recreation activities would not change however, the location of activities may change due to road closures. The following paragraphs describe some of the changes that would most likely occur if the action alternatives were implemented.

a) Visuals:

- a) Under alternatives #1 through 3, the new road that would be constructed could be seen from road 4614.
- b) Spectator activities would increase during the implementation of the action alternatives especially during harvest operations.

b) Travel:

- a) Off-road vehicle use could increase following harvest activities. These recreationists may utilize skid trails, yarding corridors, etc.. In resource sensitive areas, this could be discouraged through careful alignment of potential skid roads, the planting of vegetation, and the rehabilitation of these areas.
- b) New hiking and mountain biking opportunities could be created through blocking roads to motorized travel where such activities were not appealing due to vehicular noise and disturbance.

c) Fishing:

Opportunities for access to fish bearing streams are expected to remain the same under the action alternatives. This is because closed roads would be in the upper reaches of the drainage where there are no fish bearing streams.

d) Camping:

Landing sites could create new dispersed camp sites for recreation vehicles and tents. However, proposed road closures would deter motorized camping in some areas. Even though roads would be closed, these areas would still be available for non-motorized use.

e) Hunting:

Proposed harvest techniques could enhance habitat which could cause an increase in big game populations. Proposed activities could create access to more remote areas previously not easily accessible to all users. This could improve the success in sport hunting.

f) Nature Study:

Harvest activities could provide access to and enhance habitat of both plant and animal communities that were not easily accessible in the past.

g) Gathering:

Proposed harvest activities could provide access to and enhance habitat for plant species and other forest products that may not have been accessible or available in the past. (i.e., mushrooms, firewood, and others).

3) Experience

With the implementation of the action alternatives, the setting in the Eagle area would be modified in the managed areas by; an increase in the presence of human sights and sounds and by the amount of human induced change to the landscape. Opportunities for solitude would be reduced. Social encounters could increase and managerial regimentation would be more noticeable.

The type of recreational activities would not change. However, new lands could be more easily accessed by the general recreationist than before. Modification to the natural setting along roads would affect the opportunity to have a high degree of interaction with the natural environment.

Cumulative Effects

1) Setting:

Previous harvest activities have altered the landscape to the point where there are two small pockets of land available

for recreationists to experience a more primitive setting (362 acres). None of the proposed alternatives would change this total.

Currently, on the landscape, previous harvest activities dominate over the natural setting. Proposed shelterwood cutting (adjacent to clearcuts) could change the easily noticeable line and form distinction in these areas. This change would begin to move the area into a more natural appearing setting.

Recreation use is expected to increase on the district whether activities occur under this document or not. With alternatives #1 through 3, certain seasonal activities could increase. Due to this increase, the chance for social encounters would be more likely. Although increased social encounters may occur, the ROS classification would not change due to road construction since the road would be obliterated following management activities.

Implementation of alternatives #1 through 3 would increase on-site regimentation and controls. This would be through road closures and increased signing. This could change the attraction of the area of being a minimally controlled environment to a more regimented area. Recreationists looking for areas with minimal regimentation and controls may have to go elsewhere on the forest to find alternative sites to meet their needs.

2) Activities:

With the implementation of the action alternatives, activities that presently occur would not change or be eliminated. However, locations for certain activities may be changed. As an example, road closures would limit motorized use thus, historic motorized camp sites would no longer be available and new sites would have to be found. Hunting activities could be enhanced due to road closures which would reduce motorized harassment of big game. Additionally, habitat would be improved through the enhancement of, and the creation of new forage areas.

3) Experience:

Overall, implementation of the action alternatives would modify the Eagle area so that the classification for the area would tend to move closer to a roaded natural or rural classification. This would reduce the total acres on the district that would offer a more primitive experience. Recreationists may have to seek other areas either on the district or on the forest to find the anticipated experiences.

Salmon-Huckleberry Wilderness:

Management activities along road 4614 and near trail #502 could affect the wilderness experience by creating visually dominate modifications to the "setting" prior to entering the wilderness. With alternatives #1 and 3, harvest activities could change the natural setting of the affected areas and evidence of humans would be more noticeable. It is anticipated that the changes that would occur on the western slopes of the Eagle area would not be noticeable from the wilderness due to topography and vegetative screening. The one exception is that noise may be noticeable over the short-term due to management activities especially along the trails bordering the wilderness.

Currently, there are no plans under this document or at the district level for further recreational development in the Eagle area (e.g., campgrounds, trails, etc.). The rationale for this decision is; 1) There are no unique places that draw large numbers of people (i.e., Mt. St. Helens Scenic Area, white water rafting, unique vistas, etc.); 2) Recreation budgets have dwindled over the past several years and the cost of construction and maintenance is prohibitive when weighed against possible benefits; 3) Recreational usage has increased in the area over the past several years and it is anticipated to continue increasing as the populations increase in surrounding metropolitan areas. It appears that the majority of this increase is with motorized recreation with a small increase in trail usage. This motorized usage is usually on a daily basis. The only exception to this would be disbursed camping during hunting season or during periods of "gathering" (e.g., mushrooms etc.).

It is anticipated that recreational use would increase no matter what alternative is selected under this FEIS. This is because of increased population growth in the surrounding area and there are no proposals to dramatically change

the character of the area on the landscape level. At this time, the majority of recreational use involves motorized recreation. Although road closures would occur, there are no wholesale changes that would preclude motorized travel.

The number of visitors who use the local trail system has increased over the years. Although there would be some alteration of specific sites along these trails, it is anticipated that this change would not preclude the use of or detract from future use of the trails. This is evidenced by the re-routing of a portion of trail 502 in section 33. This was done in the mid-1980's and has had no known effect on historic or current trail usage.

Other Discussion Items

The next set of items deal with topics that were not raised as issues but should be discussed under this document. These discussion items include; A) Transportation, B) Cultural Resources, C) Fire, Fuels, and Air Quality, D) Noxious Weeds, E) Threatened, Endangered, and Sensitive Species, G) Biological Evaluation, and H) Effects of Flooding.

A) Transportation

The existing transportation system within the Eagle area was constructed primarily between 1965 to 1982 with the majority of the construction occurring in the 1970's. Except for loggers spurs, the majority of the roads are well constructed and maintained and have asphalt or rock surfacing. There are a few small slump failures on road shoulders on roads 4614 and 4615 and have been scheduled for repair. There are a few high "cut slopes" along road 4614 and 4615 which are susceptible to freeze/thaw induced rock fall. The total miles of road within this project area is approximately 21.9.

Each road in the immediate project area was examined through the Integrated Resource Analysis process in the original draft document. These same roads were re-evaluated through the watershed analysis that was conducted in 1995. In addition, since the planning process for this document began, these roads have been monitored to determine effects from various storm events such as the flood event that occurred in December 1995. The following paragraphs list uses and objectives for those roads that would be affected by this project. (Refer to map III.9 for road locations).

Road 4614 (Road Uses): Provide access to trails, used for dispersed recreation, and used to haul forest products. (Road Objective): Maintain the current road conditions for both the paved and gravel surface areas to continue providing access for the listed uses.

Road 4615 (Road Uses): Provide access to trails, used for dispersed recreation, used to haul forest products, and provides access to private and BLM land holdings along the western boundary.

(Road Objective): Maintain the current road conditions along that portion of road 4615 that is under Forest Service jurisdiction. This would provide access to recreational traffic as well as allowing access for other land owners.

Roads 4614130, 140, 150, and 160: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Close these roads but, maintain the road bed to avert any possible erosion hazards.

Road 4614167: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Obliterate this road to alleviate soil erosion, harassment of wildlife, and to reduce effects to trail #505.

Roads 4614170 and 180: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Close these roads but, maintain the road bed to avert any possible erosion hazards.

Road 4614187: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Maintain at current levels to provide continued access for current uses.

Road 4614190: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Close this road but, maintain the road bed to avert any possible erosion hazards.

Road 4615011: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Obliterate this road to alleviate soil erosion and harassment of wildlife.

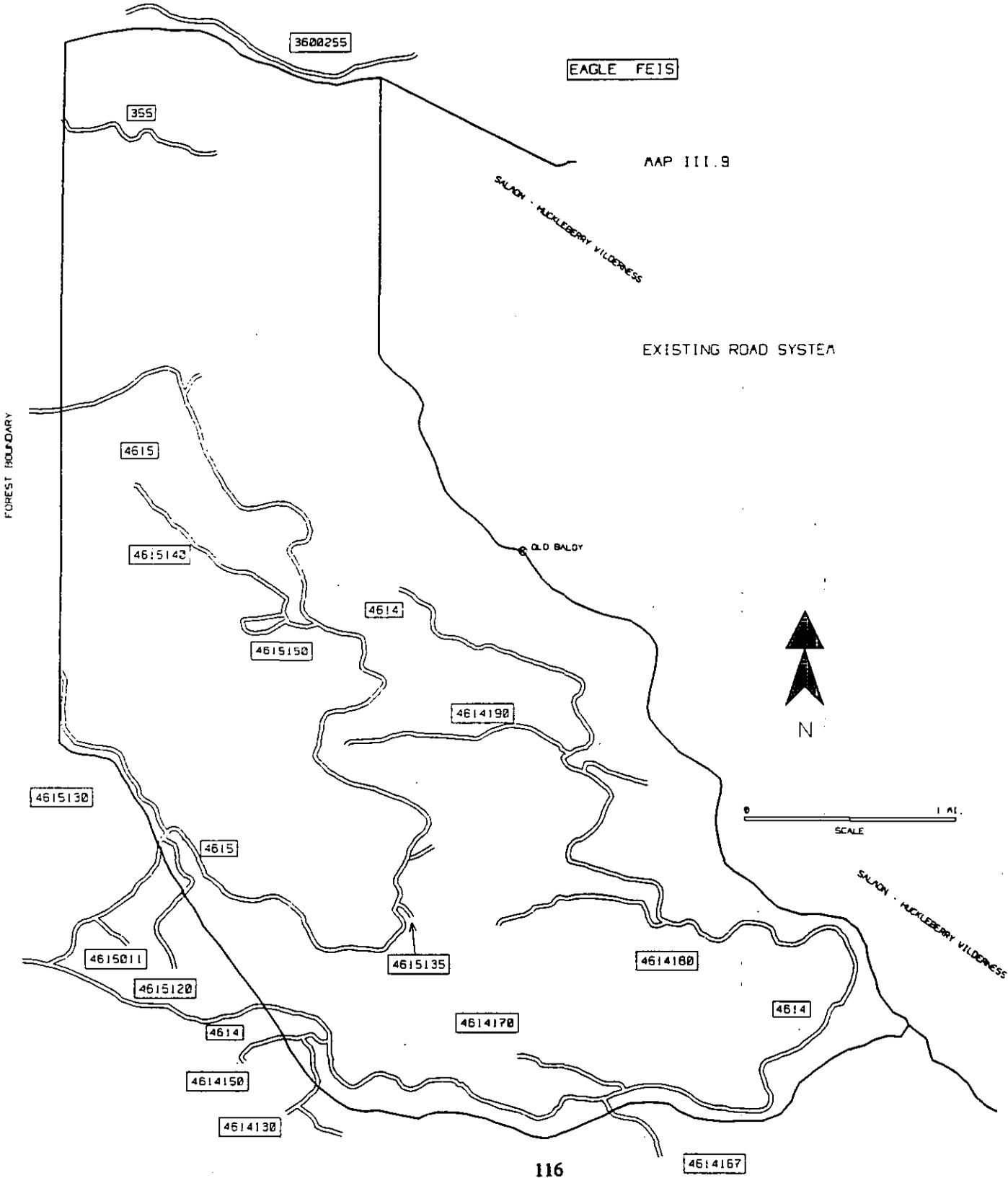
Roads 4615120, 130, and 140: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Maintain the current road conditions so that access would still be provided to a rock pit, an evaluation plantation, and to avert any possible erosion hazards.

Road 4615150: (Road Uses): Used for dispersed recreation and for hauling forest products.

(Road Objective): Maintain the road bed to avert any possible erosion hazards. However, either close the road with a physical barrier or allow vegetation to grow so that eventually the road would be impassable by motor vehicle traffic.

Road 4615135: (Road Uses): Used for dispersed recreation and for hauling forest products.



(Road Objective): Close this road but, maintain the road bed to avert any possible erosion hazards.

Two un-named loggers spurs off of 4615: (Road Uses): Used for dispersed recreation and garbage dumping.

(Road Objective): One of these spurs is partially in the LSR. Obliterate both spurs and re-vegetate to reduce effects to the watershed.

Table III.17 is a summary table that lists existing road numbers, length, surfacing, maintenance levels, and objectives.

(Table III.17) Existing Roads Data Table

Road #	Miles	Surfacing	Maintenance 1/	Objective
4614	6.00	Asphalt	3	3
	1.47	Rock	2	2
4615	4.87	Asphalt	3	3
	1.35	Rock	2	2
4614130	0.34	Rock	2	2
4614140	0.65	Rock	2	2
4614150	0.47	Rock	2	1
4614160	0.21	Rock	2	1
4614167	0.30	Rock	2	1
4614170	0.59	Rock	2	1
4614180	0.96	Rock	2	1
4614187	0.45	Rock	2	1
4614190	1.08	Rock	2	2
4615011	0.20	Rock	2	1
4615120	0.34	Rock	2	2
4615130	0.91	Rock	2	2
4615140	1.16	Rock	2	2
4615135	0.05	Natural	2	1
4615150	0.97	Rock	2	1
Un-named Spurs	0.10 Ea.	Natural	2	1

1/ A maintenance level of "1" is for a road that is currently closed or would be closed in the future however, drainage facilities would be maintained. A maintenance level of "2" is for a road that is maintained for seasonal use (e.g., dry weather log haul) but not necessarily for passenger car use. A maintenance level of "3" is for a road that is maintained for all weather use and can be used by passenger cars.

(Table III.17.1) Existing Roads Closure Table by Alternative

Roads	Alt. #1	Alt. #2	Alt. #3	Alt. #4	Total Miles
4614	---	---	---	---	7.47
4615	---	---	---	---	6.22
4614130	Block	---	Block	---	0.34
4614140	Block	---	Block	---	0.65
4614150	Block	---	Block	---	0.47
4614160	Block	---	Block	---	0.21
4614167	Obliterate	---	Obliterate	---	0.30
4614170	Block	---	Block	---	0.59
4614180	Block	Block	Block	---	0.96
4614187	---	---	---	---	0.45
4614190	Block	---	Block	---	1.08
4615011	Obliterate	Obliterate	Obliterate	---	0.20
4615120	---	---	---	---	0.34
4615130	---	---	---	---	0.91
4615140	---	---	---	---	1.16
4615135	Block	---	Block	---	0.05
4615150	---	---	---	---	0.97
Un-named Spurs	Obliterate	Obliterate	Obliterate	---	0.20

Effects of Implementation

Alternatives #1 through 3

All of these alternatives propose the construction of one road 0.85 miles in length and 0.35 miles of temporary road. This new road would be surfaced with a 3" diameter or less rock (pit run). After implementation, this road would be obliterated. The temporary roads would be surfaced with pit run and obliterated following use.

Under each of these alternatives, existing roads are proposed for closure either permanently or for certain time frames (up to 10 years). Currently, these roads have an established use. That is, repeat visitors generally use the same road system over and over again for whatever recreation activity they desire (e.g., camping, gathering, shooting, and others). If these roads are closed, it is expected that historic use would change and that new opportunities would not be developed. Conversely, with road closures, new forms of recreation may develop on these roads. As an example, a road may be used for dispersed camping where a vehicle can access a camp site.

After closure, these camp sites would no longer be accessible by vehicle thus, this form of recreation would be expected to move to other sites either in the vicinity or to other areas on the district. Conversely, a newly closed road would now afford new forms of recreation that did not appeal to the public before. As an example, mountain biking, hiking, or remote camping may now be desirable because of the chance for solitude. Since the proposed new road would be obliterated following cessation of harvest activities, there would be no chance for historic use to become established. Thus, the closure of the new road would have no effect on established activities.

Another effect of road closures is the reduced maintenance costs to the government. Over time, continued recreation traffic causes road surfacing to be displaced. Once this has occurred, the surfacing has to be re-worked or replaced. With road closures, the maintenance frequency would be reduced. Estimated maintenance rates for a gravel road with a maintenance level of "2" is approximately \$255.00 per mile. With the proposed closure of 1.42 miles of road (those roads with an objective of level 2), the cost savings could be up to \$362.00 per year. This would be a \$3,620.00 savings over 10 years (not including inflation). (Maintenance rates are estimates developed by the Supervisors Office to be used for collection purposes).

Other benefits for road closures are; reduced harassment to wildlife, reduced displacement of soils through vehicular use, fewer areas where garbage dumping can occur, etc..

Alternative #4 (No Action)

This is the no action alternative. Under this alternative, no activities would take place as a result of this document including road closures. Established use is expected to remain at current levels or perhaps increase as the numbers of forest visitors increase. Due to budget shortfalls, road maintenance dollars are becoming increasingly scarce. Due to these shortfalls, it can be expected that road surfaces would not be maintained as they have in the past. However, drainage facilities on these roads would still be maintained not only to protect the investments in the road but to also protect the watershed.

The Eagle Creek watershed analysis (WA) recommends obliteration of the first 0.7 miles of road 4614180 (WA, page 105). This recommendation is due to steep cut-banks along the uphill side of the road. In addition, continued vehicular use (both public and administrative) has worn the surfacing down so that the wheel tracks act as channels for water. When water travels down these channels, the resultant force transports the road surfacing down the road and in some cases into the ditch. A hydrologist/soil scientist was a member of the ID team for this FEIS. This scientist in conjunction with a roads engineer evaluated the site and determined that obliteration would not be necessary if certain other actions were to take place. This is because, the cut-slope probably did cause sediments to enter stream courses when it was first built however, after analyzing current conditions, material that is now entering the ditch are small rocks and chunks rather than fine material. An analysis of the ditch-line and streams in the area (both above and below the road) indicate that there has been no appreciable transport of fine sediments from this cut-slope for several years. This analysis also indicates that the small rock and chunks from the cut-slope and the rock from the road surfacing is entering the stream culvert and being transported downhill. However, the material is only being transported approximately 100 feet downhill. This culvert is approximately 3/4 of a mile from the South Fork and this coarse rock is not reaching this main stream. This is true even during high flows as evidenced by an analysis of the road system following the flood event that occurred in December of 1995. Rather than obliteration, they recommend: 1) Place more rock on the road surface of sufficient size (3/4" or bigger rock) so that it cannot be easily transported by water; 2) Crown the road surface so that water would "sheet" off both sides rather than becoming concentrated in channels; 3) Close the road to constant vehicular traffic so the road surface contour can be maintained; 4) Place barriers in the ditch-line to catch any material that may enter the channel; 5) Re-vegetate the cut-slope where possible to limit the quantity of coarse material entering the ditch. Another option would be outslope the road surface and then asphalt the first 0.7 miles so that the majority of water would sheet off over the fill-slope and would not be able to concentrate in channels on the road or in the ditch line.

Cumulative Effects

Currently, there are approximately 21.9 miles of road within the project area. Alternatives #1 through 3 would build an additional 0.85 miles of road and 0.35 miles of temporary road but these roads would be obliterated following use. The Northwest Forest Plan states; "Outside Roadless Areas - Reduce existing system and non-system road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds." (ROD, page C-7). With the implementation of the three action alternatives, funding would be available to reduce existing road mileage as well as obliterate the proposed new road. Thus, alternatives #1 and 3 would obliterate 0.70 miles of existing road and 0.85 miles of new road for a total of 1.55 miles. Once the obliterations are complete, the net road miles for this watershed would be 21.2. This is a reduction of road miles in this Key Watershed and there would be no net increase. Alternative #2 would obliterate 0.40 miles of existing road and 0.85 miles of new road for a total of 1.25 miles. Once the obliterations are complete, the net road miles for this watershed would be 21.5. Alternative #4 would not obliterate roads.

Aside from road obliteration, there would be a reduction in open road miles in this watershed. Not including obliterations, approximately 3.49 miles of existing road would be blocked to vehicular traffic under alternatives #1 and 3 and 0.96 miles would be blocked under alternatives 2.

Counting both road obliterations and road closures, alternatives #1 and 3, would close or obliterate approximately 5.04 miles of road (this total includes the 0.85 miles of new road). Thus, when implementation is complete, the total for this project area would be 17.6 miles of open road. Alternative #2, would close or obliterate approximately 2.21 miles of road (this total includes the 0.85 miles of new road). Thus, if alternative #2 were implemented, the total for this project area would be 20.39 miles of open road. With alternative #4, there would be no changes to the existing road mileage.

With these road closures, there would be fewer recreation opportunities for those activities involving a vehicle. Thus, recreationists would be required to find new locations in the vicinity or find areas on the district to accomplish the same activities. On the district, road closures are becoming more and more prevalent each year. As these closures occur, there are fewer and fewer historic recreation opportunities available to the people who use a vehicle as part of their experience. The action alternatives would add cumulatively to the total closed roads on the district. Conversely, there are limited areas where recreationists can go to enjoy activities where vehicles are not included. One such activity is mountain biking. With road closures, opportunities for biking would increase. This could be true for other forms of recreation that do not depend on a vehicle.

Road closures under this document would reduce the harassment of wildlife (except no action). This reduction would add cumulatively to the benefits of big game in the project area. In addition, road closures could add cumulatively to the general health of the watershed. This is because there is less of a likelihood that soils would be moved as a result of recreation activities or road maintenance activities. Closures would also reduce the potential for garbage dumping.

B) Cultural Resources (Heritage Resources)

Archaeological evidence throughout the western portion of Oregon indicates that the earliest human use in the Central Cascade Mountains could have occurred between 11,000 to 14,000 years ago (Burtchard 1991). Prehistoric use by American Indians is based on a limited number of historic accounts from ethnographers and travelers. This data was compiled after the traditional lifestyles of the native peoples were altered through contact with Euro-Americans. Through these accounts, the principle users of the Eagle area were the Clackamas and Molala peoples. Archaeological evidence supports the assumption that these peoples and their predecessors used this area principally for hunting, fishing, and gathering.

Historical or current use of the project area by Native Americans was also assessed through direct consultation with the Confederated Tribes of the Warm Springs and the Confederated Tribes of Grand Ronde. The tribal chairman

of the Grand Rhonde declined to give detailed information and deferred to the Confederated Tribes of the Warm Springs as the source for this information.

Meetings were held with tribal elders on the "Cultural Heritage Committee" of the Confederated Tribes of the Warm Springs on the Warm Springs Reservation and on site at the Eagle project area. These discussions revealed that the traditional encampment or rendezvous area for native Americans was west of the city of Estacada near the Clackamas River. The Eagle Creek project area is located approximately 15 miles east of this traditional meeting place. The Eagle area was used with respect to general, casual use of the up-land resources (i.e., hunting and gathering activities). The Eagle project area contains no specially notable encampments nor any ceded lands.

Euro-American historic use is estimated to have probably occurred shortly after the completion of the Barlow Road in 1845. A "Pacific Railroad" survey party led by Lieutenant Henry L. Abbot passed through the area in approximately 1855. To date, no evidence of this expedition has been found. Incidental use in the Eagle area over the last one-half (1/2) of the 1800's was primarily recreational in nature and limited to hunting and fishing. With the establishment of the National Forest system, the first permanent presence in the area was the Forest Service. Fire prevention trails and fire detection lookouts were constructed during the early part of the 1900's. One former lookout site is located within Eagle. Limited sheep and cattle grazing occurred but no sites or artifacts have been verified. Timber management and road building provided access to the area beginning in the 1960's and 1970's. Today, the primary use of the area is timber management and recreational (e.g., hunting, fishing, and gathering).

Cultural Resource surveys have been conducted within and adjacent to the boundaries of the Eagle project area over the past several years. These surveys have located a total of 7 historic sites of which 3 are within the Eagle boundaries. These figures do not represent the exact number of pre-historic or historic sites that may exist and there are probably additional sites that could be located in the future. Until formal evaluations have been completed, all of the sites are regarded as significant and eligible for inclusion on the National Register of Historic Places. To date, no pre-historic sites have been located within the Eagle area.

South of Eagle Creek, there is a travel route known as the "Bissell" trail. At one time, this trail began in the backyard of a private residence on a county road that accesses Eagle Creek. From the start of the trail, it ran across private land, BLM land, on to Forest Service land, and eventually tied into trail #502. This trail was used by the Forest Service mainly for fire prevention activities and was a supply route for guard stations. The Bissell trail also provided access for grazing. It is known that this trail was also used by recreationists but there are no records as to the actual number of visitors. As drainages were accessed by roads, trails such as Bissell were no longer needed for fire access. Additionally, the present timber stands grew to a point where forage suitable for grazing was no longer available. Thus, the Forest Service abandoned this trail and it has not been maintained for approximately 30 years. Not only was the trail abandoned because of disuse, but because private land owners had begun to cut timber between the trail head and the National Forest boundary. The trail was obliterated because of this cutting and the original tread has been lost. In conjunction with this cutting on private land, harvest activities on BLM and Forest Service land crossed this trail and further obliterated other trail segments. Today, all that remains of the trail are segments that are disconnected from each other either by roads or cutting units. These remaining segments only exist on Forest Service land. Through discussions with long-time residents, record searches, and discussions with long-time Forest Service personnel, there is no known historical significant use of this trail. In addition, this trail neither connects to or leads to points or places of historical significance.

Effects of Implementation

Alternatives #1 and 3

Three (3) historic Cultural Resource sites have been located in the Eagle area from survey efforts. Of these three, one area has the potential for disturbance as a result of harvest activities. If alternatives #1 or 3 were implemented, there would be no direct effects to the known site. This is because, although a unit with the commercial thinning

prescription surrounds the area, the site would be avoided during implementation. Thus, the integrity of the site would be maintained. Additionally, there would be no road construction near this site. Although there would be no direct disturbance from alternatives #1 or 3, disturbance could occur due to outside influences. This disturbance could occur because cutting activities would "open" the timber stand (for a short term) so that site distances would increase. Thus, increased visibility could increase the chances of vandalism, general site disturbances, and looting. If these activities were to occur, the scientific value could be lost because this is not a renewable resource.

Alternatives #2 and 4

Under these alternatives, none of the known cultural sites would be affected. This is because no road building or timber harvest would occur near these sites.

Cumulative Effects

With the proposed alternatives, none of the known historic cultural resource sites would be obliterated, disturbed, or otherwise altered through harvest activities. Thus, there would be no cumulative effects to the cultural resources in the Eagle area. However, disturbance could occur through outside influences. If these outside influences disturb the site, historic values could be lost.

C) Fire, Fuels, Air Quality

Fire and Fuels

It is widely recognized that fire has been an important disturbance factor in Pacific Northwest Forests for thousands of years (Agee 1990). The Eagle Creek drainage, along with other westside forests, are considered to be a high severity fire regime characterized by infrequent high severity fires. These fires usually result in complete to near complete stand replacement. Although fire return intervals for this type of forest is highly variable and probably could not be considered cyclical (Agee 1993), the regional average fire-return interval for the Douglas-fir zone has been estimated at 230 years (Fahnstock and Agee 1983). Surveys in the Eagle Creek drainage indicate that fires are more frequent with a return interval of approximately one-half (1/2) of the regional average. However, this area could still be considered a low frequency, high intensity fire regime.

Fire suppression and prevention efforts have been effective in this area since the turn of the century. This has probably altered the natural fire regime but to what extent, is not readily apparent. The exclusion of fire allows increased accumulations of coarse woody debris which could result in more intense fires (Kauffman 1990). Due to the length of the natural fire cycle, it is difficult to tell how significant this would be in the long term. Management activities which reduce the accumulation of fuels would increase the effectiveness of fire suppression efforts and reduce the risk of stand replacement fires. This is because the fires would be less intense and easier to extinguish.

Effects of Implementation

Alternatives #1 through 3

The timber stands in the Eagle area are declining in health and are overstocked. These stand conditions are causing mortality which is adding to the fuel loading. All of the action alternatives would reduce the risk of high intensity stand killing fires by removing trees that would eventually die, fall to the ground, and becoming fuel for a future fire occurrence. The action alternatives propose silvicultural treatments from 562 acres to 1,229 acres or from 9% to 21% of the total 6,528 acres in the project area. The fire hazard is not great and is not expected to be in the near future even with increased fuel loading. However, these treatments would provide long term benefit because there would be less fuel loading than would be expected in an unmanaged timber stand. The alternative that treats the greatest number of acres would be the most beneficial in terms of risk reduction and fire intensity.

Following timber sale activities, excess fuel (slash) would be treated by prescribed fire, where necessary, to reduce fire danger and to facilitate reforestation activities. Generally, the threshold for treatment would be in those areas

where there is slash that is greater than 15 tons per acre of material less than three (3) inches in diameter. This is the material that contributes most to fire spread and intensity (Rothermel 1983) and interferes most with reforestation. A debris prediction analysis has been done on this project and it is expected that though some burning could be prescribed, quantities would be minor (Brown and Snell 1980).

The units with a shelterwood prescription have a predicted slash loading of 8 to 21 tons per acre of material that is less than three (3) inches in diameter and a total of 10 to 23 tons per acre of all fuels. It is expected that approximately one-half (1/2) of the acres with the shelterwood prescription would be treated with prescribed fire. Aside from burning landings, these prescriptions may include some machine piling or hand piling and burning within the unit. If the terrain is too steep for these methods, burning would occur where there are concentrations. On the areas where prescribed fire is used, it is expected that 2 to 7 tons per acre would be burned.

The areas where commercial thinning would take place have a predicted fuel loading of 7-15 tons per acre of material less than three (3) inches in diameter. The only fuel treatment that is anticipated in these areas is the burning of landings and fuel concentrations along roads 4614 and 4615. It is anticipated that less than 0.5 tons per acre would be burned in these units.

Alternative #4 (No Action)

No management activities would occur under this alternative. The timber stands in the project area would continue to decline in health and would continue to be overstocked. These conditions would result in increased mortality. Eventually, these dead trees would fall to the ground adding to the existing fuel loading. Under these conditions, if a fire occurred in the future, it can be expected that an intense stand replacement fire would result.

Cumulative Effects

Lightning fire occurrence is low within the project area and none of the alternatives should have an affect.

During the implementation of management activities, there would be an increased risk of fire however, this risk would be mitigated by implementing "Industrial Fire Precaution Measures" and other requirements designed to reduce the risk of fire.

Any roads or spurs that are constructed by these alternatives would be closed following completion of management activities. In addition, some existing roads would be closed either by gates, berms, or obliteration. Overall, motorized access would be more restrictive and some areas would not be readily accessed for fire suppression activities. However, it is anticipated that human caused fires would be less likely to occur in these areas due to limited use. Conversely, with road closures, recreation activities tend to occur at the same scale only in a smaller geographic area. Thus, none of the alternatives are expected to affect the number of human caused fires but rather the location. Under current management direction, all human caused or natural fires would be aggressively suppressed.

Generally, fire suppression efforts in the Eagle project area have been effective for the last 80 to 90 years. In addition, it can be expected that they would continue to be effective under average conditions. The large stand replacement fires that occurred in the area during the last century were most likely the result of an ignition occurring during a period of extreme burning conditions. These conditions probably involved a lightning storm followed by strong east winds. There is also a possibility that this last fire could have been human caused however, there is no way of knowing the true ignition source. It is also anticipated that these conditions could re-occur in the future. A fire burning in heavy fuels during extreme conditions is probably beyond the agency's ability to suppress and would have the potential for a large stand replacement fire. This is evidenced by fires that have occurred in recent history: 1) Entiat Fire, Washington (1970), 2) Silver Fire, Oregon (1987) 3) Yellowstone, Wyoming (1988), 4) Wenatchee, Washington (1994).

The increased risk resulting from the accumulation of fuels is not easily quantified. It is suggested that in Western Hemlock/Douglas fir forests, the lowest fire intensity occurs about 100 years after stand initiation and gradually increases over time (Agee 1993). In areas of poor stand health, this increase would be more significant. The risk of a large destructive fire is currently low but would increase as fuel loading increases (Rothermel 1983).

Air Quality

The Eagle project area is located in the Eagle Creek/Southfork of Eagle creek drainages which are fairly steep and run from southeast to northwest. Elevations range from 1,500 feet where the Southfork crosses the National Forest boundary to 4,970 feet at Squaw Mountain. The majority of the project area ranges from 2,500 feet to 4,000 feet in elevation.

General weather patterns for the area are typical of the Northern Willamette Valley with fairly mild, wet winters with snow accumulations above 2,000 to 3,000 feet and generally dry summers. Prevailing winds are usually northwest to southwest with some periods of east winds mainly during late spring and fall. The topography of the area results in local up-canyon winds out of the northwest and the topography lessens the effects of southwest and east winds. Strong inversions are not common but may have an affect on the valleys to the west especially on warm summer days.

The project area is near a number of "smoke sensitive" locations. The most notable is the Mt. Hood Wilderness located twelve (12) air miles to the northeast. A portion of this wilderness is a "Class I" airshed. The remainder of the Mt. Hood Wilderness and the Salmon-Huckleberry Wilderness are "Class II" airsheds. The town of Estacada is located ten (10) air miles to the west and the Portland area is located approximately fifteen (15) air miles to the northwest. State highway 26 is located six (6) air miles to the north with highway 211 ten (10) miles to the west. Highway 26 is a major east/west route through the cascades while highway 211 connects the town of Sandy, Estacada, and Mollala. The lands to the west (off forest) are generally private timber holdings and scattered rural/residential and agricultural. The main recreational site is "Eagle Fern Park" owned by Clackamas County. This park is approximately ten (10) air miles north of Estacada and ten (10) air miles west of the project area. To the south and east is National Forest land with the Clackamas River approximately five (5) air miles to the south and Timothy Lake approximately fifteen (15) air miles to the southeast.

Existing air quality in the project area is generally good with little impact from industrial sources of pollution or wood stoves. There has been no recent slash burning in the Eagle area on National Forest lands and very little on lands of other ownership. The air quality is sometimes affected by slash burning on surrounding lands and by field burning from lands around Estacada and in the Willamette Valley.

Effects of Implementation

Alternatives #1 through 3

The primary effect on air quality from implementation of the action alternatives would be smoke from prescribed fire. Some minor effects from other contaminants such as dust and exhaust smoke can be expected but would be of short duration and confined to the immediate area.

As stated in the fire fuels section, prescribed burning may be necessary for fire hazard reduction and to facilitate reforestation. This slash treatment would occur on landings and in areas where the material is three (3) inches in diameter or less and exceeds fifteen (15) tons per acre. In areas with lighter fuel loading, disposal for hazard reduction is not necessary and site preparation for planting can be accomplished by hand methods. A post harvest review would be conducted on all units prior to any slash treatment and prescribed fire would be used only when actual conditions warrant it's use.

The Clean Air Act has established "National Ambient Air Quality Standard" (NAAQS) for certain pollutants. The primary standards that can be affected by prescribed burning are for particulate matter smaller than ten (10) microns (PM 10) and carbon monoxide (CO). Another provision of the Clean Air Act is the "Prevention of Significant Deterioration" (PSD) provisions which is intended to prevent areas with clean air from becoming polluted. Class I areas, which include wilderness areas in existence before 1977, have the tightest restrictions on additional pollution while Class II airsheds are less strict. All of the other National Forest lands surrounding the Eagle area are managed as Class II areas.

The following table compares the expected emissions for each action alternative for: 1) "Total Suspended Particulate" (TSP), 2) Particulate less than ten (10) microns in size (PM 10) (which are small enough to enter the human respiratory system), 3) Particulate less than two point five (2.5) microns in size (PM 2.5) which are particularly important for visibility and regional haze, and 4) Carbon monoxide (CO).

(Table III.18) Emissions From Prescribed Burning

Alternative	Tons Burned	*TSP	*PM 10	*PM 2.5	*CO
1	1,011	13.2	9.15	8.8	71.0
2	700	9.3	6.6	6.1	55.0
3	1,123	14.6	10.3	9.4	105.5
4	0	0	0	0	0

*Numbers Expressed in Tons

The figures presented in table III.18 represent the total amount of pollutants that could be expected over the life of the project. The burning that would be conducted would be completed over a 1 to 2 year period. Generally, prescribed burning would be conducted during the early spring. Covered piles or concentrations would be burned during the fall or winter.

With burning, carbon monoxide is produced in very high quantities. However, it is diluted very rapidly in the air (Sandberg and Dost 1990) and should not present a problem with the NAAQS except in the immediate area of the flames.

The maximum burning that would occur in a single day is expected to be equal to approximately fifty (50) acres. This would be about 250 to 260 tons of debris burned. Anticipated emissions for one day of burning are presented in table III.19.

(Table III.19) Emissions for One Day of Burning

Tons Burned	*TSP	*PM 10	*PM 2.5	*CO
250 to 260	3.2 to 3.9	2.2 to 3.0	2.2 to 2.3	17.9 to 40.9

All burning on the district is conducted during periods of good dispersion so that no violations of NAAQS for PM 10 are expected. Violations of PSD increments and failure to protect air quality related values for the Mt. Hood Wilderness could occur if burning were conducted during periods of southwest winds. There would be no effect to the Class I wilderness if burning is conducted during a northwest wind. These winds would carry the smoke well south of the wilderness. The burning of landings and covered piles may occur in the winter months, in scattered locations, and would consist of no more than 100 tons burned per day. This type of burning is done ahead of or

under the influence of a cold front or low pressure weather system with overcast skies and with precipitation. Smoke is rapidly dispersed within 1 to 2 miles from the burn site. Under these conditions, there would be no potential for violations of NAAQS in the surrounding areas or PSD increments in the Class I or II areas.

Alternative #4

This is the no action alternative. There would be no effects to air quality from projects associated with this document. Existing levels of pollution would remain the same (i.e., industrial, vehicle emissions, noise, dust, etc.).

Cumulative Effects

The greatest effect from slash disposal (burning) is the introduction of smoke into the air. Any burning can add cumulatively to existing pollution from other sources (i.e., industrial pollution from Portland, smoke from field burning, smoke from slash burning on other lands, etc.). Over the past several years, the state of Oregon has regulated the timing and duration of burning especially in the Willamette Valley area. The Forest Service complies with the state regulations and does not burn unless atmospheric conditions are favorable for such activities. When burning does occur, winds carry the smoke away from heavily populated areas so that it would not add cumulatively to existing pollution levels. Burning could also affect Class I areas (e.g., Mt. Hood Wilderness). The potential for air degradation in the Class I areas can be mitigated by burning when there is a northwest wind. When these conditions exist, smoke and pollutants would be carried far south of the Mt. Hood Wilderness. The effects of slash burning are short term (usually one to two days in duration). Due to the small amounts of slash to be burned, the short duration of effects, and compliance with state standards, smoke generated from anticipated projects would not add cumulatively to existing pollution levels in populated areas.

The greatest effects would be realized in the Class II areas immediately adjacent to the project area (i.e., Salmon-Huckleberry Wilderness and others). However, these effects would be short term (one to two days) and are expected to be insufficient to threaten local ambient air quality beyond project area boundaries.

As has been noted in previous paragraphs, fire intensity and duration would increase as fuels increase on the forest floor. If a wildfire were to begin (especially in unmanaged stands), it is expected to occur during periods of dry, hot, weather with east winds. Wildfires produce far greater quantities of pollutants than slash burning and it is expected that smoke would be pushed towards populated areas. This would add cumulatively to existing pollution levels. This is evidenced by recent fires at Estacada (Beeline and Wash Creek fires 1991). This type of event could affect ambient air quality.

D) Noxious Weeds

The proliferation of noxious weeds is inevitable in any one area given the proper living conditions for any one species. In an un-managed situation, weeds can be sown through various mechanical means. These methods include but are not limited to: 1) The transport of seed by birds and animals that travel over land for long distances. This includes deer and elk among many others; 2) Human travel on trails or during cross country travel for such purposes as hunting, fishing, or gathering and many others; 3) In a situation where the environment has been physically altered.

The most common means of weed introduction in a managed area is through road or trail construction and the implementation of erosion control measures. The seeds can be transported on heavy machinery, motor vehicles, two wheel vehicles, or mixed within grass seed used to re-vegetate bare soils. Other means of infestation are from road use by private citizens and from illegal dumping of garbage and yard debris (yard debris could include the entire plant).

Field surveys of the Eagle area have been completed and five species have been found. These plants were generally found along roads and around landings adjacent to managed stands. Along forest road 4615, the following plants

were found: Bull Thistle (*Cirsium vulgare*), Canada Thistle (*C. arvense*), Tansy Ragwort (*Senecio jacobea*), and Scotch Broom (*Cytisus scoparius*). Generally, these plants were found as either a singular plant or in groupings of up to five individuals except for Canada thistle which tended to form larger colonies. Plants that were found in managed areas were almost exclusively around landings and extending no further than 20 feet away from the landing edge.

Along forest road 4614, the following plants were found: Bull Thistle, Canada Thistle, Tansy Ragwort and Scotch Broom. In addition to these plants, St. John's Wort (*Hypericum perforatum*) was also found. Generally, these plants were found as either a singular plant or in groupings of up to five individuals except for Canada thistle which tended to form larger colonies. Plants that were found in managed areas were almost exclusively around landings and extending no further than 20 feet away from the landing edge. However, in one case near the end of the road, plants extended approximately 30-40 feet from the landing edge.

Forest road 335, is parallel to Eagle Creek and extends into the Late Successional Reserve. The same species as mentioned above were also found along this road system.

Effects of Implementation

Alternatives #1,2, and 3

As has been mentioned, noxious weeds have been found in the managed areas within the Eagle project area where soil has been disturbed. These plants most likely became established as a result of erosion control measures following management activities or through the illegal dumping of yard debris in these areas. It has been found that when these weeds do infest an area, they do not extend into the residual stands of timber but seem to prefer disturbed soils with plenty of sunlight (solar radiation).

Alternatives #1 through 3 propose the construction of .85 miles of new road and 0.35 miles of temporary road. . Additionally, these alternatives would treat different numbers of acres; alternative #1, 1,030 acres, alternative #2, 562 acres and alternative #3, 1,229 acres. The amount of soil disturbance within a particular alternative is proportional to the amount of activities proposed (acres disturbed).

The areas where soil disturbance would be most conducive to plant growth would be around landings and cut and fill slopes on new roads and on tractor skid roads. Table III.20 depicts estimates of the land area (in acres) that could be disturbed through the proposed alternatives. Due to the existing conditions, present plant locations, and assumptions, these disturbed areas would be the only places that noxious weeds would be found after harvest activities. This is because these are the only areas where plants would most likely germinate and survive.

(Table III.20) Disturbed Acres in Relation to Noxious Weeds

Alternatives	Disturbed Acres Along New Roads	Disturbed Acres on Landings	Disturbed Acres in Skid Roads	Total Disturbed Acres
Alt #1	3	19	14	36
Alt #2	3	11	9	23
Alt #3	3	21	18	42
Alt #4 (No Action)	0	0	0	0

To estimate the numbers of plants or areas that could be affected would be impractical. Suffice to say that if weeds were to propagate, the disturbed areas identified in the above table would be the most likely location. The acres

identified in the table are not all in one area but are spread out across the project area and are limited to the proposed units and new road location.

As long as disturbed soils exist, the possibility of noxious weed infestation is present. Although the Forest Service cannot prevent infestation, limiting the methods of infestation can be accomplished. Such methods may include using certified (weed free) seed during erosion control operations and ensuring that equipment used in operations are also free of weed seeds. Another method is to limit access to disturbed soil areas through the blocking or gating of roads. This action would limit the possibility of illegal dumping of lawn and garden refuse that may contain weed seeds.

Alternative #4 (No Action)

With this alternative, no new areas would be disturbed thus, the chances of introducing new populations into the area are limited. However, this does not ensure that new populations would not begin. This is because illegal dumping would most likely continue, animals would still carry seeds, and erosion control measures may be implemented to alleviate any existing soils problems (Watershed Analysis recommendations).

Cumulative Effects

If the action alternatives were implemented, it is most likely that a few noxious weeds would become established in some of the sites where disturbed soils would exist. If this were to happen, then there would be a cumulative increase in the numbers of weeds in the Eagle area. As to the numbers and exact areas where this would occur is almost impossible to predict. The greatest danger of a noxious weed infestation is that plant populations tend to take over areas and eliminate other plant life. Some of this plant life that would no longer exist in a particular spot may be beneficial to wildlife species (e.g., deer and elk). Thus, the total acres of forage for such animals would be reduced.

This document does not propose, nor are there any other documents being written that would propose eradication or control of the existing populations of noxious weeds. This is because some of the areas have been in existence for over 20 years and to date, the weeds are only limited to the disturbed areas in limited numbers and have not spread into the residual timber stands or existing openings in the residual stands. Thus, there are no epidemic nor are there expected to be any epidemic populations of noxious weeds.

Under the action alternatives, no new roads would be constructed in the Salmon-Huckleberry Roadless Area. Additionally, the majority of the harvesting would take place via aerial systems (helicopter). With this combination, the total amount of newly disturbed soil in the roadless area is minimal if non-existent. Thus, it is anticipated that the possibility of new colonies of noxious weeds becoming established from harvest activities is almost non-existent. However, there still remains the possibility of establishment through the transportation of seed via animals and cross-country travelers.

E) Sensitive Plants

Surveys were conducted for those plant species that are listed as Threatened, Endangered or Sensitive and Proposed, Threatened, Endangered or Sensitive. Within the Eagle project area, there were two sensitive plant species located in several areas. These two plants were the; *Corydalis aquae-gelidae*, cold-water corydalis and *Lycopodium selago*, fir clubmoss. Cold-water corydalis is found in or near flowing water of rivers, small streams and seeps. Fir clubmoss is found in moderately to heavy shaded areas, usually on mossy logs, rocks or soil. These plants are often at the edges of streams or other very wet areas.

With alternatives #1, 2, and 4, riparian reserves would be established along streams and wet areas where these plants would be found. Due to the distances involved between managed areas and plant locations, it is anticipated there would be no effect to the species or their habitat. There are no units located adjacent to riparian areas where these plants were found in alternative #3. Thus, under alternative #3, there would be no effect to the plants as a

result of harvest activities. In addition, mitigation measures would ensure that these plant communities would be avoided during implementation of the proposed projects. This includes any riparian enhancement projects.

Since these plants and their locations would be protected under the alternatives, there are no anticipated cumulative effects to the plants. In the case of these alternatives, there would be no reduction of plants or alteration of their habitat. Likewise, there would be no activities planned that could possibly enhance the habitat or to encourage an increase in the plant populations.

F) Animal Species of Concern

Species of concern for the Eagle project area are determined from two sources; The Region six sensitive species list and those listed as Threatened or Endangered by the U.S. Fish and Wildlife Service under provisions of the Endangered Species Act of 1973. Also discussed in this section are survey and manage C-3 species (Northwest Forest Plan) and the Great Grey Owl.

A Biological Assessment (BA) which addresses potential effects to listed threatened and endangered species including the spotted owl, peregrine falcon, and bald eagle has been completed and documented in a separate report. The BA is used for formal consultation with the U.S. Fish and Wildlife Service and is included in the analysis file for this document. The following paragraphs summarize information that was included in the BA.

Northern Spotted Owl (*Strix occidentalis caurina*)

The northern spotted owl is currently listed as threatened by the USFWS and the State of Oregon. Spotted owls have been extensively studied in the Pacific Northwest and their habitat described in detail in many publications. Most recently, in "A Conservation Strategy for the Northern Spotted Owl", (Jack Ward Thomas, et al, 1990). General habitat requirements and population discussions can be found in this reference. Northern spotted owls nest, roost, and forage mostly in mature and old growth conifer forests.

Critical habitat for recovery of the northern spotted owl was designated by the USFWS in 1992. There is no critical habitat within the Eagle project area. The nearest critical habitat is north of the Salmon-Huckleberry Wilderness (CHU OR-10). Spotted owl critical habitat would not be affected by any of the alternatives.

The upper Eagle Creek watershed was surveyed for spotted owls between 1991 and 1993. Four owl pairs were located in the wilderness or LSR. These owl pairs are greater than 1.2 miles from the project area and would not be affected by any of the alternatives. The LSR and the wilderness provide continuous habitat protection for these four owl pairs. A fifth owl pair was located outside of the project area to the south but is within 1.2 miles of the project boundary. This pair currently has 1,453 acres of suitable habitat within 1.2 miles of its home range. This project would affect 26 acres of this home range. Following implementation of the selected alternative, approximately 1,427 acres would remain as suitable habitat within the home range. Removal of this habitat would not result in a "take"² situation. The threshold for a "take" situation is when the home range acres fall below 1,182 acres. No owl pairs or 100 acre unmapped Late-Successional Reserves (LSR's) are located within the Eagle project area.

The Northwest Forest Plan has identified 1,619 acres to be managed as LSR in the northern portion of the watershed. The objective of the LSR is; in combination with other allocations and standards and guidelines, to maintain a functional, interactive, late-successional and old growth ecosystem. They are designed to serve as habitat

² Take is defined as; Significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (Sections 4(d) and 9 of the Endangered Species Act).

for late-successional and old growth species including the northern spotted owl. The Northwest Forest Plan assumes that the LSR in concert with the wilderness, would provide for the habitat needs of late seral dependent species. The combination of the LSR and wilderness in this watershed provides nearly 10,000 acres of nearly closed canopy forest. It is possible that as LSR habitat matures, it would provide habitat for additional owl pairs. However, owl populations are not expected to increase within the matrix portion of Eagle. This is because there is no un-occupied viable habitat and management objectives are not directed at encouraging the development of large, contiguous blocks of late seral habitat.

Suitable habitat is most accurately identified by structure. A general characterization of the forested habitat used by spotted owls includes the following attributes: a) Large, tall live trees with cavities; b) Broken topped trees; c) Branches capable of holding accumulated organic matter suitable for use as a nest; d) Dead standing and fallen trees; e) decaying trees and limbs to support abundant prey species; f) Dominant trees in the stand with relatively large diameters; and g) Multi-layered tree canopies with a moderate to high canopy closure in the overstory. Suitable habitat was mapped and field verified by a team of wildlife biologists. Currently, there are approximately 2,340 acres of suitable spotted owl habitat in the project area (approximately 36% of the project area).

The Northwest Forest Plan provides a long-term management strategy for the management and protection of late-successional and old growth forests and associated plant and wildlife species. This strategy is designed to maintain the long-term viability of old growth dependent species within the range of the northern spotted owl. Since the Eagle project would be implemented in a manner consistent with the Northwest Forest Plan, it is anticipated that the Eagle Project would result in a "May effect, not likely to Adversely affect" determination for the spotted owl because effects to suitable habitat are not likely to adversely affect the spotted owl. Formal consultation with the USFWS is required because the project is a major Federal action requiring an EIS.

Peregrine Falcon (*Falco peregrinus anatum*)

The Peregrine Falcon is listed as endangered by the USFWS in the lower 48 states and endangered by the State of Oregon. They are currently being considered for down-listing to threatened by the USFWS. These falcons nest on tall cliffs near large riparian areas or wetlands. The nest is a shallow scrape on a platform in a small cave or overhang with easy aerial access and visibility to surrounding forage areas. In 1994, Forest Service biologists, in cooperation with the USFWS, surveyed for potential nesting habitat. No sightings or eyries were found. No potential eyries occur within or adjacent to the project area. The closest active eyrie is over 15 miles away. Implementation of the Eagle project alternatives would have no effect on this falcon.

Bald Eagle (*Haliaeetus leucocephalus*)

Bald Eagles are listed as threatened by the USFWS and the State of Oregon. Bald eagles are occasional winter visitors to the lower Eagle Creek area but are not known to nest there. Implementation of the action alternatives would have no effect on the Bald eagle.

Candidate Species

Six candidate species may potentially occur in the Eagle project area. They include the California wolverine (*Gulo gulo luteus*), Townsends long-eared bat (*Plecotus townsendii*), White-footed vole (*Arborimus albipes*), Northern red-legged frog (*Rana aurora aurora*), Northern Goshawk (*Accipiter gentilis*), and the Harlequin duck (*Histrionicus histrionicus*). Few surveys for candidate species have been conducted. No candidate species have been found in the project area. Each of the six Federal candidate species, Category 2, are on the Regional Forester's sensitive species list and are addressed in the sensitive species biological evaluation.

C3 Species

The Record of Decision (ROD) for the Northwest Forest Plan contains a list of species to be protected through survey and management standards and guidelines. Four survey strategies are identified and described (ROD, pages

C-4, 5, and 6). These species include arthropods, mollusks, amphibians, and one mammal and are generally associated with late-successional forests. Habitat may exist within the Eagle project area. The Regional Ecosystem Office (REO) is collating location information and generating survey protocols. Of the species listed in the Record of Decision, Table C-3, only the Red Tree Vole is known to occur within the project area. Surveys of potential Vole habitat have been completed in the Eagle area. Two nest sites have been confirmed. The Red Tree Vole has a survey strategy of 2. The two nest sites would not be affected by the proposed activities because they are well away from any units or activity areas.

The Eagle area does not contain potential habitat for any of the amphibians listed in the ROD under Table C-3. As other protocols are developed, surveys may continue in the project area. A contract clause would be included that provides for the protection of any sensitive species located after project activity begins.

Great Grey Owl

The ROD for the Northwest Forest Plan prescribes protection buffers for the Great Grey Owl. These buffers are additional standards and guidelines identified in the scientific analysis team report for specific rare and locally endemic species. Surveys for this species were completed in May 1995. The habitat that was surveyed in the Eagle area was; meadows, wetlands, rock and talus slopes, and thinned stands of mature trees. Specific criteria used included: Elevations above 3,000 feet, mature stands 80+ years or older with at least some trees >21" in diameter, areas with a canopy closure of at least 60%, and areas within 1,000 feet of natural openings larger than 10 acres in size. No Great Grey owls were found within the Eagle area.

G) Biological Evaluation

Forest management activities that may alter the habitat for Threatened, Endangered, Sensitive, or proposed species are required to undergo review in a "Biological Evaluation" (BE) (FSM 2671.44 and FSM 2670.32) as part of the National Environmental Policy Act process. The BE process (FSM 2672.43) is intended to document whether proposed management actions would or would not jeopardize the continued existence or cause adverse modification of habitat for listed or proposed species or lead towards the likelihood of Federal listing. A separate report documents the BE for listed and proposed species (contained in the analysis file). The following summarizes the BE for sensitive species. The Eagle FEIS is consistent with the Northwest Forest Plan including all standards and guidelines. Due to this consistency, the project level BE process can be simplified for sensitive species whose habitat has a high likelihood of persisting through time under the Northwest Forest Plan. Only sensitive species potentially occurring in the project area are discussed. Through reviews, there is the potential that habitat for the following sensitive species may be present in or adjacent to the Eagle area:

Red-Legged Frogs:

These frogs inhabit moist forests and riparian areas typically below 2,800 ft. in elevation. During the non-breeding season, these frogs venture up to 1,000 feet from standing water in moist forest conditions.

Breeding occurs in the spring and the mating sites vary. Red-legged frogs use seasonally flooded ponds and slack water areas associated with streams and rivers. They require underwater stems or roots for egg attachment and the area must remain flooded until the tadpoles metamorphose into adults. Early embryos tolerate temperatures between 4 and 21 degrees Celsius. The time of egg deposition is closely dependant on water temperatures.

Though there have been several sightings of this species on the Estacada District, to date, there have been no sightings of this frog in the Eagle project area. However, potential habitat does occur in the area. Although this amphibian is not directly covered in the Northwest Forest Plan, its habitat needs are ensured through the implementation of the extensive network of riparian reserves. Therefore, primary habitat for the frogs would not be significantly affected by harvest under any of the action alternatives.

The alternatives would have no effect on primary habitat, individuals, or populations nor do they pose a threat to

population viability or lead toward an increased likelihood of Federal listing.

Cope's Giant Salamander

This salamander prefers forests in or near clear, cold streams and seeps, and mountain lakes and ponds. They limit their occurrence to waters with temperatures in the 8 to 14 degree Celsius range. They sometimes leave streams on wet rainy nights and can be found under logs, bark, and rocks. Courting and egg laying occurs from spring through fall. Very little is known about the adult phase of this species and this species is difficult to identify and can easily be confused with the Pacific Giant Salamander (*Dicamptadon tenebrosus*). There have been several sightings of this amphibian on the Estacada District. Two sightings have been recorded in the upper Eagle Creek watershed.

The Cope's salamander habitat needs are covered by the Northwest Forest Plan and recommendations in the watershed analysis through the establishment of riparian reserve buffers which are recommended at 208 feet from the high water mark on either side of a non-fish bearing stream and 416 feet from the high water mark on either side of a fish bearing stream (watershed analysis, page 95). Management activities would not occur in these areas except in three units in alternative #3. However, even in alternative #3, management activities would not occur immediately adjacent to the streams. Since all alternatives would be in compliance with the long-term conservation strategy, the project would have no environmental effects on habitat, individuals, or populations. This project does not pose a threat to the viability of the Cope's Giant Salamander and would not lead toward an increased likelihood of Federal listing.

Pacific Western Big-Eared Bat

This species requires caves, mines, or perhaps deep boulder fields for hibernation and reproduction. In some cases, this species has also been found in buildings. Feeding usually occurs in coniferous forests and over wet lands. Primary habitat is not known to occur in the Eagle project area.

None of the alternatives would have environmental effects on habitat, individuals, or populations of this bat and would not lead toward an increased likelihood of Federal listing.

White-Footed Vole

This animal is restricted to forests west of the Cascade crest in Oregon. Considered the rarest vole in North America, it primarily inhabits riparian areas with large saw timber and old growth. It feeds on red-alder leaves and conifer needles. There are no documented sightings of this rodent species on the Estacada District. Potential habitat can be found in the Eagle project area, especially in riparian areas. No surveys have been conducted.

Primary potential habitat for this vole would not be significantly affected by any of the action alternatives. Alder trees would not be substantially disturbed in any of the harvest areas. In addition, habitat needs for the vole are assured through standards and guidelines in the Northwest Forest Plan of which this document is consistent. Since the project would be in compliance with the long-term conservation strategy, the project would have no environmental effects on habitat, individuals, or populations. The project would not lead toward an increased likelihood of Federal listing.

Wolverine

Populations of this animal in the Cascade mountains are rare and scattered. They prefer remote timbered areas that range from 6,000 feet in elevation to above tree line. There is one un-confirmed report of a wolverine sighting on the Estacada District. The highest point in the Eagle project area is approximately 4,200 to 4,300 feet in elevation.

The project area does not provide high potential wolverine habitat due to its roaded character within the Matrix

allocation and the relatively low elevation. A higher value habitat can be found in the adjacent Salmon-Huckleberry Wilderness. The Eagle project would have no environmental effects on habitat, individuals, or populations and would not lead to an increased likelihood of Federal listing.

Northern Goshawk

The Northern Goshawk inhabits mixed to pure coniferous forests of pine, true fir, and Douglas fir. They range in elevation from sea level to timberline. Nesting habitat consists of older coniferous stands with canopy closure greater than or equal to 50% and near springs or small streams at the bottom of northeast, northwest, or north facing slopes. The project area does contain suitable habitat for this species. A field reconnaissance was completed on each proposed harvest unit and no Goshawks were discovered. Since the project would be consistent with the Northwest Forest Plan, habitat (riparian areas) would be protected and the project would not result in an increased likelihood of Federal listing.

The Harlequin Duck

The Harlequin duck is a diving bird that likes to nest along turbulent mountain streams and winters in coastal waters. Nests are located on the ground near a stream or in a hole in a tree or cliff. There are several documented sightings of this duck on the Estacada District however, only one nest site has been found. This nest site is many miles to the south of the Eagle project area. There are no documented sightings of this duck in the Eagle area although potential habitat occurs along the South Fork of Eagle Creek. Although nests can occur in snags and cliffs, most habitat needs for this species are found within the area protected through the extensive riparian reserve network. No harvest would occur in this zone with the exception of three units in alternative #3. The primary habitat for this duck would not be affected by any of the action alternatives. The Eagle project would have no environmental effects on habitat, individuals, or populations and would not lead to an increased likelihood of Federal listing.

Table III.21 provides a summary of effects for species discussed in this text.

(Table III.21) Summary of Effects to Animal Species

Species	Alternative #1	Alternative #2	Alternative #3	Alternative #4
Red Legged Frog	NI	NI	NI	NI
Copes Salamander	NI	NI	NI	NI
Pacific Western Big Eared Bat	NI	NI	NI	NI
White-footed Vole	NI	NI	NI	NI
Wolverine	NI	NI	NI	NI
Northern Goshawk	NI	NI	NI	NI
Harlequin Duck	NI	NI	NI	NI

NI = No Impact

NIIH = May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

WIFV = Will impact individuals or habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

BI= Beneficial Impact

H) Effects of Flooding

During the winter of 1995/1996, several weather related events occurred across the Northwest. Of these events, the flooding of February 1996 was the most severe. This flood was similar to the flooding that occurred in 1964 which has been called a "100 Year" event.

Generally, heavy snows fall in the Eagle area and block motorized travel on road 4614 and 4615 from mid-winter through early spring. Such was the case in the winter of 1995/1996 except that road 4615 was open during the flooding due to warmer winter air temperatures prior to this event. This flood melted a considerable amount of the snow in the upper elevations but once the event was over, a "base" still existed.

Surveys for flood damage were conducted on Forest Service lands immediately following this event and continued to progress as snow melt allowed. To date, no damage can be found along any of the road systems, drainage facilities, existing harvest units, or other areas where management has occurred. The one exception to this, is the "rutting" of road 4615011 through water flow down the running surface. This road was identified in the Eagle SDEIS as a potential sediment source and has been listed for obliteration. Following the flood event, several sites across the Forest were identified that required emergency flood repair and monies were allocated for these damaged areas. There is no damage to the road systems or drainage facilities in the Eagle area and no money has been allocated for such repairs.

Observations of stream courses indicated that high flows did occur in the various drainages in the Eagle area. Although these high flows did occur, to date, no extensive damage to the stream banks can be found and there is no evidence of scouring, down cutting, or of debris slides. All of the streams are in good condition and riparian areas are functioning as before.

Thirty-five millimeter photographs have been taken of different stream channels above and below the road systems in the Eagle area and have been included in the Analysis File.

Other Disclosures

Minority Groups, Women and Civil Rights

None of the proposed alternatives would have a direct effect on minority groups, women or civil rights. Indirect effects of alternatives #1 through 4 would be an opportunity for employment. With alternative #4, there would be no opportunity for businesses that hire minorities or women. Cumulatively, when combined with other such proposed actions, employers and business owners would have to look elsewhere for raw materials which could limit employment possibilities for minorities and women if such materials were not available.

Wetlands and Floodplains

None of the alternatives would have an effect on floodplains or wetlands.

Climate

Global changes have become a concern within the last decade. Evaluation of global climate change (effects) in a small project level document would be speculative and beyond the scope of the project. Research is being conducted on a broader scale which include the implications of forest management activities. Documents such as this one are not an appropriate means for addressing the global change issue. However, no climate changes are expected other than the brief (less than 24 hours) effect of burning on air quality as discussed under fire/fuels in this chapter.

Unusual Energy Requirements

There are no unusual energy requirements with the implementation of the alternatives with one possible exception. A portion of the proposed units could be logged using an aerial system (i.e., helicopter). As an example, a *Boeing*

Vertol, 107H, may be used in these operations. This ship consumes approximately 1,260 pounds of fuel per hour which equates to 180 gallons per hour. If roads were constructed to these helicopter units and they were logged using a conventional skyline system (instead of with a helicopter) a fuel savings could be realized. As an example, a *Thunderbird, TY 90* skyline yarder may be used in such an operation. This particular yarder would consume approximately 17.81 gallons per hour. Thus, when typical production rates are taken into account, the helicopter would require twice as much fuel to yard an equivalent amount of timber than with a skyline system.

Potential Conflicts with Plans and Policies of Other Jurisdictions

There are no known conflicts between the alternatives discussed in this document and the plans and policies of other jurisdictions. In addition to contacting state and federal agencies, the Confederated Tribes of the Warm Springs, the Yakima Indian Nation, and the Confederated Tribes of Grand Ronde were also contacted regarding this project. Meetings regarding traditional use of the area were held with the *Cultural Heritage Committee* of the Confederated Tribes of the Warm Springs at the Warm Springs Reservation and on site at the Eagle Project area.

Irreversible and Irrecoverable Commitment of Resources

An irreversible commitment of resources results from a decision to use or modify resources which are renewable only over a long period of time. The removal of rock from a rock pit at the north end of 4615130 for use as road surfacing material, is an irreversible commitment of the rock resource.

An irretrievable commitment of resources occur when opportunities are forgone for the period of time that the resource cannot be used. The road construction planned for the Eagle Creek Timber Sale is reversible because it is possible to obliterate the road and return the area to it's previously forested condition. However, the roads are not scheduled for obliteration and thus represent an irretrievable commitment of resources for as long as the roads are in place. A resource that would be irretrievably lost as a result of the commitment to road construction is an irretrievable loss of tree growth and wildlife habitat in the road corridors where vegetation is removed.

If alternative #4 were selected or in timber stands that are not managed under the action alternatives, there would be an irretrievable loss of wood fiber if dead and dying trees were left in place and not removed. In addition, there would be a irretrievable loss of wood fiber (productivity) because the timber stands would not be released and would not be growing at the full site potential.

Probable Adverse Environmental Effects Which Cannot be Avoided

There would be erosion and some sedimentation from exposed soils as a result of road and landing construction in the short-term until vegetation can re-grow (e.g., grasses, shrubs etc.).

There would be a short-term effect (usually 24 hours) on air quality if there are any slash disposal activities (i.e., prescribed burning).

There would be a temporary displacement of wildlife populations during timber harvest and road construction. This is usually caused by noise and other activities. Once timber harvest has been completed, the affected animals are expected to move back into the area.

Disturbance and sedimentation would be a short term effect while the lack of vegetation in the clearing area for the road would exist as long as the road is in place. However, the proposed road does not cross riparian reserves or streams or wet areas, thus, there is no transport mechanism that would move eroded soil to the water courses.

Temporary deviations in the visual quality objectives along trail viewsheds could occur in the short term, until ground vegetation is re-established.

Prime Farm Land, Rangeland and Forest Land

The Mt. Hood National Forest does not contain prime farm lands or rangelands. *Prime* forest land is a term used only for non-federal land and does not apply to lands within the National Forest System.

Summary Table of Effects

The following table is a comparison of the alternatives in relation to environmental consequences. This section is in table form with the significant issues on the left column and alternatives across the top row.

(Table III.22) Comparison of Alternatives

Alternatives --> Issues	Alternative #1 Treat 1,030 Acres	Alternative #2 Treat 562 Acres	Alternative #3 Treat 1,229 Acres	Alternative #4 No Action
1) Activities that disturb soil and manipulate vegetation may increase stream sediment loading, stream temperatures, and alter the timing and size of peak flows.	The ARP for Eagle Crk. would be; 94.9. For the South Fork; 85.4. Both streams combined; 92.3. No activities would occur in riparian reserves. Temp. increases would not occur. Effects would not be noticeable at the fish hatchery. The overall watershed ARP would be 65.8.	The ARP for Eagle Crk. would be; 94.9. For the South Fork; 85.6. Both streams combined; 92.3. No activities would occur in riparian reserves. Temp. increases would not occur. Effects would not be noticeable at the fish hatchery. The overall watershed ARP would be 65.8.	The ARP for Eagle Crk. would be; 94.9. For the South Fork; 85.6. Both streams combined; 92.3. Management would occur in riparian reserves. Temp. increases would not occur. Effects would not be noticeable at the fish hatchery. The overall watershed ARP would be 65.8.	This is the no action alternative. The ARP for Eagle Crk. would be; 94.9. For the South Fork; 87.5. Both streams combined; 94.9. Management would occur in riparian reserves. Temp. increases would not occur. Effects would not be noticeable at the fish hatchery. The overall watershed ARP would be 65.8.
2) Harvest activities could reduce, alter, or eliminate some existing roadless area characteristics in the Eagle area.	Under this alternative there would be a reduction of 505 ac. that meet natural integrity and 0 change in acres that would affect solitude/primitive recreation opportunities.	Under this alternative there would be a 0 reduction of acres that meet natural integrity and 0 change in acres that would affect solitude/primitive recreation opportunities.	Under this alternative there would be a reduction of 505 ac. that meet natural integrity and 0 change in acres that would affect solitude/primitive recreation opportunities.	This is the no action alternative. No harvest activities would occur. There would be no changes to the existing roadless characteristics from the current conditions.

Alternatives --> Issues	Alternative #1 Treat 1,030 Acres	Alternative #2 Treat 562 Acres	Alternative #3 Treat 1,229 Acres	Alternative #4 No Action
<p>3) The Eagle Creek planning area has the potential to supply wood products as well as employment opportunities to the local economy. Receipts from timber harvest would fund local schools and return revenues to the U.S. Treasury.</p>	<p>Under this alternative, 26.4 MMbf would be harvested. As a result, 713 jobs would be supported, \$42.2MM of income would be generated, \$6.3MM would be generated in taxes, and \$3.2MM would go to counties.</p>	<p>Under this alternative, 15.8 MMbf would be harvested. As a result, 427 jobs would be supported, \$25.3M of income would be generated, \$3.8MM would be generated in taxes, and \$3.0MM would go to counties.</p>	<p>Under this alternative, 30.8 MMbf would be harvested. As a result, 832 jobs would be supported, \$49.3MM of income would be generated, \$7.4MM would be generated in taxes, and \$5.9MM would go to counties.</p>	<p>This is the no action alternative. This alternative would harvest 0 MMbf. As a result, 0 jobs would be supported, \$0 of income would be generated, \$0 would be generated in taxes \$0 would go to counties or the U.S. Treasury.</p>
<p>4) Harvest activities could reduce, alter, or eliminate the ability for treated stands to provide habitat for a variety of organisms. In addition, ecosystem productivity could be reduced and connectivity could be disrupted between the late successional stands of timber</p>	<p>Owl habitat would be reduced by 126 ac., Interior habitat would be reduced by 1,044 ac., Approx. 111 ac. of mature forest would be converted to grass/forb., Approx. 4 to 5 miles of edge would be created. There would be no loss of viability for dependent species, Approx. 11,446 Ac. of interior habitat would remain at the landscape level, guidelines for Matrix would be met.</p>	<p>Owl habitat would be reduced by 126 ac., Interior habitat would be reduced by 460 ac., Approx. 91 ac. of mature forest would be converted to grass/forb., Approx. 4 to 5 miles of edge would be created. There would be no loss of viability for dependent species, Approx. 12,030 Ac. of interior habitat would remain at the landscape level, guidelines for Matrix would be met.</p>	<p>Owl habitat would be reduced by 221 ac., Interior habitat would be reduced by 1,115 ac., Approx. 145 ac. of mature forest would be converted to grass/forb., Approx. 4 to 5 miles of edge would be created. There would be no loss of viability for dependent species, Approx. 11,375 Ac. of interior habitat would remain at the landscape level, guidelines for Matrix would be met.</p>	<p>Owl habitat would remain at 2,285 Ac., Interior habitat would remain at 2,100 ac., Mature forest would remain at 1,435 Ac., There would be no change to the 26 miles of existing edge. There would be no loss of viability for dependent species, Approx. 12,490 Ac. of interior habitat would remain at the landscape level.</p>

Chapter V Public Participation

This chapter discusses the public participation process that occurred just prior to and during publication of the Eagle Supplemental Draft Environmental Impact Statement (SDEIS).

The mailing list for the SDEIS was the same as the one used for the DEIS however, this mailing list had not been updated for three years. Thus, the ID team for Eagle mailed an "interest" letter to all of those individuals, organizations, and businesses who received the DEIS but did not respond during the public comment period that ended in September of 1993. If these interest letters were returned to the Ranger District, then a copy of the SDEIS was sent to the respondent. All of those individuals who responded to the DEIS automatically received a copy of the SDEIS. All of the individuals, agencies, organizations, and officials who received the SDEIS will automatically receive the FEIS and the resulting Record of Decision.

From the outset, articles updating the public on the progress of the Eagle project have appeared in the Mt. Hood National Forest quarterly publication "Sprouts". In addition, notices have appeared in the Federal Register. A notice of availability for the SDEIS appeared in the Federal Register on May 24, 1996.

Copies of the SDEIS were sent to:

- 27 Federal Agencies
- 14 State Agencies
- 3 Local Government Officials
- 2 Native American Organizations
- 12 Businesses and Organizations
- 31 Individuals

The following is a list of agencies, organizations, and persons to whom copies of the SDEIS were sent. (The number at the end of each listing depicts how many copies were provided).

Federal Agencies

Advisory Council on Historic Preservation
Western Office of Review, Golden, Co. (1)

U.S. Department of Agriculture
OPA Publication Stockroom, Washington D.C. (1)
Animal & Plant Health Inspection Service, Riverdale, MD (1)
Office of Equal Opportunity, Washington D.C. (1)
National Resource Conservation Service, Washington D.C. (1)
National Agricultural Library, Beltsville, MD (3)

Department of Commerce
National Marine Fisheries Service, Portland, OR (1)

Department of Defense
U.S. Army Engineers Division, Portland, OR (1)
U.S. Navy, Washington D.C. (1)
Naval Oceanographic Division, Washington D.C., (2)

Department of Energy

Director of Environmental Compliance, Washington D.C. (3)

Environmental Protection Agency

Office of Environmental Review, Washington D.C. (5)

Office of Federal Activities, Washington D.C. (5)

Environmental Protection Agency, Seattle, WA (5)

Federal Aviation Administration

Office of Regional Administrator, Renton, WA (2)

Federal Energy Regulatory Commission

Advisor on Environmental Quality, Washington D.C. (1)

Federal Highway Administration

Region 10, Regional Administrator, Portland, OR (1)

Federal Railroad Administration

Office of Transportation and Regulatory Affairs, Washington D.C. (1)

Research and Special Program Administration, Washington D.C. (1)

General Services Administration

Office of planning and analysis, Washington D.C. (2)

U.S. Department of Housing and Urban Development, Portland, Or (1)

U.S. Department of the Interior

Office of Environmental Affairs, Washington D.C. (18)

Interstate Commerce Commission,

Chief, Energy and Environment, Washington D.C. (1)

Northwest Power Planning Council, Portland. OR (1)

U.S. Department of Transportation

Assistant Secretary for Policy, Washington D.C. (2)

U.S. Coast Guard, Environmental Impact Branch, Washington D.C. (2)

Pacific Northwest Region

Environmental Coordination, Portland, OR (15)

Oregon State Agencies

Department of Fish and Wildlife, Portland (1)

Department of Parks and Recreation, Salem (1)

Department of Water Resources, Salem (1)

Division of State Lands, Salem (1)

Department of Energy, Salem (1)

Department of Geology and Mineral Industries, Portland (1)

Department of Environmental Quality, Portland (1)
Department of Land Conservation and Development, Salem (1)
Economic Development Department, Salem (1)
State Economist, Salem, (1)
Department of Human Resources, Salem (1)
Department of Agriculture, Salem (1)
Forestry Department, Salem (1)
Governor's Forest Planning Team, Salem (1)

Local Government Officials

Clackamas County Board of Commissioners, Oregon City (1)
Chamber of Commerce, Estacada/Clackamas River Area (1)
City of Estacada, Mayor, Estacada (1)

Native American Organizations

Confederated Tribes of the Warm Springs, Warm Springs, Oregon (1)
Yakima Indian Nation, Toppenish, Washington (3)

Businesses and Private Organizations

Avison Timber Company, Molalla
Black Helterline, Portland
Bogle and Gates, Portland
Clackamas County Library, Estacada
Columbia Helicopters, Portland
International Archaeological Research Institute, Honolulu, Hawaii
James River Corporation, Camas, Washington
Northwest Forestry Association, Portland
Northwestern University, Illinois
O'Neal Forest Products, Wilsonville
Oregon Natural Resources Council, Oregon
Vanport Manufacturing, Oregon

Individuals

Blowers, J., Portland
Collins, B., Portland
Connor, M., Portland
Corkran, D., Portland
Crook, J., Sandy
Davis, J., (USFWL), Portland
Day, M., Portland
Denniston, S., Lake Oswego
Ehlin, J., Lake Oswego
Gardiner, C., Portland
Gorton, M., Portland
Haley, D., Gresham
Himes, J., Aloha
Hynes, D., Clackamas
Jones, M., Rhododendron
Kerr, R., Polebridge, Mt

Kinnaman, A., Woodburn
Kish, G., Portland
Lee, N., Estacada
McCullough, B., Estacada
Merritt, R., Portland
Owens, J., Portland
Poppino, J., Milwaukie
Rana, A., Oregon City
Reed, S., Bellingham, Wa
Reisch, D., Mollala
Schenck, R., Portland
Thompson, O., Salem
Treepainer, L., Madison, WI
Vingerhoet, D., Beaverton
Williams, M., Sandy

The comment period for the SDEIS was 45 days which began on May 24, 1996 and ended on July 8, 1996. Beginning on July 1, several "form" letters/postcards were received from individuals that were not on the original mailing list described above. These postcards demanded a cumulative effects study on previous logging and road building and that the comment period be extended by 30 days. In addition, a few individual letters asked for an extension of the comment period. A watershed analysis completed in 1995 analyzed cumulative effects for the entire Eagle Creek Watershed (this analysis was on all land ownerships from the headwaters to the confluence with the Clackamas River). In addition, a cumulative effects analysis was completed for the action alternatives in the SDEIS. The Deciding Officer was apprised of the comments and the decision was made to not extend the comment period due to a lack of substantive evidence.

By the end of the comment period (July 8, 1996), the Forest Service had received 18 letters from agencies, organizations, or individuals. In addition, 97 "form" letters/postcards were received, of which some respondents sent more than one copy. Each letter contained one or more individual comments. All of the postcards had the exact same comments.

Three (3) letters were received from federal agencies.
No (0) letters were received from state agencies
One (1) letter was received from Native American Organizations
Five (5) letters were received from businesses and organizations
Nine (9) letters were received from individuals and 97 postcards were received.

The following is a list of agencies, organizations, and persons who responded and made comment on the SDEIS.

Federal Agencies:

United States Department of the Interior, Fish and Wildlife Service
United States Environmental Protection Agency, Region 10

Oregon State Agencies:

No Comments

Native American Organizations:

The Confederated Tribes of the Warm Springs

Businesses and Private Organizations:

Audubon Society of Portland
Columbia Helicopters, Inc.
Northwest Forestry Association
Oregon Natural Resources Council

Individuals:

Nine individuals responded with letters and 97 postcards were received. For the sake of privacy, names have not been included in this section.

The Eagle Interdisciplinary Team (IDT) has considered and responded to all substantive comments received on the SDEIS. Substantive comments are those remarks that provide factual information, professional opinion, or informed judgement about the proposed project(s). Once all substantive comments were considered, the ID team had several options to choose from on how they would proceed with the development of the SDEIS. These options were:

- 1) Modify the alternatives presented in the SDEIS.
- 2) Develop and evaluate new alternatives for the SDEIS.
- 3) Supplement, improve, or modify the analysis.
- 4) Correct factual errors.
- 5) Identify where in the final document the comment is addressed. If appropriate, explain why the Forest Service position is maintained in the Eagle SDEIS.

At the beginning of the evaluation of comments, each response letter was given a number. Substantive comments were hi-lighted in each letter and then given a number. The substantive comments were then categorized into different subject areas.

As an example, a comment may have a number designation (106 / 2 / 03 and 10). In this example, the first number refers to letter #106, the second number is the number of the comment (comment #2 in the letter), and the last numbers identify the subject code. In this example, subject areas 3 and 10.

Copies of the individual letters received are in Appendix I of this Final Environmental Impact Statement.

Response to Comments

Once the Interdisciplinary Team assigned numbers to the letters, identified substantive comments, and categorized the comments, responses were generated. These comments and responses to the comments are contained in Appendix I of the FEIS.

FEIS

Copies of the FEIS are to be sent to:

- 27 Federal Agencies
- 14 State Agencies
- 3 Local Government Officials
- 2 Native American Organizations
- 12 Businesses and Organizations
- 102 Individuals

As previously stated, 97 form letters/cards were received that stated exactly the same thing. Not all of these cards had return addresses and in some cases, individuals sent multiple copies. In one instance, the address was not readable. Those individuals who did not provide an address or the address was not readable, will not receive an FEIS unless they request it in the future. If multiple responses were sent, the respondent would only receive one initial copy of the FEIS.

Index

Affected Environment (36, 53, 62)
 Aggregate Recovery Percentage (38)
 Air Quality (115, 122, 124-126, 134, 135)
 Alternative #1 (1, 2, 17, 20, 35, 48, 49, 53, 54, 64, 69, 76, 77, 84-86, 90-92, 94, 95, 101, 102, 111, 127, 133, 137)
 Alternative #2 (1, 2, 22, 25, 35, 48, 50, 51, 53, 54, 62, 69, 76, 77, 83, 84, 86, 90, 94, 95, 101, 102, 111, 120, 127, 133, 137)
 Alternative #3 (1, 2, 26, 27, 34, 35, 46, 48, 51-54, 69, 76, 77, 84-86, 90-92, 94, 95, 101-103, 111, 127, 128, 132, 133, 137)
 Alternative #4 (15, 30, 32, 35, 48, 50, 52-54, 68, 69, 76, 77, 84, 92, 94, 95, 103, 106, 111, 119, 120, 123, 126, 128, 133-135, 137)
 Alternatives Considered but Eliminated from Detailed Study (14)
 Best Management Practice (15, 32)
 Biodiversity (71, 73)
 Biological Evaluation (48, 115, 130, 131)
 C3 Species (130)
 Clearcut (1, 7, 12, 13, 17, 21, 25, 27, 30, 37, 40, 45, 49-51, 58, 62, 71, 86, 96, 98-105, 111)
 Commercial Thinning (6, 7, 12, 13, 17, 22, 26, 30, 46, 47, 49-51, 58, 62, 77, 83, 84, 86, 87, 89-91, 99, 101, 107, 123)
 Cumulative Effects (2, 8, 36, 37, 46, 53, 68, 69, 90, 106, 122, 142)
 Decisions to be mad (8)
 Deer and Elk Habitat (12, 94, 95)
 Desired Future Condition (3, 5, 46, 79)
 Ecology (14)
 Edge (11, 13, 34, 43, 62, 71-73, 76, 83, 84, 96, 98, 101, 102, 104, 127, 138)
 Effects of Implementation (61, 68, 83, 122, 124)
 Existing Condition (5, 14)
 Features Common to all Action Alternative (15)
 Fish Habitat (9, 36, 41, 51)
 Flooding (115, 134)
 Forest Health (5, 12, 85, 91, 92, 100)
 Fragmentation (72, 73)
 Fuels (115, 122-124, 126, 134)
 Fungi (85, 86)
 Individual Tree Selectio (6, 16, 17, 26, 48, 49, 62, 63, 84, 87, 89, 91, 101, 102)
 Issues (9, 11, 14, 15, 30, 35, 38, 54, 79, 115, 137)
 Legal Description (1)
 Local Economy (6, 10, 17, 22, 26, 30, 66)
 Mitigation Measures (8, 14, 16, 32, 34, 47-51, 70, 83, 129)
 Native Americans (105, 120, 121)
 Need (1, 5, 6, 14, 16, 17, 22, 26, 30, 35, 88)
 Noxious Weeds (2, 115, 126-128)
 Objective (5, 6, 17, 20, 22, 26, 31, 71, 76, 82-84, 87, 94, 115, 117, 119, 129)
 Other Issues (11, 79)
 Proposed Action (5, 6, 8, 14, 15, 17, 22, 66, 85, 86)
 Purpose and Need (5, 35)
 Recreation (1, 2, 10, 13, 55, 58, 59, 63, 64, 66, 81, 107, 109-115, 117-120, 123, 140)

Riparian (1, 3-6, 8, 13, 17, 22, 26, 30, 34-38, 41, 43, 45-53, 67, 71-73, 77, 79, 85, 86, 91, 92, 96, 100, 102-106, 128-135, 137)
Roadless (1, 4, 7, 8, 10, 16, 20, 25, 27, 35, 55, 58, 59, 61-65, 120, 128)
Salmon-Huckleberry Wilderness (1, 3, 7, 10, 11, 36, 39, 44, 55, 59, 65, 77, 79, 92, 93, 107, 110, 111, 113, 124, 126, 129)
Scoping (8, 61)
Sediment (2, 6, 9, 10, 17, 22, 26, 30, 33, 36, 37, 39-41, 46, 47, 50-52, 134)
Shelterwood (6, 13, 16, 17, 22, 26, 30, 48-51, 62, 81, 83, 84, 86-91, 99-102, 104, 105, 107, 111, 113, 123)
Spotted Owl (1, 3, 11, 38, 54, 55, 72, 73, 76, 78, 129, 130)
Temperatures (9, 10, 34, 36, 37, 41, 43-47, 131, 132, 134)
Trails (1, 3, 11, 12, 15, 17, 26, 32-34, 49, 51, 52, 58, 59, 79, 81, 82, 84, 86, 109, 112-115, 121, 126)
Unusual Energy Requirements (134)
Visual Quality (11, 12, 17, 20, 22, 26, 79, 81-84, 135)
Vole (130-133)
Water Quality (3-5, 9, 15, 32, 36, 37, 44, 46-48, 51, 52)
Watershed Analysis (1, 4, 6, 14, 15, 17, 22, 26, 30, 34, 36, 39, 40, 43-46, 48, 49, 51, 52, 67, 76, 83, 87, 103, 115, 119, 128, 132, 142)
Windthrow (12, 13, 39, 47, 48, 85, 90, 96, 100, 101)
Wood Products (5, 10, 11, 66, 68, 69)
Yew Wood (13, 105, 106)

Glossary of Acronyms and Terms

A

AGGREGATE RECOVERY PERCENTAGE--A means of describing hydrologic recovery for a watershed. It is based upon research which relates the amount of harvested area to the occurrence of rain-on-snow induces peak streamflows. It is an index. (Christner and Harr 1982)

AIR CONTAMINANT--A dust, fume, gas, mist, odor, smoke, vapor, soot, pollen, carbon, acid, or particulate matter or any combination thereof. (NFES NO. 1279)

AIR QUALITY RELATED VALUES (AQRV)--1. Those features or properties of a Class I area that made the area worthy of designation as a wilderness and that would or could be adversely affected by air pollution. Any physical, chemical, or biological component of an ecosystem that can be affected by changes in air pollutant levels. As an example: visual range as measured from a vista may be shortened by the presence of fine particulates in the air. Similarly a threatened or endangered plant species may be sensitive to sulphur dioxide levels.

2. A feature or property of an area that is affected in some way by air pollution. Examples include visibility, odor, flora, fauna, soil, water, geologic features, and cultural resources. (PNW FEIS 1988)

AIRSHED--1) A geographical area that, because of topography, meteorology, and climate, shares the same air. (LMRP)

2) A term denoting a geographical area, which, because of topography, meteorology, and climate, shares the same air mass. (PNW FEIS 1988)

AMBIENT--1. Referring to surrounding, external, or unconfined conditions; (C.F.S.) 2. Referring to the quality of some specific environmental factor such as the "ambient" temperature or "ambient" air pollution levels. (C.F.S.); PSW-13/1976

ARP--An abbreviation of Aggregate Recovery Percentage.

AMENITY--An object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value is typically used in land use planning to describe those resource properties for which market values (or proxy values) are not or cannot be established. (LMRP)

ANADROMOUS FISH--Those species of fish that mature in sea and migrate into streams to spawn. Salmon, steelhead, and shad are examples. (LMRP)

AQUATIC ECOSYSTEMS--Stream channels, lakes, marshes or ponds, etc., and the plant and animal communities they support. (LMRP)

AQUATIC HABITAT--Habitat directly related to water. (LMRP)

AQUIFER--A geologic formation or structure that contains and transmits water in sufficient quantity to supply the needs for water development. Aquifers are usually saturated sands, gravel, or fractured rock, etc. (LMRP)

B

BACKGROUND--The visible terrain beyond the foreground and middleground where individual trees are not visible but are blended into the total fabric of the forest stand (see Foreground and Middleground). (LMRP)

BASAL AREA--The cross-sectional area of a stand of trees measured at breast height. The area is expressed in square feet. (LMRP)

BENEFIT--The results of a proposed activity, program or project expressed in monetary or nonmonetary terms. (LMRP)

BENEFIT-COST RATIO--Measure of economic efficiency computed by dividing total discounted primary benefits by total discounted economic costs. (LMRP)

BEST MANAGEMENT PRACTICES (BMP) --A practice or combination of practices that are the most effective and practical (including technological, economic and institutional considerations) means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals. (LMRP)

BIOLOGICAL DIVERSITY--refers to the number of different species in the community (Kimmins 1987).

BIOLOGICAL GROWTH POTENTIAL--The average net growth attainable in a fully stocked natural forest stand. (36 CFR 2193) (LMRP)

BIOLOGICAL POTENTIAL--The maximum production of a selected organism that can be attained under optimum management. (Thomas 1979)

BIOMASS--The total quantity (at a given time) of living organisms of one or more species per unit of space (species biomass), or the total quantity of all the species in a biotic community (community biomass). (LMRP)

BREAKS--A term used to describe an extremely abrupt change slope from relatively flat to very steep.

BUYBACK--A one time process where the government bought back high priced timber sales from financially troubled companies. These sales were subsequently re-sold.

C

CALIBRATION--The process of predicting modeled fire sizes and fire intensity levels for each Fire Management Analysis Zone. The process uses historical occurrence and burned acreage to accurately reflect the "real world." Adjustments are based on modeling the current fire organization

(1978) against historical fire occurrence (1970-1979) using the same dispatch of fire fighting forces philosophy and suppression strategies. (LMRP)

CANOPY CLOSURE--The progressive reduction of space between tree crowns as they spread laterally (Ford-Robertson 1971); a measure of the percent of potential open space occupied by the collective tree crowns in a stand (Thomas 1979). (Brown 1985)

CLASS I WILDERNESS--Those wilderness over 5,000 acres which were in existence as of August 7, 1977. All other National Forest System lands are Class II, including new wildernesses and expansions to Class I wildernesses which occurred after August 7, 1977. (LMRP)

CLIMAX--The culminating stage in plant succession for a given site where the vegetation has reached a highly stable condition. (LMRP)

CLIMAX SPECIES--Those species that dominate the forest stand in either numbers per unit area or biomass at climax. (LMRP)

CODE OF FEDERAL REGULATIONS (CFR)--The listing of various regulations pertaining to management and administration of the National Forest. (LMRP)

CONNECTED ACTION--Actions which are closely related and which:

1)Automatically trigger other actions.

2)Cannot or will not proceed unless other actions are taken previously or simultaneously.

3)Are independent parts of a larger action and depend on the larger action for their justification. (40 CFR 1508.25)

CRITICAL HABITAT--For threatened or endangered species, the specific areas within the geographical area occupied by the species (at the time it is listed, in accordance with provisions of Section 4 of the Endangered Species Act) on which are found those physical or biological features essential to the conservation of the species. This habitat may require special management considerations or

protecting. Protection may also be required for additional habitat areas outside the geographical area occupied by the species at the time it is listed based upon a determination of the Secretary of the Interior that such areas are essential for the conservation of the species. (LMRP)

CROWN CLASSES

Dominant--Trees with crowns extending above the general level of the crown cover and receiving full light from above and partly from the side; larger than the average trees in the stand, and with crowns well developed but possibly somewhat crowded on the sides.

Codominant--Trees with crowns forming the general level of the crown cover and receiving full light from above but comparatively little from the sides; usually the medium-sized crowns more or less crowded on the sides.

Intermediate--Trees shorter than those in the two preceding two classes but with crowns extending into the crown cover formed by codominant and dominant trees; receiving little direct sunlight from above but none from the sides; usually with small crowns considerably crowded on the sides.

Suppressed (Overtopped)--Trees with crowns entirely below the general level of the crown cover, receiving no direct light either from above or from the sides. (Smith 1962)

CUMULATIVE EFFECTS--The combined effects of two or more management activities. The effects may be related to the number of individual activities, or to the number of repeated activities on the same piece of ground. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (LMRP)

D

DEBRIS SLIDE--A shallow landslide of soil, rock, and organic material that occurs on steep slopes. (LMRP)

DEBRIS TORRENT--A large debris slide that is changed with water and confined to a steep stream channel. Debris torrents may travel several thousand feet. (LMRP)

DESIGNATED AREA (AIR QUALITY)--Those areas delineated in the Oregon and Washington Smoke Management Plans as principal population centers of air quality concern. (LMRP)

DIAMETER BREAST HEIGHT (DBH)--The diameter of a standing tree at a point 4 feet, 6 inches from ground level. (LMRP)

DISPERSED RECREATION--Outdoor recreation that takes place outside developed recreation sites or the Wilderness. (LMRP)

DIVERSITY--The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. (36 CFR 219.3) See also Edge, Horizontal Diversity, and Vertical Diversity. (LMRP)

E

EARTHFLOW - DEEP (>100 ft.)--Rotational failure which occurs on gentle to moderate slopes.

High Risk - High potential for mass movement. Damage to facilities, loss of life or detrimental effects on fisheries or municipal water sources.

Moderate Risk - Moderate potential for movement. Less a risk of loss of life, damage to facilities or fisheries and municipal water sources encompass many acres.

Low Risk - Small in size. Little risk of loss of life, damage to facilities or fisheries and municipal water sources. (LMRP)

ECOSYSTEM--An interacting system of organisms considered together with their environment; for example, marsh, watershed, and lake ecosystems. (LMRP)

EDGE--1) The boundary between two or more

elements of the environment; e.g. field and woodland. (LMRP)

2) The place where plant communities meet or where successional stages or vegetative conditions within plant communities come together. (Thomas 1979)

EFFECTS--Environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include population growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

The terms "Effects" and "Impacts" as used in this statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health related, whether direct, indirect, or cumulative. Effects resulting from actions may have both beneficial and detrimental aspects, even if on balance the agency believes that the overall effects will be beneficial (40 CFR 1508.8). (LMRP)

EMISSION--A release into the outdoor atmosphere of air contaminants. (See Effluent) (NFES NO 1279)

ENDANGERED SPECIES--Any species of animal or plant which is in danger of extinction throughout all or a significant portion of its range. Not included are members of the class Insects which have been determined by the Secretary to constitute a pest whose protection under the provisions of this Act (Endangered Species Act of 1973) would present an overwhelming and overriding risk to man. An endangered species must be designated in the Federal Register by the appropriate Federal Agency Secretary. (LMRP)

ERODIBLE--Susceptible to erosion. (LMRP)

EROSION--The wearing away or detachment of the

land surface by running water, wind, ice, or other geological agents, including such processes as gravitation creep. (LMRP)

EROSION (ACCELERATED)--Erosion much more rapid than normal, primarily as a result of the influence or the activities of man. (LMRP)

EROSION (NATURAL)--Wearing away of the earth's surface by water, ice, or other natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by human activity. (LMRP)

EVAPOTRANSPIRATION--Loss of water from a land area through transpiration of plants and from the soil. (LMRP)

F

FINE PARTICULATE MATTER--"Fine" particulates are those particles less than 10-15 microns in size. Fine particles have longer residence time in the atmosphere, are more harmful to health and have greater impact on visibility than larger particles. "Inhalable particulate" matter are those particles less than 10 microns in diameter. "Respirable particulate" matter are those particles less than 2.5 microns in size. Respirable particulates have an especially long residence time in the atmosphere and penetrate deeply into lungs. Particles of smoke are primarily in the respirable size range. Aerosol is often used interchangeably for the smaller airborne particulate matter. However, aerosols are more precisely defined as particles in a gaseous medium.

FISH PASSAGE--Passage of fish up or downstream especially over stream obstructions. (LMRP)

FLOODPLAIN--The lowland and relatively flat area adjoining inland waters, including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year. (LMRP)

FORAGE--All browse and non woody plants available to livestock or wildlife for grazing or harvestable for feed. (LMRP)

FORBS--Non-woody plants, other than grasses. Term refers to feed used by both wildlife and domesticated animals. (LMRP)

FOREGROUND--A term used in visual (scenery) management to describe the stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway (see Background, Middleground). (LMRP)

FORESTWIDE STANDARD--A principle requiring a specific level of attainment; a rule to measure against. The Forest-wide Standards apply to all areas of the Forest regardless of the other prescriptions applied. (LMRP)

FUEL LOADING--The amount of fuel present, expressed in terms of weight of fuel per unit area. This may be available fuel or (consumable fuel) total fuel and is usually dry weight.

FUELS--Combustible wildland vegetative materials. While usually applied to above ground living and dead surface vegetation, this definition also includes roots and organic soils such as peat. (LMRP)

FUEL TREATMENT--The rearrangement or disposal of natural or activity fuels (generated by management activity, such as slash left from logging) to reduce fire hazard. Fuels are defined as both living and dead vegetative materials consumable by fire. (LMRP)

G

GUIDELINE--An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory).

H

HABITAT--The place where a plant or animal naturally or normally lives and grows. (LMRP)

HABITAT EFFECTIVENESS INDEX--The habitat effectiveness index for elk is used to evaluate habitat based on the interaction of three variables: 1) road density, 2) cover quality, and 3) size and spacing of forage and cover. (R6-F&WL-216-1986)

HERITAGE RESOURCES--The cultural foundation of our Nation includes the remains or records of districts, sites, areas, structures, buildings, networks, neighborhoods, memorials, objects and events from the past which have scientific, historic or cultural value. They may be historic, prehistoric, archaeological, or architectural in nature. Heritage resources are an irreplaceable and nonrenewable aspect of our national heritage. (LMRP)

HIDING COVER--Vegetation capable of hiding 90 percent of a standing deer or elk from the view of a human at a distance of 200 feet. (LMRP)

HORIZONTAL DIVERSITY--The distribution and abundance of plant and animal communities or successional stages across an area of land; the greater the number of communities, the higher the degree of horizontal diversity. (LMRP)

HUNDRED YEAR FLOOD--Severe flood which, statistically, has a chance of occurring once in a hundred years, or has a 1% chance of occurring each year. (LMRP)

HYDROLOGY--The scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks. (LMRP)

I

INDIAN TRIBE--The governing body of any Indian tribe, band, nation, or other group which is recognized as an Indian tribe by the Secretary of the Interior for which the United States holds land in trust or restricted status for the entity of its members. Such term also includes any Native village corporation, regional corporation, and Native group established pursuant to the Alaska Native Claims Settlement Act (36 CFR 800.2(g)). (LMRP)

INDICATOR SPECIES--A wildlife management scheme in which the welfare of a selected species is presumed to indicate the welfare of other species. (LMRP)

INFILTRATION--The movement of water into the

soil through pores or other openings. (LMRP)

INTEGRATED RESOURCE MANAGEMENT APPROACH--All resources are planned in the same area and scheduled over the next decade using an interdisciplinary approach. All further Forest Plan implementation actions are united and coordinated to achieve Forest Plan goals and objectives. (LMRP)

INTERDISCIPLINARY APPROACH--Utilize a team representing several disciplines to coordinate and integrate planning actions consistent with the principles of Multiple Use Sustained Yield Act. (LMRP)

INTEGRATED LAND AND RESOURCE MANAGEMENT (LMRP)--A Forest Plan which considers all lands and all resources of the National Forest, in contrast to consideration of only part of the Forest's lands or just one of the resources. (LMRP)

INTEGRATED RESOURCE ANALYSIS (IRA)--Looks at the integrated resource options, cumulative effects, and connected activities that could logically occur in the analysis area over a foreseeable period of time. (*Steps of the Journey* 1991)

INTENSIVE FOREST MANAGEMENT--A high investment level of timber management that envisions initial harvest, regeneration with genetically improved seedling stock, control of competing vegetation, fill-in planting, precommercial thinning as needed for stocking control, one or more commercial thinning, and final harvest. (LMRP)

INTERDISCIPLINARY TEAM (I.D. TEAM)--A team of people that collectively represent several disciplines and whose duty it is to coordinate and integrate the planning activities. See also Forest Interdisciplinary Team (I.D. Team). (LMRP)

INTERMITTENT STREAM--A stream that flows above ground at intervals or only flows periodically during the year. In contrast to ephemeral drainages (see definition), intermittent streams generally have well-defined channels. (LMRP)

INVENTORIED ROADLESS AREA--Areas of

undeveloped Federal land, greater than 5,000 acres in size, within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use. Exceptions are those areas less than 5,000 acres manageable in their natural condition, contiguous to existing wilderness, or are of issue to the public. (LMRP)

IRRETRIEVABLE--Applies to losses of production, harvest, or use of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible. (LMRP)

IRREVERSIBLE--Applies primarily to the use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long time periods. Irreversible also includes loss of future options. (LMRP)

ISSUE--A point, matter, or question of public discussion or interest to be addressed or decided through the planning process.

K

KEY SITE RIPARIAN AREAS--Large riparian areas exhibiting high habitat diversity and outstanding capabilities for producing high quality water, excellent fish spawning and rearing habitat, high quality waterfowl breeding, nesting and resting habitat, wildlife cover and diverse plant communities. (LMRP)

K-V--An abbreviation for Knutson-Vandenberg. (LMRP)

L

LAND ALLOCATION--The assignment of a management emphasis to particular land areas with the purpose of achieving the goals and objectives of that alternative. (LMRP)

LANDINGS--Those designated areas within a timber sale where logs are temporarily stored before transport to a mill. (LMRP)

LANDSLIDE--The group of slope movements wherein shear failure occurs along a specific surface or combination of surfaces.

Debris Flow. General designation for all types of rapid flowage involving debris of various kinds of conditions.

Debris Slide. A shallow landslide of soil, rock, and organic material that occurs on steep slopes.

Earthflow. A mass movement process and landform characterized by a downslope flow of earth and weathered rock. Slopes are usually 30% or less, rate of movement is imperceptible to slow, depth is variable, area can be several acres to several miles in size.

Slump. Downward slipping of a mass of material moving as a unit or several subsidiary units usually with a backward rotation. (LMRP)

LARGE WOODY DEBRIS--Logs, tree boles, and root wads greater than 4 inches in diameter. (LMRP)

LOCAL ROADS--Connect terminal facilities such as log landings and recreation sites, with forest collector roads, forest arterial roads, or public highways. Location and standards are determined by the specific resource needs that the roads serve. (LMRP)

LOGGER'S SPUR--An unnumbered, non-system road.

M

M--Thousand (LMRP)

MAINTENANCE LEVELS 1-5

Level 1. This level is assigned to intermittent service roads during the time management direction requires that the road be closed to motorized traffic.

Level 2. This level is assigned where management direction requires that the road be open for limited

passage of traffic. Roads in this maintenance level are intended for use by high clearance vehicles and not maintained passenger car traffic.

Level 3. This level is assigned where management direction requires that the road be open and maintained for safe travel by a prudent driver in a standard four wheel passenger car.

Level 4. This level is assigned where management direction requires the road to provide a moderate degree of user comfort and convenience at moderate travel speeds. Traffic volumes are normally sufficient to require a double lane aggregate surfaced road. Paved surfaces are often used.

Level 5. This level is assigned where management direction requires the road to provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. (LMRP)

MANAGEMENT INDICATOR SPECIES (MIS)--See Indicator Species.

MANAGEMENT PRACTICES--A specific activity, measure, course of action, or treatment. (36 CFR 219.3) (LMRP)

MASS MOVEMENT--Downslope, unit movement of a portion of the land's surface; i.e. a single landslide or the gradual simultaneous, downhill movement of the whole mass of loose earth material on a slope face. (LMRP)

MATURE TIMBER--Trees that have attained full development, particularly in height, and are in full seed production. (LMRP)

MAXIMUM MODIFICATION--A visual quality objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background. (LMRP)

MBF--Thousand board feet. A measure of wood volume. (LMRP)

MEAN ANNUAL INCREMENT OF GROWTH--The total increase in girth, diameter, basal area, height, or volume of individual trees or a stand up to

a given age, divided by that age. (LMRP)

METHANE--A colorless, odorless, flammable gaseous hydrocarbon CH₄ that is a product of decomposition of organic matter in marshes and mines or of carbonization of coal and is used a fuel and raw material in chemical synthesis. (Webster's)

MICRON--One millionth of a meter; a micrometer.

MIDDLEGROUND--The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the stand. (LMRP)

MITIGATION--Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice. (LMRP)

MM--Million. (LMRP)

MMBF--Million board feet. (LMRP)

MONITORING--A process to collect significant data from defined sources to identify departures or deviations from expected plan outputs. (LMRP)

MODIFICATION--A visual quality objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize natural established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground. (LMRP)

MULTILAYERED CANOPY--A stand of trees with two or more distinct tree layers in the canopy. (LMRP)

N

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)--A legal limit on the level of atmospheric contamination. The level is established as the concentration limit needed to protect all of the public against adverse effects on public health and welfare, with an adequate safety margin. Primary safety standards are those related to health effects. Secondary standards are designed to

protect the public welfare from effects such as visibility reduction, soiling, materials damage and nuisances. (NFES NO. 1279)

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) (1969)--An Act, to declare a National policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality. (LMRP)

NATIONAL FOREST MANAGEMENT ACT (NFMA)--An Act passed in 1976 amending the Forest and Rangeland Renewable Resources Planning Act. NFMA requires the preparation of Regional and Forest Plans and the preparation of regulations to guide that development. (LMRP)

NATURAL FOREST--The condition of a forest environment at any point in time including its associated plant and animal communities, which has been reached essentially through the process of natural succession. This process would include the effects of natural catastrophic occurrences. (LMRP)

NEPA--An abbreviation of National Environmental Policy Act.

NFMA--An abbreviation of the National Forest Management Act of 1976. (LMRP)

NOXIOUS WEEDS--A plant considered to be extremely destructive or harmful to agriculture and designated by law. An undesirable species that conflicts with, restricts, or otherwise causes problems with the management objectives. (LMRP)

O

O & C LANDS--An abbreviation for Oregon and California Lands. Lands given to the railroad but which later reverted to the Federal government and are presently administered by the USDA Forest

Service and USDI Bureau of Land Management.

OBJECTIVE--A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals. (36 CFR 219.3) (LMRP)

OPEN ROADS--National Forest system roads that are open and maintained for traffic.

OUTPUT--A good, service, or on-site use that is produced from forest and rangeland resources. See FSH 1309.11 for forest and rangeland outputs, codes and units of measure. Examples: X06 - Softwood Sawtimber production - MCF; X80 - Increased Water Yield - Acre feet; W01 - Primitive Recreation Use - RVDs (LMRP)

OVERSTORY--That portion of the trees in a forest of more than one story, forming the upper or uppermost canopy layer. (LMRP)

P

PARTIAL RETENTION--A visual quality objective where man's activities may be evident but subordinate to the characteristic landscape. (LMRP)

PARTICULATES--1) A component of polluted air consisting of any liquid or solid particles suspended or falling through the atmosphere. (LMRP)

2) Any dispersed aggregate matter--solid or liquid (other than water)--suspended in or falling through the atmosphere. (R6 FEIS, 1988)

PARTICULATE MATTER--Any liquid or solid particles. "Total suspended particulates" as used in air quality are those particles suspended in or falling through the atmosphere. They generally range in size from 0.1 to 100 microns. (NFES NO. 1279)

PATHOGEN--Any agent that causes disease, especially micro-organisms, such as bacteria or fungi (Morris 1976) (Brown)

PEAK DISCHARGE, PEAK FLOW--The maximum volume of flow attained at a given point in a stream during a runoff event. (LMRP)

PERENNIAL STREAM--A stream that flows throughout the year. (LMRP)

PERMANENT ROAD CLOSURE--Roads closed with the intent to never use them again, action taken to make them impassable and remove them from the transportation system. (LMRP)

PLANT COMMUNITIES--A vegetation complex unique in its combination of plants which occur in particular locations under particular influences. A plant community is a reflection of integrated environmental influences on the site - such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall. (LMRP)

PM-10--Particles with an aerodynamic diameter smaller or equal to a nominal ten micrometers. (NFES NO. 1279)

PNV--An abbreviation of present net value. (LMRP)

PRACTICES--Those management activities that are proposed or expected to occur. (LMRP)

PRESCRIBED FIRE--A wildland fire burning under specified conditions which will accomplish certain planned objectives. The fire may result from either planned or unplanned ignitions. Proposals for use of unplanned ignitions for this purpose must be approved by the Regional Forester. (LMRP)

PRESCRIBED NATURAL FIRE--The use of unplanned natural ignitions to meet management prescriptions. (LMRP)

PRESENT NET VALUE (PNV)--The difference between the discounted values (benefits) of all outputs to which monetary values or established market prices are assigned, and the total discounted costs of managing the planning area. (36 CFR 219.3) In Forest Planning; monetary values were assigned to timber stumpage, recreation visitor days (RVDs), wildlife/fish related recreation visitor days (WFVDs), grazing use and mineral outputs. (LMRP)

PRESERVATION--A visual quality objective that allows only ecological changes to take place. (LMRP)

PRIMITIVE RECREATION--Those recreation activities which occur in areas characterized by an essentially unmodified natural environment of fairly large size (2,500 acres or greater). (LMRP)

PRODUCTION POTENTIAL--The capability of the land or water to produce a given resource. (LMRP)

PUBLIC ISSUE--A subject or question of widespread public interest relating to management of the National Forest System. (36 CFR 219.3) (LMRP)

R

RANGER DISTRICT--An administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor. (LMRP)

RARE I--An abbreviation of Roadless Area Review and Evaluation I. A USFS effort in the early 1970's to systematically inventory, review, and evaluate the relative values for future uses of existing roadless areas. The RARE process identified the extent of roadless lands remaining on the National Forests and recommended each area for wilderness consideration, further study, or release for other multiple use. (Hendee et.al. 1990)

RARE II--An abbreviation of Roadless Area Review and Evaluation II. RARE II incorporated new roadless area criteria and the requirements of NFMA. Each area's resources were estimated, site specific information was reviewed, and potential uses was assessed (e.g., potential timber, harvesting, grazing, and mineral extraction. RARE II also sought to assess how each area might contribute to qualities of the wilderness system, such as ecological diversity. (Hendee et.al. 1990)

RECREATION OPPORTUNITY SPECTRUM (ROS)--Land delineations that identify a variety of recreation experience opportunities categorized into

six classes on a continuum from primitive to urban. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs. This is measured based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The seven classes are:

Primitive. Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of management restrictions and controls. Motorized use within the area is not permitted.

Semiprimitive Nonmotorized. Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

Semi-primitive Motorized. Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but subtle. Motorized recreation use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.

Roaded Modified. A subclass of the Roaded Natural ROS class. Involves areas that are characterized by predominantly natural appearing environments with high evidence of the sights and sounds of humans. Such evidence may not harmonize with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident and may not harmonize with the

natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

Roaded Natural. Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, and evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

Rural. Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

Urban. Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site. (LMRP)

REGENERATION--The actual seedlings and saplings existing in a stand; or the act of establishing young trees naturally or artificially. (LMRP)

REGENERATION CUT--Any removal of trees to

make regeneration possible. (LMRP)

REHABILITATION--A short-term management alternative used to return existing visual impacts in the natural landscape to a desired visual quality. (LMRP)

RESIDENT TROUT--A trout which spends its entire life in fresh water. (LMRP)

RESIDUAL STAND--The trees remaining standing after some form of selection cutting is performed on a stand. (LMRP)

RESIDUE--Material which includes both desired and unwanted vegetative residues which result from an activity or natural event. (LMRP)

RETENTION--A visual quality objective where human activities are not evident to the casual forest visitor. (LMRP)

RIFFLE--A feature of a stream having swift-flowing, turbulent water; can be either deep or shallow; features are generally cobble or boulder dominated. (LMRP)

RIPARIAN--Pertaining to areas of land directly influenced by water. Riparian areas usually have visible vegetative or physical characteristics reflecting this water influence. Streambanks, lake borders, or marshes and wetlands are typical riparian areas. (LMRP)

RIPARIAN AREA--Geographically delineated areas, with distinctive resource values and characteristics, that are comprised of aquatic and riparian ecosystems. On the Mt. Hood National Forest riparian areas typically include areas adjacent to all streams, lakes, and ponds and areas comprising seeps, springs, and wetlands. (LMRP)

RIPARIAN ECOSYSTEMS--A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. Identified by soil characteristics and distinctive vegetation communities that require free or unbound water. (LMRP)

RIPARIAN VEGETATION--Vegetation growing on

or near the banks of a stream or body of water on soils that exhibit some wetness characteristics during some portion of the growing season. (LMRP)

RISK--The degree and probability of loss based on chance. (LMRP)

ROAD--A general term denoting a way for purposes of travel by vehicles greater than 40 inches in width.

ROADLESS AREA--See Inventoried Roadless Area. (LMRP)

ROADLESS AREA CHARACTERISTICS

Natural Integrity--The extent to which long-term ecological processes are intact and operating in a physical setting. Impacts on natural integrity are measured by the presence and magnitude of human induced change to an area.

Apparent Naturalness--A measure of importance of visitors' perception of human impacts to the area.

Remoteness--A perceived condition of being secluded, inaccessible and out of the way. A user's sense of remoteness in an area is influenced by the presence or absence of roads (distance criteria: 1/2 mile).

Solitude--A personal, subjective value defined as isolation from the sights, sounds and presence of others, and the developments of man. The opportunity to experience solitude is normally found in Primitive (P), and Semi-Primitive Non-Motorized (SPNM) class of the Recreational Opportunity Spectrum (ROS). (See *ROS User's Guide* for more details).

Special Features--Those unique geological, biological, ecological, cultural or scenic features that may be located in roadless areas.

Manageability/Boundaries Elements--The ability of the Forest Service to manage an area to meet size criteria and the five elements listed above. (Wilderness Management 1990)

ROS--An abbreviation of Recreation Opportunity

Spectrum. (LMRP)

ROTATION AGE--The age of a stand when harvested. (LMRP)

RUNOFF--The flow or discharge of water from an area, including both surface and subsurface flow. (LMRP)

S

SCARP--A steep surface on the undisturbed ground at the edge of a landslide. Caused by movement of slide material away from the undisturbed ground. (LMRP)

SCOPING PROCESS--Determining the extent of analysis necessary for an informed decision of a proposed action. The process includes: (1) reviewing present Management direction as it relates to the analysis; (2) contacting those publics interested or affected by the proposed action to get their opinions and surface the issues; (3) determining local management concerns. This process continues throughout analysis until a decision is made. (LMRP)

SCREEN 3--A soil suitability classification; soil where present technology is not available to ensure production without irreversible resource damage. (Determination of Land Not Suitable for Timber Production, Mt. Hood National Forest <Working Paper> 1984)

SECOND GROWTH--Forest growth that has come up naturally after some drastic interference with the previous forest growth (e.g. cutting, serious fire, or insect attack). (LMRP)

SEDIMENT--Solid material, both mineral and organic, that is in suspension, and is being transported from its site of origin by air, water, gravity, or ice, or has come to rest on the earth's surface either above or below sea level. (LMRP)

SEED TREE CUTTING--Removing all mature trees

from a stand except for selected seed-bearing trees retained on site to provide a seed source for stand regeneration. (LMRP)

SELECTION CUT--Selection cutting is the periodic removal of mature trees individually or in small groups from an uneven-aged forest. By this method, both regeneration cutting and tending of immature stand components are accomplished at each entry. (LMRP)

SEMI-PRIMITIVE MOTORIZED ROS CLASS--See Recreation Opportunity Spectrum. (LMRP)

SEMI-PRIMITIVE NON-MOTORIZED ROS CLASS--See Recreation Opportunity Spectrum. (LMRP)

SENSITIVE SPECIES--Those species of plants or animals that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, that are on an official State list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on Federal or State lists. (LMRP)

SERAL--A biotic community which is a developmental, transitory stage in an ecological succession. (LMRP)

SHEET EROSION--The removal of a fairly uniform layer of soil from the land surface by runoff water. (LMRP)

SHELTERWOOD CUTTING--Any regeneration cutting in a more or less mature stand designed to establish a new stand under the protection (overhead or side) of the old stand. Usually the shelterwood involves two separate harvest operations. The first harvest (seed cut) is designed to create space and seed production to establish new trees. The second cut (removal cut) is designed to remove the remainder of the old stand before it begins to compete with the new stand for light and nutrients. This is usually within 10 years. (See also Extended Shelterwood). (LMRP)

SHPO--"State Historic Preservation Officer" means

the official appointed or designated pursuant to Section 101(b)(1) of the National Historic Preservation Act to administer the State historic preservation program or a representative designated to act for the SHPO. Among other duties, the State Historic Preservation Officer advises and assists Federal agencies and State and local governments and cooperates with these agencies and others to ensure that historic properties are considered at all levels of planing and development. (LMRP)

SILVICULTURAL SYSTEM--A management process whereby forests are tended, harvested, and replaced resulting in a forest of distinctive form. Systems are classified according to the logging method that removes the mature crop and provides for regeneration and according to the type of forest thereby produced. (36 CFR 219.3) (LMRP)

SILVICULTURE--The art and science of growing and tending forest vegetation for specific management goals. (LMRP)

SITE PREPARATION--1) An activity (such as prescribed burning, disking, and tilling) performed on a reforestation area, before introduction of reforestation, to ensure adequate survival and growth of the future crop; OR 2) manipulation of the vegetation or soil of an area prior to planting or seeding. The manipulation follows harvest, wildfire, or construction in order to encourage the growth of favored species. Site preparation may include the application of herbicides; burning, or cutting of living vegetation that competes with the favored species; tilling the soil; or burning of organic debris (usually logging slash) that makes planting or seeding difficult. (LMRP)

SITE PRODUCTIVITY--Production capability of specific areas of land to produce defined outputs such as AUMs, cubic feet/acre/yr. etc. (LMRP)

SLASH--The wood residue left on the ground after timber cutting and/or accumulating there as a result of storm, fire, or other damage. It includes unused logs, uprooted stumps, broken or uprooted stems, branches, twigs, leaves, bark, and chips. (LMRP)

SLOPE--An inclined ground surface, the inclination

of which is expressed as a ratio of horizontal distance to vertical distance. The face of an embankment or cut section. (LMRP)

SNAG—A standing dead tree. (LMRP)

SOIL—The unconsolidated mineral and organic material on the immediate surface of the earth. (LMRP)

SOIL PRODUCTIVITY—The capacity of a soil to produce a specified crop such as fiber or forage under defined levels of management. Productivity is generally dependent on available soil moisture and nutrients, and length of growing season. (LMRP)

SPECIAL EMPHASIS WATERSHEDS—This designation is applied to selected watersheds where special management emphasizes unusually high combinations of riparian resource values and high sensitivity due to generally demanding site conditions and where the goal is to maintain or improve habitat conditions for the sustained, long-term production of fisheries and high quality water. (LMRP)

SPECIES DIVERSITY—See Community Diversity.

SPRUCE BUDWORM—See Western Spruce Budworm.

STAGNATION—The process of the lessening of the growth rate of individual trees because of overcrowding. (Thomas 1979)

STAND—Timber possessing uniformity as regards to type, age class, risk class, vigor, size class, and stocking class. (LMRP)

STANDARD—A principle requiring a specific level of attainment, a rule to measure against. (LMRP)

STATE IMPLEMENTATION PLAN (SIP)—A plan required by the Clean Air Act and prepared by an Air Quality Regulatory Agency, which describes how the state will attain and maintain air quality so as to not violate National Ambient Air Quality Standards. (NFES NO. 1279)

STREAM BUFFERS—See Streamside Management

Unit. (LMRP)

STREAM CHANNEL MORPHOLOGY—The structure or form of a stream channel, as influenced by processes of erosion and deposition of channel materials (gravel, cobbles, sand, soil, etc.). (LMRP)

STREAM CLASS—Classification of streams based on the present and foreseeable uses made of the water, and the potential effects of on-site changes on downstream uses. Four classes are defined:

Class I - Perennial or intermittent streams that: provide a source of water for domestic use; are used by large numbers of fish for spawning, rearing or mitigation; and/or are major tributaries to other Class I streams.

Class II - Perennial or intermittent streams that: are used by moderate though significant numbers of fish for spawning, rearing or migration; and/or may be tributaries to Class I streams or other Class II streams.

Class III - All other perennial streams not meeting higher class criteria.

Class IV - All other intermittent streams not meeting higher class criteria. (LMRP)

STREAM DISCHARGE—The volume of water flowing past a point per unit time, commonly expressed as cubic feet per second, million gallons per day, gallons per minute or cubic meters per second. (LMRP)

STREAMSCOUR or CHANNEL SCOUR—Erosion of the channel bottom and/or banks caused by high flows or water, loss of channel stability, or debris torrents. (LMRP)

STREAM STRUCTURES—The arrangement of logs, boulders, and meanders which modify the flow of water, thereby causing the formation of pools and gravel bars in streams. Generally, there is a direct relationship between complexity of structure and fish habitat. Complex structure is also an indication of watershed stability. (LMRP)

STREAMFLOW--The flow of water, generally with its suspended sediment load, down a well-defined watercourse. (LMRP)

STRUCTURAL DIVERSITY--Diversity in a forest stand that results from layering or tiering of the canopy; an increase in layering or tiering leads to an increase in structural diversity (Thomas 1979). (Brown 1985)

STRUCTURE--The configuration of elements, parts, or constituents of a habitat, plant or animal community of forest stand (adapted from Thomas 1979). (Brown 1985)

SUCCESSIONAL STAGE--A stage or recognizable condition of a plant community that occurs during its development from bare ground to climax. For example, coniferous forests in the Blue Mountains progress through six recognized stages: grass-forb; shrub-seedling; pole-sapling; young; mature; old growth. (LMRP)

SUITABILITY--The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices. (36 CFR 219.3) (LMRP)

Suppressed Crown--See Crown Classes.

SUPPRESSED TREES--Trees in a forest stand whose crowns are below the general level of the canopy; growth is inhibited due to competition for a limited resource such as sunlight; such trees are weak, slow-growing and often become mortality. (Brown 1985)

SURFACE RUNOFF--Water that flows over the ground surface and into streams and rivers. (LMRP)

T

TAXOL--A substance extracted from yew tree material that is considered to be promising cancer

fighting compound. (An Interim Guide to the conservation and Management of Pacific Yew 1992)

TEMPORARY ROADS--Localized roads of limited duration, typically available for generic forest activities during the life of the project for which the road was constructed. (LMRP)

THERMAL COVER--Cover used by animals to lessen the effects of weather; for elk, a stand of coniferous trees 12 meters (40 feet) or more tall with an average crown closure of 70 percent or more; for deer, cover may include saplings, shrubs, or trees at least 1.5 meters (5 feet tall) with 75 percent crown closure. (LMRP)

THREATENED SPECIES--Any species of animal or plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been designated in the Federal Register by the Secretary of Interior as a threatened species. (LMRP)

TIMBER PRODUCTION--The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For planning purposes, the term "timber production" does not include production of fuelwood (36 CFR 219.3) (LMRP)

TOE--The lower, usually curved, margin of the disturbed material of a landslide pushed over onto the disturbed slope. (LMRP)

TOLERANT SPECIES--Plants that grow well in shade. (LMRP)

TRAIL SENSITIVITY

Sensitivity Level I have prescribed VQOs of retention, partial retention and modification in near-foreground, far-foreground and middleground distance zones respectively.

Sensitivity Level II trails have prescribed VQOs of partial retention modification in near-foreground, far-foreground and middleground distance zones.

Sensitivity Level III trails shall have a prescribed VQO of modification for all distance zones. (LMRP)

TURBIDITY--The degree of opaqueness, or cloudiness, produced in water by suspended particulate matter, either organic or inorganic. Measured by light filtration or transmission and expressed in Jackson Turbidity Units (JTU). (LMRP)

TWENTY-FIVE PERCENT FUND ACT OF 1908--This act provided that twenty-five percent of all moneys received during any fiscal year from each national forest shall be paid, at the end of each year, by the Secretary of the Treasury to the state in which each national forest is located. This money goes to the counties based on the proportion of the national forest in the respective counties. This payment is in addition to the payments in lieu of taxes made under the Payment in Lieu of Taxes Act of 1976. (LMRP)

U

UNDERSTORY--Vegetation growing under a higher canopy. (LMRP)

UNEVEN-AGED SILVICULTURAL SYSTEMS--The combination of actions that result in the creation of forests or stands of trees, in which trees of several or many ages grow together. Cutting methods that develop and maintain uneven-aged stands are single tree and group selecting cutting methods:

Single Tree Selection Cutting. The removal of selected trees of all size classes on an individual basis.

Group Selection Cutting. The removal of all trees in groups for regeneration purposes. The size of the group will be small enough in area that all subsequent regeneration will be influenced by the surrounding uncut stand. Cuts are generally .25 - 2.0 acres in size.

UNROADED ACRES--Those areas of undeveloped Federal land within which there are no improved roads maintained for travel by means of vehicles

intended for highway use. (LMRP)

UTILIZATION STANDARDS--Standards guiding the use and removal of timber which is measured in terms of diameter at breast height (d.b.h.), top diameter inside the bark (top d.i.b.), and percent "soundness" of the wood. (LMRP)

V

VARIETY CLASS--A classification system for establishing three visual landscape categories according to the relative importance of the visual features. (LMRP)

VERTICAL STRUCTURE--Recognizable layers of vegetation, including overstory, understory, shrub and herb layers. (Hunter 1990)

VIEWSHED--The total landscape seen or potentially seen from all or a logical part of a travel route, use area, or water body.

Primary Viewshed The landscape seen from a designated travel route, or designated use area, which has high volume of use, long duration of use, or is a major access to the Forest. The same as Level I Sensitivity to scenic quality.

Secondary Viewshed The landscape seen from a designated travel route, or designated use area, with low use volume, short use duration, or is a minor access route to the Forest. Same as Level II Sensitivity to scenic quality. (LMRP)

VISUAL CONDITION--The visual appearance of a landscape described in terms of the degree of alteration of the natural appearing landscape. These terms are normally used as a summary rating for a large land area, such as a viewshed corridor. Descriptive degrees of alteration are:

Natural Appearing. Area appears untouched by man; changes are not visually evident. Generally

similar to the Retention VQO.

Slightly Altered. Changes may be noticed by the average visitor but do not attract attention. Natural appearance dominates minor disturbances. Generally similar to the Partial Retention VQO.

Moderately Altered. Changes are easily noticed by the average visitor and may attract attention. Disturbances are apparent. Generally similar to the Modification VQO.

Heavily Altered. Changes are strong and obvious to the average visitor. Changes dominate the landscape but may resemble natural patterns when viewed from a distance of 3 to 5 miles. Disturbances are major. Generally similar to the Maximum Modification VQO. (LMRP)

VISUAL QUALITY OBJECTIVES (VQO)-- Categories of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape.

Preservation (P) - Ecological changes only.

Retention (R) - Management activities should not be evident to the casual Forest visitor.

Partial Retention (PR) - Management activities remain visually subordinate to the characteristic landscape.

Modification (M) - Management activities may dominate the characteristic landscape but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

Maximum Modification (MM) - Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Enhancement - A short-term management alternative which is done with the express purpose of increasing positive visual variety where little variety now exists. (LMRP)

VQO--An abbreviation of visual quality objective. (LMRP)

W

WATER QUALITY--The biological, physical, and chemical properties of water that make it suitable for given specified uses. Definition of water quality for forest areas is difficult because of the wide range of downstream uses. (LMRP)

WATERSHED--The line separating head-streams which flow to different river systems; it may be sharply defined (crest of a ridge), or indeterminate (in a low undulating area). (LMRP)

WATERSHED IMPACT AREA--Areas within a watershed which are being hydrologically disturbed by management activities (timber harvest, road construction, etc.) or natural disturbances (wildfire, landslides, etc.). Such areas may adversely affect the hydrologic equilibrium of a watershed by increasing peak flows or decreasing watershed or channel stability. Impact areas are limited to a percent of the total watershed area by Standards and Guidelines in Chapter 4 of the Forest Plan. (LMRP)

WESTERN SPRUCE BUDWORM (Choristoneura occidentalis)--A member of the *Lepidoptera* family that defoliates and damages the cones of several species of conifers. (Forest Insect and Disease Leaflet 53)

WETLANDS--Areas that are inundated by surface or ground water with a frequency sufficient to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. (Executive Order 11990.) Under normal circumstances the area does or would support a prevalence of vegetative or aquatic life. (LMRP)

WILD AND SCENIC RIVERS--Those rivers or sections of rivers designated as such by congressional action under the 1968 Wild and Scenic Rivers Act, as supplemented and amended, or those sections of

ivers designated as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and scenic rivers may be classified and administered under one or more of the following categories:

Wild River Areas. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

Scenic River Areas. Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational River Areas. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

WILDERNESS—Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable. Wilderness areas have outstanding opportunities for solitude or for a primitive and unconfined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest. (LMRP)

WILDFIRE—Any wildland fire not designated and managed as a prescribed fire within an approved prescription. (LMRP)

WINTER RANGE—The area available to and used by big game through the winter season. (LMRP)

WOODY MATERIAL (LARGE WOODY DEBRIS)—Large logs necessary for stream channel stability and maintenance of watershed condition. (LMRP)

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List of Preparers

The following is a list of Interdisciplinary Team (IDT) members and those who assisted the IDT in the development of the Eagle Final Environmental Impact Statement.

USDA - Forest Service Employees

Interdisciplinary Team Members:

<u>Name</u>	<u>Area of Expertise</u>	<u>College Degree(s)</u>	<u>Years of Experience</u>
Robert Alvarado	Wildlife Biology	B.S. Wildlife Mgmt	17
Larry Bryant	Hydrology, Soils	B.S. Soil & Water Sci.	21
Don Davison	I.D. Team Leader	A.S. Forest Technology	25
Craig Edberg	Silviculture	B.S. Nat. Res. Mgmt.	26
Jack Gerstkemper	Consultant (I.D. Team Leader for the DEIS)	B.S. Engineering M.F. Forestry	19

Specialists who assisted the Interdisciplinary Team:

Merle Seidel	Archeology Tech.	None	33
Pat Greene	Landscape Arch.	B.S. Landscape Arch.	4
Lois Kemp	Botany, Plants	None	16 (Now Retired)
Mike Malone	Logging Systems	A.S. Forest Technology	18
Tom Dorigan	Fire, Air Quality	None	22
Glenda Woodcock	Recreation	B.A. Geography M.A. Geography	5
Dick Yoder	Road Design	A.A Math Science	30
Joe Moreau	Fishery Biology	B.A. Biology	10

Appendix A (Roadless Area)

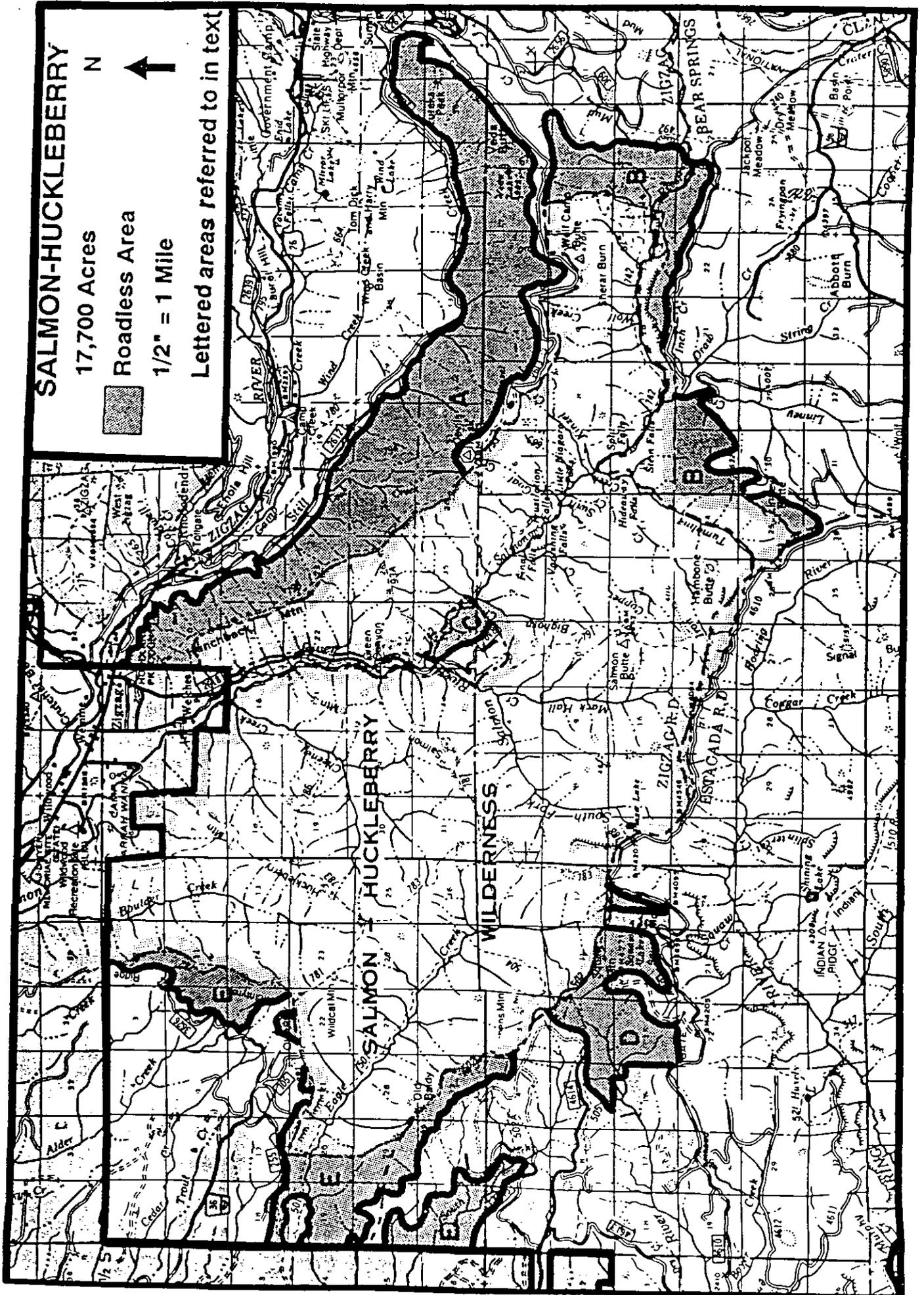
Content

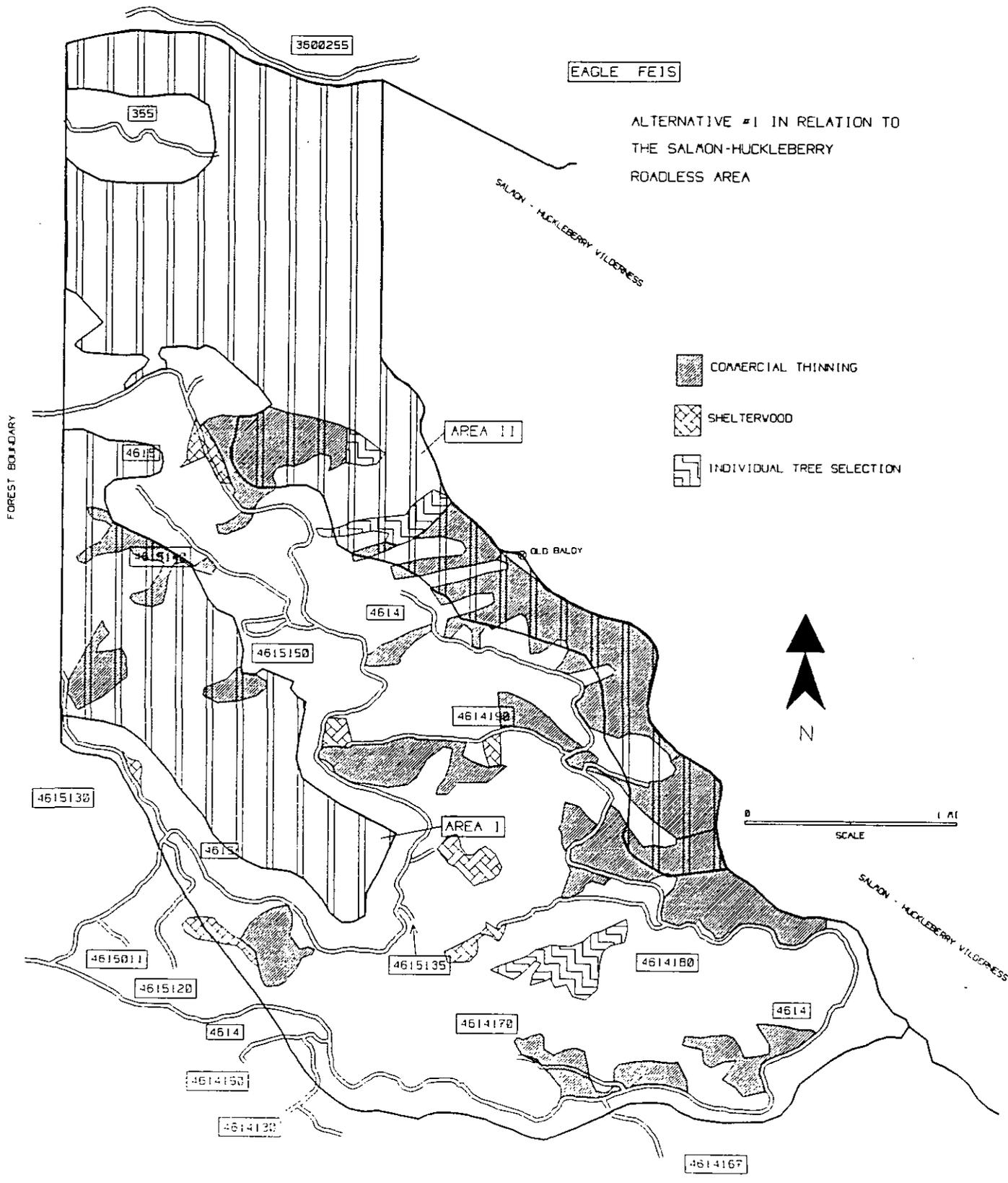
Map of the Entire Salmon-Huckleberry Roadless Area

Map of Alternative #1 in relation to Roadless Lands

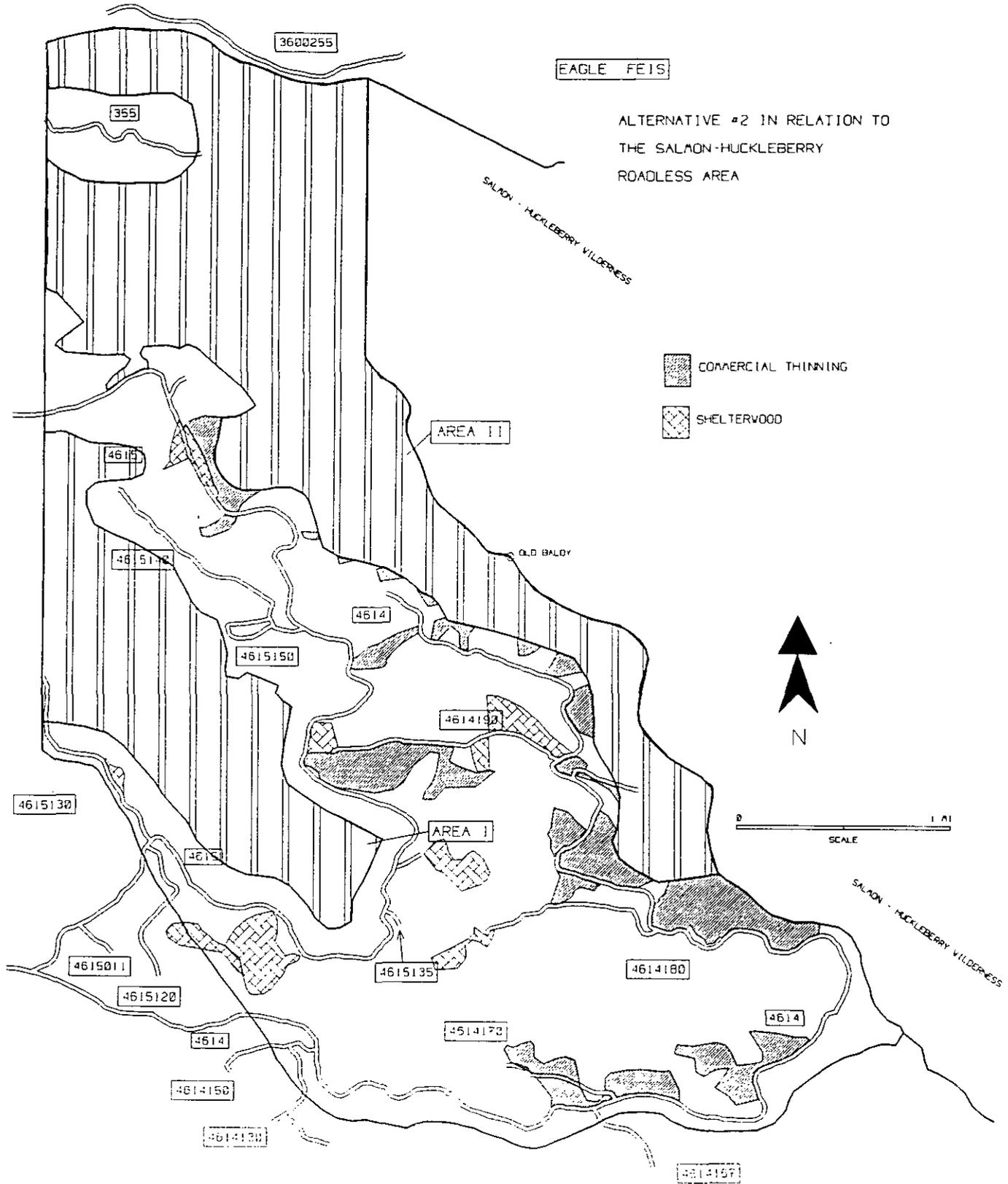
Map of Alternative #2 in relation to Roadless Lands

Map of Alternative #3 in relation to Roadless Lands





FURST BURNERY



EAGLE FEIS

ALTERNATIVE #2 IN RELATION TO THE SALMON-HUCKLEBERRY ROADLESS AREA

-  COMMERCIAL THINNING
-  SHELTERWOOD

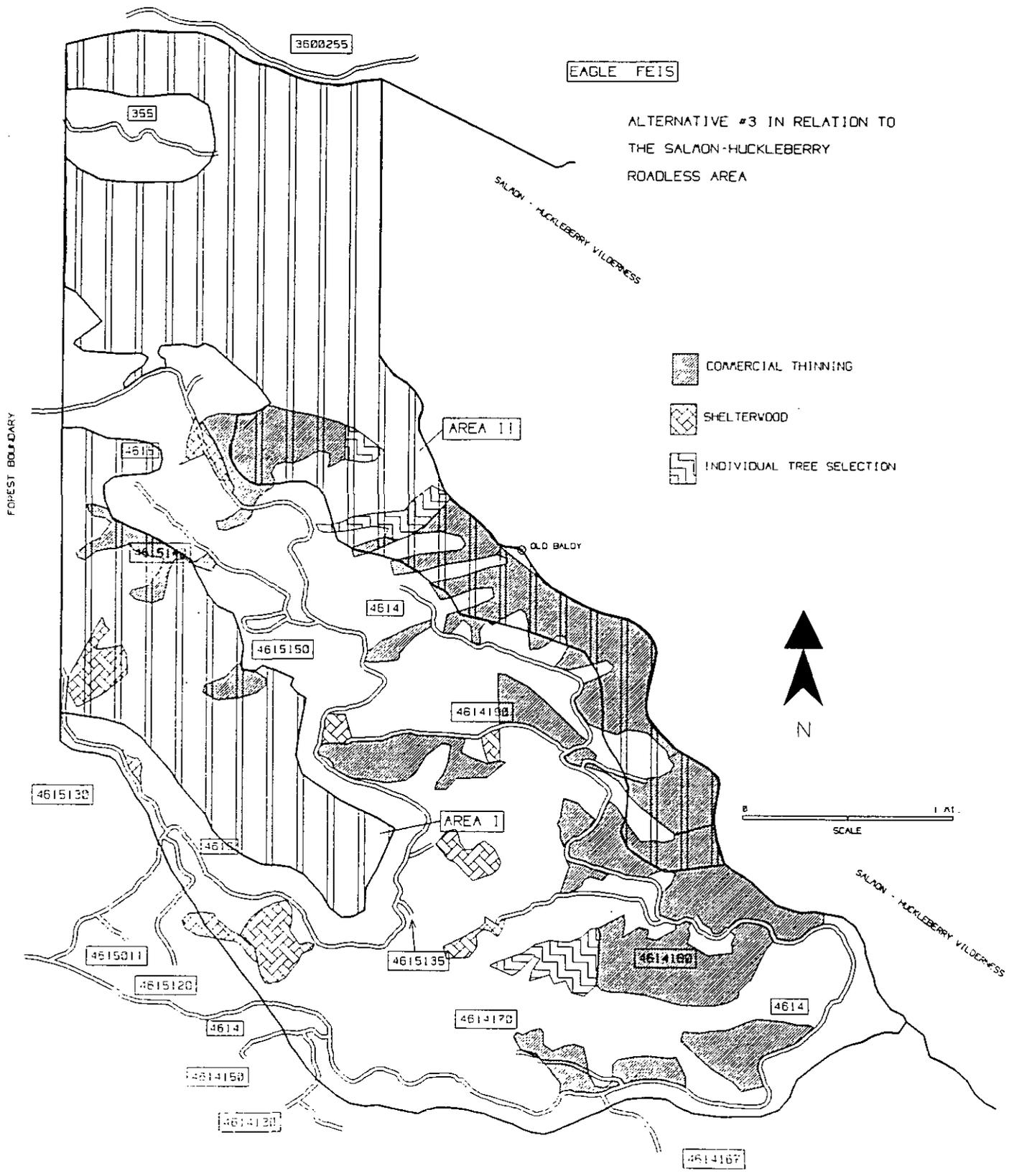
AREA II

OLD BALDY



0 1 MI SCALE

SALMON - HUCKLEBERRY WILDERNESS



Appendix B (Economics)

Content

Data sheets for an "Economic" Analysis, by Alternative

Present Net Value of a Long Term Project

Eagle Alt#1

The Base Year is 0
 The Discount Rate is 4.0 %
 The Project Length is 13 years

YEAR	ACTIVITY	COST (\$)	BENEFIT (\$)	DISCOUNT FACTOR	PVC (\$)	PVB (\$)
0			0	1.0000		0
1	Sale Prep	527,900		0.9615	507,596	
	Tractor Thin 1306M	70,576			67,862	
	Skyline Thin 3371M	245,071			235,645	
	Timber Receipts		2,572,350			2,473,414
	Road Const	55,000			52,885	
	Sale Admin	51,447			49,468	
	Haul & Maint	113,417			109,055	
2	Skyline Thin 3371M	245,071		0.9246	226,582	
	Heli Thin 9174M	3,004,118			2,777,476	
	Timber Receipts		6,912,295			6,390,806
	Sale Admin	137,995			127,584	
	Haul & Maint	304,216			281,265	
3	Heli Thin 9174M	3,004,118		0.8890	2,670,650	
	Timber Receipts		5,045,700			4,485,609
	Sale Admin	100,914			89,712	
	Haul & Maint	222,470			197,775	
	Post Harvest Fuel Treatment	15,766			14,016	
4	Reforest 125 Acres	58,877		0.8548	50,328	
	Road Closures	800			684	
	Road Oblit	13,500			11,540	
5	Restoration Projects	25,000		0.8219	20,548	
	Tree Blasting	180,525			148,378	
	Forage Seeding	13,557			11,143	
13	PreComm Thin	27,440		0.6006	16,480	

The total Present Value Benefit is \$13,349,828

The total Present Value Cost is \$7,666,673

The Present Net Value is \$+5,683,156

The Present Value Benefit/Cost Ratio is 1.74

Present Net Value of a Long Term Project

Eagle Alt #2

The Base Year is 0
 The Discount Rate is 4.0 %
 The Project Length is 13 years

YEAR	ACTIVITY	COST (\$)	BENEFIT (\$)	DISCOUNT FACTOR	PVC (\$)	PVB (\$)
0			0	1.0000		0
1	Sale Prep	315,640		0.9615	303,500	
	Tractor Thin	70,576			67,862	
	Skyline Thin 3100M	225,370			216,702	
	Timber Receipts		2,423,300			2,330,096
	Road Const	55,000			52,885	
	Sale Admin	48,466			46,602	
	Haul & Maint	106,846			102,737	
2	Skyline Thin 3099M	225,297		0.9246	208,300	
	Heli Thin 4138M	1,184,212			1,094,871	
	Timber Receipts		3,980,350			3,680,057
	Sale Admin	79,607			73,601	
	Haul & Maint	175,497			162,257	
3	Heli Thin 4139M	1,184,499		0.8890	1,053,015	
	Timber Receipts		2,276,450			2,023,756
	Sale Admin	45,529			40,475	
	Haul & Maint	100,370			89,229	
	Post Harvest Fuel Treatment	13,117			11,661	
4	Reforest 104 Acres	48,986		0.8548	41,873	
	Road Closures	800			684	
	Road Oblit	13,500			11,540	
5	Restoration Projects	25,000		0.8219	20,548	
	Tree Blasting	180,525			148,378	
	Forage Seeding	13,557			11,143	
13	PreComm Thin	27,440		0.6006	16,480	

The total Present Value Benefit is \$8,033,909

The total Present Value Cost is \$3,774,341

The Present Net Value is \$+4,259,568

The Present Value Benefit/Cost Ratio is 2.13

Present Net Value of a Long Term Project

Eagle Alt#3

The Base Year is 0
 The Discount Rate is 4.0 %
 The Project Length is 13 years

YEAR	ACTIVITY	COST (\$)	BENEFIT (\$)	DISCOUNT FACTOR	PVC (\$)	PVB (\$)
0			0	1.0000		0
1	Sale Prep	615,960		0.9615	592,269	
	Tractor Thin 1306M	70,576			67,862	
	Skyline Thin 3615M	262,810			252,702	
	Timber Receipts		2,706,550			2,602,452
	Road Const	55,000			52,885	
	Sale Admin	54,131			52,049	
	Haul & Maint	119,334			114,744	
2	Skyline Thin 3614M	262,738		0.9246	242,916	
	Heli Thin 11131M	3,695,492			3,416,690	
	Timber Receipts		8,109,750			7,497,920
	Sale Admin	162,195			149,958	
	Haul & Maint	357,566			330,590	
3	Heli Thin 11132M	3,695,824		0.8890	3,285,574	
	Timber Receipts		6,122,600			5,442,969
	Sale Admin	122,452			108,859	
	Haul & Maint	269,951			239,985	
	Post Harvest Fuel Treatment	16,270			14,464	
4	Reforest 129 Ac	60,761		0.8548	51,939	
	Road Closures	800			684	
	Road Oblit	13,500			11,540	
5	Restoration Projects	25,000		0.8219	20,548	
	Tree Blasting	180,525			148,378	
	Forage Seeding	13,557			11,143	
13	Pre Comm Thin	27,440		0.6006	16,480	

The total Present Value Benefit is \$15,543,341

The total Present Value Cost is \$9,182,259

The Present Net Value is \$+6,361,082

The Present Value Benefit/Cost Ratio is 1.69

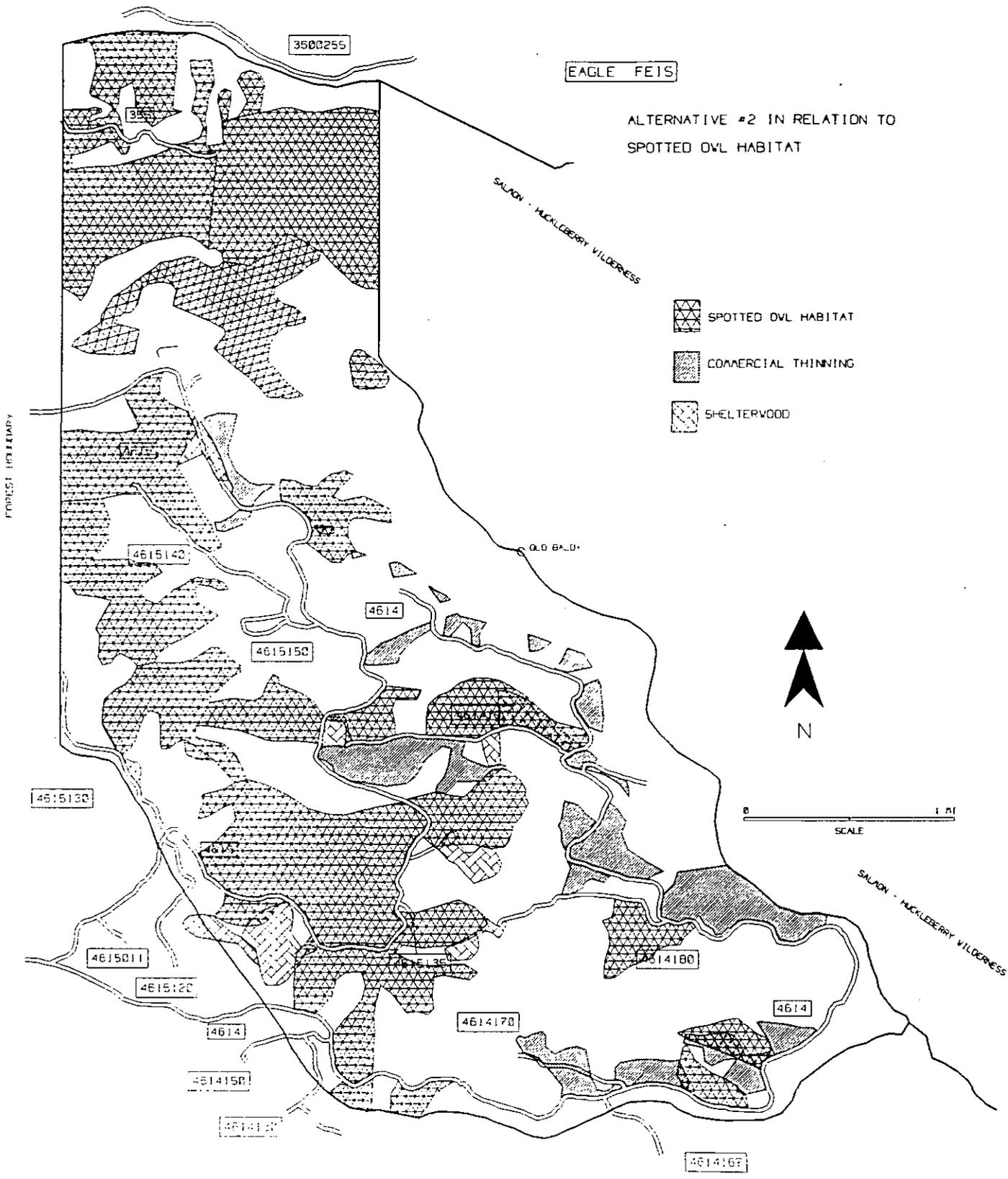
Appendix C (Spotted Owl Habitat)

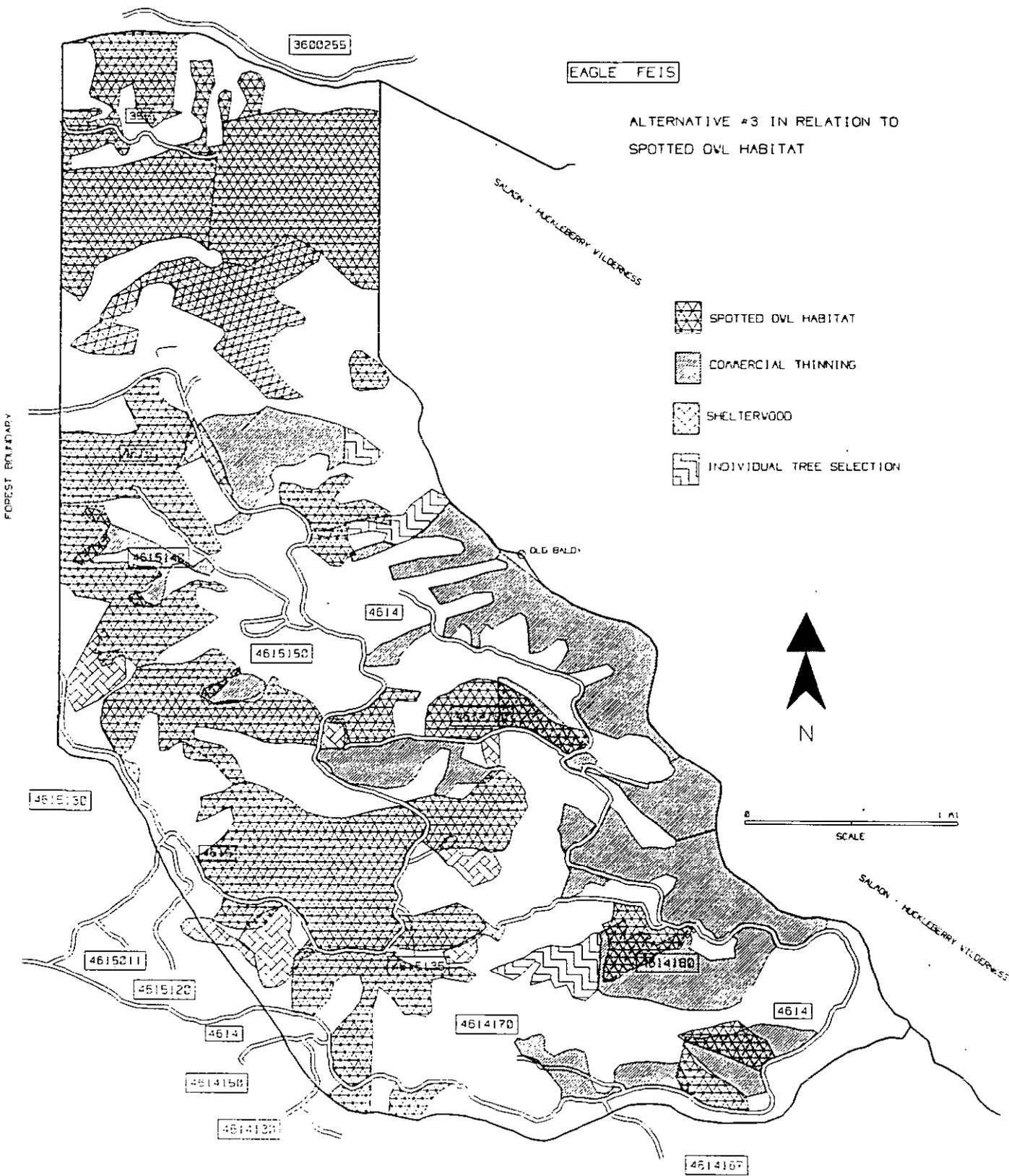
Content

Map of Alternative #1 in relation to Owl Habitat

Map of Alternative #2 in relation to Owl Habitat

Map of Alternative #3 in relation to Owl Habitat

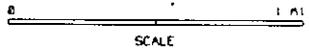




EAGLE FEIS

ALTERNATIVE #3 IN RELATION TO SPOTTED OWL HABITAT

-  SPOTTED OWL HABITAT
-  COMMERCIAL THINNING
-  SHELTERWOOD
-  INDIVIDUAL TREE SELECTION



FOREST BOUNDARY

SALMON - HUCKLEBERRY WILDERNESS

OLD BALD

SALMON - HUCKLEBERRY WILDERNESS

3600255

4615130

4615211

4615120

4614150

4614130

4614

4615150

4614170

4614180

4614

4614157

Appendix D (Silvicultural Data Sheets)

Content

Data sheets listing unit by unit prescriptions, size and others, by alternative.

EAGLE FEIS
DATA TABLE

ALTERNATIVE 1

Unit	Acres	Gross Vol/Ac (MBF)	Trees/ Acre	Relative Density	Rx	% BA Removed	Unit Volume (MBF)
1	84	88	206	86	CT	35-45	2,890
2	9	86	172	77	SW	40-50	293
3	4	88	158	76	ITS	10-15	40
4	12	91	198	88	ITS	5-10	34
5	7	75	217	82	CT	35-45	140
6	42	79	143	67	CT	30-40	987
7	7	92	189	90	CT	35-45	146
8	329	70	227	88	CT	35-45	6,909
9	23	81	261	76	CT	30-40	766
10	15	72	246	78	CT	35-45	295
11	36	61	173	72	CT	40-50	627
12	4	61	173	65	SW	70-80	111
13	13	78	140	85	SW	60-70	656
14	81	85	147	85	CT	35-45	2,006
15	10	78	149	70	SW	55-65	278
16	15	78	287	85	SW	55-65	293

17	27	98	104	80	SW	70-80	2,197
18	9	88	201	96	CT	30-40	389
19	6	74	201	80	CT	25-35	175
20	10	74	175	80	SW	50-60	173
23	21	74	164	70	ITS	10-20	155
24	132	65	269	83	CT	35-45	3,237
25	49	84	228	89	CT	35-45	1,441
26	33	84	228	89	CT	35-45	970
27	16	72	245	78	SW	50-60	391
28	36	94	251	86	CT	35-45	797
TOTALS	1,030						26,396

EAGLE FEIS
DATA TABLE

ALTERNATIVE 2

Unit	Acres	Gross Vol/Ac (MBF)	Trees/ Acre	Relative Density	Rx	% BA Removed	Unit Volume (MBF)
1	26	88	206	86	CT	35-45	892
2	9	86	172	77	SW	40-50	293
5	7	75	217	82	CT	35-45	140
7	7	92	189	90	CT	35-45	146
8	5	70	227	88	CT	35-45	105
9	23	81	261	76	CT	30-40	766
12	4	61	173	65	SW	70-80	111
13	13	78	140	85	SW	60-70	656
14	81	85	147	85	CT	35-45	2,006
15	10	78	149	70	SW	55-65	278
16	15	78	287	85	SW	55-65	293
17	27	98	104	80	SW	70-80	2,197
18	9	88	201	96	CT	30-40	389
19	6	74	201	80	CT	25-35	175
20	10	74	175	80	SW	50-60	173
24	89	65	269	83	CT	35-45	1,736

25	49	84	228	89	CT	35-45	1,441
26	33	84	228	89	CT	35-45	970
27	16	72	245	78	SW	50-60	391
28	36	94	251	86	CT	35-45	797
29	3	70	277	88	CT	35-45	63
30	9	70	277	88	CT	35-45	189
31	4	70	277	88	CT	35-45	84
32	8	70	277	88	CT	35-45	168
33	14	70	277	88	CT	35-45	294
34	9	70	277	88	CT	35-45	189
35	40	70	277	88	CT	35-45	840
TOTALS	562						15,782

EAGLE FEIS
DATA TABLE

ALTERNATIVE 3

Unit	Acres	Gross Vol/Ac (MBF)	Trees/ Acre	Relative Density	Rx	% BA Removed	Unit Volume (MBF)
1	84	88	206	86	CT	35-45	2,890
2	9	86	172	77	SW	40-50	293
3	4	88	158	76	ITS	10-15	40
4	12	91	198	88	ITS	5-10	34
5	7	75	217	82	CT	35-45	140
6	42	79	143	67	CT	30-40	987
7	7	92	189	90	CT	35-45	146
8	329	70	227	88	CT	35-45	6,909
9	23	81	261	76	CT	30-40	766
10	15	72	246	78	CT	35-45	295
11	36	61	173	72	CT	40-50	627
12	4	61	173	65	SW	70-80	111
13	13	78	140	85	SW	60-70	656
14	81	85	147	85	CT	35-45	2,006
15	10	78	149	70	SW	55-65	278
16	40	78	287	85	SW	55-65	780

17	27	98	104	80	SW	70-80	2,197
18	9	88	201	96	CT	30-40	389
19	6	74	201	80	CT	25-35	175
20	10	74	175	80	SW	50-60	173
23	21	74	164	70	ITS	10-20	155
24	132	65	269	83	CT	35-45	3,237
25	49	84	228	89	CT	35-45	1,441
26	64	84	228	89	CT	35-45	1,882
27	16	72	245	78	SW	50-60	391
28	36	94	251	86	CT	35-45	797
29	143	84	337	86	CT	30-40	3,003
TOTALS	1,229						30,798

Appendix E (Best Management Practices)

Content

A listing of Best Management Practices for Maintaining Water Quality.

Best Management Practices for Maintaining Water Quality

Timber Management

- T-1 Complete watershed effects analysis. Avoid sensitive areas - riparian mapping
- T-2 In progress. Will consider protection of water resources as site specific information is available.
- T-4 Commitment from IDT to utilize implementation plan to designate water resource protection.
- T-5 Limited operating season for yarding 7/15 - 10/31. Work outside of this season to be considered by IDT.
- T-7 SMU's / RMA's. Designate for each unit in FEIS. When complete, unit-specific treatments are completed: by unit size, width, yarding allowed or not. RMA's will be monitored pre and post implementation.
- T-8 Needs unit specific information in FEIS: Equipment operation, directional felling, full suspension, retention of LWD.
- T-9 For ground-based yarding systems: If field investigation reveals average slopes within proposed harvest units exceed 20%, alternative yarding systems will be considered.
- T-10 Landings will be located greater than 200 feet from an RNA.
- T-11 Tractor Skid Trails, yarding equipment would not operate within 150 feet of an RMA. Skid trails for ground based yarding systems would be designated, pre-approved, and designed for long term site productivity and stand management.
- T-12 Unit locations and logging systems info to be included in FEIS.
- T13 + 14 Seed, mulch, and waterbars for erosion control will be installed in harvest units prior to October 1 to ensure protection from storm events.
- T-15 + 16 Erosion control measures on landings and skid trails may require scarification or subsoiling prior to seeding.

Road Systems

- Road design and construction would follow Best Management Practices (BMP's) as outlined in the USDA Forest Service, Pacific Northwest Region publication, General Water Quality Best Management Practices.
- R-3 The operating season for road construction would be limited to the period 7/15 - 10/31.
- R-4 During the planning and design phase, if road cut slopes are expected to exceed 15 feet in height, the IDT will consider intensive erosion control measures and alternative designs. Evaluation of road cut slope design during the planning phase will minimize potential for erosion and mass wasting from road slopes.

Best Management Practices for Maintaining Water Quality

- R-7 To minimize surface erosion from new road construction, special design considerations (see Burroughs, E.R. and King J.G., 1991) will be used for road surfaces within 200 feet of wet areas and stream crossings. To minimize sediment from fill slopes, the following measures will be considered: 1) Slash windrows at the base of the fill and 2) Rocking the ditch to reduce water velocity and sediment transport.
- R-8 If road construction is left incomplete over the period 10/1 - 6/14, exposed ground would be protected by seeding, mulching, waterbarring, and blockage prior to 10/1. Live stream crossings would be protected with temporary culverts or similar structures during pioneer road construction.

Appendix F (Recreation Information)

Content

Excerpts from the Recreation Information Management (RIM) Handbook (FSH 2309.11)

Data table for recreation visitor hours by activity.

RIM HANDBOOK

*- 124.21 - Recreation Activities. Activities are significant parts of a person's total recreation experience on National Forest System lands. Activities are defined as:

A recognized action or number of similar or related actions which tend to fulfill a portion of the outdoor recreation needs desired by visitors on National Forest lands or waters.

Recreation activities and codes recognized in the RIM system will be found in exhibit 1.

People may participate in more than one activity in a given instance; for example, walking (hiking) and hunting at the same time. Record the activity which best represents the primary experience sought by the visitor. When the primary experience may not be readily apparent, record the activity which has the most management and/or resource impact.

Many people engage in more than one activity during a given visit. These activities should be recorded separately for a given site or area. For example, a person may picnic (code 43.1) and participate in team sports (code 21.1), individual sports (code 21.2), and games and play (code 21.3), in a single visit to a group picnic area.

Activity code definitions in exhibit 1 have been revised to include companion activities. For example, sightseeing is part of recreation travel (automobile riding, hiking, horse-back riding, etc.) However, time spent at observation sites should be recorded under viewing scenery (code 1.1).

Activities (and use) should be recorded on the site or area where they take place. -*

LEISURE VIEWING	
VIEWING SCENES, ACTIVITIES, OBJECTS	1.1 VIEWING SCENERY: Viewing outstanding scenes, landscapes or other natural features from observation points, turnouts, vista points or other areas where visitors generally stop for a period of time.
	1.2 (RESERVED; DO NOT USE)
	1.3 VIEWING ACTIVITIES (Spectator): Viewing other people participating in a wide variety of activities on National Forest lands. Typical examples are spectators viewing winter sports activities, boating activities, hang gliders, mountain climbers, or organized games. Also includes viewing of other forest-related activities which may enhance or broaden the visitors recreation experience such as watching timber harvest or road construction activities, slash disposal operations, cattle drives, fire-fighting, smokejumping, etc.
	1.4 VIEWING WORKS OF HUMANKIND: Visiting and/or viewing human-made features such as dams, bridges, buildings, fish hatcheries, etc., on National Forest lands.
TRAVEL - ALL TRAVEL MODES (Includes sightseeing while traveling. Read FSH 124.21 and 124.23)	
TRAVEL ALL MOTORIZED LAND	11.1 AUTOMOBILE: Driving or riding in motorized vehicles with at least 4 wheels. Includes all common passenger carrying vehicles such as cars, pick-ups, vans, campers, etc.
	11.2 MOTORCYCLES AND SCOOTERS: Driving or riding motorized vehicles with less than 4 wheels.
	11.3 ICE AND SNOW CRAFT: Using tracked, propeller-driven, or spiked-wheel motorized equipment specifically designed for ice and snow travel.
	11.4 SPECIALIZED LANDCRAFT (ATV's): Driving or riding in vehicles with wheels (at least 4), tracks or other suspension systems designed specifically for off-road use. Includes swamp and dune buggies, tracksters, and similar specialized vehicles. Report common or standard 4-wheel drive vehicles under 11.1 and airboats under 12.2.
	11.5 TRAIN AND BUS TOURING: Riding in buses, trains, cog railways and similar mass vehicles carrying people on, or to, National Forest lands for recreation purposes.
TRAVEL ALL MOTORIZED WATER	12.1 TOUR BOAT, SHIP, FERRY: Travel on commercial watercraft operating as tour boats or providing service primarily for visitors to view scenery on, or gain access to, National Forest lands.
	12.2 BOAT, POWERED: Driving or riding in small pleasure craft, houseboats, airboats, and similar craft for pleasure. Includes the activity of launching boats at boating sites.
TRAVEL OTHER MISCELLANEOUS LAND BASED TRAVEL	13.1 AIRCRAFT, MOTORIZED: Flying or riding in powered wing or rotor aircraft to gain access to National Forest lands or waters for recreation purposes.
	13.2 AERIAL TRAMS AND LIFTS: Riding aerial devices to view scenery on, or gain access to, National Forest lands. Includes alpine sliding and other off-season riding of ski lifts and trams at winter sports sites. Include winter use of trams and lifts for skiing access under activity code 51.3. (Skiing)
	13.3 AIRCRAFT, NON-MOTORIZED: Use of hang-gliders, parachutes, winged gliders, balloons or similar airborne structures that are launched, landed or otherwise dependent on the characteristics of National Forest lands for people to participate in the sport.

TRAVEL - CONTINUED	
TRAVEL - NON-MOTORIZED LAND	14.1 HIKING AND WALKING: Foot travel (including jogging) for pleasure or access. Includes sightseeing while traveling and rest or leisure stops that are not significant enough to report as specific activities.
	14.2 BICYCLE: Riding non-motorized vehicles with three wheels or less.
	14.3 HORSEBACK: (HORSEBACK RIDING): Using animals for mounted travel irrespective of the type of animal ridden.
TRAVEL - NON-MOTORIZED WATER	15.1 CANOEING: Riding in canoes, kayaks, and other lightweight craft propelled with paddles. Includes launching.
	15.2 SAILING: Riding in sailboats, prams, or other wind-propelled watercraft. Includes launching.
	15.3 OTHER WATERCRAFT (ROWING, DRIFTING, RAFTING): Riding in nonmotorized watercraft such as rowboats, rafts, innertubes. Includes launching.
SPORTS, GAMES, PLAY-ALL (Excludes Winter Sports)	
SPORTS-GAMES	21.1 TEAM SPORTS: Participating in team activities such as football, baseball, volleyball, etc.
	21.2 INDIVIDUAL SPORTS: Golf, tennis, archery, target practice, horse shoes and similar sports.
	21.3 GAMES AND PLAY: Playing games such as cards, checkers, tag, hide and seek etc.; throwing frisbees, playing catch, dancing, or using playground equipment.
WATER SPORTS AND PLAY	22.1 SWIMMING AND WATERPLAY: Swimming, diving, beach play, sunbathing and related activities. Includes bathing in hot springs, competitive swimming events and use of floating devices.
	22.2 DIVING: Skin and scuba diving (includes snorkeling) for the purpose of viewing, photographing, hunting or exploring underwater areas.
	22.3 WATERSKIING AND OTHER WATER SPORTS: Waterskiing, ski jumping, kiting, platter-riding, surfing and similar activities which take place outside of boats.
FISHING	
FISHING-ALL (Includes recreation harvest of non-fish aquatic life)	31.1 FISHING, COLD WATER: Fishing in waters where conditions will support trout species.
	31.2 FISHING, WARM WATER: Fishing in waters where conditions will not support trout species but are sufficient for species such as bass, perch, and catfish.
	31.3 FISHING, SALT WATER: Fishing in oceans and estuaries.
	31.4 FISHING, ICE: Fishing through ice on frozen bodies of water.

-FSH 9/80 AMEND 42-

RIM HANDBOOK

124.21-3

PERSONAL ACCOMMODATIONS - ALL	
CAMPING	41.1 CAMPING, GENERAL DAY: All nonspecific daytime use, general leisure and activities relating to camping in temporary shelters. This is basically time spent in the proximity of camp that cannot be readily defined in other activity codes. Report on developed sites or dispersed areas where use occurs. Report night use of camp (approximately 9:00 am to 9:00 pm) under activity codes 41.2, 41.3 or 41.4. Also, see codes 41.5, 41.6, 46.1, 46.2, and 46.3.
	41.2 CAMPING; AUTO: Night use (approximately 9:00 pm to 9:00 am) of persons camping in temporary shelters carried on or incorporated in the transportation vehicle. Includes camping in state wagons, vans, pickup campers, RV's, buses, trucks, etc. Record 12 visitor hours (1 RVD) for each person using such shelter for all or most of the night-time period. Record non-specific day use in Code 41.1
	41.3 CAMPING, TRAILER: Night use of persons camping in temporary shelters towed behind the transportation vehicle. Includes travel trailers, fold-out or pop-up tent trailers. Report non-specific day use in Code 41.1.
	41.4 CAMPING, TENT: Night use of persons camping in tents, lean-to's, shelters, or other accommodations that are not part of a vehicle. Includes all camping with no formal shelter (i.e. sleeping bag). Report non-specific day use in Code 41.1.
	41.5 ORGANIZATION CAMPING, GENERAL DAY: All non-specific daytime use, general leisure and activities occurring on organization sites, that cannot be readily defined in other activity codes. Report night use under Code 41.6.
	41.6 ORGANIZATION CAMPING, NIGHT: Overnight use of organization camps. Record 12 visitor hours (1 RVD) for each occupant between 9:00 pm and 9:00 am.
PICNICKING	43.1 PICNICKING: Eating meals in a forest environment for pleasure and relaxation. (Incidental meals eaten while participating in other major activities such as hunting, fishing, hiking, etc., should be reported as part of those activities).
OTHER ACCOMMODATIONS	46.1 RESORT AND COMMERCIAL PUBLIC SERVICE, GENERAL: All nonspecific daytime activities and general leisure at hotels, lodges, resorts, and other public service sites (i.e., stores, restaurants, filling stations, etc.).
	46.2 RESORT LODGING: Overnight use of hotels, lodges, motels, hostels, cabins, etc. Record 12 visitor hours (1 RVD) for each person using shelter between approximately 9:00 pm and 9:00 am the following day. All nonspecific daytime use is recorded in 46.1.
	46.3 RECREATION CABIN USE: Includes day and night use of permitted recreation residences or Forest Service owned cabins. One person present for 24 hours will be reported as 2 RVD's.

-FSH 9/80 AMEND 42-

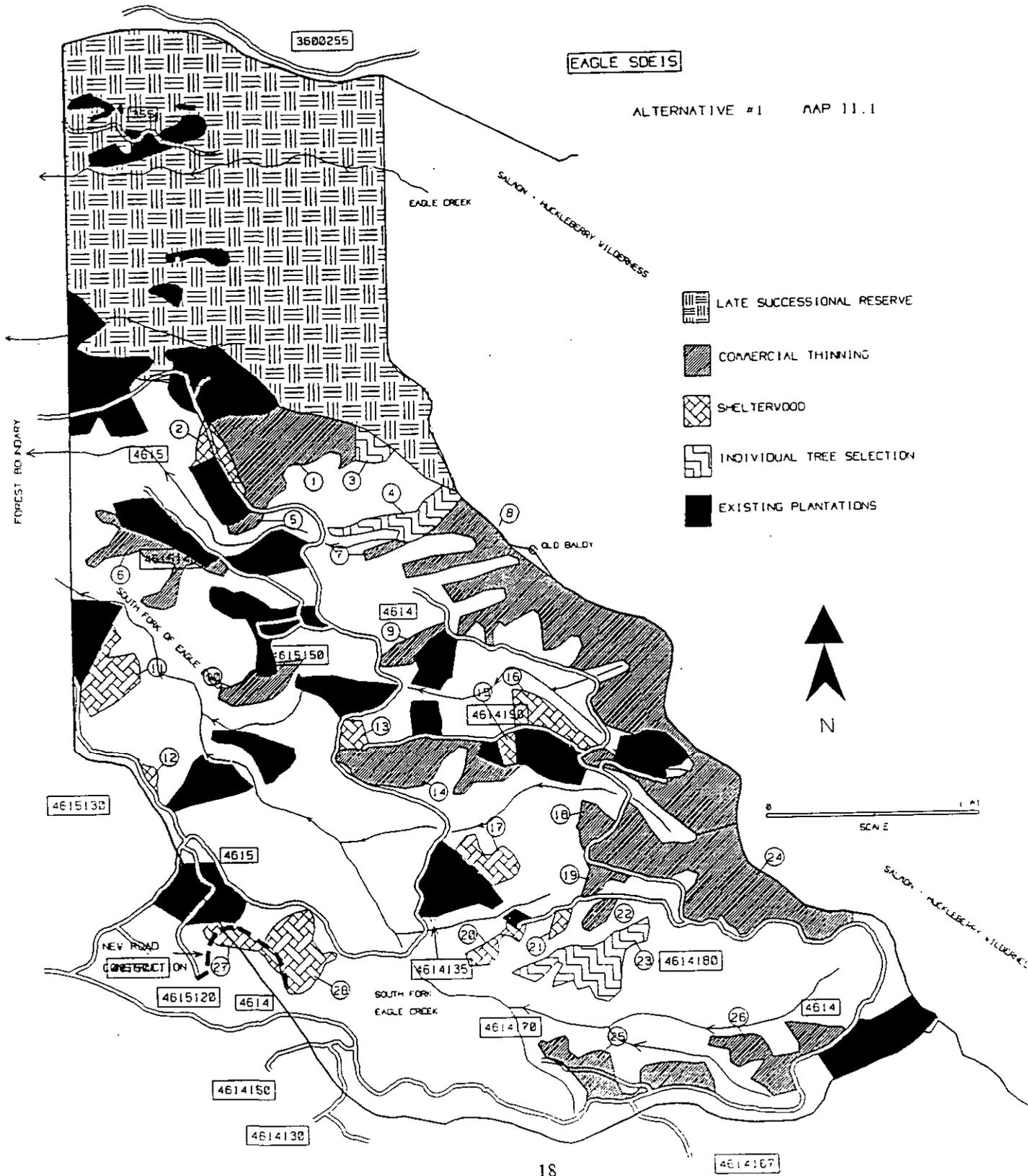
CODE	DESCRIPTION	VISITORY_HOURS	EDIT_DATE
1	VIEWING SCENERY	1.6	18-JUN-92
2	VIEWING ACTIVITIES (SPECTATOR)	1.4	18-JUN-92
3	VIEWING WORKS OF HUMANKIND	.7	18-JUN-92
11	AUTOMOBILE TRAVEL	3.2	18-JUN-92
12	MOTORCYCLES & SCOOTERS	3	18-JUN-92
13	ICE & SNOWCRAFT TRAVEL	3.7	18-JUN-92
14	SPECIALIZED LANDCRAFT (OHV'S)	3.2	18-JUN-92
15	TRAIN & BUS TOURING	2.5	18-JUN-92
21	TOUR BOAT, SHIP, FERRY	3.8	18-JUN-92
22	BOAT, POWERED	2.6	18-JUN-92
31	AIRCRAFT, MOTORIZED	1.2	18-JUN-92
32	AERIAL TRAMS & LIFTS	.9	18-JUN-92
33	AIRCRAFT, NONMOTORIZED	1.7	18-JUN-92
41	HIKING & WALKING	3.9	18-JUN-92
42	TOURING BIKE	2.9	18-JUN-92
43	HORSEBACK RIDING	4.4	18-JUN-92
44	MOUNTAIN BIKE	4.5	18-JUN-92
45	TRAILHEAD/SNOWPARK ACTIVITIES	1.2	18-JUN-92
51	CANOEING	2.9	18-JUN-92
52	SAILING	3.1	18-JUN-92
53	OTHER WATERCRAFT	2.8	18-JUN-92
54	SAIL BOARDING	3.12	18-JUN-92
55	BOAT LAUNCHING	1.2	18-JUN-92
61	TEAM SPORTS	1.4	18-JUN-92
612	INDIVIDUAL SPORTS	1.1	18-JUN-92
613	GAMES & PLAY	1.4	18-JUN-92
71	SWIMMING & WATERPLAY	2.1	18-JUN-92
72	DIVING	1.7	18-JUN-92
73	WATERSKIING & OTHER WATER SPORTS	2.3	18-JUN-92
81	FISHING, COLD WATER	4.3	18-JUN-92
812	FISHING, WARM WATER	3.5	18-JUN-92
813	FISHING, SALT WATER	4.1	18-JUN-92
814	FISHING, ICE	2.7	18-JUN-92
815	FISHING, ANADROMOUS	3.96	18-JUN-92
91	CAMPING, GENERAL DAY	7	18-JUN-92
912	CAMPING, VEHICLE	11	18-JUN-92
913	CAMPING, TRAILER	11.9	18-JUN-92
914	CAMPING, TENT	11	18-JUN-92
915	ORGANIZATION CAMPING, GENERAL DAY	8.6	18-JUN-92
916	ORGANIZATION CAMPING, NIGHT	10.8	18-JUN-92
93	PICNICKING	3.6	18-JUN-92
95	RESORT & COMMERCIAL PUB. SERV, GEN.	2.5	18-JUN-92
952	RESORT LODGING	11	18-JUN-92
953	RECREATION CABIN USE	15.4	18-JUN-92
96	ICE SKATING	1.7	18-JUN-92
97	SLEDDING, TOBOGGANING, TUBING	2.6	18-JUN-92
98	SKIING, DOWNHILL	4.9	18-JUN-92
99	SNOW PLAY	2.8	18-JUN-92
995	CROSS-COUNTRY SKIING, SNOWSHOEING	4.1	18-JUN-92
100	HUNTING, BIG GAME	7.8	18-JUN-92

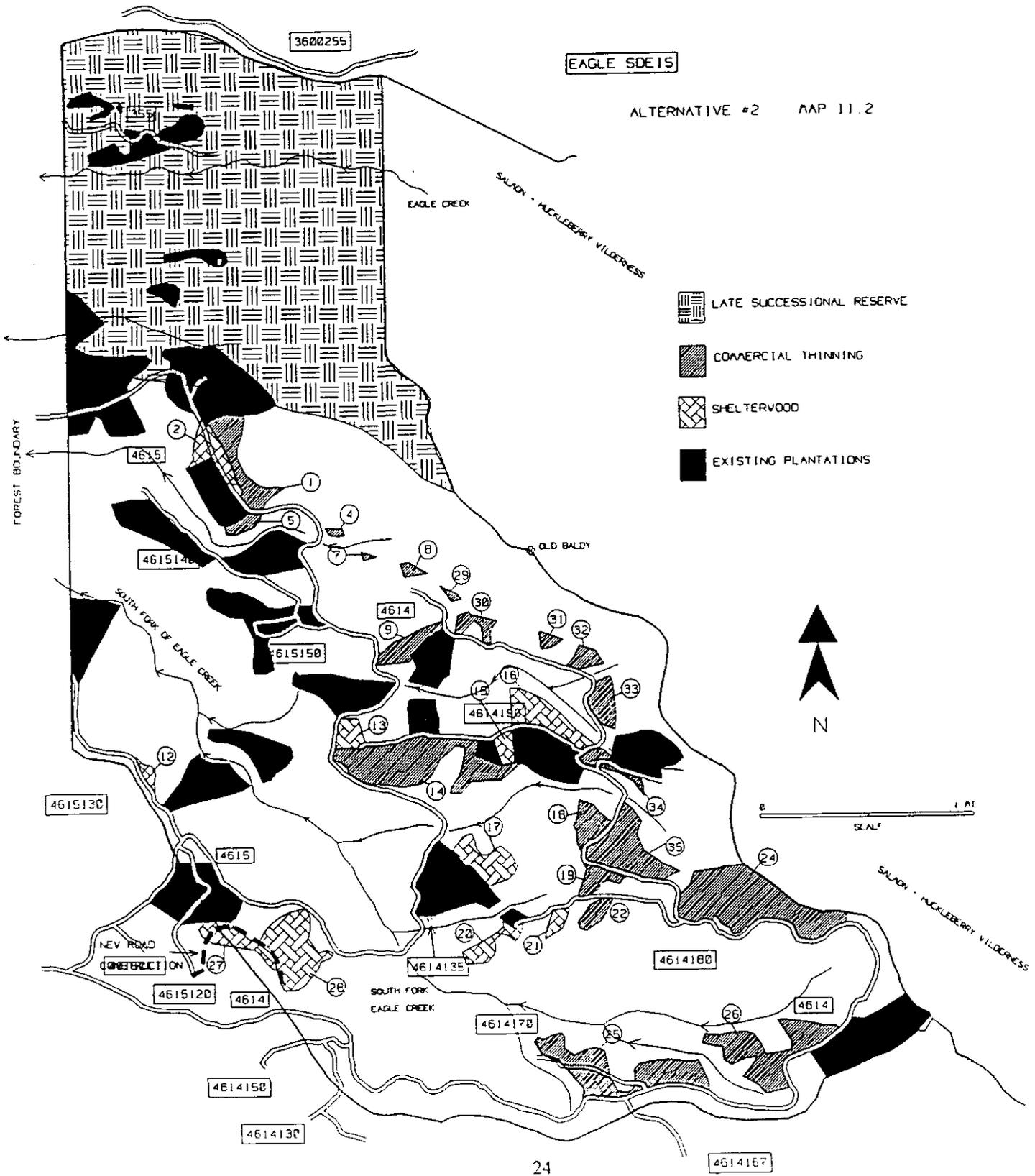
DESCRIPTION	VISITORY_HOURS	EDIT_DATE
12 HUNTING, SMALL GAME	3.8	18-JUN-92
17 HUNTING, UPLAND BIRDS	4.4	18-JUN-92
HUNTING, WATERFOWL	4.6	18-JUN-92
15 TRAPPING	5.04	18-JUN-92
21 NON-CONSUMPTIVE WILDLIFE USE	2.9	18-JUN-92
22 NATURE STUDY (HOBBY, EDUCATION)	2.7	18-JUN-92
31 MOUNTAIN CLIMBING	7.4	18-JUN-92
41 GATHERING FOREST PRODUCTS	4.7	18-JUN-92
1 VIEWING INTERPRETIVE EXHIBITS	.8	18-JUN-92
2 ATTENDING TALKS & PROGRAMS	1	18-JUN-92
3 TOURING, GUIDED	1.7	18-JUN-92
4 TOURING, UNGUIDED	1.4	18-JUN-92
5 WALKING, GUIDED	1.4	18-JUN-92
6 WALKING, UNGUIDED	1.2	18-JUN-92
7 VIEWING INTERPRETIVE SIGNS	.3	18-JUN-92
8 LISTENING TO AUDIO PROGRAMS	.4	18-JUN-92
9 GENERAL INFORMATION	.3	18-JUN-92

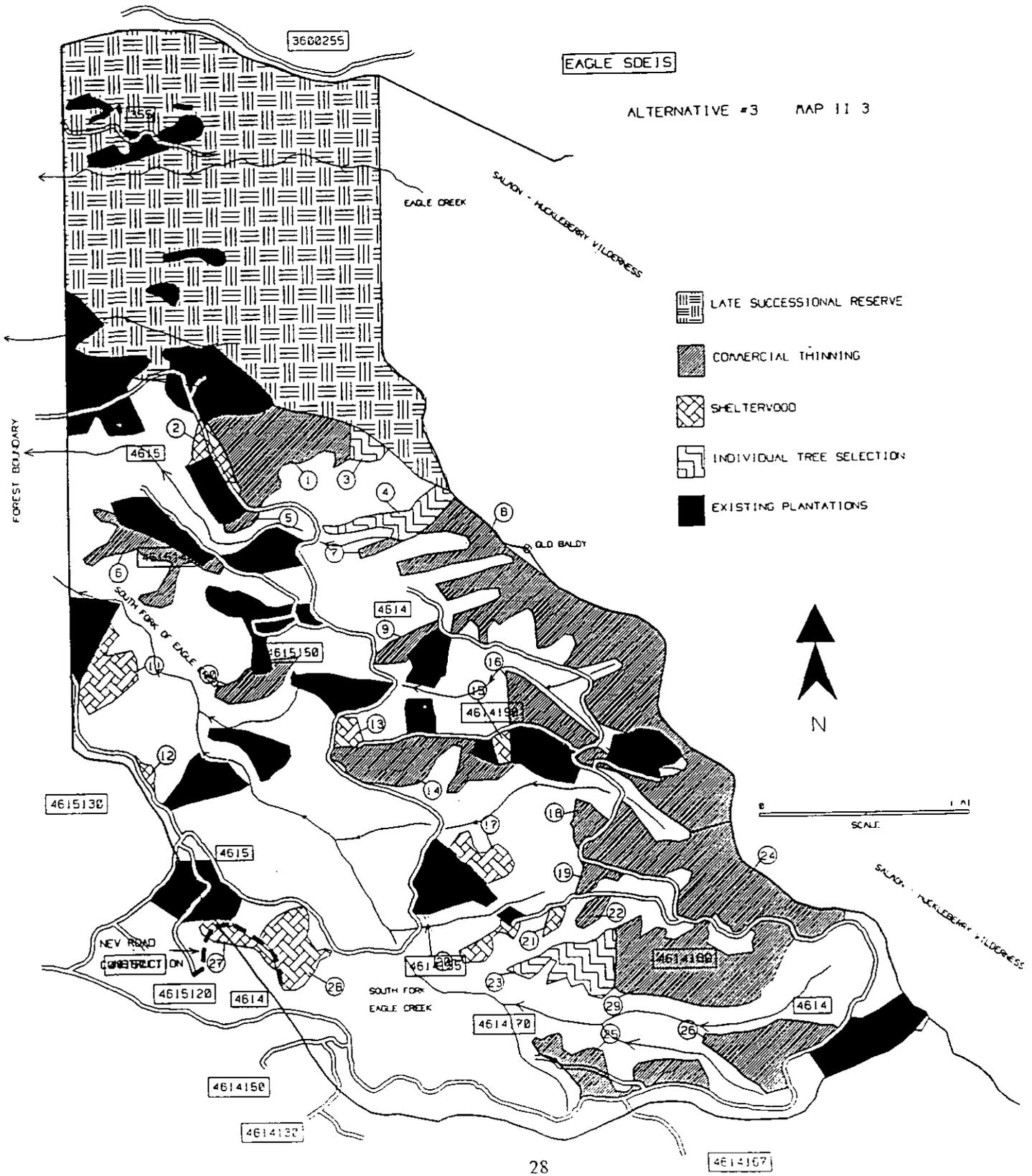
Appendix G (Alternative Maps for Eagle SDEIS)

Content

Maps of alternatives #1 through 3 of the Eagle SDEIS.







Appendix H (Blowdown)

Content

Blowdown narrative

Map of blowdown areas in the Eagle Creek drainage

Blowdown potential map

Blowdown in the Eagle Creek drainage

Blowdown area descriptions:

Blowdown was not a concern in the Eagle area until approximately 1983. Prior to this time, no clearcut harvest activities had occurred with the exception of a clearcut along the western forest boundary where road 4615 now passes through the southern end of the unit and small clearcuts north of road 4615 and along road 355 in the physical drainage of Eagle Creek. These clearcuts were harvested in the late 1960's or early 1970's. Road 4615, 4615140, and 4614150 were built to log the Raven thinning. The thinning began where 4615 crosses the South Fork and continued below road 4615 out to just past the 4615 / 4615140 road junction. Road construction and logging for the Raven sale began in the early 1970's and continued until approximately 1978. Road 4614 was constructed to log the "Baldy" sale. This sale was sold in the late 1970's but was given back to the Forest Service through the "buyout" legislation in the early 1980's. None of the units from the original Baldy sale were ever logged.

The first clearcut units to be sold and logged along the 4615 road were under the "Warbler" sale. One unit was south of road 4615 at the 4615 / 4615120 road junction. Three other units were located along the 4615130 road. The Warbler sale was sold in 1982 and completed in 1985.

In December of 1983, the Estacada district experienced a windstorm out of the east that caused blowdown across the district. Part of this blowdown was included in the "Quilt" salvage sale. These sites were near the Raven thinning and adjacent to one of the Warbler units at the 4615120 road junction. (Refer to attached blowdown map, Area 1): In addition to the units shown on the map, some roadside salvage occurred along road 4615 but these units removed individual trees where there were no heavy concentrations.

In 1985, the Estacada district experienced another storm out of the east that mainly affected the Eagle area (Refer to attached blowdown map, Area 2). The four blowdown locations indicated on the map (two north of road 4615190, one south of 4614190, and one at the end of the 4614180 road, were located within contiguous stands of timber (no clearcuts or thinnings had yet been sold or harvested along this road system). In addition to the four concentrations indicated, several trees were blown over along the 4614170, 4614180, and 4614190 spurs (as indicated on the map). Once this blowdown occurred, the "Gossamer" sale was planned and sold. Gossamer not only salvaged the four concentrations of blowdown, but also created logical logging units around these blowdown areas. Thus, the first clearcut units along the 4614, 4614180, and 4614190 roads were created. Roadside salvage units were created to log the blowdown adjacent to the 4614170, 4614180, and 4614190 spurs (indicated on the map by "X's"). Other roadside salvage units were established along the 4614 road but these units only picked up scattered individual windthrown trees.

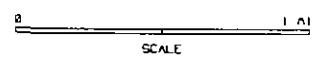
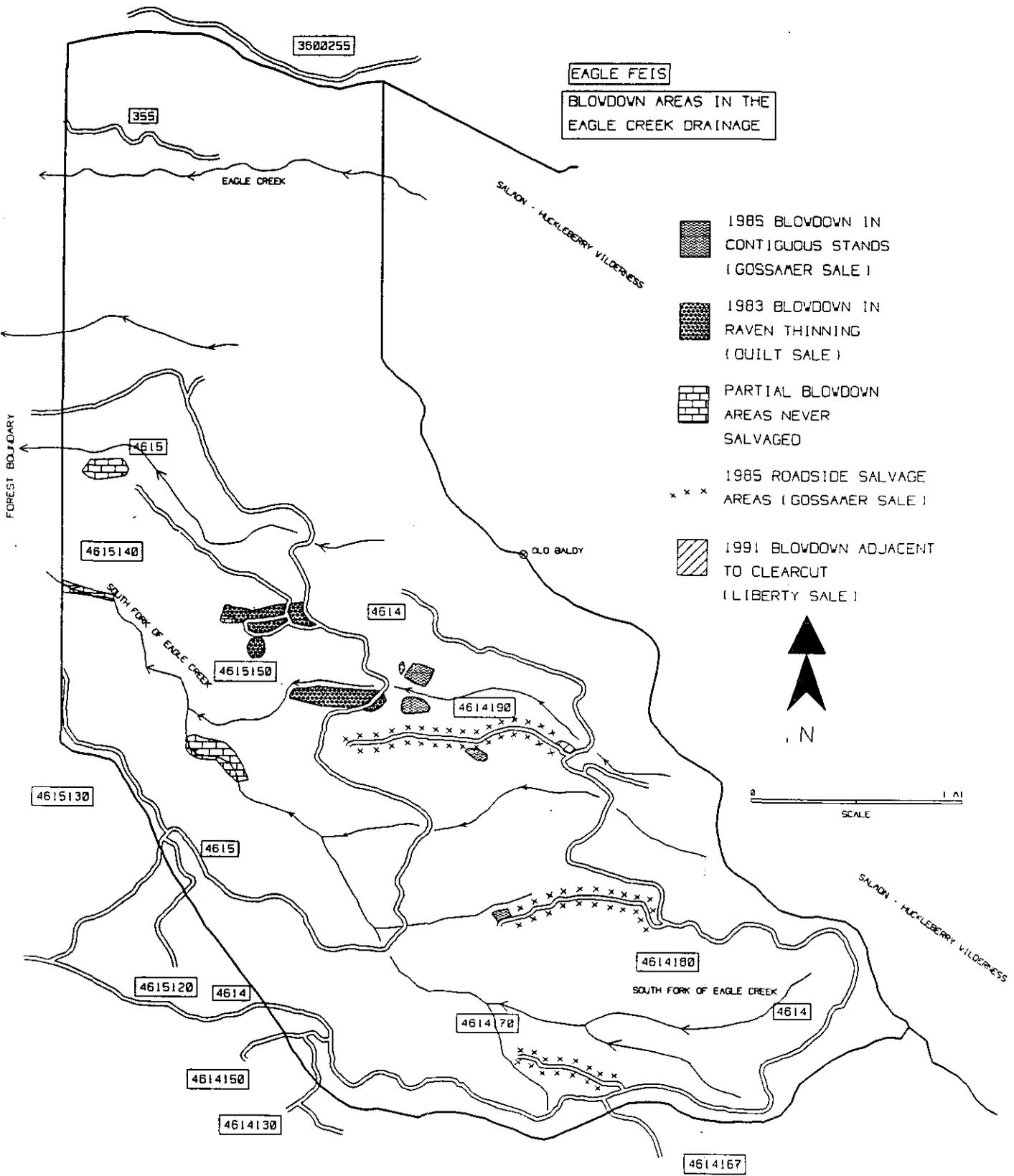
As shown on the attached map, one blowdown site is located off of the end of the 4615140 road (designated as Area 3 on the attached map). This blowdown area is in a contiguous stand of timber (there are no clearcuts immediately east of this pocket). The trees in this area are lying from east to west indicating that east winds created the blowdown.

It is unknown as to the exact date of when this blowdown occurred however, it is estimated it probably occurred in either 1983 or 1985. There are no plans to salvage this area.

Blowdown area "4" is adjacent to a clearcut created from the Gossamer sale. The way the trees are lying indicates that east winds created this pocket. It is unknown as to when these trees were blown over however, the original sale was sold in 1986 and completed in 1988. Thus, the blowdown probably occurred after 1988. There are no plans to salvage this pocket.

EAGLE FEIS
BLOWDOWN AREAS IN THE
EAGLE CREEK DRAINAGE

-  1985 BLOWDOWN IN CONTIGUOUS STANDS (GOSSAMER SALE)
-  1983 BLOWDOWN IN RAVEN THINNING (QUILT SALE)
-  PARTIAL BLOWDOWN AREAS NEVER SALVAGED
-  1985 ROADSIDE SALVAGE AREAS (GOSSAMER SALE)
-  1991 BLOWDOWN ADJACENT TO CLEARCUT (LIBERTY SALE)



The "Crowfoot" sale was a scheduled sale of *green* timber and was sold in January of 1990. Four units were located on the 4615 and the 4614 road systems. One unit is located at the junction of the 4614 and 4614190. Blowdown area "5" is located on the other side of the 4614190 road across from this Crowfoot unit. This pocket was blown over in late 1990 or early 1991 and was salvaged by the "Liberty" salvage sale. In addition, this salvage sale picked up scattered individual trees along the 4614 and 4615 road systems. The way the trees were lying indicates that this blowdown occurred from a southwest wind.

Blowdown area "6" is located adjacent to a Quilt unit. This blowdown occurred as a result of an east wind but it is not known as to the exact date of this event. To date, this area has not been salvaged.

One other sale logged timber and constructed roads. This sale was "Eager" and was located on the 4615 and 4615140 road systems north of the Quilt salvage area. Eager was sold in 1983 and was completed in 1987. After the unit at the end of the 4615 was logged, the BLM constructed a road from this Eager unit, west across the forest boundary and then out onto their land. Blowdown area "7" is located west of this Eager unit and was blown over by east winds. It is not known when this event occurred but it probably happened in 1987 or 1988.

Suspected causes of specific events:

At the time of each specific blowdown event, no analysis was completed as to the exact cause of the windthrow. However, through photo interpretation, general ground observations, district experience, known scientific data, and common sense, conclusions as to the cause of the event(s) can be determined.

For this analysis, several color photos were taken of a few of the blowdown sites. These photos were included in the analysis file. Each series of photos were divided into *Groups* and then each photo was given a letter designation. Thus, these groups and photos are referred to in the following text.

Area 1: The blowdown pocket on the 4615 and 4615120 road was located on a flat area adjacent to previously harvested units (refer to *Group 3*, photo "h"). Thus, the east winds that caused this event blew against a wall of trees along the edge of a clearcut. If it had not been for this edge, it is anticipated that blowdown would probably not have occurred. This is because trees in contiguous stands on the same topography surrounding the area were not affected.

There are two other pockets designated as "area 1". Of these two pockets, one is located adjacent to Raven creek. This pocket is located in a "V" shaped draw and both sides of the draw were thinned in the Raven sale (refer to *Group 6*, photo "a"). Thus, the question arises, why did one side of the draw blow over and not the other side if both were thinned at the same intensity? (refer to *Group 6*, photo "b") (at the time of this event, no clearcuts were located east of the blowdown). From ground observations and photo interpretation, it appears that several factors contributed to this event. a) The east winds appeared to have funneled down through the stream drainage possibly accelerating as they went down stream. b) Ground water and alder patches appear above and on the east side of the road and it is possible the north facing slope has a higher water table than the south facing slope. This condition could cause smaller root masses when compared to a drier site. c) Road 4615 created an edge above the blowdown site. d) The trees in the timber stand had been close growing, tall, and without a large root mass.

The remaining pocket in area 1 is located on a small, dry, relatively flat ridge (refer to *Group 8*, photo "a & b"). When compared to the surrounding terrain, this site is more exposed than other areas in the vicinity. Suspected causes of the event are; a) The site is located on a relatively exposed, shallow soiled ridge. b) The road system created an edge above and in the blowdown site. c) The trees in the timber stand were close growing, tall, and without a large root mass.

Area 2: Two pockets of blowdown in area 2 were on either side of Raven creek. (at the time of this event,

these hillsides were contiguous stands of timber except for constructed roads). Suspected causes of the event are: a) The sites are located in areas with high water tables (tributary streams to Raven creek and wet areas are located above and to the sides of the sites) thus, root masses were small. b) The east winds appeared to have funneled down through the stream drainage possibly accelerating as they went down stream. c) The trees in the timber stand were close growing, tall, and without a large root mass.

A third pocket of blowdown in area 2 was located south of road 4614190. (at the time of this event, this hillside consisted of contiguous stands of timber except for constructed roads). This site was approximately 200' south of the 190 road, on a relatively exposed, dry knob on a ridge. Suspected causes of the event are: a) The site is located on a relatively exposed, shallow soiled ridge. b) The ground is fairly rocky with shallow soils. (c) The root mass of the trees was small due to site conditions and the trees were close growing.

A fourth pocket of blowdown was located at the end of the 4614180 road. (at the time of this event, this hillside consisted of contiguous stands of timber except for constructed roads). This site is located on the side of a ridge adjacent to the 180 road. Suspected causes of the event are: a) The road system created an edge above the blowdown site. b) The trees in the timber stand were close growing, tall, and without a large root mass. c) The road cut created a tunnel where the wind could drop below the canopy layer and possibly accelerate as in a venturi.

The remaining portions of area 2 was roadside salvage along the 170, 180, and 190 spurs. The trees along these roads were laying parallel with the road and very few were actually laying across the road. The heaviest blowdown was adjacent to the road with a few scattered individuals approximately 100 to 150 feet back into the timber. (at the time of this event, this hillside consisted of contiguous stands of timber except for constructed roads). Suspected causes of the event are: a) The trees in the timber stand were close growing, tall, and without a large root mass. b) The road cut created a tunnel where the wind could drop below the canopy layer and possibly accelerate as in a venturi.

Area 3: This site is located on a north facing slope adjacent to an un-named tributary to Eagle Creek and is located in a contiguous stand of timber. Suspected causes of the event are: a) The east winds appeared to have funneled down through the stream drainage possibly accelerating as they went down stream. b) The trees in the timber stand were close growing, tall, and without a large root mass. c) It is possible the north facing slope has a higher water table than the south facing slope. This condition could cause smaller root masses when compared to a drier site.

Area 4: This small site is located in riparian buffer left alongside a tributary to Raven creek (refer to *Group 3*, photo "f"). This buffer was left after the logging of a clearcut in the Gossamer sale. Suspected causes of the event are: a) The east winds that caused this event blew against a wall of trees along the edge of a clearcut. b) The site is in an area with high water tables where root mass is small. c) The trees in the timber stand were close growing, tall, and without a large root mass due to competition and poor drainage.

Area 5: This small site is located next to road 4614190, across from a clearcut created by the Crowfoot sale (refer to *Group 3*, photo "d"). This site is located on a north facing slope in the upper Raven creek drainage. Of the blowdown sites described, this is the only patch (aside from scattered individuals along roads) that was blowdown by a westerly wind. Suspected causes of the event are: a) The west winds that caused this event blew against a wall of trees along the edge of a clearcut and road cut. b) The trees in the timber stand were close growing, tall, and without a large root mass due to competition. c) It is possible the north facing slope as a higher water table than the south facing slope. This condition could cause smaller root masses when compared to a drier site.

Area 6: This small site is located next to a clearcut created by the Quilt sale. This site is located on a west facing slope on the back side of a dry ridge. Suspected causes of the event are: a) The east winds that caused

this event blew against a wall of trees along the edge of a clearcut. b) The trees in the timber stand were close growing, tall, and without a large root mass due to competition.

Area 7: This site is located in a "leave" strip between a clearcut created by the Eager sale and a clearcut created in the late 1960's or early 1970's (refer to *Group 3*, photo "e"). The site is located on relatively flat dry land. Suspected causes of the event are: a) The east winds that caused this event blew against a wall of trees along the edge of a clearcut. b) The trees in the timber stand were close growing, tall, and without a large root mass due to competition.

Blowdown Potential

The following map was developed through on the ground investigations, district experience, scientific data, and common sense. This map is in no way attempting to predict future windthrow events nor is it an attempt to predict where blowdown would occur. Rather, it is intended to be a tool whereby managers can design planned projects so that the likelihood of success is greater. It cannot be assumed that if stands are contiguous, that the probability of blowdown is low over the entire project area. This is evidenced by past blowdown events in the Eagle drainage that have occurred in contiguous timber stands. It depends on stand condition, site condition, and the velocity and direction of the wind.

The high probability areas on the map were placed on ridge tops, along roads that are aligned east to west, along streamsidess and riparian areas that are aligned east and west, and in areas where blowdown has occurred in the past.

The moderate probability areas on the map were placed on the "lee" side of ridges where the ridges were designated high probability, on ridge tops with shallow soils, drainages that were not aligned east and west, and north slopes where it is suspected that water tables could be high.

The low probability areas were placed on the "lee" side of ridges lower down in the project area, on west facing slopes, and where north slopes were lower down in the drainage and are protected by surrounding topography.

This map is a worst case scenario in that, if a clearcut "edge" were placed in a high probability area, then blowdown would most likely occur along that edge over time. Likewise, if a thinning were to occur in a high probability area and the wind was not allowed to drop below the canopy layer, then the probability would be low although there is a greater chance that blowdown could occur given the right conditions (i.e., wind direction, wind velocity, soil moisture content etc.). In this analysis, "edge" is defined as; the distinct line between two different seral stages (e.g., the line created where a 10 year old plantation abuts a 130 year old residual stand of timber). If a clearcut edge were placed in a moderate probability area, then the chances of blowdown along that edge is not as great as in a high probability area. However, the possibility of blowdown still exists. If a thinning were placed in the moderate area and the wind was not allowed to drop below the canopy layer, the probability of blowdown is low. In the low probability area, the chances of blowdown are much less than in the other probability areas. This is especially true in the case of a thinning. It should be remembered too, that while normal stand damage can be minimized by good silviculture, there is no way of completely preventing loss caused by gusts of hurricane force (Mergen 1954).

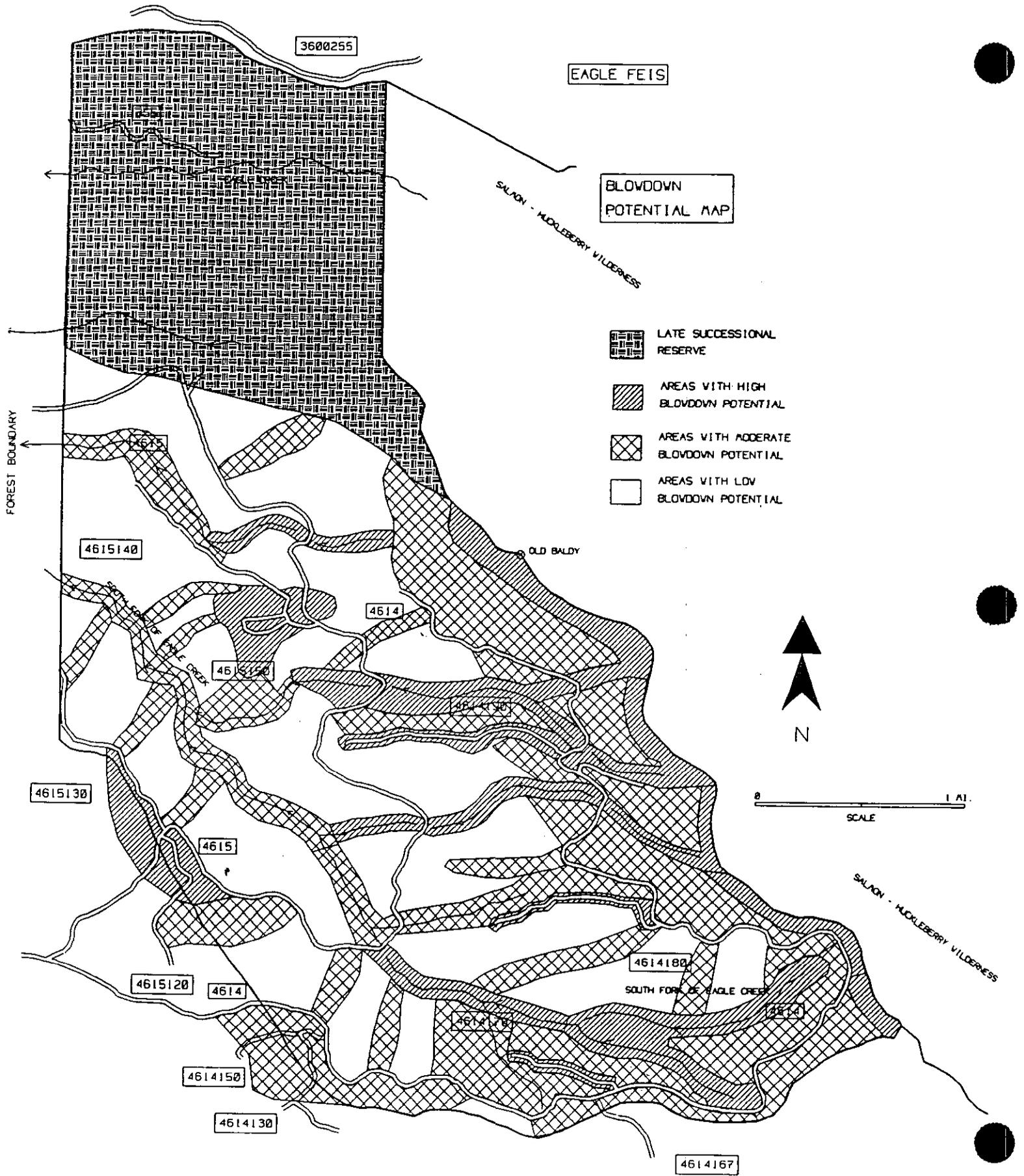
Under the Eagle SDEIS, the clearcut prescription would not be used in any of the alternatives. The closest silvicultural tool that resembles a clearcut is the shelterwood where 20 trees per acre are left on site. This prescription would not be recommended in high probability areas because it does create an edge and blowdown would most likely occur. The shelterwood prescription with 20 trees per acre, could be used in the moderate probability area if this cutting was placed lower down in the drainage. The possibility of blowdown still exists but a manager can be somewhat assured of success. The decision to place a shelterwood in a moderate area would also depend on other objectives for the site. If the other objectives outweigh the blowdown risk, then a shelterwood of this type may be appropriate. In addition, a shelterwood in the moderate probability areas would be more assured of success if 40 or 50 trees per acre were left rather than 20. In the low probability areas, a shelterwood leaving 20 trees per acre would be very appropriate and the probability for success is very high.

Another silvicultural tool being considered in the Eagle FEIS is thinning. It is recommended that a thinning boundary not be placed immediately adjacent to the top of the ridge that divides Eagle and the wilderness. This

is because this is a high probability area and the chances of the wind dropping below the canopy layer is high even though this is a thinning. Once on the "lee" side of the ridge, thinning can begin but with a light removal (i.e., less than 30% of the basal area should be removed). Below this lighter removal, the thinning could increase in intensity. However, the intensity should not be such that the wind goes below the canopy. Further down the slopes, thinnings can increase in intensity and small openings can be created. This can occur on the lower slopes in the moderate and low probability areas. Utilizing the above methods should ensure that objectives for stand manipulation are met with a fairly secure guarantee of their success.

Surveys have been completed that identify all wet areas and streams that could be affected by the proposed alternatives. It would be too cumbersome to map all of these areas on the attached blowdown potential map. However, these too are areas with a high blowdown potential. In this type of area, tree removal should be with a low intensity and then increase in intensity as the unit moves away from the site. An edge should not be created immediately adjacent to these wet areas and tributaries through shelterwood harvesting.

Another high potential area for blowdown is along the edges of existing clearcuts. These too were not shown on the attached map. It appears that the majority of the clearcut edges that currently exist are windfirm however, there are exceptions (refer to color photos in the analysis file). These exceptions are where edges were left adjacent to wet areas or areas with high water tables and adjacent to exposed ridge tops where soils are shallow. It is recommended that heavy shelterwood cutting units not be placed next to these high potential areas. In addition, if stands are to be thinned, that the intensity of thinning be light while close to these edges (i.e., Not to remove more than 30% of the basal area in the stand.



EAGLE FEIS

BLOWDOWN POTENTIAL MAP

SALMON - HUCKLEBERRY WILDERNESS

-  LATE SUCCESSIONAL RESERVE
-  AREAS WITH HIGH BLOWDOWN POTENTIAL
-  AREAS WITH MODERATE BLOWDOWN POTENTIAL
-  AREAS WITH LOW BLOWDOWN POTENTIAL

FOREST BOUNDARY

OLD BALDY



0 1 MI. SCALE

SALMON - HUCKLEBERRY WILDERNESS

SOUTH FORK OF EAGLE CREEK

4614167

Appendix I (Public Comments)

Content

Response to substantive comments from the Eagle SDEIS

Eagle FEIS
Table of Contents for Responses to Substantive Comments

1) Subject: <u>Spotted Owl Habitat</u>	I-1
Response:	I-1
2) Subject: <u>Roadless Areas</u>	I-2
Response:	I-2
3) Subject: <u>Cumulative Effects</u>	I-2
Responses:	I-2
4) Subject: <u>Economics:</u>	I-3
Responses:	I-3
5) Subject: <u>Roads:</u>	I-3
Responses:	I-4
6) Subject: <u>Blowdown:</u>	I-4
Response:	I-5
7) Subject: <u>Riparian Areas</u>	I-6
Response:	I-7
8) Subject: <u>Water Quality:</u>	I-9
Response:	I-10
9) Subject: <u>Wilderness:</u>	I-10
Response:	I-11
10) Subject: <u>Trails:</u>	I-11
Response:	I-11
11) Subject: <u>Wildlife Habitat:</u>	I-11
Response:	I-13
12) Subject: <u>Aquatic Habitat:</u>	I-15
Response:	I-15
13) Subject: <u>Specific Units:</u>	I-15
Response:	I-16
14) Subject: <u>Silviculture:</u>	I-16
Response:	I-19
15) Subject: <u>Flood Effects</u>	I-23
Response:	I-23
16) Subject: <u>Fungi:</u>	I-24
Response:	I-24
17) Subject: <u>Recreation:</u>	I-24
Response:	I-24

18) Subject: <u>Restoration</u> :	I-24
Response:	I-25
19) Subject: <u>Anadromous Fish/Resident Fish</u> :	I-25
Response:	I-25
20) Subject: <u>Stream Temperatures</u> :	I-26
Response:	I-26
21) Subject: <u>Comment Period</u> :	I-26
Response:	I-26
22) Subject: <u>Municipal Watershed</u> :	I-27
Response:	I-27
23) Subject: <u>Aggregate Recovery Percentage (ARP)</u> :	I-27
Response:	I-28
24) Subject: <u>Instability / Landslides</u> :	I-28
Response:	I-29
25) Subject: <u>Mitigation</u> :	I-30
Response:	I-30
26) Subject: <u>Fire</u> :	I-30
Responses:	I-30
27) Subject: <u>Procedures</u> :	I-31
Responses:	I-32

Introduction

The substantive comments received on the SDEIS are briefly summarized below and then followed by a response by the Interdisciplinary Team. Where similar comments were received in more than one letter, these comments were combined under one heading and a single response was used to address the comment(s). Following the substantive comments and responses, copies of the letters received have been included in this appendix.

1) Subject: Spotted Owl Habitat

Comment numbers 201/13/01, 306/06/01, 310/57/01, 310/58/01, 310/59/01, 310/60/01, 310/61/01:

"Page 73 - Since much of the South Fork is similar in age and structure and is designated as suitable Spotted Owl habitat, why isn't more of the eastern portion suitable Spotted Owl habitat? The elevation varies from about 2,500 feet to about 4,000 feet. At the least it seems that it should be dispersal habitat. If not, an explanation would be helpful."

"Other areas not adequately addressed in the EIS: - The cumulative impacts of decreasing Spotted Owl Habitat loss."

"Did the Forest Service study account for the cumulative effects of future and current logging operations on the Spotted Owl? For instance, how will the decrease in interior connectivity effect future distribution of the owl?"

"Has the service conducted any study concerning the fifth owl pair whose habitat will be reduced to see if it will fall below the 1,182 acres take limit by factoring in other cutting that may occur on public or private lands?"

"Is the fifth pair roosting? If so, what is the possibility a chick will emigrate towards this area due to habitat loss in other areas? How will the decrease in interior habitat effect this type of migration?"

"Why are management objectives not geared towards increasing late seral habitat for new owl pairs? (pg. 129) It appears the Forest Service is stating Spotted Owls are not expected to increase in the area because their range is being logged. Is this the case? Would Spotted Owl populations increase if the Forest Service was not destroying their habitat? If so, how is this consistent with the spirit of the Standards and Guidelines B-13, Improving "travel and dispersal corridors for many terrestrial animals, and to provide connectivity corridors among Late-Successional Reserves."

Response:

The elevation of the Eagle project area tends to increase as one travels west to east culminating in a ridge at approximately 4,000 feet prior to falling steeply into the Salmon-Huckleberry Wilderness. There are marked changes in forest stand conditions across this elevation gradient. Stands at the higher elevations tend to have smaller average diameters. There is a pronounced lack of large snags which are important as owl nesting structures and down logs which are needed to support a healthy owl prey base. In addition, there tends to be less large residual trees in the upper elevations. Due to these differences in stand characteristics, much of the eastern portion of the project area was not considered suitable Spotted owl habitat (i.e., nesting, roosting, or foraging). However, much of the Eagle area does provide dispersal habitat. Dispersal habitat for Eagle was consulted on with the U.S. Fish and Wildlife Service in the Mt. Hood National Forest 1996 Biological Assessment for Timber Sales and other Projects. Within Eagle, 168 acres of dispersal habitat would be removed and approximately 1,032 acres would be degraded. The U.S. Fish and Wildlife Service conclusion is the Mt. Hood National Forest FY95 and FY96 timber sale program is not likely to destroy or adversely modify designated critical habitat (Refer to file number 1-7-96-f-208).

The Forest Service addressed the cumulative effects on the spotted owl through a programmatic biological assessment. Biological assessment "Fiscal year 1995/1996 Biological Assessment for Timber Sales and Other Projects, Mt. Hood National Forest." The biological assessment addresses: 1) Summary of effects of the proposed action to spotted owls and their habitat; 2) LSR/Wilderness complexes; 3) Connectivity/dispersal; 4) Critical habitat units; 5) Incidental Take; and 6) Inter-related and Inter-dependent effects. In addition, the Biological Assessment for the Eagle project addresses the cumulative effects to critical habitat, LSR habitat, dispersal habitat, and owl "take" within the project area.

The "fifth pair" (pair 5292) has been surveyed to Region 6 protocol. A determination has been made that its habitat would be retained above "take" thresholds, including effects from all public and private lands.

"Roosting" is defined as the resting behavior of an animal. A roost site is a place where an animal roosts. It can refer to day or night roosting.

There is no possibility of a "chick" emigrating towards the Eagle area due to habitat loss in other areas since chicks are helpless and restricted to the nest site. Dispersal is the process by which an animal leaves one area to establish a new home range in another area. Dispersal can be undertaken by juvenile or adult spotted owls. Juvenile spotted owls can disperse from their natal sites in random directions and travel moderate distances, approximately 9-30 miles on average (Gutierrez, et.al., 1985).

On pages C-39 and C-61 of the Record of Decision (ROD) for the Northwest Forest Plan, discusses the standards and guidelines for matrix lands. The matrix consists of lands outside the six categories of designated areas. Most timber harvest and other silvicultural activities would be conducted in that portion of the matrix with suitable forest lands. Owl populations are not expected to increase in the Matrix areas. Managing Matrix areas "towards increasing late seral habitat for new owl pairs" or increasing late seral habitat is not one of the matrix objectives stated in the ROD.

2) Subject: Roadless Areas

Comment numbers 310/77/02 & 310/78/02:

"Why will 3% of land in roadless areas be logged by this sale. (pg.64)

"What percent of land in the Sale are no including the Wilderness and the LSR will be logged ? Why did the Forest Service include these other areas ?"

Response:

Objectives for managing Forest Service lands were displayed on page 5 of the SDEIS, this is why these lands are being logged. The amended Mt. Hood National Forest, Forest Plan considered all of the roadless areas on the Forest. Some of these lands were set aside for preservation, others were not. The Salmon-Huckleberry Roadless Area was not set aside for preservation (SDEIS page 54).

Excluding the LSR and wilderness, the SDEIS considered 6,320 acres of land for management (SDEIS page 66). The Forest Service preferred alternative would manage 1,396 of these acres (SDEIS pages 26 and 27). Thus, 1,396 divided by 6,320 equals 22% of the land outside of the LSR/wilderness would be managed under this document.

3) Subject: Cumulative Effects

Comment numbers 303/09/03 and 307/06/03:

"Cumulative effects of logging on private lands and public lands within the watershed should be addressed in the draft EIS. The Watershed Analysis should be revised to reflect conditions of the watershed following the damage caused by the 1996 floods."

"Taxpayers are shelling out millions of dollars for road repairs and other infrastructure damage that was proven to be exacerbated by logging (especially clearcuts and heavy thinnings on steep slopes). With nothing to hold back the snow, when the warm rains came we had massive water volume rushing out of the Cascade mountain valleys. Do we want another Santiam River flood situation on the Clackamas ?"

Responses:

The watershed analysis considered the entire Eagle Creek watershed and the cumulative effects from Forest Service activities and activities of other land owners. An analysis was conducted in March of 1996 to validate the Eagle Creek Watershed Analysis. Due to the lack of damage, the watershed analysis is still considered valid.

On the ground reviews conducted during the spring and summer of 1996 indicate that those lands administered by the Forest Service in the Eagle Creek drainage suffered little if any damage from the floods of 1996. The one exception is road 4615011. This spur now contains deep "ruts" from water run-off however, the Forest Service recognized this potential in the SDEIS and would obliterate this road during alternative implementation (SDEIS page 29).

The SDEIS did not discuss in detail, the flood of 1996. This discussion will be included in the FEIS.

4) Subject: Economics:

Comment numbers 100/01/04, 100/02/04, & 100/03/04:

"... special emphasis needs to be placed on the design of the timber sales or the economics can be adversely impacted. In particular, when thinning or partial cutting, the marking prescription must be such that the trees can be actually fell through the canopy. Generally, the canopy must be opened enough that the helicopter pilot and hooker can actually see each other. It is a good system in that special corridors need not be cut and the stand can be treated evenly. However, this system will not work if it is forced to do understory removal."

"One thing that may be worth looking into is mechanical falling and bunching."

Responses:

Contained within the analysis file for the SDEIS are cost estimates for helicopter yarding on all action alternatives. These cost estimates are based on the "Helipace" computer program that has been developed by helicopter loggers. This program accounts for several variables that confront operators using the helicopter systems (including canopy openings). This analysis indicates that helicopter yarding is economical for this project. In addition, it is felt that this type of aerial system would best meet all of the objectives for this watershed.

In the past, those people involved in logging engineering have toured different sites where mechanical harvesters have been operating. Although this is a good ground based system, it was felt that due to the soil types, water tables, and sensitivity of this watershed that a mechanical harvester would not be appropriate for this particular set of sale(s).

5) Subject: Roads:

Comment numbers 101/01/05, 310/41/05, 310/42/05, 310/43/05, 310/44/05, 310/45/05, and 310/46/05 :

"We do question the practice of obliterating roads when those activities can cause more siltation than a well maintained and hardened road. Furthermore, as management direction changes in the future, new roads may be called for in the exact same place where the original roads were obliterated."

"What measures are being taken to eliminate erosion from road #335? If nothing is being done, the plan should be modified to make rehabilitation of this area a priority. These measures should be consistent with C-7 and C-32, RF-3 (c)."

"How do you propose to maintain road 4615150 yet allow vegetation to grow on the road so that it is eventually impassable (page 117)." "How long do you propose to close the 1.6 miles of road ? Permanently or for up to 10 years ?"

"This plan will increase the amount of road in the area from 21.7 to 22.6 (page 119). This does not conform with ROD Standard and Guidelines C-7, minimum level of "no net increase" in roads on Key Watersheds outside roadless areas ? Why is the Forest Service not conforming to their own rules ?"

"How is this road and its proposed units consistent with the Aquatic Conservation Strategy for this watershed ?"

"Why does the plan invest money in new roads in a key watershed when the highest priority of this watershed is restoration ? (Standards and Guidelines C-7)."

"How does road 4615 facilitate watershed restoration ? It is on a ridge above a steep slope that is going to be

sheltered cut. Have you assessed the effects this will have the watershed ?"

"How many logging spurs are there in the area ? Will all of them be obliterated or just the two mentioned in the SDEIS ? When is the Forest Service going to clean up the trash left by people on the logging spurs?"

"Why are all of the road closure and obliteration projects recommended in the Watershed Analysis no being undertaken ?"

Responses:

Roads can contribute sediment to streams. The actual amount of sediment varies by the placement of the road in relation to streams and if a transport mechanism is in place. The roads that have been identified for closure in the SDEIS (page 29), are steep, do have annual run-off, and a transport mechanism is in place for sediment transport. Thus, these roads have the highest priority for obliteration and restoration. It is anticipated that these roads would not be needed for access for 10 to 20 years or longer. However, an event may occur during this time frame where access would be required (e.g., insect infestation, wildfire, etc.). In this watershed, restoration does have priority and closing these roads would aid in watershed restoration efforts.

Obliteration of the roads listed above is consistent with the watershed analysis. In addition, problem areas along roads are being dealt with which is watershed restoration and is consistent with the Watershed Analysis (SDEIS page 27 and 29). Not all recommendations in the watershed analysis are required to be dealt with under one document. Thus, the Eagle SDEIS/FEIS is dealing with the areas that cause the greatest concern for possible degradation of the watershed.

There is a discrepancy in information within the SDEIS. There would be a decrease in road miles in the FEIS.

Road 4615150 is located on top of a knob and does not pass through nor is it close to riparian area. In addition, there is no sediment transport mechanism in place so that the possibility of sediment entering stream courses is practically nil. The maintenance discussed in the document is for surfacing and not for culverts, ditches, or other water transport mechanisms. Once the vegetation has closed the road, there would no longer be a need to maintain it.

There is one shelterwood cutting unit on road 4615 (Unit #2). The slope in this unit averages approximately 40% and the unit is well away from stream courses. This unit does not remove timber from riparian areas (SDEIS page 28 and Appendix K). Water quality and fish habitat were addressed in Chapters III and IV beginning on page 35 of the SDEIS.

Road #355 is along Eagle Creek and is in a Late Successional Reserve (LSR). As discussed in the SDEIS, to limit the scope of the document, the Forest Service will not conduct management activities in the LSR nor will the Forest Service complete an LSR assessment which is required before management activities can take place (SDEIS page 1 and ROD page C-11).

With the exception of one spur on the 4615, all logging spurs on Forest Service land, outside of the LSR, are shown on the maps (SDEIS page 29). Annually, the Forest Service in cooperation with SOLV (Stop Oregon Litter and Vandalism) and volunteer private hauling companies, meet and clean-up sites where illegal trash dumping has occurred. The main area for trash dumping is on the 4610 and 45 road systems. Although the Forest Service would like to clean-up as much as possible, there is a lack of revenue and volunteers who would be willing to spend a day or two helping to pick up trash. Thus, since the problem on the 4614/4615 is not as great as the other road systems, the Forest Service has not been able to clean the spurs in the area.

6) Subject: Blowdown:

Comment numbers 201/07/06, 310/74,101,104,105,106,107, and 108/06, and 306/01 & 02/06:

"Page 13 - While 4-5 miles of edge are being created, the large area of thinning may also lead to an increase in the

amount of blowdown."

"... is the lack of analysis of the cumulative impacts of logging and road building concerning blowdown. There is an extensive history of blowdown in the area connected to roads and logging, whether clearcuts, thins, or shelterwood cuts."

"All of the units for the three cutting alternatives are surrounded by riparian areas with high or moderate potential for blowdown."

"What proof do you have that a marginal increase in windfirmness outweighs the certain damage, which will increase windthrow, done to trees from logging activities?"

"Why is only the first row of conifers being retained around 'No Treatment Buffers'. Since there is a danger of windthrow damage, infestations, and fire following the sale, more trees should be left to ensure these areas are not damaged?"

"Alt. 3 has the highest proportion of cutting in areas prone to wind throw (pg. 101). Why choose the alternative with the greatest chance of damage to the forest and watershed?"

"Would the skyline corridors (running east to west) result in a funneling of wind? Since the roads in the area running east to west have the greatest potential for windthrow (pg. 102), does the same hold true for the corridors?"

"The SDEIS states that 10% of the trees after cutting would be expected to fall down due to windthrow? (pg. 101) In areas where this will occur, is this number taken into account as a reduction in habitat for the spotted owl, interior habitat and fragmentation, and total riparian zone loss?"

"Which are the wet areas where blowdowns have occurred in the past?(102) Are these sites more at risk of future blowdowns? How is this taken into account when planning cuts?"

"Several units in riparian zones in upper watershed have a high potential for blowdown. (Blowdown map and Alt. map) Units 29, 26, 25, are examples of units that have a combination of these factors that would necessitate exemption from cutting. Why did the Forest Service decide to log despite these factors?"

Response:

The edge referred to in the SDEIS is more of a delineation between vegetation types rather than a distinct edge associated with a clearcut. As indicated in the blowdown analysis (SDEIS starting on page 96), if the wind does not drop below the canopy layer, blowdown is not likely to occur. One of the objectives for the thinning prescriptions in this project is to leave plenty of canopy so that the wind does not have a chance to drop below these upper layers. More information is contained in Appendix H of the SDEIS and the Analysis File.

A cumulative effects analysis was completed and findings were documented (SDEIS pages 103 and 104).

As stated in the SDEIS, blowdown can occur in riparian areas whether in a natural stand or adjacent to a cutting unit. The factors that lead to blowdown are: small root systems, wet soils, tall trees with little taper, and allowing the wind to drop below the canopy layer, etc.. With the delineation of riparian areas (as per ROD standards), wet soil areas are being avoided thus, no blowdown is anticipated due to management activities. In addition, thinning occurring in areas with a higher blowdown potential would be light and the wind would not be able to drop down into the stand. Thus, catastrophic blowdown is not expected to occur.

The 10% referred to in the SDEIS is in units with the shelterwood prescription (SDEIS page 101). As indicated in the document, when a shelterwood cut is complete, owl habitat and interior habitat would be affected or would no longer serve in this function thus, a cumulative effects analysis has already been completed for the effects to this

type of habitat. Since these areas would no longer be functioning as this type of habitat, further blowdown would not cumulatively add to the reduction of owl or interior habitat. No shelterwood units are planned in riparian areas. Note: To put this in perspective, a 10% reduction in a shelterwood with 40 residual trees per acre would mean 4 trees per acre would blow over.

Evidence on the ground in Eagle indicates that blowdown would not be enhanced due to logging activities (i.e., corridors, landings, rub trees, tailtrees, etc.). This is evidenced by photos contained in the Analysis File and surveys completed in the spring of 1996 after the flood and windstorm events of the 1995/96 winter. The "Raven" thinning that occurred along the 4615 road in the 1970's, indicates that skyline corridors do not enhance blowdown even though these corridors may be lined-up east and west. If straight line edges and cutting unit boundaries are located away from streams and wet soils, blowdown will not occur. This is evidenced by on the ground observations and by photographic evidence. Thus, with the ROD standards of one or two potential tree lengths away from streams, riparian areas would not be affected.

Blowdown in wet areas has occurred in un-managed stands throughout the Eagle area. The factors that caused this event are saturated soils and small root systems. The areas that can be seen from the road are along the 4615 road past the 4615/140 junction. These areas are being avoided with riparian buffers and blowdown will not occur due to management activities.

7) Subject: Riparian Areas

Comment numbers 303/04/7, 304/01/7, 305/04/7, 306/02/7, 308/02/7, 308/07/7, 309/01/7, 309/02/7, 310/02/7, 312/12/7, 310/15/7, 310/84/7, 310/110/7, 310/113/7, 310/115/7, 310/116/7, 310/117/7, 310/118/7, 310/119/7, 310/120/7:

"... your proposals plan on building almost a mile of road and logging in riparian areas! This is a recipe for disaster."

"Your preferred alternative (alternative 3) prescribes cutting in and around riparian reserves; how can this be justified in a Tier Two watershed?"

"...there is no need for thinning in these healthy riparian zones (25 and 29)."

"All of the cutting units for the three cutting alternatives are surrounded by riparian areas with a high or moderate potential for blowdown... This area is unsuitable for any type of logging due to the large riparian areas and the history of blowdown!"

"past timber management within riparian areas has adversely effected (sic) fish habitat. Building of roads alongside streams, and harvest blocks have increased sediment loading throughout much of the lower Clackamas Drainage.

"CTWS strongly believes that riparian areas are vital to the maintenance and protection of fish habitat and water quality. Logging and/or road construction in riparian areas are not compatible with the protection of instream temperatures.

"PILP understands that the proposed alternative includes commercial thinning in Riparian Reserves within a tier-two watershed. We believe that this proposal violates the guidelines of both the President's Forest Plan and Secretary Jack Ward Thomas' memorandum of 7/2/96."

"While this (Option 9) does not preclude any active management within the watershed, it would certainly seem to exclude logging in over 120 acres of Riparian Reserve."

"Of even more concern to us was that many of the seeps and streams which we found in the unit did not appear on Forest Service maps."

"The Forest Service is assuming that windthrow damage will occur in riparian zones (p 47). Does the Forest Service have evidence that a decreased level of cutting as one approaches riparian areas ensures the safety of areas?"

"Why are the Riparian Reserves not being managed to attain old growth quality? Are you intimating that without cutting these reserves will not reach old growth status?"

"Why are the recommendations in their Watershed Analysis to delay cutting in the Riparian Reserves to increase Pinemartin (sic) and Pleated (sic) woodpecker habitat not being followed (112, WA)?"

"What will be the composition of Riparian Buffer Zones after the proposed cutting occurs?"

"Will thinning in the Riparian Zones take any old growth, or soon to reach old growth stage trees (within 40 years)... Cutting in these reserves will endanger water quality therefore should not occur."

"Unit 29 [36 in FEIS] is of particular concern. It is dominated by riparian areas. There are at least three year round streams and numerous seeps, springs, and intermittent water channels. These areas do not appear on the SDEIS."

"Unit 26... There is a large wetland in the southwest of the unit. This area should be protected from the effects of any cutting."

"Unit 24 has a ... large wetland are (sic) on the west part of the sale next to the road. Around this area are seeps. This area should be protected from logging."

"If logging occurs in unit 16, it will be a very intense cut. The Forest Service marked a buffer on the steep slopes of the stream. It may be large enough to buffer the stream from immediate effects of logging. However, this buffer will be effected by blowdown and drying out caused by the logging which will occur on the upper part of the slope."

Response:

Field investigations were undertaken in the summer and fall of 1993 and the summer and fall of 1995, and the spring and summer of 1995. Areas proposed for silvicultural treatment and many areas considered and eliminated from proposed treatment were surveyed for streams, marshes, seeps, wet areas, and unstable or potentially unstable areas. Survey information has been entered into the Forest Geographic Information System (GIS). As new information becomes available through project planning, it is added to the GIS. Maps generated from the GIS were utilized in project planning and the tentative layout of proposed harvest units. Owing to the difficulty of traversing and accurately mapping streams in this terrain and the fact that seeps, wet, areas, and minor stream channels are often invisible on aerial photographs, some inaccuracies and omissions are inevitable. On-the-ground observations will dictate the actual treatment prescriptions and designation of riparian reserve boundaries.

The maps displaying proposed alternatives in the SDEIS purposefully did not show all streams and wet areas known to occur in the project area. Such detailed information would be difficult to display on a page sized map, along with roads, plantations, and proposed harvest units. The SDEIS contains a small scale map showing the locations of riparian reserves, which reflect the presence of these features.

As required by the Northwest Forest Plan (NFP, page A-7), a watershed analysis was conducted for the Eagle Creek drainage. Through this process, additional information was gathered and recommendations from this analysis were considered in the SDEIS. Mapping for riparian areas and recommendations for riparian reserve delineation are included in the Watershed Analysis.

All alternatives in the SDEIS establish riparian reserves in accordance with the Northwest Forest Plan (NFP) and the Eagle Creek Watershed Analysis (WA). Riparian reserves are established to encompass all streams, wet areas,

seeps, springs, marshy areas, and unstable or potentially unstable landforms. The SDEIS describes anticipated effects to riparian areas, including seeps and springs, with riparian reserves in place. On-the-ground delineation (widths and prescriptions, if any) vary depending upon documented criteria for each hydrologic feature (stream, wet area, etc.) and by alternative.

Site specific locations for management within riparian reserves (as distinct from riparian areas) are identified in the alternatives in the SDEIS.

None of the alternatives propose building roads in the riparian areas.

The WA recommended expansion of riparian reserves in the upper South Fork drainage (WA, p 96), to encompass inclusions of matrix lands in between concentrated riparian reserves, because of the impracticality of having different management objectives for these included areas. The NWP specifically allows management within riparian reserves in order to meet aquatic conservation strategy (ACS) objectives. The WA (p 97-101) determined that most riparian reserves within the project areas were not in need of treatment in order to meet ACS objectives. However, actual on-the-ground interdisciplinary examination of sites within several riparian reserves revealed that portions of these areas and adjacent included matrix lands could benefit from limited thinning in order to meet the ACS objectives for this Tier 2 watershed. Alternative 3 in this SDEIS was developed in response to these findings.

The SDEIS displays and discusses the anticipated effects of each alternative with respect to riparian reserves and water quality.

The comment(s) that past timber harvesting and road construction has adversely affected fish habitat elsewhere in the Clackamas drainage is correct. These types of effects are described in the SDEIS (Chapters III & IV). Notably, however, the streams on National Forest lands within the Eagle Creek watershed, particularly the South Fork, provide good to excellent habitat and water quality despite a previous harvest and roading history as discussed in detail in the SDEIS and the WA from which information is drawn. Previous harvest activity included primarily clearcutting, with thinning occurring in several locations. As the SDEIS discusses in detail, proposed harvesting involves mostly thinning prescriptions, limited shelterwood, and no clearcutting.

The SDEIS describes in detail the relationship of windthrow to various site factors including proximity to streams and other wet areas. The SDEIS also states that on-the-ground examination by silvicultural and watershed specialists would be required to develop prescriptions for individual areas (Chapter III & IV).

In describing the need to thin certain portions of riparian reserves in Alternative 3, the SDEIS clearly states that the objective is to acquire desired vegetation characteristics in order to meet ACS objectives (Chapter III & IV, Alternative 3). Many areas will, over time, achieve these qualities independent of human intervention. Some areas may never achieve these qualities due to inherent site limitations. Alternative 3 would treat limited areas (within the larger riparian reserve) which would benefit from such treatment, based upon on-the-ground examinations

The statement in the WA reads as follows: "...Further analysis in the Eagle Creek Watershed evaluated structure of late seral stands, and those closest to old growth characteristics in the abandoned B-5 [Pileated Woodpecker / Pine Marten Habitat] areas were recommended to have delayed harvest until adjacent stands in the Riparian Reserves and LSR meet old growth stand conditions." The intent was to defer activity in the non-riparian "abandoned" B-5 areas until such time that adjacent riparian areas had achieved the desired character. The implication being that at least some riparian reserves are not as yet in the desired state. This provided a partial impetus to seek out areas where we could manage within riparian areas to achieve desired conditions in a shorter time frame.

Site-specific comments regarding wet areas, seeps, springs and other riparian features were largely of common knowledge to project team members and previously incorporated into site-specific prescriptions. New information contributed through efforts of several reviewers has been incorporated.

The comment addressing proposed Unit 16, which includes "...this buffer will be effected (sic) by blowdown and drying out caused by logging which will occur on the upper part of the slope", has no basis in science. If anything, loss of trees on upper slope positions of this predominantly northeast slope would increase soil moisture immediately below, as a result of reduced transpiration.

Of greatest general concern and interest to reviewers is the proposal to enter riparian reserves areas in several units, most notably unit 29 [36 in SDEIS], as proposed under Alternative 3. Alternative 1 is the Preferred Alternative presented in the FEIS.

8) Subject: Water Quality:

Comment numbers 300/01/08, 301/01/08, 303/01/08, 303/11/08, 307/01/08, 307/03/08, 310/21/08, 310/22/08, 310/28/08, 310/29/08, 310/38/08, 310/39/08, 310/40/08, 310/44/08:

"Cutting these areas would cause... water quality to deteriorate and damage this natural forest by increasing the risk of blowdown."

"-the Water quality in the proposed timber sale units is very good, currently, going in and commercial thinning on these steep slopes would do nothing but cause disruption to the system. Sedimentation and erosion would most definitely foul the current clarity of the South Fork."

"We need clean water. This massive timber operation will not achieve that, it will only worsen downstream quality."

"there should be no logging within riparian reserves as the draft EIS contains no empirical evidence that such logging will benefit water quality and other objectives of Tier 2 Watersheds."

"there should be no new road construction within the project area ... since roads are a primary source of sedimentation and instability within watersheds."

"The 'managing' of this area, which is a naturally occurring forest, will...reduce existing Roadless Areas and serve counter to the B6 special emphasis watershed that is desired for this area."

"The placement of roads (including permanent roads) also occur within the rain-on-snow even zone. Most roads occur in this zone. Road building will be increased in this zone with the construction of a new road for Units 27 and 28. This style of cutting and road placement results in unacceptable damage being done to the watershed from increased landslides and siltation of water channels."

"Recent harvests have been estimated to deliver, in addition to natural erosion, the same amount of sediments as would occur during a period of wildfire recovery.....Without logging sedimentation levels will decrease over time with merely a chance of increased sedimentation. Therefore, how is cutting consistent with this Tier Two watershed designation."

"Soils along ridges where thinning will occur are shallow. How shallow are they? This area also has a moderate chance of windthrow. Why is cutting still occurring in these areas. What specific measures are you taking to ensure these slopes retain topsoil with its current characteristics? How will these characteristics be altered once logging has occurred. What proof do you have these measures will protect water quality?"

"The lower section of the South Fork of Eagle Creek has the highest risk of landslides (39 WA). Will any cutting, private or public, occur in these areas? Will cutting the upper reaches of Eagle Creek effect the stream banks or areas susceptible to landslides in these areas? How will this effect water quality?"

"How does Road #4615 facilitate watershed restoration? It is on a ridge above a steep slope that is going to be shelterwood cut. Have you assessed the effects this will have the watershed (sic)? Since it (? , sic) touches a road

on a downhill slope, it will most likely provide a conduit for silt to flow into the South Fork of Eagle Creek.”

Response:

Implementation of specific mitigation measures and Best Management Practices (BMPs), including Riparian Reserve designations, predominant application of selective harvest and thinning silvicultural prescriptions, and the predominant use of aerial logging systems (skyline and helicopter) will ensure that water quality will not deteriorate. Areas of highest risk of blowdown are on more exposed upper slope positions. Should blowdown occur in these areas, it would pose a negligible risk to water resources. Prescriptions have been prepared specifically to minimize this risk of blowdown and any potential subsequent effects to water quality.

The SDEIS discusses monitoring procedures to ensure implementation and evaluate effectiveness of BMPs.

The effectiveness of proposed prescriptions and best management practices in promoting a diverse mature forest cover, while maintaining water quality can readily be observed by anyone traversing the area in the adjacent to (primarily below) road 4615 within the South Fork subwatershed. These stands of large mature trees, with a multi-layered canopy, and excellent riparian characteristics, are the direct result of thinning prescriptions and skyline logging implemented in the same stand types proposed for treatment in this project, approximately 10 years earlier.

In general, as presented in the SDEIS, roads may and often do contribute to increased levels of sediment and turbidity in receiving waters. However, field reconnaissance undertaken during the November 1995 rain-on-snow event revealed virtually no perceptible clarity reductions in receiving waters downslope from roads and road drainage structures. This appears to be related to the fact that roads have pavement or aggregate surfaces and ditches are vegetated or rocked throughout much of the area. Heavy snow cover within the project area precluded a similar investigation during the February storm event. Follow-up field investigations during spring of 1995, when the area was again accessible, revealed no road-related landsliding, gulying, obvious surface erosion, or significant alteration of channel substrates (sedimentation) within the project area, as presented in the Flood discussion of the FEIS. In this area the storm flooding was estimated to have a 2% to 1% return interval (100-year to 50-year), equating to a large amount of runoff in a very short period of time, with no apparent adverse effects.

The new road proposed in the SDEIS to access units 27 and 28 (erroneously referred to as 4615 in one of the comments) has been relocated to utilize an existing spur road off of road 4614. The contribution of roads was considered in the Hydrologic Recovery analysis and expressed in the Aggregate Recovery Percentage (ARP) values. The relative contribution of the “new “ road amounts to less than two tenths of one percent. More over, the proposed road is planned as a temporary road, utilizing an existing road in part, to be followed by decommissioning after use in this project. This would result in a net decrease in the contribution of roads to ARP values and potential peakflows.

No harvest or road construction is planned for any alternative within or adjacent to areas having a risk for landsliding, as identified either in the Eagle Creek Watershed Analysis or through comprehensive field reconnaissance associated with this project.

Unit 28, cited in a comment, is not located on unstable or potentially unstable ground. The prescription has, however, been modified in the FEIS to a thinning for silvicultural considerations. This further reduces the already low risk of erosion within the unit.

Road 4615 will remain as a main access route into the lower portion of the project area.

9) Subject: Wilderness:

Comment numbers 303/12/09, 307/02 and 04/09, and 309/04/09:

“there should be no logging within units 4 and 8 which are adjacent to the Salmon-Huckleberry Wilderness to preserve the integrity of the adjacent wilderness system;”

“there should be no logging within inventoried wilderness areas as these areas are in short supply and serve as

biological anchors in the forest ecosystem;"

"We need a buffer for the Salmon-Huckleberry Wilderness area, and this proposal destroys that vital resource."

"Lastly PILP would like to voice its concern over cutting adjacent to the Salmon-Huckleberry Wilderness Area. Units 8 and 4 are particularly bad since they: (1) border a wilderness area; (2) ..."

Response:

There will be no logging in the Salmon-Huckleberry Wilderness. This has been assured because the boundary has been physically designated on the ground with metal tags and tree "blazes". This boundary was designated using the wilderness boundary descriptions that were passed as part of the law, by congress, for wilderness designations. The Salmon-Huckleberry Roadless Area was considered in the "Rare II" analysis and was eliminated as part of the wilderness system by Congress. The Mt. Hood National Forest considered all Rare II areas in the Forest Plan analysis and kept some of these areas for preservation and others for management. It was recognized by the Forest Plan that these areas, once managed, would no longer retain the roadless area attributes.

The management proposed near the wilderness boundary is a light thinning where only select trees would be cut. Through the analysis in this document, the attributes of the wilderness would not be compromised by management activities. This has been determined because: a) All planned cutting units lie on slopes with a generally western aspect and none face the wilderness. Thus, visually, a visitor in the wilderness will not be able to see where management activities have occurred; b) No new roads would be built in the roadless area thus the ROS attributes that extend into the wilderness would not be compromised; and c) Since the management prescriptions are for individual tree removal, blowdown should not occur because the main canopies would remain intact.

10) Subject: Trails:

Comment numbers 302/02/10, 306/08/10, 309/04/10:

"Lastly PILP would like to voice its concern over cutting adjacent to the Salmon-Huckleberry Wilderness Area. Units 8 and 4 are particularly bad since they: ... (2) border the "Old Baldy Trail; (3) ..."

Unit #8 thinning is on or near a couple of trails (502, 502a), will these trails be protected ?

"People do not like to hike through tree cut areas as people go hiking to get away from the sounds and sights of man. The trails in this area are already heavily impacted with roads and previous tree cutting. Any of the three cutting alternatives will add greatly to this impact."

Response:

Trail 502 is known as the "Old Baldy" trail. The Mt. Hood National Forest, Forest Plan, has designated the "Visual Quality Objective" (VQO) of "Retention". The existing condition is "Retention, Natural Appearing" (SDEIS page 82). Though thinning would occur near the trail, the VQO would be maintained. This would be assured by consultation and assistance from a "Landscape Architect".

Trail 502A is a short trail segment that begins on the 4615, connects with the 4614 road and then ties into the 502 trail. This trail should have a VQO of retention however, it's current condition is "Modification, Heavily Altered". Though management activities would occur near this trail, the current condition would not be further reduced. Likewise, the current condition would not be moved towards a higher objective with the proposed management activities.

11) Subject: Wildlife Habitat:

Comment number 201/06/11, 201/08/11, 303/07/11, 303/08/14, 306/10/11, 310/14/11, 310/47/11, 310/48/11, 310/51/11, 310/52/11, 310/53/11, 310/55/11, 310/56/11, 310/62/11, 310/63/11, 310/79/11, 310/80/11, 310/81/11, and 310/102/11:

"Page - 8 Under Alternative #3 it states that the number of acres of interior habitat drops from 2,100 to 985, which is a 53% loss. Will this decrease have significant effect on those species dependent on this type of habitat and microclimate."

"Page 17-The discussion under paragraph 12 concerns large woody debris. Are funds available to monitor down wood levels and to hire fallers if natural recruitment doesn't occur in the 3-4 year time frame given? How will the Forest Service ensure that this is tracked and accomplished?"

"Since when did building roads increase any diversity in the forests? Since when did logging operations on steep slopes do any good for aquatic creatures such as salamanders or frogs, not to mention logging in riparian areas which you have proposed."

"Where do all of the animals go when the logging starts on such a wide area? Do they further crowd into the Wilderness area, maybe. Do they disperse into the private lands below at lower elevations, I think not."

"Surveys need to be done for the six candidate species that may occur in the Eagle area and the C3 species including but not limited to the White Footed Vole, Northern Goshawk (going out to the units and looking up in the sky- "field reconnaissance" is not adequate!).

"How much cutting will occur in areas designated as "Special Habitat" in the Watershed Analysis? (25, Map 3-8, WA) How does this conform with Standards and Guidelines C-44? (Retention of old-growth fragments in watersheds where little remain.)

"The Forest Service has not conducted any field surveys on many of the species in the SDEIS. (pg. 130) How can it be determine if there are candidate species in this area if no surveys have been conducted. If these species have habitat, then why are no surveys being conducted?"

"Will the C3 species information now being collected by the Regional Ecosystem Office be used when making any decision to cut in this area? (pg. 130) How will its results be used? Will any logging activities take place prior to the release of this report?"

"Has the Forest Service conducted any studies for the Red Legged Frog in the riparian areas scheduled to be logged in Alt.3? (pg. 131)"

"Cope's Giant Salamander has been sighted in the upper watershed. Alt. 3 cuts in the riparian areas in the upper watershed. Has the Forest Service conducted any studies on the salamander in these areas. If they have not, then how can they say the cutting will not effects its habitat. The NWFP recommends a 208 foot buffer for the Salamander. (pg. 131) Will cutting occur within 208 feet of any seep, stream (named or unnamed), creek, or wetland that it finds or has already located? Is this determination left to an on-site determination? If so, what safeguards are in place to ensure the safety of this animal?"

"Has the Forest Service done any surveys in the upper watershed to ensure there are no nesting cites of the Harlequin Duck in the Riparian Zones? (pg. 132)"

"Does the Forest Service have any information concerning Bald Eagles nesting in this area?"

"The Watershed Analysis was conducted during the dry Fall months. Did any field reconnaissance take place during the wet winter months when animals, such as salamanders, would be more likely to be observed?"

"Not including the LSR, what percent of interior habitat will be cut? Why is the LSR included in your computations of interior habitat for this sale? The Forest Service would have to use completely different guidelines in harvesting the LSR therefore, it should not be included in the total amount of interior habitat."

"This sale will result in fragmentation of 1,115 acres of late successional interior forest (53% reduction). (pg. 75) This will convert 10% of the interior habitat into grass or shrub conditions. (pg. 75) How are these actions consistent with Standards and Guidelines B-11: 2, 4, 8, 5, and 6? Do these numbers take into account windthrow?"

If not, how much will these numbers increase with the windthrow?"

"This sale will increase edge by 4-5 miles. (pg. 75) This benefits the white-crowned sparrows and black-tailed deer at the expense of water quality and the Spotted Owl. How can this be consistent management guidelines of a Tier Two watershed?"

"The Forest Service justifies this sale by stating it will benefit the Roosevelt Elk. However, will decreasing interior habitat 53% be a benefit to the Roosevelt Elk. The increase in foraging habitat will be marginal and temporary.

"How is the decision not to permanently close or obliterate roads, but to increase them in this area, consistent with benefiting the Elk. How did the Forest Service conclude this combination of factors lead to a benefit, rather than an increase in disturbances for the elk."

"Your response to comment number 113/01/04 of the Draft EIS stated that the SDEIS would have a more complete list of references available. Why was no such list presented?"

Response:

The resulting decrease in interior habitat would not result in a significant effect to those species dependent on this type of habitat. The Eagle project would be implemented in a manner consistent with the Record of Decision (ROD) for the Northwest Forest Plan. Key components necessary for the maintenance of ecosystem functions and retention of diversity of habitats across the landscape would be retained. In addition, the Salmon-Huckleberry Wilderness and the northern third of the planning area has been designated as Late-Successional Reserve. These reserves would maintain the functional, interactive, late-successional and old-growth forest ecosystems and provide vast areas of interior habitat, assuring viability of those species dependent on this type of habitat and microclimate.

The Knudson-Vandenberg Act (KV) as amended, authorizes the collection of funds from a timber sale for protecting and improving the future stand on each sale area, including sale area improvement, maintenance and construction, reforestation, and wildlife habitat management. KV funds would be collected to cover the costs of monitoring post harvest down wood levels and to recruit large down wood from the residual stand where monitoring reveals insufficient log levels. Collection of funds to cover these costs would be included in the Sale Area Improvement (SAI) plan.

The open road density will decrease with all action alternatives which would reduce human disturbance and improve the habitat effectiveness of adjacent areas. Riparian and aquatic dependent species such as the Cope's salamander would be adequately protected through the riparian reserve system. The Eagle project would be in compliance with the ACS objectives listed on page B-11 of the ROD and with riparian reserves standards and guidelines (ROD, page C-3 to C-38).

The Eagle project covers an expansive area (6,528 acres). Much of the Eagle project area is within land allocations where little or no activity would occur. The northern 1/3 is designated as a Late-Successional Reserve. A riparian reserve network has been designated throughout the project. The Salmon-Huckleberry Wilderness is located directly to the east and provides a vast area with minimal if any human disturbance. In addition, much of the Eagle area is part of the Salmon-Huckleberry Roadless area which by its nature, receives less disturbance than roaded areas. The projects in Eagle would affect less than 20% of the land base over the course of several years. It is unlikely that all activities would occur concurrently. Wildlife behavioral response to disturbance and changes in habitat characteristics as a result of logging operations varies considerably and depends on many factors including: the species in question and specific habitat needs, mobility, characteristics of adjacent untreated stands, amount of human use in the general area, (i.e., camping, hunting, mushroom and firewood gathering, cross country and trail hiking, etc.), open road densities, and other factors. Some of the species may be displaced for awhile during logging operations while others may actually be attracted to these areas due to curiosity and/or a potential food source.

There would be no treatment of special habitat areas including non-forest areas, rock or talus slopes, national

wetlands, local wetlands less than one acre, or local wetlands > one acre. The standards and guidelines on page C-44 of the ROD do not pertain to special habitats shown on Map 3-8 of the watershed analysis and listed above.

The Eagle SDEIS page 130 does not state "no surveys have been conducted". It states that "few surveys for candidate species have been conducted". Surveys were completed for species with potential habitat within the project area. However, surveys could not be completed for some species such as the Townsend's big-eared bat, since no known habitat occurs (e.g., caves, abandoned buildings, bridges). If there is no habitat, there is no need to complete surveys since species cannot exist without their respective habitats. Candidate species are also addressed in the Biological Evaluation (BE). Refer to the B.E. for a discussion of the habitat needs of individual sensitive species.

All information available on C-3 wildlife species at the time of project planning was used. Development of survey protocol for all C-3 species may take several years. Forest Service direction for survey and manage species is stated in the Northwest Forest Plan, Record of Decision (pages C-4 through C-6). Of the species listed in the ROD, Table C-3, only the Red Tree Vole is known to occur in the project area. Surveys of tree vole habitat have been conducted and two nest sites have been confirmed. The tree vole has a survey strategy of 2. These two nest sites would not be affected by operations in any of the Eagle alternatives. The Eagle project area does not contain potential habitat for any of the amphibian species listed in Table C-3. As survey protocols are developed for other C-3 species, surveys may continue in the project area. Clause C6.25# (11/80) would be included in the contracts. This clause provides for the protection of any sensitive species located after project activity begins. Surveys for the Great Grey Owl have been conducted in the Eagle area. All potential habitat was surveyed and no Great Grey Owls have been found.

Surveys for the Red-Legged frog and other amphibians have been completed within the Eagle project area, including the riparian areas scheduled for treatment in alternative #3. As stated in the B.E., although no Red-Legged frogs have been observed, potential habitat does exist. Habitat needs and population viability would be protected through the implementation of the extensive network of riparian reserves. Primary habitat needs for this frog would not be significantly affected by proposed treatment.

Surveys have been conducted for the Cope's giant salamander which is a stream dwelling species. Application of riparian reserves would provide habitat protection. The respondent is in error. The Record of Decision (ROD) for the Northwest Forest Plan does not say that riparian reserves should be 208 feet. The ROD says a minimum of 150 feet or one potential site tree on a non-fish bearing stream or a minimum of 300 feet or two potential site trees on a fish bearing stream. The Watershed Analysis and the SDEIS state that the distances would be 208 feet and 416 feet respectively because this is the height of a potential site tree. In addition, the ROD does not preclude management of riparian areas. Management activities would not occur in riparian areas except in three units under alternative #3. However, these activities would not occur immediately adjacent to the streams thus, habitat would be protected.

Surveys have been done for the Harlequin duck and none have been found in the area.

Bald eagles are not known to nest in the Eagle project area.

Biologists conducted field reconnaissance of the Eagle area in every month with the exception of February, March, and April when snow depth made the area non-accessible.

In order to address the effects of the project at the landscape level (cumulative effects), the entire area was assessed for every analysis criteria including interior habitat. All areas of the Eagle planning area influence the functioning of the ecosystem and are important considerations in determining overall effects.

The Record of Decision, page B-11 displays the Aquatic Conservation Strategy (ACS). The specific items pointed out (#2,4,8,5, and 6) primarily deal with aquatic and riparian habitats and dependent species. The Eagle document(s) are consistent with the ACS and are therefore consistent with the specific items pointed out (although they are not

directly related). The changes to interior habitat stated by alternative do not include potential future blowdown because blowdown cannot be predicted with any great accuracy, through the blowdown discussion in the SDEIS blowdown is not expected, and there are no models available to predict windthrow at the level of specificity needed to show how it would affect existing levels of interior habitat.

As stated in the SDEIS through analysis, there would be no significant effects to water quality and there would be no adverse effects to owls. Tier two watersheds may not contain at-risk fish stocks but are important sources of high quality water. Long-term management within key watersheds requires watershed analysis prior to further resource management activity. For the Eagle area, watershed analysis has been completed and since the Eagle document(s) are consistent, the proposed projects are consistent with the Aquatic Conservation Strategy for a key watershed.

Elk habitat was analyzed using the "Elk Habitat in Western Oregon" model, USDA Forest Service, Pacific Northwest Region, 1996. This model takes into consideration; forage, hiding cover, optimal cover, thermal cover, and roads. Elk use of habitat is adversely affected by roads open to vehicular traffic. Roads effectively closed to vehicular traffic, either through gates and other barriers or through road obliteration do not decrease habitat effectiveness because there is no associated human disturbance caused by motor vehicle access. If there is no disturbance from vehicles, the elk will fully utilize the adjacent habitat. As shown on page 34 of the SDEIS, there are 21.7 miles of open road in the project area. With the implementation of the action alternatives, this total mileage would be decreased by as much as 4.0 miles. The total miles of open road after implementation would range from 21.31 to 17.7 depending on which alternative is selected. This is consistent with the Mt. Hood National Forest, Forest Plan.

See the section of the SDEIS titled "References Cited". See "References/Literature Cited", Eagle Biological Assessment Report. See "References/Literature Cited", Wildlife Report.

12) Subject: Aquatic Habitat:

Comment numbers 201/10/12, 308/06/12, 310/16/12:

"Page 43 ... the reference to Behnke (1992, page 23) describing '...native Redband trout in intermittent desert streams thriving in water of 28.3 degrees C' ... has little relevance for the native trout species at middle elevations in the northern Oregon Cascades. These trout do not inhabit the EIS area."

"... the SDEIS did not note the condition of planning area streams' substrate in terms of surface fines. This needs to be quantified.

"How will the proposed cutting effect the 'stable' stream and the increasing towards stability ratings (50, WA) of this area?"

Response:

An effort was made to summarize all available data for fish in the SDEIS.

Proposed timber harvest outside of designated riparian reserves will have no discernible effect on stream channel stability or its transition toward increasing stability. Alternative 3 proposes thinning of selective portions of riparian reserves to decrease stocking and develop stand characteristics which contribute to achieving ACS objectives. Implementation of any of the other alternatives would allow riparian condition and channel stability to transition at a somewhat lower rate.

13) Subject: Specific Units:

Comment numbers 310/113/13:

"Unit 29 is of particular concern. It is dominated by riparian areas. There are at least three year round streams and numerous seeps, springs and intermittent water channels. These areas do not appear on the SDEIS. The document should include this type of information. If the Forest Service cuts in accordance with the Standards and Guidelines, most of the unit will be precluded from logging operations by buffer zones."

Response:

The ROD for the Northwest Forest Plan does not preclude management of riparian areas (ROD page C-32, TM-1 (c)). Appendix K of the SDEIS includes mapping of unit #29 and clearly indicates the numerous riparian reserves that would be thinned under alternative #3.

14) Subject: Silviculture:

Comment numbers 201/02/14, 201/03/14, 201/04/14A, 201/04/14B, 201/14/14, 201/15/14, 201/16/14, 201/17/14, 309/01/14, 309/04/14, 305/05/14, 305/06/14, 303/06/14, 310/11/14, 310/17/14, 310/18/14, 310/28/14, 310/64/14, 310/65/14, 310/66/14, 310/67/14, 310/68/14, 310/69/14, 310/70/14, 310/71/14, 310/75/14, 310/76/14, 310/82/14, 310/83/14, 310/85/14, 310/91/14, 310/92/14, 310/93/14, 310/94/14, 310/95/14, 310/103/14, 310/112/14 and 310/114/14:

"On page 21 of the Eagle Creek Watershed Analysis, it states that 'overall, existing conditions range from good to excellent with the only future threat to stand vigor being overstocking,' while on page 122 of the SDEIS it is stated that 'the timber stands in the Eagle area are declining in health and overstocked'. Current stand density is in the range of 140-287 trees per acre with nearly all units less than 250 trees per acre. What are considered average stand levels for westside naturally regenerated stands of this age (110-150) and elevation that are found in the published literature? How will Alternatives 1-3 that are proposed improve on what is already taking place by natural process?"

"On page 111 of the Eagle Creek Watershed Analysis, the PSQ for Forest lands in the watershed is 10.3 MMBF per decade, but the preferred Alternative #3 is for 17.1 MMBF. How will this affect future projects? This appears to be more than a sustainable yield. What about other projects in other parts of the watershed? Does this mean that no other timber will be removed for at least 17 years?"

"The prescription for removing trees in the Riparian Reserves under Alternative #3 do not appear justified. There are no immediate disease concerns identified, nor does it appear to be a problem in the future."

"If woody debris levels are low, why remove the trees that are scheduled for thinning?"

"On page 89 it is stated that for the shelterwood prescription that 'structural diversity would be increased and a beginning stage of a multi-aged, multi-storied stand would take place between and among leave trees and groups.' On page 87 it is stated that 'the majority of the leave trees would be removed after regeneration occurs' for the second and third shelterwood prescription, and for alternative #3 on page 91 the majority of the leave trees would be removed. It seems that the same problem that is being treated is being recreated by this prescription."

(201/15/14) "Page 90 - In the last paragraph it states that 'It would be impossible to guarantee the long-term health of this area without some kind of management activities (Oliver 1990)'. It is also impossible to guarantee the long-term health of this area with management activities."

"On page 122, it is stated that the timber stands in the Eagle Creek area are declining in health and are overstocked while on page 52 it is stated that the project area is in good hydrologic condition and would improve with no treatment. Most of the treatment areas having a stand density of 150-250 trees per acre which is probably not overstocked for a 110-150 year old naturally regenerated forest. On page 21 of the Eagle Watershed Analysis it states 'overall, existing conditions range from good to excellent with the only future threat to stand vigor being overstocking.'"

(201/17/14) "On page 122, it is stated that 'the fire hazard is not great and is not expected to be in the near future even with increased fuel loading,' yet the threat of fire is being used to justify the prescriptions."

(309/01/14) "My concerns center on un-necessary disturbance of a roadless area; the on-the-ground physical condition of the naturally occurring forest does not jive with the 'overstocked condition' asserted in the EIS; planned

clearcutting across riparian areas in headwater units; failure to thin adjacent plantations of regenerated young fir that truly do need thinning."

"Lastly PILP would like to voice its concern over cutting adjacent to the Salmon Huckleberry Wilderness Area. Units 8 and 4 are particularly bad since they: ...; (4) are perfectly healthy stands; ..."

"It is far from clear that thinning will help create a multilayered canopy. In areas such as unit 29, there is a depauperate rhododendron and bear grass understory which has been shaded out by canopy closure. Seedling hemlock and true firs are numerous in the many bare soil patches. Thinning trees will rejuvenate brush and beargrass, crowding out development of a tree understory. The difficulties in regenerating rhododendron-bear grass communities have yielded only to plowing in the past, but that is unthinkable on these slopes and in this drainage. Thinning in all the high elevation units of Alt. 3 runs the risk that development of a multi-layered canopy is retarded rather than enhanced. Beyond this, the lack of regeneration because of brush competition will encourage expensive future management excursions or a more drastic silvicultural treatment of low productivity sites in the future."

"While we recognize that thinning would become progressively lighter upslope, we reiterate that these higher ridges are prone not only to high east winds and storm winds from the southwest, but also to sunscald on tree trunks around openings and partial openings, and frost and cold desiccation of tree crowns. These physical actions are as important as crowding in determining what happens to stands. Any activity which reduces stand density runs the risk of increasing disturbance effects. Less exposed stands have much less of a chance of disturbance effects, and thinning is therefor more justified in those stands."

"Any logging activities could dry soils out and increase noxious weed numbers and rhododendron populations. This would compete with trees left on site and would ultimately lead to disease and/or blowdown increasing."

"How did the Forest Service decide that cutting trees is more beneficial than letting trees be naturally thinned?"

"The Watershed Analysis states that logging operations are expected to increase Douglas-fir beetle infestations. This will increase green tree mortality. (80, WA) Yet part of your rational for cutting is to decrease the chances for infestations? (80, WA) How does the Forest Service resolve this contradiction? How do Forest Service actions conform with Standards and Guidelines, Timber Management 32 (a) - (c)?"

"Green tree mortality increases fuel loading. This will heighten chances of wildfires. (80 WA) This is counter to your rational that cutting will actually decrease the chances of a severe wildfire destroying the forest at Eagle Creek. How do you explain this Contradiction? How do your actions comply with Standards and Guidelines 31-32 TM-1 (a)-(c); C-40 A, B; C-41 (B)-(D)?"

"What percentage of the Southfork watershed has been cut in zone in the last 15 years? What percentage will be cut during the next 15 years?"

"Which units will receive sheltered prescriptions?"

"Which prescription of sheltered removal will Unit 27 and 28 receive?"

"What is the rational of: 1) Removing 40% of the basal area of a 1/2-1 acre stand of forest and then calling it individual tree removal? (pg. 87)"

"What is the difference in effect on interior habitat, species dependent on interior habitat, erosion and windthrow? Would this type of prescription result in the removal of more wood than thinning or light shelterwood prescriptions?"

"Does the Forest Service plan on entering this area every 20 years to manage this forest? (pg.88) How many more

times will the Forest Service enter this area?

"With commercial thinning, damage to boles of trees will occur (pg.88) This will allow pathogens, such as root rot, to increase its presence in the forest. If the Forest Service is concerned with increasing infestations and fire, then why is it cutting trees that will result in the very occurrence they seek to avoid?"

"How will the determination be made that underbrush may cause competition problems for seedlings?"

"Since increasing forest health is a major rationale of cutting, how can you further substantiate your claim? If your only rationale is a 'judgement call'. How can the promotion of pathogens and beetles be consistent with Watershed Restoration, Standards and Guidelines B 30-31."

"What percentage of the total sale area will have plantations and commercially thinned areas and what percentage will have trees on it over 180 years of age? What percentage of trees that are to be cut will attain old growth status within the next 40 years?"

"Portions of unit 10 will have commercial thinning on top of commercial thinning (Compare map on pg. 28 & 56). This area is also in a roadless area. This combination of factors should preclude cutting in Unit 10. Why is cutting still continuing in this area? Why not do away with this given the area's Tier Two designation and its proximity to riparian zones. What proof does the Forest Service have this double thinning will not increase siltation in surrounding water channels?"

"What is the relevance of 'vigor'. What substantive contribution does the term 'vigor' make to managing forests in a Tier Two watershed. Why did the Forest Service use a term that it did not define in any document? Why does the loss of vigor necessitate cutting? Is there any evidence cutting these trees will increase the remaining trees 'vigor' given their age, current health and future management prescriptions?"

"Why go back in and fell trees to meet the standards of the NWFP for down trees on clearcuts, partial cuts or shelter cuts? Why not leave them when you cut? This area is on track to meet these specifications without cutting."

"How will the Forest Service determine which trees are to be saved because they are genetically superior? What criteria is the Forest Service using to make this determination?"

"Your Watershed Analysis and SDEIS state that overstocking is the biggest problem facing forest health in Eagle Creek? What factors went into this determination? Did the Forest Service factor in the excellent health of the stands, high moisture in the area, current lack of infestation, minimal amounts of fuels, and the area's uncertain causes of fire when making this determination?"

"Did the Forest Service account for the possibility that the last major fire in the area was possibly set by humans when deciding that overstocking posed the largest threat to these stands?"

"How much larger a problem is overstocking than allowing the trees to be naturally thinned? Does this statement take into account the damage caused by pathogens attacking trees through stumps, damage from logging operations leading to beetle outbreaks and stressing trees through soil compaction from logging?"

"What percentage of the trees proposed to be cut are over 140 years old? What percentage of the total BA cut do these number represent? Why are there any of these trees being cut when they serve a vital connectivity and habitat function?"

"What percentage of the area, which if it were not cut, would reach late seral stage in 20 years? How many acres of this type of forest have been cut in the last six years? Why are any trees with these characteristics being cut given their high value for diversity and connectivity?"

"Your response to comment number 306/15/06 of the Draft EIS stated that more information would be provided on the issues covered in the comments. Why was no further information provided on all of the topics in the comment?"

"I have walked over many of the units proposed for cutting in the Talon Timber Sale. During this ground truthing, I discovered that many of the Forest Service's concerns, used as rationales for cutting, were not present in this forest."

Response:

The quote from page 21 of the *Eagle Creek Watershed Analysis* is found under the heading entitled *Insect and Disease* and agrees with findings of the *SDEIS*. The term of overstocking or overstocked is common to both of the quotes cited above and is a common thread between the *Eagle Creek Watershed Analysis* (page 80) and the *SDEIS*. Average stocking levels for unmanaged, naturally regenerated westside stands of this type would range from about 149-281 trees per acre (*The Yield of Douglas Fir in the Pacific Northwest*, R. E. McArdle, 1949). However, when looking at stand density, one must look past the number of trees per acre and age and take into consideration site, stand condition, past disturbance regimes, size (area) of the stand, etc. When using the *Density Management Diagram for Douglas-fir* (J. Drew and J. W. Flewelling, 1979), it can be discerned that the relative stand density for this area is high and individual tree mortality is occurring at this time. It must also be recognized that this area is designated as *Matrix* land under the *Northwest Forest Plan*, where most timber harvest takes place (page C-49), and as *B6 Special Emphasis Watershed* in the *Mt. Hood National Forest Land Management and Resource Plan* (page Four-246) which calls for management that maintains healthy forests. The term "improve" (the last sentence of the comment) is subjective and can't be addressed in this process. From the Forest Service point of view, by actively managing the resources in the Eagle area, there is a better probability of obtaining the desired future conditions in a shorter time frame than letting the stands "naturally" evolve, which would be slower and may have more unpredictable outcomes.

The last sale, other than roadside salvage, was sold in 1989. A subsequent "green" entry into the proposed units of the sale is not being recommended for another 15-20 years, except where shelterwood trees affecting the growth of a new understory may need to be removed. At this time, no projects are being planned for the Eagle watershed in the near future and the Forest Service intends to follow the recommendations of the *Eagle Creek Watershed Analysis*.

In the *Insects and Disease* portion of the *Eagle Creek Watershed Analysis* (page 21), it states that "Small pockets of laminated root rot (*Phellinus weirii*) exists as with most forested ecosystems in the Western Cascade." In addition, "...the only future threat to stand vigor being stocking". Instead of waiting for a condition to develop and become a problem, a recommended integrated pest management strategy of stocking control is being followed. See also the response to comment 201/02/18.

The trees that would be removed by thinning would usually be the smaller trees (both diameter and height) that don't meet present standards for large woody debris, either on the forest floor or in riparian areas. By reducing competition on the residual trees and removing smaller conifers, it is expected that the present rate of growth would be maintained or possibly increased.

All designated leave patches in shelterwood units would be left in place in order to meet the requirements of the *Northwest Forest Plan*. A minimum of about 12 trees per acre out of the original 50 trees per acre would be left in place. This would add to structural diversity on a landscape basis, a silvicultural objective found on page 86 of the *SDEIS*.

The Forest Service agrees with comment 201/15/15. "

(201/17/14) See the two sentences following the above quote on page 122 and also the third paragraph on page 52

of the *SDEIS*.

(309/01/14) See response to comment 201/02/15. No clearcutting is planned across riparian areas. Precommercial thinning is an ongoing program that does reduce stocking levels in plantations. Young stands are treated when it is appropriate.

While the trees may look "perfectly healthy," a closer look at all of the factors tied into stand health indicate that overstocking, and subsequent mortality, is taking place. See also the response to comment 201/02/18.

The Eagle area is designated as *Matrix* land under the *Northwest Forest Plan*, where most timber harvest takes place (page C-49), and as *B6 Special Emphasis Watershed* in the *Mt. Hood National Forest Land Management and Resource Plan* (page Four-246) which calls for management that maintains healthy forests. Given this fact, getting a new age class of conifers growing in the conditions mentioned in the comment above may be difficult. But when looking at the possible options for starting a new stand at the upper elevations, which include no action, clearcutting, shelterwood or commercial thinning, the latter was chosen because of its minimal impacts on the resources. As stated above, there are numerous young seedlings beginning to grow. And yes, brush such as rhododendron and beargrass tend to take advantage of the increased light brought on by thinning. However, it is thought that the best way to release the seedlings is to open up the stands slightly, so that the established young conifers may take quick advantage of the situation and out-compete the brush. It is realized that this process may not be successful in all situations and that it may be a long process, but this treatment is expected to have the least effects on other resources while moving towards a multi-aged, multi-layered stand. The approach of a combination of light commercial thinning and small openings is thought to be the best way to actively manage this area. There is no plan for "plowing" up the ground at these upper elevations (units 8, 24 and 29).

There is agreement with the concern expressed. However, given the land allocations, the proposed treatment, which is relatively light, is thought to be the best action at this time. No action, in the long-term could prove to be more detrimental by not managing to maintain stand vigor and not planning for incrementally replacing portions of the existing stand. See also the response to comment 305/05/16.

There may be some drying of soil, an increase in rhododendron in some areas and some blowdown. However, these items are not expected to be significant as evidenced by the healthy plantations in the area and the lack of blowdown in the stands that have been commercial thinned previously. Experience in the area has shown that noxious weeds seldom move more than about 20' from landings (See also *SDEIS* page 126 for more detail). Some disease may find its way into residual trees that have been damaged by logging, but that effects of that is considered to be minor (See also *SDEIS* pages 88 and 89).

In order to meet the desired future conditions for this *Matrix/B6-Special Emphasis Watershed*, it was determined that harvesting activities the most appropriate. See also *SDEIS* Summary -- page 1 & 2 and *SDEIS* page 3.

The Watershed Analysis (page 80) discusses insects and potential damage in the context of windthrow and salvage, not logging operations: "In the situation where windthrow is reduced, an indirect benefit may be realized as less and less breeding habitat for Douglas-fir bark beetle becomes available. However, in areas where salvage is highly controlled such as in riparian reserves (see pg. C-32 in the ROD) and in the LSR (see pg. C-13 in the ROD), we may expect a population increase in Douglas-fir bark beetle. This may lead to an increase in green tree mortality and added fuel loadings. Added fuels will increase the hazard of wildfires." No roads are being constructed in riparian areas and Forest Service actions conform with Standards and Guidelines, Timber Management 32 (a) - (c).

While it is true that green tree mortality increases fuel loading, it does not follow that it would "heighten the chances of wildfire." The chance of wildfire is based upon potential risk; fuel loading influences intensity. See also response to comment 310/17/18. The *SDEIS* does address fire intensity (page 122), not chance. The *SDEIS* for Eagle comply with Standards and Guidelines TM-1 (a) and (b) and proposed entering riparian reserves on only three

of the 29 units discussed. C-40 (A) & (B) and C-41 (B)-(D) clauses are also being met.

Approximately 13% of the watershed has been cut in the last 15 years. At this time, no additional acres are planned for commercial entry beyond the presently proposed sales.

The following units are planned for some form of a shelterwood prescription: 2, 12, 13, 15, 16, 17 and 27.

Unit 27 would have approximately half of its area covered by groups of leave trees. Unit 28 would be a commercial thinning.

Individual trees are selected for removal in these small areas rather than removing all of the trees.

The meaning of the first question is unclear to this writer, and so cannot be answered. Removing 40% of the basal area is a type of thinning prescription. The amount of basal area removed has a direct effect on the amount of wood removed. More wood is normally removed in a light shelterwood than by a 40% basal area removal commercial thinning.

Management of a forest takes many forms for the many resources that are located within it. In the near future, this may include restoration and enhancement work for fisheries, wildlife or riparian. Planting and Precommercial thinning may be necessary in this time period also. Road and trail maintenance and road closures may need to take place as well. At this time, a subsequent "green" entry into the proposed units of the sale is not being recommended for another 15-20 years, except where shelterwood trees affecting the growth of a new understory may need to be removed. The *Eagle Creek Watershed Analysis* (page 111) recommends a 150 year rotation for the Forest Service timber of the watershed. Given the long-term commitment needed for forest management and the changing needs of society, an estimate of future entries into this area is not possible.

Management of the forest is a very complex matter. While some damage to tree boles may occur, it is expected to be minor (*SDEIS* page 88). The trade-offs for reduced stress on the residual trees and increased vigor of the remaining stands, as a whole, has been determined to be worth the possible risk of minor infections of rot, which is endemic to the forest. As stated in the *SDEIS* (page 88), trees infected with rot become wildlife trees, over time.

"Competition problems for seedlings" vary with species and site conditions. In general, competition becomes a problem when seedlings are not able to become well-established on a site and are not able to overtop the competing vegetation.

For the first question, see the response to 310/69/18, *Eagle Watershed Analysis* pages 21 and 80, *SDEIS* Summary-- page 1 and page 3. Pathogens and beetles are not being "promoted" by this project. Ample evidence of this can be seen in adjacent areas where harvesting activities have taken place. The *Eagle Watershed Analysis* (pages 85-87) indicates that the South Fork portion of the watershed is not in need of restoration and, thus, the proposed action is consistent with Watershed restoration.

Approximately 13% of the total sale area presently has plantations and about 9% commercially thinned areas. An estimated 23% of the area has trees over 180 years old. No trees that will reach old growth status over the next 40 years will be cut during this entry.

No double commercial thinning would take place in unit 10; the map on page 28 is in error. Yes, this unit is in a roadless area. The third sentence is an opinion. For answers to the next two questions, see *SDEIS* Summary -- pages 1 - 3, *SDEIS* pages 3 & 4 and *Mt. Hood National Forest Land Management and Resource Plan* (page Four-246). See the first sentence of this response for the last question.

The size of the crown, its density and the shape of the top indicate crown vigor and consequently the inherent

capacity of the tree to grow and endure exposure to beetles (Smith, 1962). Vigor of trees in the stands indicate which trees may survive disturbances, whether or not they are located in a Tier Two. Loss of vigor indicates stress in trees which may be caused by overstocking, insects, diseases or other types of disturbances. It does not always necessitate cutting, but if the cause of the stress may be mitigated by cutting, then that may take place. There is evidence that commercial thinning of trees in this approximate age class will at least maintain or increase their vigor by introducing stocking control (SDEIS page 87-88; Raven Thinning). The term "vigor" was not included in the Glossary because of an oversight.

Many of the proposed units do not presently have an adequate number of coarse woody debris necessary to meet *Northwest Forest Plan* Standards and Guidelines (page C-40). Some logs may be left in place during harvesting operations. Some scattered windthrow may occur during the first year or two following harvesting. This material may help to fulfill the requirements. If not, then some falling may need to take place.

The genetic tree improvement program has been in place on the Mt. Hood National Forest for about 30 years. All of the trees that were needed for this phase of the program were selected prior to this time. Some of the characteristics of importance include form of the tree, straightness of grain, branch size and angle, prolonged growth rate, health of the tree and crown position.

In the preparation of both documents, the factors of stand health, moisture, insect and disease conditions, fuel loading and fire history were included.

Origins of fires that occurred 150 or more years ago are hard to determine. Our task at this time is to deal with the present conditions of the resources and desired future conditions (see the *Eagle Creek Watershed Analysis* the *Mt. Hood National Forest land Management and Resource Plan* and the *ROD* of the *Northwest Forest Plan*).

Approximately 13% of the proposed sale acres contain trees over 140 years old. This represents about 4%-6% of the total basal area of the proposed units. See *Purpose and Need* (SDEIS pages Summary 2-5). All of the trees in the units would not be cut and still may serve as habitat and connectivity links. Riparian reserves and the LSR to the north of the area have been identified as key components for habitat and connectivity (*Northwest Forest Plan* pages B-4 & B-5 and B-13).

A very high percentage of the stands in the area are basically single-storied, even-aged and are lacking coarse woody debris, although many large trees can be found. Late seral structure includes stands dominated by conifers greater than 21" in diameter (*Eagle Creek Watershed Analysis*, page 13), multi-layered canopy, multi-age and coarse woody debris on the forest floor. With these characteristics in mind, an estimated 10-15% of the acres presently meets the above criteria. That figure is expected to remain about the same 20 years. About 40 years from now, it is felt that this number would begin to increase as a second layer and age class takes it's place in these stands. Approximately 145 acres of this type of forest have been cut in the last six years. For the last question, see *Purpose and Need* (SDEIS pages Summary 2-5).

Comment 306/15/06 was: "More discussion was needed on the top of the Douglas Fir Bark Beetle and the Spruce Bud Worm's impact on the forest ecosystem. Do they present a significant risk to the forest? What is the estimated time frame within which we will begin to see evidence of infestation? Are there other alternatives, using Integrated Pest Management, that could be used to control the infestation of these organisms?"

The omission was an oversight. Douglas-fir bark beetles are endemic to many Pacific Northwest forests. Bark beetle populations tend to build up following disturbances causing injury or death, such as heavy wind damage or fire. Once dead and dying trees have been attacked and populations increase, green trees may fall prey to the beetles. Populations tend to peak about three years after the initial outbreak and then subside. These insects do cause mortality in trees, especially if they are not in a healthy condition. Spruce budworm populations feed on the needles of conifers, especially true firs and Douglas-fir. The defoliation by these insects usually don't kill their

hosts but rather tend to weaken them and curtail their growth. In this state, they become more vulnerable to attacks by other insects and/or diseases which causes mortality. An infestation may last for several years with various peaks of intensity during that time. At this time the Douglas-fir bark beetle and spruce budworm are not considered to be a significant risk to the proposed area, but are, nonetheless, a risk. Changing conditions of the forest within this area could increase the risk and those time frames cannot be predicted. Treatments proposed for the Eagle incorporate Integrated Pest Management (IPM) strategies. The foremost principle of IPM is to maintain a healthy stand by exercising stocking control, such as thinning, to maintain or increase stand vigor and health. Another tenet reducing uniformity within a large block of homogeneous forest. This can be done by creating openings of various sizes and introducing new age classes.

The respondent does not specifically state which concerns that the Forest Service has are not present. Without this information, a specific response cannot be made. However, refer to the response for 201/02/14, 210/04/14A, and 201/04/14B.

15) Subject: Flood Effects

Comment numbers 308/05/15, 310/26/15, 310/33/15, 310/34/15, 310/34/15, 310/35/15, 310/36/15, 310/37/15 and 310/125/15:

"...lack of any mention of this February's flood event and its effects on the road and instream conditions.

"ONRC believes this sale should be stoped (sic) until the issues raised by this past winter's flooding can be adequately assessed by the Forest Service."

"Did the Forest Service check downstream structures, such as the fish hatchery, to determine if they were harmed? Management activities directly affect these areas."

The Forest Service contends that the Watershed Analysis is still valid after the storms. Did they do any studies on water turbidity in the area, or downstream, to see if siltation levels were higher in the area, or downstream, to see if siltation levels were higher than before the flood."

"What damage [to primary and secondary roads] did occur. Could any of this damage have resulted from past management activities?...Will these activities be repeated with this sale?...How will a storm of similar of greater magnitude effect (sic) water quality in this watershed?"

"Congress recently appropriated \$63 million dollars to Region 6 for post-flood watershed analysis, restoration, surveying, monitoring, and other activities. The Estacada Ranger District should disclose: 1) the total amount of money they are getting from the above mentioned sources; 2) any additional source of money they are getting that can be directed to similar activities; 3) an explanation of why no money is being directed towards these activities if that is the case; and 4) their priorities with regards to (a) proposed actions and (b) funds distribution among these priorities."

Response:

Field reconnaissance undertaken during the November 1995 rain-on-snow event revealed virtually no perceptible clarity reductions in receiving waters downslope from roads and road drainage structures within the Eagle project area. This appears to be related to the fact that roads have pavement or aggregate surfaces and ditches are vegetated or rocked throughout much of the area. Heavy snow cover within the project area precluded a similar investigation during the February storm event. Follow-up field investigations during spring of 1996, when the area was again accessible, revealed no landsliding, gullying, obvious surface erosion, cutslope or fillslope failures to any primary or secondary roads. Nor was any significant alteration of channel substrates (sedimentation) within the Eagle Creek project area observed. In this area the storm flows were estimated to have a 2% to 1% (50-year to 100-year) return interval, equating to a large amount of runoff in a very short period of time, with no apparent adverse effects.

Accelerated gullying in a spur road (4615011) outside of the South Fork drainage, but within the immediate project

area was observed. This road was previously identified in the WA and SDEIS as a chronic erosion problem and was proposed for decommissioning in the SDEIS. The road remains a candidate for decommissioning in the FEIS.

Insofar as National Forest lands are concerned, the existing Eagle Creek Watershed Analysis remains valid in its findings, conclusions, and recommendations. A discussion of flood damage surveys and findings within the Eagle project area is included in the FEIS.

The respondent is correct in that dollars have been received to repair flood damage from the floods of 1995. However, it is beyond the scope of this document to deal with projects or other activities or how dollars are spent if they are not directly related to the Eagle Creek watershed. Projects on other watersheds have their own environmental documentation with their own set of objectives, issues, and concerns that are not directly related to the objectives, issues, and concerns of this document. None of the previously mentioned "emergency flood repair" dollars are being spent nor will they be spent in this drainage. This is because there was no damage caused from the flooding in this drainage other than road 4615011 which has been mentioned previously and was identified in the SDEIS. All projects mentioned in the SDEIS would continue in the FEIS and would be funded through normal sources associated with this kind of activity. The watershed analysis is valid and will continue.

16) Subject: Fungi:

Comment Numbers 306/09/16:

"The loss of habitat for fungi was not discussed at all and needs to be addressed. The lack of analysis of the fungal communities in this area directly affects mushroom gatherers and the health of the ecosystem upon which the forest depends."

Response:

Additional information will be added to the FEIS.

17) Subject: Recreation:

Comment numbers 306/07/17:

"Recreation: This will be negatively affected through loss of forest cover and biodiversity. The gathering of forest products, study of nature, habitat for game, fishing, camping and hiking will be negatively impacted."

Response:

Logging and road building have occurred in this watershed for several decades and it has been the experience of the Forest Service that recreation has not declined but rather increased (SDEIS page 65 and 113). Over the past three years, permits for forest products on the Estacada District, as described in the above comment, have numbered between 3,800 permittees to 4,700 permittees. These numbers fluctuate because of seasonal conditions (e.g., drought, rain, snow, etc.) however, as long as there is a demand for such forest products, such products would be gathered in the Eagle area.

There are no developed recreation sites (e.g., campgrounds, picnic areas, etc.) in this watershed nor in or near the wilderness thus, there are no "special" attractions that would draw a person to this area. If a person wishes seclusion or other attributes of this type, the wilderness is immediately adjacent to the Eagle area. The only areas where camping occurs is in dispersed sites along the roads and sometimes along a few of the trails although evidence of such activities (e.g., fire rings, cleared tent areas, etc.) indicates this is not a major draw for this area. However, opportunities for motorized camping would be more limited due to road closures. Likewise, opportunities for camping by mountain bike or hiking would increase. This watershed is a good area to hunt due to its proximity to Portland and other metropolitan areas and the possibility of being successful should increase because of planned forage planting and wildlife projects in the action alternatives. Analysis indicates that fish populations would not be affected by the proposed management activities thus, fishing should continue at its present rate or increase as the populations in the areas increase.

18) Subject: Restoration:

Comment number 306/04/18:

"Restoration should begin immediately with the re-contouring and revegetating of all roads in this area. This area is unstable and unsuitable for logging."

Response:

Surveys of the road systems and existing clearcuts along the 4614 and 4615 road systems and existing clearcuts show that there were no mass landslides, no road fill or cut failures, no debris torrents along any of the streams, and no heavy sediment movement. The only exception to this is road 4615011 which was identified as a problem in the SDEIS and has been included in the alternatives for obliteration and restoration. Note: the 4615011 road does not drain into Eagle Creek but rather Fall Creek that drains into the North Fork.

Analysis, stream surveys, and on the ground observations indicate that water quality is good and that there are no major problems affecting water quality from past management activities.

19) Subject: Anadromous Fish/Resident Fish:

Comment numbers 308/01/19, 310/05/19, 310/07/19, 310/08/19, 310/49/19, 310/50/19, 310/54/19:

"CTWS is very concerned about any potential impacts to anadromous fish at the Eagle Creek National Fish Hatchery and resident fish attributed to logging and road building. ...this project has the potential to damage fish habitat, water quality and stream morphology within Eagle Creek and its tributaries."

"Some tributaries have not been studied for the extent of their fish bearing potential (p41). Will there be activity around these tributaries? How close will cutting occur to these streams?"

"Since the extent of fish distribution is not fully understood, no cutting should occur in any area where studies have not been conducted. The definition of 'Fish Bearing' in the Standards and Guides is 'any stream containing any species of fish for any period of time'. Allowances should be made in the variability of tributary use by fry. ...Cutting should be conducted in accordance with ROD and Standards and Guidelines for 'Fish Bearing Streams'."

"Is a 416 foot buffer being left in areas where fry have been found in the upper reaches of Eagle Creek and its side channels? How will the unknown range of fish in Eagle Creek and its side channels be factored into plans for cutting this sale?"

"There is not a complete understanding of the distribution of fish species in the Eagle Creek watershed (p41). How can you predict the sale's impact on fish if you don't know where they reside?"

"Why is this Sale going forward if it may impact lower Columbia Coho? This should be enough reason to stop cutting in riparian areas. How could it impact lower Columbia Coho?"

"This sale would increase sediment into the waterways. Why is the Forest Service planning to decrease the health of a stressed river system by further cutting?"

Response:

The SDEIS presents and discusses the potential risks to and effects on anadromous and resident fish. The SDEIS addresses potential impacts to fish habitat, water quality, and stream morphology for Eagle Creek and its principal tributaries. None of the alternatives pose a serious risk.

Riparian reserve delineation is based upon recommendations of the Eagle Creek WA and site-specific information gathered during project development leading to the SDEIS. Riparian reserve widths and factors influencing the determinations are included in the SDEIS.

Additional streams have been surveyed subsequent to the SDEIS and the information used in developing

recommendations for riparian reserve delineation. This process is iterative and will continue through project layout and implementation. All streams adjacent to proposed harvest units have been surveyed to determine whether or not they are "fish bearing". The ROD definition of "fish bearing stream" provides the basis for determining riparian reserve widths. See SDEIS.

Predictions of effects are based on current data and relevant information gathered from various sources, as interpreted by professional judgment. If new information is obtained at any point in the planning or implementation of this project it will be considered and appropriate action taken.

The SDEIS displays the information leading to the conclusion that there is little or no risk to lower Columbia Coho salmon posed by proposed alternatives.

The SDEIS supports the conclusion that there is little or no risk of increased stream sedimentation posed by any of the alternatives and stream health is expected to improve over time.

20) Subject: Stream Temperatures:

Comment number 308/06/20:

"We are troubled by the mean August temperatures at the hatchery site which have exceeded state standards (58 degrees F) for at least 24 of the last 34 years. ...Logging and/or road construction in riparian areas are not compatible with the protection of instream temperatures."

Response:

The SDEIS documents similar Forest Service concern about downstream temperatures at the hatchery which was the primary impetus for designating the National Forest portion of the Eagle Creek watershed as a B-6 Special Emphasis Watershed in the Mt. Hood National Forest Land Management Plan. Similar concerns and potential effects on anadromous fish stocks influenced the designation of this watershed as a Tier 2 Watershed in the Northwest Forest Plan.

The Eagle Creek WA and this SDEIS present data which documents water temperatures at several locations in the watershed. The data indicates that temperatures are lowest at the National Forest boundaries, reflecting the role of intact riparian areas which dominate the National Forest portion of the watershed. Temperatures within the South Fork are actually lower than those recorded for the upper mainstem of Eagle Creek, which lies primarily within the Salmon-Huckleberry Wilderness.

Proposed prescriptions for all alternative, including Alternative 3, would maintain canopy closures and ensure that temperatures would not be adversely affected.

Road construction is not proposed in riparian areas in any of the alternatives.

21) Subject: Comment Period:

Comment numbers 311/03/21 (Received 97 form letters/cards with the same comment(s)), 303/10/27:

"I demand that the past deleterious cumulative effects of abusive roadbuilding and logging operations be factored into any decision made, and that a cumulative impact study be undertaken by the USFS, and accordingly, that the public comment period be extended by 30 days."

"You need to at least allow the public some more time to digest your proposals, so they can realize the potential problems that will arise from your actions."

Response:

Cumulative impacts have been discussed in the Watershed Analysis for the Eagle watershed (1995) and in Chapters III and IV of the SDEIS. The Forest Supervisor (Decision Maker) was apprised of the demand for additional time and due to a lack of substantive comment or rational and because of the cumulative effects analysis that has already

been completed, decided to maintain the comment period for the Eagle SDEIS at 45 days.

In response to the comment addressing "more time to digest proposals", the following is a list of public involvement activities that have occurred for this project:

- a) The proposals for managing this watershed began in 1991 with a "Notice of Intent" (NOI) in the Federal Register.
- b) The original notice was amended with a second NOI.
- c) Public meetings on the proposal were conducted prior to publishing a draft document.
- d) A draft document was published in 1993 and mailed to several interested people with the comment period being 60 days..
- e) A field trip was conducted for those members of the public that had shown an interest.
- f) Updates have regularly appeared in the Mt. Hood National Forest Newsletter, "Sprouts".
- g) A NOI was published in the Federal Register indicating that a Supplemental Draft Environmental Impact Statement (SDEIS) was being prepared. This NOI indicated that the comment period would last 45 days.
- h) Individuals requested copies of the SDEIS, by phone, when it was available however, no other letters were received providing input to the SDEIS and no additional information was provided concerning the watershed.
- i) Mailings began on May 15, 1996 (Nine days before the Notice of Availability appeared in the Federal Register). These documents went to people who have shown an interest in the past or specifically asked for a document prior to publication.
- j) An "interest" letter was mailed to several people who were on the mailing list(s) and several were returned. If the letter was returned, these people received a copy of the document.
- k) A "Notice of Availability" appeared in the Federal Register on May 24, 1996. The end of the comment period was on July 8, 1996 (This in actuality is 46 days for comment)
- l) Those who first received the document had 54 days to comment on the proposals.

22) Subject: Municipal Watershed:

Comment number 310/24/22:

"The Forest Service should continue to consult with the City of Portland and other rural (sic) communities relying on drinking water from this watershed. Their municipal water supply is directly threatened by this timber sale. ...This will preclude costly future problems with water quality, water quality (sic), and habitat loss for sensitive species."

Response:

The comment is not an accurate statement of fact. The municipal water supply for the City of Portland has its source in the Bull Run Watershed, not the Eagle Creek Watershed (as implied in this comment). The Bull Run is located within a totally separate river basin (Sandy River).

Communities in the vicinity of Oregon City obtain municipal water supplies from the lower Clackamas River, of which Eagle Creek is one of many tributaries. This project area constitutes much less than one percent of the contributing watershed area upstream from the point of diversion for the Oregon City water system. Municipal water supplies would not be affected by this project, directly or indirectly. The Eagle Watershed Analysis displays and discusses the overwhelming contribution of non-federal forest, agricultural, and urban landscape on water quality of Eagle Creek. By extension, the contribution of this project area to water quality considerations at the point of municipal diversion is minuscule.

The City of Portland, along with other regional water purveyors is studying the Clackamas River as a potential future regional water source in the next century, decades after the proposed implementation of this project.

23) Subject: Aggregate Recovery Percentage (ARP):

Comment numbers 310/19/23, 310/21/23, 310/22/23, 310/25/23, 310/29/23:

"There is an inconsistency in the SDEIS. It states that 'water available for runoff' model is being used to compare alternatives against one another. (p 10). It also states the 'Hydrologic Recovery Model was used to determine specific project alternatives (p 6). Which is it?"

"The lower reaches of Eagle Creek is (sic) capable of releasing large quantities of silt and sand (50, WA). Since the harvesting of trees in the upper reaches of the creek will lead to increased peak flows and downstream harvesting methods and cycles are uncertain, this cut should not occur. This will help ensure ARP's for the Eagle Creek watershed are maintained at current levels even if more cutting occurs elsewhere. Will this, and expected future cuts, result in increased erosion of down stream banks due to increased peak flows?"

"First, if BLM sale goes through, what will the ARPs be for the effected (sic) drainage? The qualification that they will 'likely be the same' (p 37) is not an acceptable scientific/professional assessment given the importance of this watershed."

"These same concerns as relevant to the possible land exchange transfers with Longview Fiber. How will these effect (sic) the ARPs for the effected (sic) areas?"

"The placement of roads (including permanent roads) also occur within the rain-on-snow even zone. Most roads occur in this zone. Road building will be increased in this zone with the construction of a new road for Units 27 and 28. This style of cutting and road placement results in unacceptable damage being done to the watershed from increased landslides and siltation of water channels."

Response:

The inconsistency in the SDEIS with regards to hydrologic analysis models has been corrected in the FEIS. The "water available for runoff model was a tool utilized for assessing the entire watershed (Eagle Creek Watershed Analysis). The "hydrologic recovery" methodology was utilized for comparison of alternatives in this project. Both approaches are based upon the same factors.

The hydrologic recovery analysis (ARP) revealed that increases in peakflows associated with any of the proposed alternatives are extremely unlikely. The percentage point differences are not significant when considering the relative imprecise available data used in the analysis. Effects on water quality (sediment and turbidity) related to potential (though imperceptible) peakflow changes are similarly not measurable.

ARP is not an appropriate methodology to apply for lands outside of the transient snow zone. The assumption is made that BLM activities, should they occur, would be implemented with regards to current direction for BMPs, riparian reserves, and other Federal guidelines for the protection of water quality. Insofar as ARP values are concerned, there would be no measurable change.

We cannot predict the effects of a possible land exchange and future management which may never occur.

The contribution of roads was considered in the Hydrologic Recovery analysis and expressed in the Aggregate Recovery Percentage (ARP) values. The relative contribution of the "new " road amounts to less than two tenths of one percent. More over, the proposed road (accessing units 27 and 28) is planned as a temporary road, utilizing an existing road in part, to followed by decommissioning after use in this project. This would result in a net decrease in the contribution of roads to ARP values and potential peakflows.

24) Subject: Instability / Landslides

Comment numbers 201/11/24, 305/03/24, 306/05/24, 307/03/24, 308/04/24, 310/30/24:

"Page 44 - The last sentence on the page states that 'similar landforms and soils are observed elsewhere in the project area and may be affected by one or more project alternative.' ...These [unstable or potentially unstable] areas within the South Fork should also be included within Riparian Reserve boundaries and not receive treatments that may activate unstable sites."

"Our investigations of units 25 and 29 [36 in SDEIS] suggest that even with the proposed mitigation measures there are too many chances for logging-induced soil instability adjacent to some streams and bogs. ...Thinning these areas will not enhance slope or stream instability. ...Long term stability will be reduced by removal of any timber which might subsequently fall into streams."

"This area is unstable and unsuitable for logging."

"There should be no new road construction within the project area to accommodate planned treatments since roads are a primary source of sedimentation and instability within watersheds."

"However, we are still concerned that the estimated sediment delivery from 128 miles of road in the Eagle Creek watershed ranges from 50 to 2000 times that of the SDEIS noted natural rate of erosion. State standards limit turbidity to 10% of background. These roads have sediment delivery that is likely violating this standard. The SDEIS does not describe how this sediment loading would be monitored or corrected."

"Logging and roads are major factors in the number and severity of landslides which occur (sic) during storms. In the Oregon Cascades, the relationship between logging and road building has been documented by a recent study [Weaver, William, et al, May 1996]. Since the sale would decrease the ability of this area to resist landslides, no logging should be allowed in this area."

Response:

Unstable and potentially unstable areas were identified during the WA and during field reconnaissance associated with the Eagle Creek project. These have been included into riparian reserves, however not all riparian reserves are necessarily unstable or potentially unstable. As discussed in the SDEIS, unstable and potentially unstable areas, and other highly sensitive areas are specifically avoided in all alternatives, including Alternative 3 which proposes commercial thinning within portions of riparian reserves.

The location of unit 25 specifically avoids the very wet, steep talus covered slopes adjacent to the channel of the upper South Fork, in recognition of potential instability and risk to water quality. This area was incorporated into the riparian reserve. The stream channel lying to the west of proposed unit 25 was identified as having a history of naturally occurring debris slides and torrents, and was intentionally avoided during project planning and placed in riparian reserve. This channel was scoured by reactivated sliding during the winter floods, however the slide area is not associated with any previous management activities.

The cited aerial survey by William Weaver and many other similar studies over the past 30 years have documented the relationship of timber harvest and roads to the occurrence and severity of landsliding. Recent flood damage surveys conducted by Forest Service personnel have documented similar relationships elsewhere on the Mt. Hood National Forest. The Weaver survey did not, however, include the Eagle Creek area, where no such cause and effect relationships have been documented on National Forest lands. More over, the Weaver study specifically focused on clearcut timber harvest / landslide relationships. The study does not draw any conclusions about the relationship between commercial thinning prescriptions and the occurrence of landslides.

Surveys on this forest, while still ongoing, have revealed that most in-unit failures were associated with older clearcut units which may have been located and logged without recognition of inherent site factors contributing to the risk of landsliding. Similarly, our studies indicate that road-related landslides tend to be more common with older road systems where road location, design and construction practices were not up to present-day standards, or where road maintenance has not been commensurate with needs. Several large landslides and debris torrents had origins in Wilderness areas, with no previous management history.

The cited Weaver study has little relevance to the Eagle project which proposes commercial thinning harvest prescriptions, skyline or helicopter logging systems on all but the most gentle slopes, and avoidance of potentially unstable areas.

The 128 miles of road mentioned in the comment includes the entire watershed of which, approximately 21 miles of road are on Forest Service lands. The remaining 107 miles are on private and other ownership lands. Of the 21 miles of road under Forest Service jurisdiction, sediment producing roads and problem areas would be dealt with if one of the action alternatives is selected. The SDEIS included a monitoring plan under Appendix J of the SDEIS

which discusses monitoring for water quality.

No roads are proposed for construction in any unstable or potentially unstable areas.

25) Subject: Mitigation:

Comment number 310/100/25:

"Are all recommendations to mitigate erosion in the watershed analysis being implemented? If not, then which are being excluded? Why are they being excluded?"

Response:

All mitigation measures are implementable and it is the intention of the Forest Service to implement all of them.

26) Subject: Fire:

Comment numbers 310/87/26, 310/88/26, 310/89/26, and 310/122/26:

"What is the duff layer and ladder fuel height in the sale? Did you take these factors into account when discussing the possibility of stand replacement fires? If they were not included, what was the rationale for the decision? What measures are being taken to account for these factors? { Controlled burns, ladder removal}"

"A rationale for cutting is to ensure that a replacement fire does not occur again. Yet, the cause of the last replacement fire is not known. It could have been human (pg. 123) How can an area that has a low propensity for replacement and lightning strike fires (pg. 123) be deemed prone to replacement fires? What proof does the Forest Service have that conclusively shows this area is prone to replacement fires."

"Under this sale, fuel treatment is accomplished by cutting trees. (pg. 122) But logging trees results in the drying out of the stand and the build up of ladder fuels. This will increase the chances of fire in dry summer months? Therefore, the long term effects of cutting is to increase fire danger. How does the Forest Service propose to address this contradiction?"

"Thinning and shelterwood removal will increase the short term fuel loading of an area that is currently very healthy. The Forest Service has therefore failed to substantiate (1) a reduction in imminent susceptibility to fire through this timber sale, and (2) why no other treatment, such as "No Action" would be insufficient or ineffective to reduce high fuel loading and high risk of fire."

Responses:

Duff/litter layer depth within the project area averages 1-2 inches as identified in the Mt. Hood Soil Resource Inventory (SRI) and ground observations. Natural reproduction varies from two to fifteen feet tall and would generally have limbs to the ground (these are ladder fuels). However, many areas have very little if any reproduction. The natural fire regime for areas west of the Cascade range is characterized as high severity. Fires in high severity areas tend to be infrequent (often > 100 years) but may be of high intensity (stand replacement) where most of the vegetation is at least "top-killed". While no forest is "fire proof", there are structural characteristics that tend to make forests "fire-safe". These characteristics include but are not limited to: 1) Forest stands that are comprised of fire-tolerant trees described in terms of species, sizes, and structure. As stated in the purpose and need of the SDEIS, there is a need to encourage growth of large trees that among other things, would improve structural diversity; 2) Lowering the probability that crown fires would either initiate or spread through the forest. Crown fires will stop if either the rate of spread or the bulk density of the crown fall below a minimum value. Thinning a stand would reduce the crown bulk density.

As for "proof" of stand replacement fires, surveys within the Eagle area indicate that the fire return interval is approximately 115 to 130 years. A single fire event within an area would leave remnant trees with numerous snags and stumps and eventually a significant amount of dead and downed material as the fire killed trees begin to fall over and decay. Multiple fire rotations through an area tend to deplete the downed material as successive fires consume the dead material. The lack of large down material, stumps, and snags in the area support the evidence

that fire is a re-occurring event. Even though the area has a low propensity for stand replacement fires, lightning is and will continue to be a source of ignition. One may say that blowdown too could cause replacement of a stand however, again, there is the lack of evidence that such an event occurred. This evidence would be; a) Large amounts of down wood; b) Several old remnant trees scattered across the landscape; c) Heavy layers of duff and rotten wood; and d) "Root-wad" mounds. These are mounds of dirt that remain after a tree blows over and the roots have rotted away. Next to such a mound would be a pit where the tree used to be.

Currently, the residual fuel loading within the project area is considered light. However, as stated in the purpose and need, the sale area is a single aged stand which has started to lose its vigor because of overcrowding. Stands that are overcrowded naturally thin which would add significant amounts of dead and down material to the residual fuel loading. This type of stand is also susceptible to disease, insects, and windthrow which would greatly increase fuel loading. Thinning promotes understory vegetation of both shrubs and herbs. These plants maintain moisture content and provide a dampening effect on fire behavior. For a short time, opening of the canopy will make the residual fuels and duff layer dryer than in a closed canopy condition. This drying would become less and less as the vegetation begins to grow. The Forest Service recognizes that there may be other methods of management in these types of stands however, to meet all objectives, thinning was selected as the preferred method (refer to the SDEIS page 6).

27) Subject: Procedures:

Comment numbers 201/01/27, 201/05/27, 201/09/27, 201/12/27, 305/01/27, 309/03/27, 310/01/27, 310/18/27, 310/20/27, 310/23/27, 310/86/27, 310/90/27, 310/96/27, 310/97/27, 310/98/27, 310/99/27, 310/121/27, and 310/123/27:

"As a public document, the SDEIS should be clear and the logic path easy to follow, which often does not occur. The most obvious example is the confusion brought about by designating Alternative #1 as the Proposed Action on page 4 and writing the document as if it were the Preferred Alternative, while the Forest Service Preferred Alternative is #3 as stated on page 34."

"Summary-Page-5- Under item 11 of Features Common to All Action Alternatives, it states that "up to 240 lineal feet of logs will be left for wildlife considerations." The minimum amount of woody debris that is left should be at least 240 ft of wood at least 20 inches in diameter and at least 20 feet in length per acre (Rod-Standards and Guidelines, page C-40)."

"All the maps that present the alternatives (i.e., the map on page 28 of the SDEIS) show an existing plantation in the lower right portion of the map while map 3-5 in the Eagle Creek Watershed Analysis appears to show the same area as late-successional forest. Which is correct or are we interpreting the maps incorrectly? Does this make a difference in spotted owl habitat?"

"Page 51 - The map on page 28 for Alternative #3 still shows units 20,21,22,23 and 11 which would be dropped under this alternative according to next to last paragraph on the page.

"We found ourselves confused by terms in the document. On pg. 17 Alt. #1 is described as the "proposed action". On p. 34 Alt. #3 is labelled the "Preferred Alternative." Which alternative is the one you intend to use?"

"Another area of grave concern to PILP is the roadless area in the proposed sale. Please read "point 1" of Secretary Thomas' memorandum and remove the roadless area from the sale. It does no help forest health to log everywhere and anywhere.

"Why are the recommendations in the Watershed Analysis to delay cutting in the Riparian Zones to increase Pinemartin and Pleated Woodpecker habitat not being followed? (112,WA)"

"The field reconnaissance for the Watershed Analysis took place in the Fall of 1993. The Forest Service stated that it has conducted reconnaissance during the winter months. Is this information part of the administrative record? If

so, where is it referenced and how was it utilized? If it was not utilized, why was this the case?"

"Why is cutting on private lands not accounted for in the SDEIS? If this cutting occurs in a shorter time period than the 55 yr. cycle predicted by the Service, what effect will it have on the watershed? Will monitoring activities account for these types of changes?"

"This project should include a new Watershed Analysis. The analysis currently being used by the Mt. Hood National Forest is out of date. It does not account for any of the impacts of the past winter's storms. A watershed analysis is described as an iterative process. A new Watershed Analysis should at a minimum, address the impacts of increased peak flows land slides, turbidity levels, and sedimentation of waterways which may have occurred as a result of the recent floods".

"How much deviation is allowed with input from representative resource specialists? Is there any review of this input? Are these deviations noted for the record and rationalized using standardized criteria? If so, what is that criteria?"

"Alternative three puts at risk a Tier Two watershed by cutting in or near riparian reserves. No other alternative does this. (pg. 51) This option is unacceptable given the importance of the watershed. Why did the Forest Service choose the alternative that is the most harmful to riparian areas and forest health?"

"The slope on parts of the Southfork is described as "modest". (33 WA) What is the relevance of "modest"? What ramifications does "modest" have for levels of erosion? Why was the amorphous term "modest" used rather than specific numbers? What types of studies were done to measure the slope?"

"Why is the BLM going to be trading land with Longview Fiber that will adversely effect this Tier Two Watershed? Why is an area prone to instability being given to a commercial timber operator?"

"Why did the watershed analysis use a "best case scenario" in a Tier Two watershed? Why did they not use a worst case scenario that would better protect water quality and public health?"

"Will all work take place within the recommended time period?"

"This sale does not comply with the "Revised Direction for Emergency Timber Salvage Sales Conducted Under Section 2001(b) of P.L. 104-19, dated July 2, 1996. How do units 1,3,4,6,7,8,10, and 24 comply with item one of the memorandum. Many if not all, of these areas are completely healthy."

"There is no description of the estimated volume of dead versus green volume. Nor is there a clear rational, given the health of the forest stands, for cutting of green trees."

Responses:

Under the regulations for implementing the National Environmental Policy Act (40 CFR parts 1500-1508), scoping is a vital part in the development of the document. Under 40 CFR, 1501.7 (Scoping); "There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." This section further states; "As soon as practicable after its decision to prepare an environmental impact statement and before the scoping process the lead agency shall publish a notice of intent (1508.22) in the Federal Register except as provided in 1507.3(e)." The Forest Service understands that there has to be a proposed action before issues can be generated. The proposed action was presented in the Federal Register and issues were generated from this proposed action. In the SDEIS, the proposed action was stated and the issues generated from this proposed action were identified (SDEIS page 6, 9, 10, and 11). No where in the document did the SDEIS state or imply that the proposed action is/was going to be the preferred alternative. The identification of the preferred alternative as stated on page 34 was determined by the deciding officer after careful consideration of the effects of implementation of all alternatives. The alternatives described in chapter II of the SDEIS included

the proposed action which is consistent with 40 CFR part 1502.14. Part 1502.14 (b) states; "Devote substantial treatment to each alternative considered in detail including the proposed action ..." Further, under 40 CFR 1502.14 (e); "Identify the agency's preferred alternative ..." The alternatives including the proposed action were displayed in chapter II of the SDEIS (SDEIS pages 17 through 30). As stated previously, prior to page 34 of the SDEIS, the document did not state or imply which alternative was the agency preferred.

The comment pertaining to woody debris is correct and missing descriptions will be included in the FEIS.

The map(s) displayed in the SDEIS (e.g., page 28) are correct. There is a clearcut in the lower right corner of the Eagle project area with several residual wildlife trees remaining in the unit. After consulting with the project leader for the Eagle Watershed Analysis, it was determined that there is a mapping error in Map 3-5 in the watershed analysis. A portion of the site in question should not have been mapped as late seral. The existing clearcut is approximately 20 acres in size. Thus, there are approximately 20 fewer acres of late seral forest than is stated in the watershed analysis. For the SDEIS and the resulting FEIS, this clearcut was taken into account and all acreage and analysis are accurate.

The paragraph on page 51 is an editing error and should not have been included in the SDEIS. All analysis in Chapters III and IV for Alternative #3 included these units and their acreage.

The roadless area under consideration is approximately 16% of the total Salmon-Huckleberry Roadless Area as described in the Mt. Hood National Forest, Forest Plan. When considering the entire roadless area, it is not the intent of the Forest Service to manage, through timber harvest, all roadless acres. In this document, the area under consideration is approximately 2,800+ acres and the Forest Service does not propose to manage every acre. In this case, alternatives #1 and 3 would manage 538 acres of roadless or approximately 19% +/- 2%.

In 1995 the Mt. Hood National Forest completed a review of all B-5 Pileated Woodpecker/Pine Martin habitat areas. Based on the Northwest Forest Plan (ROD C-45), B-5 areas in the Eagle watershed were recommended to be dropped. Further analysis in the Eagle watershed evaluated structure of late seral stands. Those closest to old-growth characteristics in the abandoned B-5 areas were recommended to have a delayed harvest until adjacent stands in riparian reserves and LSR's meet old-growth stand conditions. The Eagle SDEIS followed recommendations in the watershed analysis for interim retention of the oldest forest patches (Eagle WA Map 4-2).

No information for a watershed analysis was gathered in 1993. This is because the ROD for the Northwest Forest Plan that requires a watershed analysis had not been issued yet. Additionally, a watershed analysis team had not been formed at this time. Information that was gathered for the watershed analysis and used in the analysis phase is contained in the watershed analysis file.

A watershed analysis was completed for the Eagle Creek watershed which analyzed all lands affecting Eagle Creek. This document accounted for vegetative patterns on lands of all ownerships and the watershed analysis developed a conceptual landscape design. The SDEIS/FEIS used the "interim operating plan" in the watershed analysis (SDEIS page 15, Watershed Analysis page 78 and map 4-3). If there are significant changes in predicted management cycles, the watershed analysis would be reviewed and updated as necessary. It is beyond the scope of this document to monitor actions across the watershed except those that result from the implementation of proposed projects in the preferred alternative.

The watershed analysis was reviewed to determine validity following the floods of 1996. The watershed analysis is valid. Documentation is in the FEIS analysis file. A field review of Forest Service lands in the watershed was conducted in the spring and early summer of 1996. The reviewers included road engineers, silviculturists, a hydrologist, field personnel, and the I.D. Team for Eagle. Results; No visible flood damage can be found on Forest Service lands (e.g., slides, slumps, mass wasting, surface erosion, culvert erosion, etc.). Photographic evidence included in the analysis file shows that all of the streams in the project area channeled flood water adequately and that all of the drainage facilities were adequate to handle the excess flows. These photos also show that although

there was some sediment movement in the channels, there was no excessive sediment transport above what could be expected from this type of event. There have been no flood repair dollars for roads allocated to this drainage because there is no flood damage. The only erosion on a road that could be found was on road 4615011. This road contributed sediment to Fall Creek and this road was identified in the SDEIS as being a problem and was identified for closure and obliteration prior to the floods (SDEIS page 29). It should be noted that Fall creek flows into the North Fork and then into the Clackamas River and has no effect on Eagle Creek. The watershed analysis for Eagle Creek is not being used by the Mt. Hood National Forest. Rather, this analysis is being used by the Ranger District to aid in management of the Eagle watershed so that the desired future conditions can be attained. This watershed analysis does not pertain to other watersheds.

Resource specialists provide input to projects such as this SDEIS/FEIS and they are regarded as the agency expert(s). In the case of various reports (e.g., Biological Evaluations, etc.) a "lead" biologist would review the report and approve the document. If there is a discrepancy in information provided, the information in question is reviewed by the specialists peers for validity. If changes should occur, then the information is updated. This type of review is informal and there is no formal criteria.

The decision maker was apprised of the objectives, issues, alternatives, and effects of implementation. Management of riparian reserves is acceptable as long as such activities do not retard or prevent attainment of the Aquatic Conservation Strategy objectives (ROD page C-31). The proposed projects in the SDEIS/FEIS are designed to enhance riparian values as well as enhance forest health across the watershed on Forest Service owned lands (Refer to the objectives in the SDEIS page 5).

The information from the watershed analysis in this comment was taken out of context and failed to convey that the information provided on page 33 of the watershed analysis is informational rather than analytical. The statement on page 33 does say that slopes in some cases do exceed 70%. However, no where on page 33 does the document refer to slopes specifically in the Southfork drainage. Rather, the paragraphs on page 33 are providing an overview of the watershed and are not discussing specific sites.

It is beyond the scope of this document to answer why the BLM is considering a land exchange. The watershed analysis was completed in cooperation with the BLM and the BLM is fully aware of the analysis provided in the watershed analysis. If the respondent wishes further information or rational, the headquarters for the BLM in this area is in Salem Oregon.

The time frame given is a recommended operating "season" because it is the driest time of the year. However, if there are certain weeks preceding or following this period that are dry, then operations could be allowed as long as objectives for the area would be met.

The respondent is referring to Public Law 104-19 (Recission Bill) (1995). As stated in the SDEIS, Chapter I, page 1; "...however, these lands do not contain a salvage component." No where in the SDEIS does it state that this document and resultant sales would be under the salvage component of Public Law 104-19. Refer to the Purpose and Need for the rational of entering these units.

The respondent is correct in that there is no delineation between green and dead volume given. This is because timber volume and salvage are not objectives for management in these stands (refer to page 5 and 6 of the SDEIS). However, the production of wood products and the local economy was a key issue raised by the public at one of the several public meetings during development of this document. This issue dealt with only merchantable volume and was not concerned if it was dead or not. As mentioned in the previous response, there is no salvage component identified in this document.



COLUMBIA HELICOPTERS, INC.

May 15, 1996

Mr. John Berry, District Ranger
Mr. Don Davison, Project Leader
Mt. Hood National Forest
Estacada Ranger District
595 NW Industrial Way
Estacada, OR 97023

Re: Eagle EIS

Gentlemen:

We see that about 2/3 of the volume under your preferred alternative is to be heli-logged. We also note that most of it is thinning.

We believe you can expect excellent results by utilizing helicopters as they are the most flexible logging systems available. However, special emphasis needs to be placed on the design of the timber sales or the economics can be adversely impacted. In particular, when thinning or partial cutting, the marking prescription must be such that the trees can be actually felled through the canopy. Generally, the canopy must be opened enough that the helicopter pilot and the hooker can actually see each other. This is usually very possible and still be able to achieve desired post harvest stand conditions.

It is a good system in that special corridors need not be cut and the stand can be treated evenly. However, this system will not work if it is forced to do understory removal. Both economics and safety are compromised.

One thing that may be worth looking into is mechanical falling and bunching. We are using these machines on up to 50% slopes in small timber and achieving excellent results. Some bunching can occur which help economics and lessens stand damage from yarding. We are doing this on Weyerhaeuser ground now and flying logs cheaper than skylines can drag them, while achieving better results. Ground distance has been minimal.

It is important that projects like this are a success both economically and in the public's eye.

Mt. Hood National Forest
Estacada Ranger District
May 15, 1996
Page two

For those of you who have not seen partial cutting in action with a helicopter, I would suggest you visit Enola Hill. Your SA, Jerry Hernandez, has a very good idea on what it takes to make it work. The stands we are treating look excellent and we think the job will be a silvicultural showcase.

We would offer our services on planning as you may see fit.

Thank you.

Best Regards,

COLUMBIA HELICOPTERS, INC.

Vice President of Logging Operations
MM:hld

101



July 8, 1996

John Berry, District Ranger
Estacada Ranger District
595 NW Industrial Way
Estacada, OR 97023

RE: Eagle Creek Timber Sales, Supplemental Draft Environmental Impact Statement

Dear John:

I would like to offer the following comments on the Supplemental Draft Environmental Impact Statement for the Eagle Creek Timber Sales. Please accept these comments on behalf of the Northwest Forestry Association. The Northwest Forestry Association is a forest products trade association that represent 70 small and large forest products manufacturers and forest land owners in Washington and Oregon.

I was pleased with the thorough analysis of the issues conducted by the ID Team for that project. Given the limited solution space dictated by the Northwest Forest Plan, I feel the range of alternatives was reasonable. While Alternative #3 would be our first choice, the proposed Action treats a reasonable amount of acreage and would result in badly needed timber sale volume.

The timber industry feels that objectives of improving and maintaining water quality and fish habitat are worthy resource management goals. We do question the practice of obliterating roads when those activities can cause more siltation than a well maintained and hardened road. Furthermore, as management direction changes in the future, new roads may be called for in the exact place where the original roads were obliterated.

Finally and most important, preparing and offering economically sales associated with this project must be done as soon as possible, so that long awaited logs can begin to flow to local mills. Preparing a timber sale that is economically viable is critically important. Your resource management objectives will not be achieved if the sale receives no bids.

Thank you for this opportunity to comment on this Supplemental DEIS. Should you have any questions regarding any of my comments, please call me at (503) 222-9505.

Sincerely,

Vice President

cc: Mt. Hood Timber Purchasers Committee



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

REPLY TO
ATTN OF: ECO-088

JUN 04 1996

Roberta Moltzen
Forest Supervisor
Mt. Hood National Forest
2955 NW Division Street
Gresham, Oregon 97030

Re: Eagle Creek Timber Sales
Draft Supplemental Environmental Impact Statement

Dear Ms. Moltzen:

The U.S. Environmental Protection Agency (EPA) has received the Eagle Creek Timber Sales Draft Supplemental Environmental Impact Statement (EIS) for review in accordance with our responsibilities under the National Environmental Policy Act and under Section 309 of the Clean Air Act.

EPA Region 10 has used a screening tool to conduct a limited review of the draft supplemental EIS evaluating management strategies for the Eagle Creek Timber Sales. Based upon the screen, we do not foresee having any environmental objections to the proposed project. Therefore, we will not be conducting a detailed review of the draft supplemental EIS.

If you have any questions, please contact me in Seattle at 206/553-1984.

Sincerely,

A handwritten signature in cursive script that reads "Richard B. Parkin".

Richard B. Parkin, Manager
Geographic Implementation Unit



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon State Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

July 8, 1996

Don Davison
Estacada Ranger Station
595 NW Industrial Way
Estacada, Oregon 97023

Dear Mr. Davison:

The U.S. Fish and Wildlife Service (Service) has reviewed the Eagle Supplemental Draft Environmental Impact Statement (SDEIS). The area under consideration was designated as matrix land and has timber emphasis as a major function under the Northwest Forest Plan. Overall the projects proposed in the SDEIS appear to be within the range of activities consistent with management of matrix lands under the Northwest Forest Plan, although there are some comments and questions concerning the clarity, consistency, and rational of the document. As a public document, the SDEIS should be clear and the logic path easy to follow, which often does not occur. The most obvious example is the confusion brought about by designating Alternative #1 as the Proposed Action on page 4 and writing the document as if it were the Preferred Alternative, while the Forest Service Preferred Alternative is #3 as stated on page 34. Major concerns include preferred Alternative #3 harvest levels compared to Probable State Quantity levels, activities in Riparian Reserves, fire risk, and forest health. Comments and questions follow.

Comments or questions concerning the document:

- Although the areas being considered for treatments are designated matrix lands under the Northwest Forest Plan, they are considered B6-Special Emphasis Watershed under the Mt. Hood National Forest Land Management Plan and Teir 2 watershed under the Northwest Forest Plan. The main goal of B6 lands and Teir 2 watersheds is to maintain or enhance aquatic habitat and water quality, and the secondary goal of B6 lands is to maintain a healthy forest condition through a variety of timber management practices. On page 87 of the Eagle Creek Watershed Analysis, it states that "good riparian conditions provide adequate riparian habitat and high levels of potential large woody debris in streams in the Upper Mainstem and South Fork Subwatersheds." On page 21 of the Eagle Creek Watershed Analysis, it states that "overall, existing conditions range from good to excellent with the only future threat to stand vigor being overstocking," while on page 122 of the SDEIS it is stated that "the timber stands in the Eagle area are declining in health and overstocked." Current stand density is in the range of 140-287 trees per acre with nearly all units less than 250 trees per acre. What are considered

average stand levels for westside naturally regenerated stands of this age (110-150 years) and elevation that are found in published literature? How will Alternatives 1-3 that are proposed improve on what already is taking place by natural processes?

- On page 111 of the Eagle Creek Watershed Analysis the PSQ for Forest Lands in the watershed is 10.3 MMBF per decade, but the preferred Alternative #3 is for 17.1 MMBF. How will this affect future projects? This appears to be more than a sustainable yield. What about other projects in other parts of the watershed? Does that mean that no other timber will be removed for at least 17 years?
- Page 92 - The prescription for removing trees in the Riparian Reserves under Alternative #3 do not appear justified. There are no immediate disease concerns identified, nor does it appear to be problem in the near future. Disease is a normal process in forested ecosystems and levels appear to be very low currently. Openings in the Riparian Reserve will occur from natural processes. If woody debris levels are low, why remove the trees that are scheduled for thinning? On the landscape scale there are many openings in riparian areas to meet wildlife and riparian vegetation requirements. On page 52, under the no action alternative, it states "with no new timber harvest or road construction taking place under this alternative (Alternative #4), the project area would steadily improve from an already good condition to a very good condition as the tree cover in existing harvest units approach crown closure. This would increase the area's resiliency to absorb major runoff producing rain-on-snow events without noticeable effects to the terrestrial, aquatic, and riparian areas, or to upland wet area and wetland habitat". If this is so, why enter into the Riparian Reserve?
- Summary-Page 5 - Under item 11 of Features Common to All Action Alternatives, it states that "up to 240 lineal feet of logs will be left for wildlife considerations." The minimum amount of woody debris that is left should be at least 240 ft of wood at least 20 inches in diameter and at least 20 feet in length per acre (Rod-Standards and Guidelines, page C-40).
- Page 8 - Under Alternative #3 it states that the number of acres of interior habitat drops from 2,100 to 985, which is a 53% loss. Will this decrease have significant effect on those species dependent on this type of habitat and microclimate?
- Page 13 - While 4-5 miles of edge are being created, the large area of thinning may also lead to an increase in the amount of blowdown.
- Page 17 - The discussion under paragraph 12 concerns large woody debris. Are funds available to monitor down wood levels and to hire fallers if natural recruitment doesn't occur in the 3-4 year time frame given? How will the Forest Service ensure that this is tracked and accomplished?

- All the maps that present the alternatives (i.e., the map on page 28 of the SDEIS) show an existing plantation in the lower right portion of the map while map 3-5 in the Eagle Creek Watershed Analysis appears to show the same area as late-successional forest. Which is correct or are we interpreting the maps incorrectly? Does this make a difference in spotted owl habitat?
- Page 43 - Although the reference to Behnke (1992, page 24) describing "...native Redband trout in intermittent desert streams thriving in water of 28.3°C" is interesting, but has little relevance for native trout species at middle elevations in the northern Oregon Cascades. "The tolerance of exceptionally high temperatures shown by these Redband trout populations evolved through natural selection in streams of hot, arid regions over thousands of years." These trout do not inhabit the EIS area.
- Page 44 - The last sentence on the page states that "similar landforms and soils are observed elsewhere in the project area and may be affected by one or more project alternatives." In Watershed Analysis on page 100-101 it states "sediment delivery from management influenced landslides continues to be a risk on private lands in the Upper Mainstem and South Fork Watersheds. Full Riparian Reserve width with the inclusion of unstable or potentially unstable lands will decrease sediment delivery from roads, timber harvest and landslides influenced or initiated by management activities to the maximum extent possible on federal lands in the Middle Mainstem, North Fork and Delph Creek Subwatersheds." These areas within the South Fork should also be included within Riparian Reserve boundaries and not receive treatments that may activate unstable sites.
- Page 46 - The last sentence on the page states "while the near-term effects of the no action alternative appear very favorable, there is still an elevated risk, however small, of catastrophic wildfire and watershed impacts." This will still be the case after any of the treatments offered.
- Page 51 - The map on page 28 for Alternative #3 still shows units 20, 21, 22, 23 and 11 which would be dropped under this alternative according to next to last paragraph on the page.
- Page 73 - Since much of the South Fork is similar in age and structure and is designated as suitable Spotted Owl habitat, why isn't more of the eastern portion suitable Spotted Owl habitat? The elevation varies from about 2,500 feet to about 4,000 feet. At the least it seems that it should be dispersal habitat. If not, an explanation would be helpful.
- On page 89 it is stated that for the shelterwood prescription that "structural diversity would be increased and a beginning stage of a multi-aged, multiple-storied stand would take place between and among the leave trees and groups." On page 87 it is stated that "the majority of the leave trees would be removed after regeneration occurs" for the second and third shelterwood prescription, and for alternative #3 on page 91 the majority

of the leave trees would be removed . It seems that the same problem that is being treated is being recreated by this prescription.

- Page 90 - If blowdown occurred in the shelterwood areas the insect buildup would probably not be a problem and could be left in place, because the number of residual trees left in the shelterwood treatments is low (less than 50 trees/acre).
- Page 90 - In the last paragraph it states that "It would be impossible to guarantee the long term health of this area without some kind of management activities (Oliver 1990)." It is also impossible to guarantee the long term health of this area **with** management activities.
- On page 122, it is stated that the timber stands in the Eagle area are declining in health and are overstocked while on page 52 it is stated that the project area is in good hydrologic condition and would improve with no treatment. Most of the treatment areas having a stand density of 150-250 trees per acre which is probably not overstocked for a 110-150 year old naturally regenerated forest. On page 21 of the Eagle Watershed Analysis it states "overall, existing conditions range from good to excellent with the only future threat to stand vigor being overstocking."
- On page 122, it is stated that "the fire hazard is not great and is not expected to be in the near future even with increased fuel loading," yet the threat of fire is being used to justify the prescriptions.
- On page 123, it is stated that the fires that occurred in this area in the late 1800's were probably associated with a lightening storm and east winds or that there is a possibility that they could have been human caused. The latter is much more likely since most of the large stand replacement fires that occurred on the westside of the Cascades in northern Oregon and southwest Washington in the late 1800's and early 1900's were associated with human activities. The lands in the project area have an estimated fire return interval regime of 50-300+ years (Eagle Watershed Analysis, page 19).

We appreciate the opportunity to comment on the Eagle Supplemental Draft Environmental Impact Statement. If you have any questions regarding these comments or recommendations, please contact John Davis or Robin Bown at the above address or at (503) 231-6179.

Sincerely,



For
Russell D. Peterson
State Supervisor

ps
Mr. John Berry
Estacada District Ranger
595 NW Industrial Way
Estacada, OR 97023

June 28, 1996

Mr. Berry,

I strongly support the alternative for no action on the Talon and Eagle timber sales in your district. Cutting these areas would destroy prime spotted owl habitat, cause water quality to deteriorate and damage this natural forest by increasing the risk of blowdown. Alternatives 1-3 in the DEIS would run counter to the objectives that the Forest Service wants^{to} accomplish.

Cutting these areas would impact the adjacent Salmon-Huckleberry Wilderness and rob future generations from enjoying this area. Again, I strongly urge that the alternative for no action be chosen.



DB

Mr. John Berry
Estacada District Ranger
595 NW Industrial Way
Estacada, OR 97023

June 28, 1996

Mr. Berry,

I strongly support the alternative for no action on the Talon and Eagle timber sales in your district. Cutting these areas would destroy prime spotted owl habitat, cause water quality to deteriorate and damage this natural forest by increasing the risk of blowdown. Alternatives 1-3 in the DEIS would run counter to the objectives that the Forest Service wants accomplish.

Cutting these areas would impact the adjacent Salmon-Huckleberry Wilderness and rob future generations from enjoying this area. Again, I strongly urge that the alternative for no action be chosen.



,96 5:40 PM

Message:

From: John Berry

Date: Jul 08,96 2:17 PM

Mary Vogel called me this morning with two comments concerning the Eagle EIS.

Units #24, 29, and 26 which have a thinning prescribed appear to be very healthy, thrifty, and in owl habitat. Mary questioned whether these areas needed thinning and what the objectives and benefits would be.

Unit # 8 thinning is on or near a couple of trails (502,502a), will these trails be protected, repaired? Mary's opinion is that thinning may not be compatible with trails.

-----X-----

①

Dear Jon Barry,

After reading the SP.E.I.S. for the Eagle timber sale, I was outraged. How many contradictions did I read? I lost count. I will start by listing the five objectives you staff proposed and how I think those objectives should be met.

1) To maintain and enhance the long term health of the watershed for the production of high quality water; - the water quality in the proposed timber sale units is very good currently, going in and commercial thinning on these steep slopes would do nothing but cause disruption to the system. Sedimentation and erosion would most definitely foul the current clarity of the South Fork. Not to mention, your proposals plan on building almost a mile of road and logging in riparian areas! This is a recipe for disaster! These naturally seeded stands deserve no interruption in their regrowth and healing. The water quality of the South Fork would only be degraded by any silviculturalist activities. Hasn't the area been cut over enough?

2) To enhance the long term health growth potential of area. This will not be achieved by thinning, and especially ^{not} shelter wood cutting or regeneration harvesting, continued.
manual for snare trapping

2) Cont.

2). Any logging activities would dry the soils out and increase noxious weed numbers and rhododendron populations. This would compete with trees left on site & would ultimately lead to disease and/or slow down increasing.

3) Enhance wild life habitat diversity - if this is one of your true goals to attain, you're surely going about it the wrong way with your proposed alternatives.

Since when did building roads increase any diversity in the forests? Since when did logging operations on steep slopes do any good for aquatic creatures such as salamanders or frogs, not to mention logging in riparian areas which you have proposed. Tom, let's get real, you know as well as I do that this objective will never be attained by Alternatives 1, 2 or 3. If your ~~objective~~ objective is further disconnection of animal habitat and the extinction of certain species, your stated alternatives may achieve that. Tell me something, where do all the animals go when the logging starts on such a wide area? Do they further crowd into the wilderness area, maybe. Do they disperse into the private lands below at lower elevations, I think not. These private holdings have no elk winter range habitat remaining, they hold no spotted owl areas for dispersal ~~and~~ and surely have no habitat for shade loving

so we as a concept one of the last untouched

3) cont.

aquatic species. You are dooming the diversity of this region by your proposals, not adding to it. You know it and I know it, and the SPEIS is nothing but a waste of time. My intelligence is insulted everytime I read one of these and can see right through the gibberish. Your only goal is to cut more trees and make a few select timber owners a little more wealthy than they already are. After the severe floods of this past winter and spring we should stop and look at our past logging and management practices before going on with business as usual. Tax payers are shelling out millions of dollars for road repairs and other infrastructure damage that was proven to be exacerbated by logging (especially clear cuts and heavy thinning on steep slopes). With nothing to hold back the snow, when the warm rains come we had massive water volume rushing out of the Cascade mountain valleys. Do we want another Santiam River flood situation on the Clackamas? The Salem City Council is very concerned about this and so should West Linn Oregon City, Lake Oswego and Portland be also. What you're proposing to do is disrupt one of the last untouched

D cont.

areas in the Eagle Creek watershed. You need to at least allow the public some more time to digest your proposals, so they can realize the potential problems that will arise from your actions. For, we must be careful with the management of these last vital watershed eco-systems. Our lack of compassion towards the common good of the public will only strengthen the division ~~of~~ between the Forest Service and citizens. We need clean water, this massive timber operation will not achieve that, it will only worsen down stream ~~and~~ quality. We need a buffer for the Salmon Huckleberry Wilderness area, and this proposal destroys that vital resource.

In conclusion, the benefits of a few short term timber jobs compared to a natural, green, growing vital watershed should convince you and your fellow Forest Service employees to think hard before choosing Alternative 1, 2, 3. Why must it be so big? John, this is not sustainable forestry, this is degradation on a large scale. Think of the tax payers who are paying right now for all the problems caused by these such actions. You concerned forest users,

7/4/96

Dear Mr. Berry:

Happy Fourth of July. We don't know whether to laugh or cry about your plans for the Eagle Creek Watershed. The Talon Timber Sale is an egregious example of "agency capture" by private industry. Your preferred alternative (alternative three) prescribes cutting in and around riparian reserves; how can this be justified in a Tier Two watershed? How can you possibly believe that this is in any way reflective of the manner in which the wants its watersheds managed? Do not log in Riparian Reserves! Do not log in roadless areas! Most of all do not fragment the habitat of connected interior habitat!

Your agency in general, and your national forest in particular, have done more in the past year to alienate and disempower the public than we would have thought possible. The "salvage rider" does not give you carte blanche to ignore the public will and permanently trash public watersheds. Oregonians are tired of your single-minded give-aways of our natural heritage to the timber industry.

Redeem your agency's image and reputation; stop logging in Spotted Owl habitat and pushing more and more species to the brink of extinction. Stop acting as if Goshawks and Salamanders are merely impediments to getting the cut out. One needn't be an "agency expert" to understand the tragedy that is taking place in the native temperate rainforests of the Cascadia ecosystem. You want to cut right up to the wilderness boundary; you want to build yet more roads in what is already a maze of erosion; and you want to gut the interior habitat of the Eagle Creek Watershed. It is terribly frustrating to participate in the procedurally complex but substantively empty NEPA process which leads to these results. The legal shield provided by the salvage rider does not hide the fact your agency interprets Option-9 as allowing commercial forestry in Riparian Reserves (Eagle Talon) and Late Successional Reserves (Warner Creek).

The last time we went hiking in the Eagle Creek drainage we saw a bobcat, some evidence of bark beetles, and miles and miles of roads; we all know which of these is the real threat to forest health. In the SDEIS you write "[W]ithin the thinning areas, small openings have been prescribed. These small openings are essentially clearcuts...". We will be sure to refer friends to your description when asked to explain what is meant by "thinning" in our National Forests.

In remembrance of Wild Prune, Enola Hill, Sugarloaf, Roman Dunn, Tobe West, Rocky Brook, and the clean water and intact ecosystems that existed before Forest Service implementation of the Option-9 via the Salvage Rider.

John Berry, District Ranger
Estacada Ranger District, Mt. Hood National Forest
595 NW Industrial Way
Estacada, Oregon 97023

July 5, 1996

Dear John,

Thank you for the opportunity to comment on the Eagle SDEIS. We found ourselves confused by terms in the document. On p. 17 Alt. # 1 is described as the "proposed action". On p. 34 Alt. # 3 is labelled the "Preferred Alternative." Which alternative is the one you intend to use?

In light of this confusion you might wish to clarify to all who received an SDEIS what your intent is. You may wish to extend the comment period as well.

We urge that you adopt Alt. # 2 rather than either of the other alternatives. Alt. # 2 avoids riparian zones and also most of the disturbance-prone higher ridges, and concentrates timber management where it is least susceptible to wind, erosion, and other natural disruptions and is most likely to succeed.

We would be very concerned if you are proposing Alt. # 3. Our investigations of units 25 and 29 suggest that even with the proposed mitigation measures there are too many chances for logging-induced soil instability adjacent to some streams and bogs. The gullies and streams lie within two hundred feet of each other in the northeast portion of unit 29. These streams are deeply incised where the slope is steep. Thinning these areas will not enhance slope or stream stability. Even with the half-tree-length mitigation measure, removal of timber poses the threat of some immediate loss of stability. Long term stability will be reduced by removal of any timber which might subsequently fall into streams. To promote long run stability one needs the maximum possibility for CWD input. Thinning reduces the odds that this would occur. Furthermore, there is no need for thinning in these healthy riparian zones. On June 30, Char found both a Cascade Torrent Salamander adult and a jumping mouse (*Zapus* sp.) in the moist understory vegetation more than 20 meters from one of the streams in unit 29 -- both are strong indicators of a fully functioning riparian system.

It is far from clear that thinning will help create a multi-layered canopy. In areas such as unit 29 there is a depauperate rhododendron and bear grass understory, which has been shaded out by canopy closure. Seedling hemlock and true firs are numerous in the many bare soil patches. Thinning trees will rejuvenate brush and beargrass, crowding out development of a tree understory. The difficulties in regenerating rhododendron-bear grass communities have yielded only to plowing in the past, but that is unthinkable on these slopes and in this drainage. Thinning in all the high elevation units of Alt. 3 runs the risk that development of a multi-layered canopy is retarded rather than enhanced. Beyond

this, the lack of regeneration because of brush competition will encourage expensive future management excursions or a more drastic silvicultural treatment of low productivity sites in the future.

The extensive thinning planned between the ridgetop and Rd. 4614 along the northeast boundary of the planning unit has other draw backs. While we recognize that thinning would become progressively lighter upslope, we reiterate that these higher ridges are prone not only to high east winds and storm winds from the southwest, but also to sunscald on tree trunks around openings and partial openings, and frost and cold dessication of tree crowns. These physical actions are as important as crowding in determining what happens to stands. Any activity which reduces stand density runs the risk of increasing disturbance effects. Less exposed stands have much less of a chance of disturbance effects, and thinning is therefor more justified in those stands.

For these reasons we urge adoption of Alt. # 2, which stays out of riparian zones and mostly off of higher ridges. We also would urge that units 9 and 16 be individual tree selection units. Both already have only 50-60 per cent crown closure. Very few trees need removal here to release the others, and felling and yarding would disturb the understory which is growing up in unit 9. Unit 9 also contains a population of Clackamas Iris which seems to be flourishing. So we urge adoption of Alt. # 2 with units 9 and 16 being ITS rather than thinning.

Thank you for the opportunity to comment.

Sincerely yours,

John Berry Dist. Rngr. Estacada R.D.

Comments on the Eagle SDEIS:

This EIS is inadequate for many reasons. It is lacking in its breadth and scope of analysis and study of the current conditions of, and the resultant effects of implementing one of the three timber sale alternatives.

Greatest among these inadequacies is the lack of analysis of the cumulative impacts of logging and roadbuilding concerning blowdown. There is an extensive history of blowdown in this area connected to roads and logging, whether clear-cuts, thins, or shelterwood cuts. As stated on p. 96 the majority of blowdown occurs in or near wet areas. All of the units for the three cutting alternatives are surrounded by riparian areas with a high or moderate potential for blowdown. Any of these three alternatives are a prescription for destruction as blowdown will occur in the next major windstorm with a resultant decrease in water quality, habitat, soil loss, tree cover, and biodiversity. There is also a pattern of corruption inherent in your management of the Eagle area - each timber sale leads to blowdown which leads to a timber sale, which leads to blowdown, which leads to a timber sale ad nauseum... This area is unsuitable for any type of logging due to the large riparian areas and this history of blowdown! Objective #5 of this plan says that the F.S. is to begin restoration activities where there are known resource concerns! Blatant in its absence is the lack of concern for the impacts of blowdown! Restoration should begin immediately with the re-contouring and revegetating of all roads in this area. This area is unstable and unsuitable for logging.

Other areas not adequately addressed in this EIS:

- The cumulative impacts of decreasing Spotted Owl Habitat loss. Any habitat loss is unacceptable.
- Recreation: This will be negatively affected through loss of forest cover and biodiversity. The gathering of forest products, study of nature, habitat for game, fishing, camping and hiking will all be negatively impacted.
- Trails: People do not like to hike through tree cut areas as people go hiking to get away from the sounds and sights of man. The trails in this area are already heavily impacted with roads and previous tree cutting. Any of the three cutting alternatives will add greatly to this impact.
- The loss of habitat for fungi was not discussed at all and needs to be addressed. The lack of analysis of the fungal communities in this area directly affects mushroom gatherers and the health of the ecosystem upon which the forest depends.
- Surveys need to be done for the six candidate species that may occur in

the Eagle area and the the C3 species including but not limited to the White footed Vole, Northern Goshawk (going out to the units and looking up in the sky- "field reconnaissance" in not adequate!).

In short this project should never have been considered and the No Action Alternative should be chosen. A restoration project should begin immediately closing and revegetating all the roads in this area. This project will increase the habitat quality, decrease soil loss, blowdown etc.. Restoring this area will be an economic boon to the surrounding communities through direct jobs doing restoration and through increased recreation and tourist dollars being spent in the local towns.

I would like to request an extension of the comment period for this project for another 30 days so I can fully analyze the data in the EIS and the additional data I am requesting.

Pursuant to the Freedom of Information Act 5U.S.C. 522, I hereby request the following information:

1. The Watershed Analysis for Eagle creek/South Fork Eagle creek.
2. The BA for animal Species of Concern.
3. Surveys for sensitive plants.
4. Road density standards for TES species. Include maps of the existing roads and the total density of road miles per square of this area.
5. Stream surveys for all streams in the Eagle area.
6. The Best Management Practices Evaluation Program monitoring and evaluation documents pertaining to on-site and off site effects of all past road building in this project area.
7. Maps and analysis (including color photos- these can be photocopies) of all blowdown occurrences in this area from the time of the first harvesting up to the present day.
8. Soils report.
9. Hydrology reports.

I will not use the information under this request for profit. It will be used to benefit the general public in their participation of the management of public lands. I therefore request that any search and duplication fees be waived pursuant to 5 U.S.C. 522(a)(4).



AUDUBON SOCIETY OF PORTLAND

Inspiring people to love and protect nature.

July 8, 1996

John Perry
District Ranger, Estacada Ranger District
595 NW Industrial Way
Estacada, OR 97023

RE: Eagle Supplemental Draft EIS

Dear Mr. Perry,

The Portland Audubon Society submits on behalf of its 7000 members the following comments on the Eagle Supplemental draft EIS. We recommend Alternative 4, the no action alternative, because it would preserve the greatest degree of ecological diversity on the 6,528 acres of project lands and would be most consistent with the objectives of Tier 2 Watersheds under the Northwest Forest Plan. Specifically, Alternative 4 is the only alternative that will not reduce acres of suitable spotted owl habitat, interior habitat, or late-successional forest. It has the greatest chance of reducing sedimentation and maintaining and improving water quality over the long term.

We ask the following concerns be addressed in planning any activity in the affected area:

- there should be no logging within Riparian Reserves as the draft EIS contains no empirical evidence that such logging will benefit water quality and other objectives of Tier 2 Watersheds;
- there should be no logging within Units 4 and 8 which are adjacent to the Salmon-Huckleberry Wilderness to preserve the integrity of the adjacent wilderness system;
- there should be no new road construction within the project area to accommodate planned treatments since roads are a primary source of sedimentation and instability within watersheds;
- there should be no logging within inventoried wilderness areas as these areas are in short supply and serve as biological anchors in the forest ecosystem;
- fragmentation of interior habitat conditions (and concomitant increase in edge effect) is a pervasive problem in the watershed and additional fragmentation should be avoided;

- cumulative effects of logging on private lands and public lands within the watershed should be addressed in the draft EIS. The Watershed Analysis should be revised to reflect conditions of the watershed following the damage caused by the 1996 floods.

Thank you for consideration of our views.

Sincerely,

Conservation Director

Warm Springs, Oregon 97761 / 503 553-1161



July 5, 1996

John Berry
Estacada District Ranger
Mt. Hood National Forest
595 NW Industrial Way
Estacada, OR 97023

Re: Eagle Supplemental DEIS

Dear Mr. John Berry,

The Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) wishes to provide comments on the Supplemental Draft Eagle Creek EIS (DEIS).

CTWS is very concerned about any potential impacts to anadromous fish at the Eagle Creek National Fish Hatchery and resident fish attributed to logging and road building on the Mount Hood National Forest. CTWS relies partly on the adult salmon returns from this hatchery to supplement *U.S. vs Oregon* requirements under the Columbia River Fish Management Plan for the Northwest Treaty Tribes' salmon harvest rights. The Eagle Creek National Fish Hatchery has been particularly important to CTWS in the past few years as adult salmon returns have decline in the Tribes ceded area (Mid Columbia, Hood, Deschutes, and John Day Rivers). In addition, cooperative projects between Eagle Creek National Fish Hatchery and Warm Springs National Fish Hatchery may occur in the future and will require high water quality in Eagle Creek.

In the Tribes letter to the Estacada Ranger District (January 7, 1992) it was noted this proposed project has the potential to damage fish habitat, water quality and stream morphology within Eagle Creek and its tributaries. We listed concerns in habitat, cumulative effects and logging systems. The Columbia Basin System Planning Salmon and Steelhead Production Plan for the Clackamas River of the Willamette River Subbasin (PPCR) by the Northwest Power Planning Council noted that past timber management within riparian areas has adversely effected fish habitat. Building of roads alongside streams, and harvest blocks have increased sediment loading throughout much of the lower Clackamas Drainage.

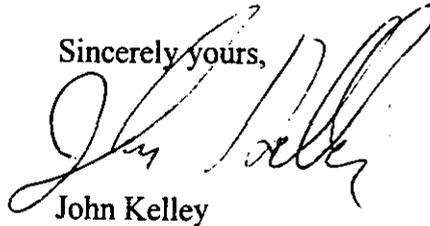
We are pleased that the Eagle Creek National Hatchery has observed decreases in sediment rates and instream temperature.

However, we are still concerned that the estimated sediment delivery from 128 miles of roads in the Eagle Creek watershed ranges from 50 to 2000 times that of the SDEIS' noted natural rate of erosion. State standards limit turbidity to 10% of background. These roads have sediment delivery that is likely violating this standard. The SDEIS did not describe how this sediment loading would be monitored or corrected. Further, we are concerned with the number of landslides noted along Eagle Creek and the lack of any mention of this February's flood event and its effects on the roads and instream conditions. Lastly, the SDEIS did not note the condition of planning area streams' substrate in terms of surface fines. This needs to be quantified.

We are also troubled by the mean August instream temperatures at the hatchery site which have exceed state standards (58 degrees F) for at least 24 of the last 34 years. CTWS strongly believes that riparian areas are vital to the maintenance and protection of fish habitat and water quality. Logging and/or road construction in riparian areas are not compatible with the protection of instream temperatures. The Tribes requests the District not enter riparian reserves. The Columbia River Inter-Tribal Fish Commission has suggested no riparian silvicultural entry until it is proven that instream aquatics can be improved from these treatments.

CTWS appreciates being included in the planning process on the Eagle project area and wish to be informed on the progress of this and all projects on the District that might affect fish. CTWS hopes these comments will be useful to the interdisciplinary teams as they conduct the EIS of the proposed project area. The Tribes look forward to working with the District in the future. Please feel free to discuss these comments or any other related issues with me, John Kelley at (503) 553-3233.

Sincerely yours,



John Kelley

CTWS Natural Resources
Fish Conservationist

xc:

Charles Calica CTWS

Eugene Greene Sr. CTWS

CTWSRO Fish & Wildlife Committee

Jim Griggs CTWS

Brian Cunninghame CTWS

Mark Fritsch CTWS

Jim Weber CRITFC

Chorno

File

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July 8, 1996

John Berry
District Ranger
Estacada Ranger District
595 N.W. Industrial Way
Estacada OR 97203

Dear Mr. Berry:

Thank you for accepting these comments from the Public Interest Law Project (PILP) of Lewis & Clark Law School regarding the Talon Timber Sale. PILP understands that the proposed alternative includes commercial thinning in Riparian Reserves within a tier-two watershed. We believe that this proposal violates the guidelines of both the President's Forest Plan and Secretary Jack Ward Thomas' memorandum of 7/2/96.

Option-9 calls for tier-two watersheds (such as the Eagle Creek) to be managed primarily for protection of water quality and quantity. While this does not preclude any active management within the watershed, it would certainly seem to exclude logging in over 120 acres of Riparian Reserve. The alleged reason for entering the Riparian Reserve is that it is "overstocked". As part of preparing these comments, five members of PILP visited unit 29 and saw little to no "overstocking". The stand has numerous snags and dying trees and is in the process of "thinning" its-self. We paid special attention to the amount of canopy closure and saw no evidence of the alleged forest health crises. Of even more concern to us was that many of the seeps and streams which we found in the unit did not appear on Forest Service maps. Much like the Sugarloaf cut, we suspect that genuine concern for forest health is not the reason the Forest Service wishes to log here. Please do not allow commercial thinning (or any commercial logging) within the riparian reserves of a tier-two watershed.

Another area of grave concern to PILP is the roadless area in the proposed sale. Please read "point 1" of Secretary Thomas' memorandum and remove the roadless area from the sale. It does not help forest health to log everywhere and anywhere. The only parts of the watershed which appear at all healthy are those which have somehow escaped the plethora of roads and cutting which have characterized Forest Service management. Please refrain from building any more roads in this watershed.

Lastly PILP would like to voice its concern over cutting adjacent to the Salmon Huckleberry Wilderness Area. Units 8 and 4 are particularly bad since they: (1) boarder a wilderness area; (2) boarder

the "Old Baldy trail"; (3) are on steep slopes; (4) are perfectly healthy stands; and (5) further fragment the interior habitat.

Please take the steps necessary to regain public trust in the professionalism of the timber sale process in the Mt. Hood National Forest. The Eagle Creek watershed has been heavily impacted by poor forest practices on both public and private lands, it is time to manage the watershed as if water matters as much as the coffers of the timber industry. Please adhere to the Riparian Reserve Widths identified on C-30 of the Standards and Guidelines of Option-9. Please consider alternatives which will prevent the further fragmentation of the "interior habitat" of the Eagle Creek Watershed. We find that only the "no action" alternative protects the important values of this public resource.

Thank you,

for
Public Interest Law Project
Of Lewis & Clark Law School
10015 SW Terwilliger Blvd.
Box 6528
Portland, OR 97219
(503) 236-5169

309B

July 8, 1996

Roberta Moltzen
Forest Supervisor
Mt. Hood National Forest
2955 N.W. Division Str.
Gresham, OR 9703

Dear Ms. Moltzen:

What follows is a copy of the concerns which the Public Interest Law Project have sent to District Ranger John Berry regarding the proposed Talon Timber Sale.

Thank you for accepting these comments from the Public Interest Law Project (PILP) of Lewis & Clark Law School regarding the Talon Timber Sale. PILP understands that the proposed alternative includes commercial thinning in Riparian Reserves within a tier-two watershed. We believe that this proposal violates the guidelines of both the President's Forest Plan and Secretary Jack Ward Thomas' memorandum of 7/2/96.

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Lastly PILP would like to voice its concern over cutting adjacent to the Salmon Huckleberry Wilderness Area. Units 8 and 4 are particularly bad since they: (1) boarder a wilderness area; (2) boarder the "Old Baldy trail"; (3) are on steep slopes; (4) are perfectly healthy stands; and (5) further fragment the interior habitat.

Please take the steps necessary to regain public trust in the professionalism of the timber sale process in the Mt. Hood National Forest. The Eagle Creek watershed has been heavily impacted by poor forest practices on both public and private lands, it is time to manage the watershed as if water matters as much as the coffers of the timber industry. Please adhere to the Riparian Reserve Widths identified on C-30 of the Standards and Guidelines of Option-9. Please consider alternatives which will prevent the further fragmentation of the "interior habitat" of the Eagle Creek Watershed. We find that only the "no action" alternative protects the important values of this public resource.

Thank you.

for
Public Interest Law Project
Of Lewis & Clark Law School
10015 SW Terwilliger Blvd.
Box 6526
Portland, OR 97219
(503) 236-5169

Mr. John Berry
District Ranger, Estacada Ranger District
595 N. W. Industrial Way
Estacada, OR 97023

Thank you for accepting these comments on the Eagle Supplemental Draft Environmental Impact Statement. ONRC is a non-profit, public interest environmental organization involved in a wide variety of environmental issues throughout Oregon. ONRC is particularly interested in timber sales planned within municipal watersheds. The Talon Timber Sale meets this criteria.

NOTE: These comments contain numbers in parenthesis. These correspond to either the SDEIS (pg. #) or Watershed Analysis (#,WA). If we refer to a general aspect that is covered in a number of areas or documents, no reference is provided.

NO ACTION ALTERNATIVE

ONRC believes no cutting should occur in this Tier Two watershed, therefore, we urge Alternative #4, no action. However, ONRC believes remedial measures should be implemented by the Forest Service. These measures should include protecting the health of this municipal watershed, protecting dependent species, ensuring incidental benefits accrue to upland species, and providing greater connectivity of LSR habitat. Since this sale adversely effect all of these watershed components, it should be halted and corrective measures should be undertaken by the Forest Service.

I. Riparian Areas

The Forest Service is assuming windthrow damage will occur in riparian zones. (pg. 47) Does the Forest Service have evidence that a decreased level of cutting as one approaches riparian areas ensures the safety of these areas given soil depth, slope, tree height, and the danger of windthrow? No cutting should occur in the riparian areas until the Forest Service has scientific proof this prescription will ensure the safety of these areas.

The Forest Service should not fall trees into streams to create woody debris even if it is lacking in certain areas. Eagle Creek has a high potential for the creation of down woody debris. If the Forest Service attempts to initiate the creation of woody debris they would create unnecessary siltation in this key watershed.

Some tributaries have not been studied for the extent of their fish bearing potential. (pg. 41) Will there be activity around these tributaries? How close will cutting occur to these streams?

Since the extent of fish distribution is not fully understood, (pg. 41) no cutting should occur in any area where studies have not been conducted. The definition of "Fish Bearing Stream" in the Standards and Guidelines is, "Any stream containing any species of fish for any period of time." Allowances should also be made in the variability of tributary use by fry. If fry have been detected in one portion of a water channel, then an area encompassing the range which small fish may visit for "any length of time" should be designated as "Fish Bearing." Cutting should be conducted in accordance with ROD and Standards and Guidelines for "Fish Bearing Streams" in these areas.

Is a 416 ft. buffer being left in areas where fry have been found in the upper reaches of Eagle Creek and its side channels? How will the unknown range of fish in Eagle Creek and its side channels be factored into plans for cutting this sale?

The SDEIS states that seeps grow in size during the wet season and shrink during the dry. (pg. 40) The Watershed Analysis states surveys were conducted during the Fall. (Effects Discussion, WA) If the Forest Service decides to go forward with this sale, cutting that occurs around these sites should use their winter area, not summer. If this area can not be determined before the Sale occurs, cutting should be halted until good measurements can be taken.

More than one row of trees should be left around seeps and springs for areas of less than one acre in size. (Mitigation Measures, WA) What evidence do you have that this buffer accounts for windthrow, soil, and slope distinctions. The No-Treatment Buffers along these streams should equal the distance of two potential trees. This would ensure damage from windthrow and beetle infestation would be minimized in these vital sources of clean water. These action would be consistent with Standards and Guidelines C 30-31.

There are a number of activities which are incongruent with your objectives for this watershed. Objective #2 appears to dominate the nature of this sale. Contributing to the potential sale quantity of the Mt. Hood National Forest directly endangers water quality in a Tier II watershed. Objective #4 is totally subverted by the cutting of 125 acres in riparian reserves. Objective #3, encouraging growth of large trees through cutting, will result in increased siltation of a Tier II watershed. All of these actions unnecessarily defeat the purpose of this watershed, that of supplying clean drinking water to surrounding municipalities.

How did the Forest Service decide that cutting trees is more beneficial than letting trees be naturally thinned? Cutting will increase the death of green trees through the same natural processes described as adverse in Forest Service documents. (80, WA) The decision to cut appears to be arbitrarily based on the best guess of the Forest Service rather than any scientific evidence. This should not be permissible given this watershed's importance as a municipal watershed.

Why are the Riparian Reserves not being managed to attain old growth quality? (81, WA) Are you intimating that without cutting these reserves will not reach old growth status? If so, what proof do you have to support this proposition? If you are stating the Forest Service intends to cut in these reserves which will ensure they do not reach old growth status, then how is this consistent with the management of a Tier Two watershed?

Why are the recommendations in their Watershed Analysis to delay cutting in the Riparian Zones to increase Pinemartin and Pleated Woodpecker habitat not being followed? (112, WA)

How much cutting will occur in areas designated as "Special Habitat" in the Watershed Analysis? (25, Map 3-8, WA) How does this conform with Standards and Guidelines C-44? (Retention of old-growth fragments in watersheds where little remain.)

What will be the composition of the Riparian Buffer Zones after the proposed cutting occurs?

How will the proposed cutting effect the "Stable" stream and the increasing towards stability ratings (50, WA) of this area? If it will adversely effect it, why is this cutting occurring in a Tier II

watershed? Any Forest Service action adversely effecting these ratings should not be undertaken.

The Watershed Analysis states that logging operations are expected to increase Douglas-fir beetle infestation. This will increase green tree mortality. (80, WA) Yet part of your rational for cutting is to decrease the chances of infestations? (80, WA) How does the Forest Service resolve this contradiction? How do Forest Service actions conform with Standards and Guidelines, Timber Management 32 (a) - (c)?

Green tree mortality increases fuel loading. This will heighten chances of wildfires. (80, WA) This is counter to your rational that cutting will actually decrease the chances of a severe wildfire destroying the forest at Eagle Creek. How do you explain this contradiction? How do your actions comply with Standards and Guidelines 31-32 TM-1 (a)-(c); C-40 A, B; C-41 (B)-(D)?

The field reconnaissance for the Watershed Analysis took place in the Fall of 1993. The Forest Service stated that it has conducted reconnaissance during the winter months. Is this information part of the administrative record? If so, where is it referenced and how was it utilized? If it was not utilized, why was this the case?

What factors have been looked at in relation to the floods? What aspects of the area were effected and why? Has a new watershed analysis been completed? If not, why not?

II. ARP's

There are a number of issues that ONRC has concerning the ARP's. Although they will not all appear in this section they include soil depth and stability, roads placement and construction, logging activities in the transient snow zone, silvicultural methods, the ramifications of this last winter's floods, fire's effect on ARP's, and logging activities in nearby areas.

The Sale has a number of questionable assumptions. First, if BLM sale goes through, what will the ARP's be for the effected drainage? The qualification that they will "likely be the same" (pg. 37) is not an acceptable scientific/professional assessment given the importance of this watershed. These same concerns as relevant to the possible land

transfers with Longview Fiber. How will these effect the ARP's for the effected areas?

Why is cutting on private lands not accounted for in the SDEIS? If this cutting occurs in a shorter time period than the 55 yr. cycle predicted by the Service, what effect will it have on the watershed? Will monitoring activities account for these types of changes?

There is an inconsistency in the SDEIS. It states the "Water available for runoff" model is being used to compare alternatives against one another. (pg. 10) It also states the Hydrologic Recovery Model was used to determine specific project alternatives. (pg. 36) Which is it? This could have serious ramifications for the veracity of your decisions. No cutting should occur until this is cleared up.

The lower reaches of Eagle Creek is capable of releasing large quantities of silt and sand. (50, WA) Since the harvesting of trees in the upper reaches of the creek will lead to increased peak flows and downstream harvesting methods and cycles are uncertain, this cut should not occur. This will help ensure ARP's for the Eagle Creek watershed are maintained at current levels even if more cutting occurs elsewhere. Will this, and expected future cuts, result in increased erosion of down stream banks due to increased peak flows? If so, how will this effect the fish populations and drinking water be effected?

This project should include a new Watershed Analysis. The analysis currently being used by the Mount Hood National Forest is out of date. It does not account for any of the impacts of this past winter's storms. A watershed analysis is described as an iterative process. A new Watershed Analysis should, at a minimum, address the impacts of increased peak flows¹, land slides², turbidity levels, and sedimentation of waterways which may have occurred as a result of the recent floods.

¹J. A. Jones (Dept. of Geosciences at Oregon State University) and G. E. Grant (Pacific Northwest Research Station at the U. S. Forest Service), Peak Flow Responses to Clearcutting and Roads in Small and Large Basins, Western Cascades, Oregon. DRAFT (June 1995)

²See William Weaver, Ph.D., and Danny K. Hagans, Aerial Reconnaissance Evaluation of 1996 Storm Effects on Upland Mountainous Watersheds of Oregon and Southern Washington: Wildland response to the February 1996 storm and flood in the Oregon and Washington Cascades and Oregon Coast Range Mountains. Prepared by the Pacific Watershed Assoc.. (May 1996)

The Forest Service should incorporate a number of documents and views into any planning process used to manage this watershed. An excellent hydrologic study should be completed and integrated into the planning process before the Forest Service decides to move forward with any logging operations. The Forest Service should continue to consult with the City of Portland and other rural communities relying on drinking water from this watershed. Their municipal water supply is directly threatened by this timber sale. Incorporating their views, and any documents referenced in this document, will increase the likelihood that effective preventative measures will be planned for and implemented. This will preclude costly future problems with water quantity, water quality, and habitat loss for sensitive species.

III. Rain-on-Snow Events

ONRC believes new measures must be taken to ensure rain-on-snow events do not harm water quality and water quantity in the watershed. The poor water quality of other streams and rivers in this watershed demonstrate that past calculations of Aggregate Recovery Percentage (ARP) were faulty and that past measures taken by the Mt. Hood National Forest to maintain hydrologic recovery and mitigate erosion have clearly been insufficient.

The ARP's of the South Fork of Eagle Creek should be kept at or above their current levels. This would help ensure the maintenance of the watershed's health and its capacity to produce safe, reliable drinking water. Downstream water quality has been severely degraded by logging activities. This area supplies municipalities with clean water that compensates for the degraded water supply in other areas of this watershed. Therefore, it should not be degraded by logging activities. Logging will decrease the overall quality and quantity of water for municipalities. This area is a storehouse of clean water, not a stockyard of timber waiting to be cut.

IV. Transient Snow Zone

The Oregon Cascades are particularly prone to rain-on-snow events. These events cause high amounts of runoff and increased siltation of water channels. A recent study conducted by The Pacific Rivers Council estimates that whole-storm runoff in areas of the Oregon

Cascades is "thought to consist of perhaps 40% snow melt."³ This acts as a trigger for landslides. Landslide activity during this winter's past storms is believed to have been concentrated in the 3,000' - 3,500' range. This elevation corresponds with the rain-on-snow event zone.⁴ The Forest Service should not offer this sale, or other sale, in this watershed. This will allow the sale area and downstream forests time to recover from past management practices.

Less than 20% of the watershed is in the transient snow zone (pg. 36), yet 78% of this sale lies within this zone (36, WA). No cutting should occur in this zone considering its propensity to discharge high levels of sediment into water channels and Eagle Creek's Tier Two Watershed designation?

What percentage of the Southfork watershed has been cut in this zone during the last 15 years? What percent will be cut during the next 15 years? How will the cumulative cuts in this area effect the occurrences of landslides and turbidity in this sub-watershed? How will this impact drinking water quality?

V. Unit Placement

ONRC is concerned about the placement of cuts in this timber sale. The vast majority of cuts will occur at the within the rain-on-snow event zone. This style of unit placement, the slopes, danger of windthrow, fragility of riparian areas, and soil composition on which many of the cuts will occur should preclude this from occurring.

The Eagle Creek watershed has already experienced a large number of cuts. However, the Forest Service wants to increase logging activities, many of which will occur next to plantations resulting from prior clearcuts (See Units 1, 5, 6, 9, 10, 11, 14, 15, 8, 17, 27, and 26..). The overcutting this watershed has experienced, and will continue to suffer from, if this sale continues is a threat to future water quality therefore the sale should be stopped.

The placement of roads (including permanent roads) also occur within the rain-on-snow event zone. Most roads occur in this zone. Road building will be increased in this zone with the construction of a

³Id.. at 5.

⁴Id.

new road for Units 27 and 28. This style of cutting and road placement results in unacceptable damage being done to the watershed from increased landslides and siltation of water channels.

VI. Landslides

Logging and roads are major factors in the number and severity of landslides which occur during storms. In the Oregon Cascades, the relationship between logging and road building has been documented by a recent study.⁵ Since the sale would decrease the ability of this area to resist landslides, no logging should be allowed in this area. This would ensure that water quality is maintained for downstream communities.

The findings in the study mentioned above may be caused by a wide variety of forces including: poorly maintained road drainage systems; the overcutting of trees; the cutting of trees on steep slopes; poor management and monitoring activities; and a lack of understanding about how to manage the forest ecosystem to ensure that damage from landslides is no worse in managed than unmanaged watersheds.

Landslides can carry huge amounts of sediment and debris into water channels. The same study noted that whole trees and organic debris traveled two miles from the original site of the landslide during this past winter's storms.⁶ In addition to the silt load they have already experienced, large numbers of water channels in this watershed now are repositories of silt that will continue to be released into downstream water ways for the next decade.⁷ This has obvious long term, detrimental effects on municipal supplies of drinking water and sensitive animal species. For these reasons, the sale should be halted and remedial activities for the entire watershed should be instituted.

A geological explanation for the increased landslides (where the dominant cause was assumed to be an area's regularly bedded sandstone) was ruled out. The report noted that **thickness and hydraulic conductivity** of colluvium headwall swales, slope gradients, and recent land use history all contribute to the

⁵Supra note 2, at 7-8.

⁶Id. at 6.

⁷See Id.

severity of landslide damage.⁸ These findings support the need for a new watershed analysis, a complete review of Forest Service management practices in this watershed, and remedial actions to correct damage caused by these practices.

One concept is undeniable. The forests of Oregon have suffered a great amount of landslide damage from management practices and road construction.⁹ This vicious cycle is propelled forward by this sale that will result in an exacerbation of these factors. This cycle of destruction is ultimately detrimental to public welfare by decreasing drinking water quality and quantity (especially during the dry summer months when municipalities are already running low on water), watershed quality, and increasing the funds needed to repair or maintain damaged infrastructure and habitat. For these reasons the sale should be halted to allow the watershed time to recover from past management practices.

VII. Mitigating and Reversing Past Damage

The Forest Service should undertake specific activities to increase soil stability and decrease siltation of rivers, streams, and reservoirs. These activities must include, but should not be limited to, the halting of road construction and the cutting of trees in this watershed. The Forest Service must decrease the potential for landslides and erosion from existing roads and recently harvested areas. Drainage systems and culverts must be installed or upgraded. Monitoring and studies should be conducted on the drainage systems to ensure they are not contributing to the problems of siltation and landslides. The obliteration or increased maintenance of roads which jeopardize water quality and fish populations should be conducted in this watershed irrespective of any proposed Forest Service action. A wholesale reassessment of the Forest Service's management practices should be conducted in light of the impacts from last winter's storms and the studies cited in these comments.

⁸Id. at 13.

⁹Id. at 9, 13.

VIII. Accounting for the Flooding

ONRC believes this sale should be stopped until the issues raised by this past winter's flooding can be adequately addressed by the Forest Service. A letter from Mr. Don Davison concerning the monitoring of impacts from flooding in Eagle Creek raised a number of questions. The monitoring that occurred was too limited in scope for a true assessment of the storms' effects. The aerial surveillance and thorough ground truthing, in addition to road surveying, should have been undertaken by the Forest Service in this key watershed.

The Forest Service statement that no structures were harmed is misleading. This area has no structures to harm. Did the Forest Service check downstream structures, such as the fish hatchery, to see if they were harmed? Management activities directly affect these areas.

The Forest Service contends the Watershed Analysis is still valid after the storms. Did they do any studies on water turbidity in the area, or downstream, to see if siltation levels were higher than before the flood? Have any followup studies been conducted to see if these levels remained high months after the storms? If they are higher, this demonstrates the necessity of leaving the sale area untouched because it provides a buffer for increased turbidity of more heavily logged areas.

The Forest Service states that damage to primary and secondary roads was minimal. What is minimal? What damage did occur? Could any of this damage have resulted from past management activities? If so, what types of activities? Will these activities be repeated with this sale? If so, how will a future storm event of similar or greater magnitude affect water quality in this watershed? Did the Forest Service check on downstream landslides on roads, in or near stream beds, and in areas that have been logged in the past?

These are the types of issues and questions the Forest Service should be addressing in studies and monitoring following the storms. The Forest Service should not implement management activities that do not take into account or are not based on natural occurrences, such as harsh winters, in the Oregon Cascades. This style of management has already degraded this municipal watershed. Continuing this style of

management is illadvised, irresponsible, and harmful to issues of public health.

IX. Soil composition and landslides

There have been 14 landslides counted in the upper and middle sub-watersheds from past logging activities. (pg. 38). Recent harvests have been estimated to deliver, in addition to natural erosion, the same amount of sediments as would occur during a period of wildfire recovery. Therefore, this Sale results in an assured increase in sediment loading in rivers. Without logging sedimentation levels will decrease over time with merely a chance of increased sedimentation. Therefore, how is cutting consistent with this Tier Two watershed designation.

Soils along ridges where thinning will occur are shallow. (pg. 38) How shallow are they? This area also has a moderate chance of windthrow. This combination of factors should preclude Units 8, 24, 25, 26, and 29 from being cut. Why is cutting still occurring in these areas? What specific measures are you taking to ensure these slopes retain topsoil with its current characteristics? How will these characteristics be altered once logging has occurred. What proof do you have these measures will protect water quality?

The lower section of the South Fork of Eagle Creek has the highest risk of landslides. (39, WA) Will any cutting, private or public, occur in these areas? Will cutting in the upper reaches of Eagle Creek effect the stream banks or areas susceptible to landslides in these areas? How will this effect water quality?

X. Roads

What measures are being take to eliminate erosion from road #335? If nothing is being done, the plan should be modified to make rehabilitation of this area a priority. These measures should be consistent with C-7 and C-32, RF-3 (c).

How do you propose to maintain Road #4615150 yet allow vegetation to grow on the road so that it is eventually impassable? (pg. 117)

How long do you propose to close the 1.6 miles of road?
Permanently or for up to 10 years? (pg. 118)

This plan will increase the amount of road in the area from 21.7 to 22.6. (pg. 119) This does not conform with ROD Standard and Guidelines C-7, minimum level of "no net increase" in roads on Key Watersheds outside roadless areas? Why is the Forest Service not conforming to their own rules?

How is this road and its proposed units consistent with the Aquatic Conservation Strategy for this watershed?

Why does the plan invest money in new roads in a key watershed when the highest priority of this watershed is restoration?
(Standards and Guidelines C-7.)

How does Road #4615 facilitate watershed restoration? It is on a ridge above a steep slope that is going to be a sheltered cut. Have you assessed the effects this will have on the watershed? Since it touches a road on a downhill slope, it will most likely provide a conduit for silt to flow into the South Fork of Eagle Creek. This site's contribution of silt could increase because it is in the boundaries of a moderate windthrow area, next to a high windthrow area, and next to a riparian reserve. The danger of windthrow damage is compounded by the fact that the Forest Service has planned a road running east to west. This type of road promotes the funneling of wind which increases the damage of windthrow. These units should not be implemented because of their obvious adverse impacts on water quality.

Will the new road be built in the transient snow zone? If so, this will increase the chances of higher turbidity levels in Eagle Creek. (See above critique of this road and its units.) This would be another reason to stop these particular units even if the Forest Service disregards the obvious ill-effects this sale will have for water quality:

How many logging spurs are there in the area? Will all of them be obliterated or just the two mentioned in the SDEIS? When is the Forest Service going to clean up the trash left by people on the logging spurs?

Why are all of the road closure and obliteration projects recommended in the Watershed Analysis not being undertaken? (105, WA) They would have the beneficial impacts of increasing elk habitat and decreasing siltation in the waterway of a Tier II watershed. If the rationale is to continue recreational opportunities, then how does this ensure water quality as the primary management objective in this watershed?

The SDEIS states that roads create more sediment than do existing clearcut areas. (pg. 39) Instead of putting any money into constructing new roads, the forest service should be funding road obliteration and maintenance to bring sedimentation levels down. Why is the Forest Service not doing this?

XI. Sediment Levels

This area has the lowest sediment levels out of the entire sub-watershed. Why is it being degraded by logging and road building? Clean water from this stream is needed to compensate for increased temperature and sedimentation from other water channels that have been degraded by actions similar to those pursued in this sale.

XII. Monitoring

Monitoring the effects of any cutting is a vital activity given this watershed's importance. ONRC believes that monitoring activities that can assess the cumulative impacts (on water quality and quantity) of logging individual timber sale units and the cumulative impacts of cutting in this watershed should be implemented. These activities should include, but not be limited to, all of the issues discussed in these comments.

XIII. Species

The Forest Service has not conducted any field surveys on many of the species in the SDEIS. (pg. 130) How can it determine if there are candidate species in this area if no surveys have been conducted? If these species have habitat, then why are no surveys being conducted?

Will the C3 species information now being collected by the Regional Ecosystem Office be used when making any decision to cut in this area? (pg. 130) How will its results be used? Will any logging activities take place prior to the release of this report?

There is not a complete understanding of the distribution of fish species in the Eagle Creek watershed. (pg. 41) How can you predict the sale's impact on fish if you do not know where they reside?

Why is this Sale going forward if it may impact lower Columbia Coho? This should be enough of a reason to at least stop cutting in the riparian areas. How could it impact lower Columbia Coho? if it is effecting water quality, then what ramifications does this have for downstream communities depending on this area for clean water?

Has the Forest Service conducted any studies for the Red Legged Frog in the riparian areas scheduled to be logged in Alt. 3? (pg. 131)

Cope's Giant Salamander has been sighted in the upper watershed. Alt. 3 cuts in the riparian areas in the upper watershed. Has the Forest Service conducted any studies on the salamander in these areas. If they have not, then how can they say the cutting will not effects its habitat. The NWFP recommends a 208 foot buffer for the Salamander. (pg. 131) Will cutting occur within 208 feet of any seep, stream (named or unnamed), creek, or wetland that it finds or has already located? Is this determination left to an on-site determination? If so, what safeguards are in place to ensure the safety of this animal?

Has the Forest Service done any surveys in the upper watershed to ensure there are no nesting cites of the Harlequin Duck in the Riparian Zones? (pg. 132)

The down stream hatchery has already suspended their release of fall Chinook salmon because of possible sediment loading. (44, WA) This sale would increase sediment into the waterways. Why is the Forest Service planning to decrease the health of a stressed river system by further cutting?

Does the Forest Service have any information concerning Bald Eagles nesting in this area?

The Watershed Analysis was conducted during the dry Fall months. Did any field reconnaissance take place during the wet winter months when animals, such as salamanders, would be more likely to be observed?

A. Spotted Owls

This plan will decrease spotted owl habitat by 221 acres (10%). (pg. 75) Any decrease in Spotted Owl habitat is yet another reason to stop this sale. Did the Forest Service study account for the cumulative effects of future and current logging operations on the Spotted Owl? For instance, how will the decrease in interior connectivity effect the future distribution of the owl?

Has the service conducted any study concerning the fifth owl pair whose habitat will be reduced to see if it will fall below the 1,182 acres take limit by factoring in other cutting that may occur on public or private lands?

Is this fifth pair roosting? If so, what is the possibility a chick will emigrate towards this area due to habitat loss in other areas? How will the decrease in interior habitat effect this type of migration?

Why are management objectives not geared towards increasing late seral habitat for new owl pairs? (pg. 129) It appears the Forest Service is stating Spotted Owls are not expected to increase in the area because their range is being logged. Is this the case? Would Spotted Owl populations increase if the Forest Service was not destroying their habitat? If so, how is this consistent with the spirit of the Standards and Guidelines B-13, Improving "travel and dispersal corridors for many terrestrial animals, and to provide connectivity corridors among the Late-Succession Reserves."

Not including the LSR, what percent of interior habitat will be cut? Why is the LSR included in your computations of interior habitat for this sale? The Forest Service would have to use completely different guidelines in harvesting the LSR therefore, it should not be included in the total amount of interior habitat.

XIV. Silvicultural Methods

This sale will result in fragmentation of 1,115 acres of late successional interior forest (53% reduction). (pg. 75) This will convert 10% of interior habitat into grass or shrub conditions. (pg. 75) How are these actions consistent with Standards and Guidelines B-11: 2, 4, 8, 5, and 6? Do these numbers take into account windthrow? If not, how much will these numbers increase with windthrow?

Which units will receive which sheltered prescriptions? (pg. 87)

Which prescription of sheltered removal will Unit 27 and 28 receive?

What is the rationale of: 1) Removing 40% of the basal area of a 1/2-1 acre stand of forest and then calling it individual tree removal? (pg. 87) What is the difference in effect on interior habitat, species dependent on interior habitat, erosion, and windthrow? Would this type of prescription result in the removal of more wood than thinning or light shelterwood prescriptions?

Does the Forest Service plan on entering this area every 20 years to manage this forest? (pg. 88) How many more times will the Forest Service enter this area?

With commercial thinning, damage to the boles of trees will occur. (pg. 88) This will allow pathogens, such as root rot, to increase its presence in the forest. If the Forest Service is concerned with increasing infestations and fire, then why is it cutting trees that will result in the very occurrence they seek to avoid?

How will the determination be made that underbrush may cause competition problems for seedlings? (88)

The SDEIS states that sheltered removal will decrease the potential for the spreading of pathogens. (pg. 88) However, when stumps are created, disease actually has an increased chance of spreading in the ecosystem.

Beetles will have a longer flight from tree to tree with sheltered removal. However, the distance is insignificant to a beetle. With the increased damage from cutting to the boles, crowns, and roots of

trees (pg. 88) and the loss of trees due to windthrow, disease, and infestation, it appears that sickness would spread more rapidly with cutting than without. This is consistent with the area's sparse to non-existent history of infestations. Since increasing forest health is a major rationale of cutting, how can you further substantiate your claim? If your only rationale is a "judgment call". How can the promotion of pathogens and beetles be consistent with Watershed Restoration, Standards and Guidelines B-30-31.

The SDEIS states that thinning must occur early in a tree's life to be effective as a counter to windthrow. (pg. 97) How early must it occur? Are all of the trees within this age class? The average age of the trees appears to be quite old, therefore how much benefit will the stand receive from this treatment. What proof do you have that a marginal increase in windfirmness outweighs the certain damage, which will increase windthrow, done to trees from logging activities?

A number of units are planned to be on the north facing side of a ridge. Since they also buffer riparian areas this cutting, on wet soil, will increase windthrow in logged and non-logged riparian zones? (pg. 102) (Example Units: 17, 16) How is this type of cutting consistent with Standards and Guidelines B-11: 2, 4, 5, 6, and 8?

What percentage of the total sale area will have plantations and commercially thinned areas and what percentage will have trees on it over 180 yrs. of age? What percentage of trees that are to be cut will be attaining old growth status within the next 40 years?

Portions of Unit 10 will have commercial thinning on top of commercial thinning (Compare map on pg. 28 & 56). This area is also in a roadless area. This combination of factors should preclude cutting Unit 10. Why is cutting still continuing in this area? Why not do away with this given this area's Tier Two designation and its proximity to riparian zones. What proof does the Forest Service have this double thinning will not increase siltation in surrounding water channels?

Why will 3% of land in roadless areas be logged by this sale. (pg. 64) Since there is not much of this type of land left in the forest, this area should remain undisturbed. What percent of land in the Sale are you including the Wilderness and the LSR will be logged? Why did the Forest Service include these other areas? Their inclusion is

inconsistent with this sale because different measures would have to be undertaken if the Forest Service wanted to log in these areas.

This sale will increase edge by 4-5 miles. (pg. 75) This benefits the white-crowned sparrows and black-tailed deer at the expense of water quality and the Spotted Owl. How can this be consistent management guidelines of a Tier Two watershed?

The Forest Service justifies this sale by stating it will benefit the Roosevelt Elk. However, will decreasing interior habitat 53% be a benefit to the Roosevelt Elk. The increase in foraging habitat will be marginal and temporary. How is the decision not to permanently close or obliterate roads, but to increase them in this area, consistent with benefiting the Elk. How did the Forest Service conclude this combination of factors lead to a benefit, rather than a an increase in disturbances for the elk.

What is the relevance of "vigor". What substantive contribution does the term "vigor" make to managing forests in a Tier Two watershed. Why did the Forest Service use a term that it did not define in any document? Why does a loss of "vigor" necessitate cutting? Is there any evidence cutting these trees will increase the remaining trees "vigor" given their age, current health, and future management prescriptions?

Why go back in and fell trees to meet the standards of the NWFP for down trees on clearcut, partial cuts, or sheltered cuts? Why not leave them there when you cut? This area is on track to meet these specifications without cutting.

Will thinning in the Riparian Zones take any old growth, or soon to reach old growth stage trees (within 40 years)? If it will, why is the Service not saving these trees to ensure that diversity and connectivity of the habitat is retained? (76, WA) Cutting in these reserves will endanger water quality therefore is should not occur.

XV. Mitigation Measures

How will the Forest Service determine which trees are to be saved because they are genetically superior? What criteria is the Forest Service using to make this determination?

How much deviation is allowed with input from representative resource specialists? Is there any review of his input? Are these deviations noted for the record and rationalized using standardized criteria? If so, what is that criteria?

XVI. Fires

What is the duff layer and ladder fuel height in the sale? Did you take these factors into account when discussing the possibility of stand replacement fires? If they were not included, what was the rational for this decision? What measures are being taken to account for these factors? {Controlled burns, ladder removal}

A rational for cutting is to ensure that a replacement fire does not occur again. Yet, the cause of the last replacement fire is not know. It could have been human (pg. 123) How can an area that has a low propensity for replacement and lightning strike fires (pg. 123) be deemed prone to replacement fires? What proof does the Forest Service have that conclusively shows this area is prone to replacement fires?

Under this sale, fuel treatment is accomplished by cutting trees. (pg. 122) But logging trees results in the drying out of the stand and the build up of ladder fuels. This will increase the chances of fire in dry summer months? Therefore, the long term effects of cutting is to increase fire danger. How does the Forest Service propose to address this contradiction? The continuation of management prescriptions that increase the chances of damage to forests, especially in a Tier Two watershed, is inconsistent with the Aquatic Conservation Strategy.

Chipping and dispersal of debris should be implemented with this sale given the area's Class I airshed status. (pg. 125-6). Since there is a chance the fire could get out of hand, this Tier Two watershed should not be endangered by burning. This is another reason chipping and dispersal should be implemented. Since this sale is expected to result in a profits, chipping is an affordable and necessary safeguard for water and air quality.

XVII. Procedures

Alternative three puts at risk a Tier Two watershed by cutting in or near riparian reserves. No other alternative does this. (pg. 51) This option is unacceptable given the importance of the watershed. Why did the Forest Service choose the alternative that is the most harmful to riparian areas and forest health? If the rationale was to provide timber, then how does this conform with the ROD and Standards and Guidelines designation of Eagle Creek as a Tier Two watershed? It would appear that the Forest Service is putting the production of timber before the quality of water. This is inconsistent with the ROD and Standards and Guidelines.

Your Watershed Analysis and SDEIS state that overstocking is the biggest problem facing forest health in Eagle Creek? What factors went into this determination? Did the Forest Service factor in the excellent health of the stands, high moisture in the area, current lack of infestation, minimal amount of fuels, and the area's uncertain causes of fire when making this determination?

Did the Forest Service account for the possibility that the last major fire in the area was possibly set by humans when deciding that overstocking posed the largest threat to these stands?

How much larger a problem is overstocking than allowing the trees to be naturally thinned? Does this statement take into account the damage caused by pathogens attacking trees through stumps, damage from logging operations leading to beetle outbreaks, and stressing trees through soil compaction from logging?

What percentage of the trees proposed to be cut are over 140 years old? What percentage of total BA cut do these numbers represent? Why are any of these trees being cut when they serve a vital connectivity and habitat function?

What percentage of the area, which if it were not cut, would reach late seral stage in 20 years? How many acres of this type of forest have been cut in the last six years? Why are any trees with these characteristics being cut given their high value for diversity and connectivity?

The slope on parts of the Southfork is described as "modest". (33, WA) What is the relevance of "modest"? What ramifications does "modest" have for levels of erosion? Why was the amorphous term "modest" used rather than specific numbers? What types of studies were done to measure the slope? If no measurements were taken of the slope, this sale should be discontinued until the Forest Service has this information at its disposal.

Why is the BLM going to be trading land with Longview Fiber that will adversely effect this Tier Two Watershed? Why is an area prone to instability being given to a commercial timber operator?

Why did the Watershed analysis use a "best case scenario" in a Tier Two watershed? Why did they not use a worst case scenario that would better protect water quality and public health?

Will all work take place within the recommended time period? (July 1-Sept. 30) Given the amount of timber coming out of this sale, should not the Forest Service reduce the amount timber being extracted to ensure that operations can be run at a slower pace so that human error does not harm this water quality?

Are all recommendations to mitigate erosion in the watershed analysis being implemented? If not, then which are being excluded? Why are they being excluded?

Why is only the first row of conifers being retained around 'No Treatment Buffers'. Since there is a danger of windthrow damage, infestations, and fire following this sale, more trees should be left to ensure these areas are not damaged?

Your response to comment number 113/10/04 of the Draft EIS stated that the SDEIS would have a more complete list of references available. Why was no such list presented?

Your response to comment number 306/15/06 of the Draft EIS stated that more information would be provided on the issues covered in that comment. Why was no further information provided on all of the topics in the comment?

XVIII. Windthrow

Alt. 3 has the highest proportion of cutting in areas prone to wind throw (pg. 101). Why choose the alternative with the greatest chance of damage to the forest and watershed?

Would the skyline corridors (running east to west) result in a funneling of wind? Since the roads in the area running east to west have the greatest potential for windthrow (pg. 102), does the same hold true for the corridors? If so, was this taken into account when computing expected damage from windthrow? If it was not taken into account, then the Forest Service should halt logging until better estimates are available for planning unit placement and prescription.

The SDEIS states that 10% of the trees after cutting would be expected to fall down due to windthrow? (pg. 101) In areas where this will occur, is this number taken into account as a reduction in habitat for the spotted owl, interior habitat and fragmentation, and total riparian zone loss? If not, then what will the reduction of these areas be with this loss?

Which are the wet areas where blowdowns have occurred in the past? (102) Are these sites more at risk of future blowdowns? How is this taken into account when planning cuts?

Several units in riparian zones in upper watershed have a high potential for blowdown. (Blowdown map and Alt. map) Units 29, 26, 25, are examples of units that have a combination of these factors that would necessitate exemption from cutting. Why did the Forest Service decide to log despite these factors?

Units 8 and 24 occur in areas which have a high risk of blowdown. (Compare map of Alt. two with map in Appendix H). Given this area's Tier Two designation, these units should be excluded from any present or future logging activities.

XIX. Weeds

Will the forest service be undertaking any of the actions to mitigate the infestation of weeds? (pg. 127)

XX. Units that should be taken out due to cumulative effects on species and water quality.

The following units should be taken out of the proposed sale if any cutting occurs. These units have cumulative impacts that, when combined, demonstrate that these units are ill-devised. All but two of these units will either 1) heavily impact spotted owl habitat; 2) are shelterwood cuts (except for 26 and 19) that occur in areas of high or medium blowdown rating; 3) have a high amount of large trees coming out based upon the % BA Removed and % Vol. / Acre Removed; or they 4) occur in riparian zones.

Units: 2, 11, 13, 15, 16, 20, 26, 28, 29 should all be taken out based on the above combination of factors.

XXI. Changes in EA Format

ONRC would like to suggest changes in the EA format. These changes are applicable to this EA and any future EA. The document should have a description of the percentage of cuts that will occur in the rain on snow event zone. The description should reflect the types of cuts. Similar information on the road system should be provided. This information can be made available in map format. However, elevation levels should be easily understood by looking at the map. All roads (temporary, permanent, and otherwise) and road work should also be noted in the EA. The Forest Service should also include figures detailing the total percentage of a watershed logged within a five and twenty year time span. The number, severity, and placements of landslides should also be included. Planning documents should also have information on the dominate age of trees in individual Units. These changes would greatly facilitate cogent comments on proposed Forest Service actions by better informing the public about the ramifications of Forest Service management decision.

XXII. Site Specific Concerns

I have walked over many of the units proposed for cutting in the Talon Timber Sale. During this ground truthing, I discovered that many of the Forest Service's concerns, used as rationales for cutting, were not present in this forest. I have done extensive ground truthing on units 29, 26, 24, 8,, 15, 16, and 9. All of these units contained traits that precluded them for being cut and seriously call into question the Forest Service's ability to assess a forest's health if they prescribed logging based on the reasons detailed in their document.

Unit 29 is of particular concern. It is dominated by riparian areas. There are at least three year around streams and numerous seeps, springs and intermittent water channels. These areas do not appear on the SDEIS. The document should include this type of information. If the Forest Service cuts in accordance with the Standards and Guidelines, most of this unit will be precluded from logging operations by buffer zones. This is particularly true as the unit gets closer to the South Fork of Eagle Creek. Given the high moisture content of this area and the potential for blow down, these areas should be protected by buffers equal to the height of two site potential trees.

Stand health in this unit is very good. There are natural openings in the canopy. Canopy closure is generally excellent throughout the unit. There is already a multiple layer canopy, with an increasingly complex canopy being developed. The unit contains large and small down woody debris and the potential for more is very great. Further up the hillside of this unit, the terrain becomes very steep. Given its steep slope and numerous little indentations on the hillside, erosion will increase during winter months if logging occurs in this area.

This unit is proposed for commercial thinning operations. However, on the lower half of the unit, thinning operations will not be economically feasible due to good stand health and a lack of areas that can be cut if the Forest Service intends to leave the appropriate buffers as required by the Standards and Guidelines. If the Forest Service is not planning on leaving these buffers, they should have discussed this in the SDEIS. Logging operations up the slope is ill-advised. The unit is extremely steep. Natural thinning has already occurred. It will continue to occur. Commercial thinning will reduce the long term site potential for down woody debris in this area while

increasing the short term debris level. Thinning will result in the drying out of the forest floor around these areas that are thinned. Since this watershed will have to produce clean drinking water for growing communities well into the future, the factors discussed above should preclude cutting which would clearly be detrimental to the purpose of a B-6 Special Emphasis Watershed.

Unit 26 does not need to be thinned. The unit is dominated by a multiple layered canopy with many large healthy trees. In some areas, rhododendrons are growing because the canopy already has large open areas. If the Forest Service goes in and cuts down more trees, these rhododendrons will crowd out small seedlings. This process can be seen in large open areas located next to the road. The soil on this unit is also extremely dry. Thinning will decrease soil moisture. This will also increase the ability of brush to out compete small seedlings. If the Forest Service leaves this area alone, the multiple layer canopy will continue to increase in complexity.

There is a large wetland in the southwest of the unit. This area should be protected from the effects of any cutting. There is also an large intermittent water channel that flows into the wetland. It appears to be a channel that catches large amount of run off during storm events or rain on snow events because it has a lot of scour, large rocks, lies in a drainage basin, yet is dry during by the end of June. The water channel is very large and bordered by a wetland area. This channel and wetland should be protected by a buffer the size of two site potential trees. This would ensure water quality is protected if any cutting does occur in this area.

Thinning in this area is ill-advised and, if done according to the Standards and Guidelines, would not be economically feasible. The vast majority of stands are healthy. The few experiencing crowding are naturally thinning themselves. This is creating a sustainable level of large and small down woody debris. A healthy amount of debris is already on the forest floor. Forest health should not be used as a reason to thin this unit. Anyone that has walked through it would see that it is healthy.

Units 24 and 8 do not need to be thinned. Unit 24 has a number of features that should preclude it from being cut. There is a large wetland area on the west part of the sale next to the road. Around this area are seeps. This area should be protected from any logging. On the middle south portion of the unit is a intermittent stream and

numerous seeps. This is visible from the road. Buffers the size of two site potential trees should be left around these areas.

Further up the ridge, these units become increasingly steep. The soil is dry. There are numerous signs of blowdown. A multiple layer canopy has formed and is in the process of becoming more complex. Brush is not a problem in this area despite its low soil moisture content and small openings. However, brush may become a problem if larger openings are created in this area. If this steep slope is logged, it will increase erosion. This occurrence is extremely likely since the openings will likely increase because this area is prone to blow down. Thinning can not possibly facilitate forest health in this unit. The forest is healthy and strong. Large down woody debris is present and increasing. The canopy is already open. In the few places where stands could be thinned, it would not be economically feasible given the small amount of sites and overall quality of trees that would be taken if the large genetically superior trees were left.

The comments contained in the last paragraph is also relevant to unit 8. These units are also ill-advised because they propose to thin right up to the wilderness boundary. This should not be done. No cutting, staggered or otherwise, should occur next to this area.

If logging occurs in unit 16, it will be a very intense cut. The Forest Service marked a buffer on the steep slopes of the stream. It may be large enough to buffer the stream from the immediate effects of logging. However, this buffer will be effected by blowdown and drying out caused by the logging which will occur on the upper part of the slope. These factors will effect the buffered area, as they have already effected the upper hillside.

This logging will apparently be more intensive than a thinning, although this is the prescription for the unit according to the SDEIS. Since the upper slope will basically be clearcut, the Forest Service should extend the buffer further up the hill. However, if the area will basically be a clear cut, this goes against the rational described in the SDEIS. Clearcutting will not improve forest health. Therefore, the entire unit should be withdrawn. The forest in the unit is healthy. The most unhealthy part is on the upper slope, where the effects of logging are very evident. Increasing blowdown and drying out the soil are not consistent with forest health. Yet, these are the results of past logging operations next to this unit. These detrimental impacts will only be increased if logging occurs on the unit site.

Unit 9 should not be thinned. The entire area has an evenly opened canopy. There is a multiple layer canopy present on this unit. It is increasing in complexity. There is also a intermittent water channel that runs down the middle of the unit. This channel should have a buffered the size of one height potential tree. Any stands that may withstand some thinning because of current overstocking would not be economically feasible to cut. If forest health is indeed the rational for going into this unit, it is a very inefficient prescription, if not ultimately destructive prescription.

Unit 15 should not be cut. It is surrounded by a road, plantations, a proposed thinning unit, and is right next to a riparian reserve. To shelterwood cut right up to the border of this riparian reserve is ill-advised given the level of cutting this ridge has already sustained. Blowdown and decreasing soil moisture will become and even larger problem in this area if it is cut. The Forest Service should allow this area to recover from the impacts of past cutting before any further logging occurs on this ridge.

Given the deficiencies in these units, the entire rational for cutting in this area should be reviewed by the Forest Service. The Forest Service should do ground truthing before they plan to log using a rational that is not born out by the facts. If the Forest Service wishes to log because they want to get volume, then they should be truthful to the public. Lying is never the best policy.

XXIII. Compliance with Department of Agriculture Guidelines

This sale does not comply with the "Revised Direction for Emergency Timber Salvage Sales Conducted Under Section 2001(b) of P.L. 104-19, dated July 2, 1996.

How do Units 1, 3, 4, 6, 7, 8, 10, and 24 comply with item one of the memorandum. Many, if not all, of these areas are completely healthy. They certainly do not fall within the definitions described in 6(a) or (b) of the memorandum. Yet, they all effect roadless areas. Under this directive, these units should not be cut.

These stands are not in a high risk of incurring insect attacks nor is a change in stand structure or character anticipated within 3 years or

less because of insect attack. These are healthy trees that are naturally thinning themselves.

These stands are not Imminently susceptible to insect attack as defined by the memorandum. There is not a high fuel loading in this area. Nor is there a high risk of fire. One recorded instance of a large fire should not be extrapolated to label the entire area as a high risk fire area so that healthy green trees can be logged.

Thinning and shelterwood removal will increase the short term fuel loading of an area that is currently very healthy. The Forest Service has therefore failed to substantiate (1) a reduction in imminent susceptibility to fire through this timber sale, and (2) why no other treatment, such as "No Action" would be insufficient or ineffective to reduce high fuel loading and high risk of fire. As described above, logging in these areas will increase the chances of fire in this area.

There is no description of the estimated volume of dead versus green volume. Nor is there a clear rationale, given the health of the forest stands, for the cutting of green trees. The sale should be halted until this estimation is given to the public and they have had a chance to comment on it. Anything less would be considered arbitrary, capricious, and an abuse of discretion by the Forest Service.

While selected stands may be placed under (c), thinning these trees in accordance with the memorandum's directive that cutting healthy trees "must be subordinate to the objective of salvaging "diseased or insect infested trees, dead, damaged or down trees..." will not be economically feasible nor consistent with the spirit and letter of the directive.

This sale is extremely important to communities that depend on this watershed for drinking water and water for industrial uses. The component of green trees is also greater than 25 percent. Given the deficiencies of this sale in complying with Forest Service directives, the Forest Service should stop this sale and review it for compliance with the memorandum.

XXIII. Covering the Cost of Remedial Activities

ONRC recommends that the USFS undertake activities such as: a new Watershed Analysis; field reconnaissance; creation, maintenance, and

monitoring of road drainage systems; road closures and obliteration; consultations with Portland and other communities; project monitoring and re-calculation of ARP's; continued assessment and remedial activity directed at the effects of the so-called "Salvage rider" and last winter's floods; and a reassessment of the Forest Services management practices. The money is there to begin this process. The forest Service should assess the costs and priorities of these activities. However, it should also account for all future costs incurred by municipalities to deal with decreased drinking water quality and quantity if the Forest Service decides to cut in a municipalities watershed.

Congress recently appropriated \$63 million dollars to Region 6 for post-flood watershed analysis, restoration, surveying, monitoring, and other activities. The Estacada Ranger District should disclose: 1) the total amount of money they are getting from the above mentioned sources; 2) any additional source of money they are getting that can be directed to similar activities; 3) an explanation of why no money is being directed towards these activities if that is the case; and 4) their priorities with regards to (a) proposed actions and (b) funds distribution among these priorities.

This would be a wise investment of taxpayer money since these activities will act to decrease more costly remedial actions in the future and lessen any subsequent damage caused by future storms. It would also increased levels of public health and welfare by ensuring a safe, reliable source of drinking water for a number of municipalities. Ultimately, it is less expensive to protect this watershed than to log it.

ONRC understand that government agencies must prioritize a variety of interest when deciding on responsible management of natural resources and the directing of limited government funds. For too long, the watersheds around Mount Hood have been managed for the benefit of the timber industry. Downstream communities and businesses paid the price for mismanagement of these watershed. It is time the Forest Service placed public health and welfare first on its list of priorities. Doing anything less is a disservice to the people you serve.

If you have any questions on these comments, please feel free to contact me. I look forward to working with the Forest Service, impacted municipalities, and interested individuals to ensure the Estacada Ranger District puts the interests of clean water before anything else in the B-6 Special Emphasis Watershed. Thank you very much for reading and considering these comments.

Sincerely,

Grant Cope

Water Quality Advocate

There are 97 copies of these form letters/cards.
All state exactly the same thing. All of these cards were given one number, 311.

Estacada District Ranger and Eagle Project Team Leader,

I strongly support Alternative # 4, the no action alternative, for the Eagle project, which includes the Talon and Eagle Timber sales, located along the west boundary of the Salmon-Huckleberry wilderness within the Mt. Hood National Forest. Alternatives 1, 2 and 3 run counter to all Forest Service objectives as listed in the Supplemental Draft Environmental Impact Statement.

The "managing" of this area, which is a naturally occurring forest, will reduce necessary acreage and biodiversity within spotted owl habitat, reduce existing roadless areas and serve counter to the B6-special emphasis watershed that is desired for this area.

I demand that the past deleterious cumulative effects of abusive roadbuilding and logging operations be factored into any decision made, and that a cumulative impact study be undertaken by the USFS, and accordingly, that the public comment period be extended by 30 days. I further request that I be kept up to date on all efforts made by the Estacada and/or the Zig Zag ranger districts in accordance with this matter, including the receipt of the Final Environmental Impact Statement.

Sincerely,

312

2050 SW 78th Ave.
Portland, OR 97225
July 24, 1996

John Berry
DistrictRanger
ClackamasRangerDistrict
595 NW Industrial Way
Estacada, OR 97023

Dear John:

Please accept this belated thanks for the June field trip with some of the members of the Sierra Club Forest Committee. I'm sure that I'm speaking for each of the members when I say that your effort, time, and expertise are really appreciated.

We discussed the field trip last week at our regular monthly meeting. It was a learning experience for everyone who went along. Members came back from the trip with a much better sense of the issues the Clackamas Ranger District staff deal with as they manage the forests, especially those within the matrix. They also expressed a deep respect for the integrity and forethought you bring to the management of your district. I believe that these qualities are reflected in your staff partially due to your leadership.

I am continuing my involvement with the watershed improvement process at Squaw Meadows this summer. In fact, I am visiting the area today with Jean Rice.

We talked in the van about a spur off of FSR 4614. I have not been able to find the number of the road, but it basically obliterated a short segment of the Fanton Trail #505. It leads to a large clearcut spanning a tributary of the North Fork of the Clackamas, thus it is actually slightly outside of the Eagle planning area. Remember, the clearcut has an abandoned car and trash in it. I would like to recommend the road for restoration work, even though it is probably technically outside of the Eagle planning area. Who is the person I should contact about this? I've forgotten their name.

Once again, thank you for the time and effort you put into our field trip. It is much appreciated.

Sincerely,



United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
500 NE Multnomah Street, Suite 600
Portland, Oregon 97232-2036

IN REPLY REFER TO:

July 31, 1996

ER 96/0350

Don Davison
Estacada Ranger Station
595 N.W. Industrial Way
Estacada, Oregon 97023

Dear Mr. Davison:

On July 8, 1996, the U.S. Fish and Wildlife Service (Service), a bureau within the Department of the Interior (Department), provided comments directly to you on the Draft Supplemental Environmental Impact Statement for the Eagle Creek Timber Sales, Mt. Hood National Forest, Clackamas County, Oregon (copy attached). The Department concurs with the Service's comments and they should be considered as the Department's comments when preparing the Final Supplemental Environmental Impact Statement.

We appreciate the opportunity to provide comments. If you have questions regarding the comments or recommendations, please contact the Service's Oregon State Office Field Supervisor at (503) 231-6179.

Sincerely,

Preston Sleeper
Acting Regional Environmental Officer

Enclosure

Sauvie Island Oregon 97231-6906

July 5, 1996

Mr. John Berry - District Ranger
USFS
595 NW Industrial Way
Estacada OR 97023

RE: Eagle Sale

Dear John,

I ceased my involvement with the Clackamas Stewardship Committee you created, after I felt that you and your staff were on the right track for sustainable forest management; (i.e. emphasizing commercial thinning, less clearcutting, strong emphasis on protection of riparian areas and avoiding roadless areas).

My understanding of the Eagle Sale, unfortunately, makes me wonder if the USFS isn't backsliding to the "bad old days".

My concerns center on un-necessary disturbance of a roadless area; the on-the-ground physical condition of the naturally occurring forest does not jive with the "over-stocked condition" asserted in the EIS; planned clearcutting across riparian areas in the headwater units; failure to thin adjacent plantations of regenerated young fir that truly do need thinning.

It seems that again we're seeing the same old arguments to justify entering roadless areas and cut native forest.

These actions, John, seriously undermine the credibility which you diligently helped to build through the public Stewardship Committee.

I urge you to withdraw this sale until the objections raised by many other citizens and summarized above are addressed in a meaningful fashion. At this time I support Alternative 4, the No-Action alternative.

Sincerely,

Appendix J (Monitoring)

Content

Monitoring Plans

Monitoring Plans

General

Monitoring of specific items within 18 different program areas is required on pages *Five - 8* and *Five - 9* of the Mt. Hood, Forest Plan. The Mt. Hood National Forest produces an annual monitoring report that reports on compliance, progress, and accomplishments within each of the 18 areas. These monitoring categories are not repeated in this document because they have become part of our standard monitoring practices. The monitoring items listed below are additional specific items as a result of the site specific analysis of the Eagle Creek project area.

Best Management Practices

As a result of a formal agreement with the Oregon Department of Environmental Quality, the Mt. Hood National Forest has developed a *water quality checklist* of Best Management Practices to evaluate the effectiveness of mitigation measures and compliance with Forest Plan standards and guidelines. District watershed staff would monitor the Eagle Creek project area for compliance with these Best Management Practices before and after project implementation.

Stream Temperature

Monitoring of stream water temperatures during critical summer low-flow periods will continue at existing monitoring locations, as part of the on-going comprehensive water temperature monitoring program for the Clackamas Sub-basin, as administered by the Clackamas Drainage Ranger Districts at Estacada. Continuing the existing monitoring program will provide information relative to the effectiveness of prescribed riparian protection and management measures and also provide a basin-wide context in which to assess water temperatures.

On-site and Off-site Effects of New Road Construction

The Eagle Creek Watershed Analysis and a large body of scientific literature indicates that roads are the primary contributors of management-related water quality effects. Various "best management practices" (BMPs) have been prescribed to minimize the potential for soil erosion and water quality impacts. Visual, qualitative on-site observations during and following road construction will be carried out to document the implementation and effectiveness of prescribed BMPs. Implementation of BMPs and an assessment of effectiveness will be documented on monitoring and evaluation forms as part of the Forest-wide Best Management Practices Evaluation Program (BMPEP). The results of this monitoring will determine if more intensive, quantitative monitoring is appropriate.

Water Quality Observations at Road/Stream Intersections

Visual observations of water quality (clarity) will continue at stream crossings, above and below road fills and drainage structures to assess the relative contribution of sediment from roads. Observations will be made during the first significant runoff-producing event of the rainy season, followed by observations during and following major rainfall and snow melt events, as access permits. These observations will be documented on the appropriate BMPEP forms. Observed effects, such as decreased water clarity, will be subject to additional quantitative turbidity monitoring, to assess compliance with State water quality standards for turbidity.

Assessment of Management Activities Within and Adjacent to Riparian Reserves

A hydrologist, fisheries biologist, or other appropriate watershed specialist will assist with, and direct, the implementation of cutting prescriptions for units within or immediately adjacent to riparian reserves. Following

Monitoring Plans

harvest activities, these areas will be evaluated by appropriate watershed specialists (peer review) and documented using the BMPEP evaluation forms. Observations of non-compliance with prescribed BMPs will determine the need for additional monitoring or follow-up actions.

Stream Surveys

Stream surveys have been conducted prior to planning in the Eagle area. The surveys would be repeated by the fisheries staff on the district 3 years after completion of project activities to determine if there are changes in stream habitat characteristics, such as large woody debris, pool depth and pool-to-riffle ratios.

Soils

The amount of soil disturbance would be monitored and controlled by the *Timber Sale Officer* during project implementation. Soil specialists would monitor the timber sale areas to determine if there was any detrimental soil compaction or disturbance. This would occur within one year following the completion of activities.

Windthrow

On-site inspections would be made at least once per year to determine if blowdown has occurred in the Eagle area. Additionally, an on the ground inspection would be made following any unusual storm event that displays the potential for creating windthrow. If windthrow has occurred, the specific site would be mapped and an attempt would be made to determine what the causal factors were. This would validate the blowdown potential map in appendix "H" of this document as well as giving insight to managers for future actions.

Old Growth Characteristics

Objectives of silvicultural prescriptions include increasing the number of den and nesting snags, encouraging the development of older forests with a mid-level canopy, and increasing structural diversity within homogenous stands of mature timber. Selected stands would be monitored one and three years after treatment. Photo points would be established. Wildlife and silvicultural staff would monitor canopy closure, average diameters, snags, and canopy levels at these photo points.

Large Woody Debris

Three to four years after harvest, wildlife and silviculture staff would monitor the units for large down woody debris created by logging or blowdown. If adequate supplies are not found, (6 down logs per acre equaling or greater than 40 cu. ft. each) standing trees would be felled to meet the down wood requirements.

Wildlife Trees

One year following harvest, wildlife and silviculture staff would monitor the units for standing dead and defective trees. If adequate supplies are not found, (2-3 trees per acre) green trees would be blasted or girdled for the purpose of creating nest trees.

Forage Production

Wildlife staff would measure the quality and quantity of forage produced by various silvicultural prescriptions. Forage production in lbs./acre and species would be measured 3 years after the completion of activities.

Visual Quality Along Trails

A landscape architect and silvicultural staff would monitor compliance with the visual quality objectives of *Retention and Partial Retention* within the near foreground corridor that measures 660 feet each side of the trails in the area. This monitoring would be conducted during unit designation, tree marking, and after the completion of harvest activities.

Monitoring Plans

Photo Points

Several straight-line edges exist on the landscape from previous cutting activities. A landscape architect has designed cutting units adjacent to these edges to "soften" the visual effects of straight lines. These cutting units have been incorporated into the alternative designs. Should an action alternative be selected, the landscape architect would go back to selected photo points (e.g., road 4615130, Hwy. 211, McIver Park area, and others) after implementation and photograph the landscape. These photos would be compared to existing photographs to see if the methodologies worked as intended.

Cultural Resources

Surveys have been completed for the project area and known sites would be protected through project design. Monitoring would occur in high probability areas where soil disturbance takes place (e.g., landings, skid roads, and others). If sites are located, appropriate measures would be undertaken to alleviate any further disturbance that may occur.

Prescription Implementation

During the marking phase of sale preparation, a combination of visual inspections and random plots would be used to measure the percentage of basal area being removed from commercial thinning units. This activity would take place during marking of the stands to make corrections prior to the sale being auctioned.

Site Preparation

A visual inspection would be made following sale closure to see if a minimum of approximately 400 open planting spots per acre are found. If less than this is found, then site preparation would be prescribed (e.g., handpiling, burning of concentrations, etc.). With more than 400 spots per acre, no site preparation would be needed.

Stocking Exams (Plantation)

Stocking exams would be made at the end of the first, third and, if necessary, at the end of the fifth growing seasons to make sure that an adequate number of seedlings are growing in planted units (optimal stocking is 400 trees per acre). If less than 350 seedlings per acre are growing at the end of the first year, a determination would be made as to why the mortality occurred and corrective measures may be implemented. With less than 200 trees per acre, there is the possibility of inter-planting once casual factors have been determined. The Mt. Hood National Forest, Land Management Plan standard and guideline C1-030 states that there should be a minimum of 125 crop trees per acre at the end of five years.

Shading by Residual Overstory Trees in Shelterwood Units

Too much shading by residual overstory trees in a shelterwood unit can cause reduced survival and growth rates of seedlings. Eight to ten years following harvest, estimates of canopy closure would be made. If the canopy closure is greater than an average of 30%, then treatments would be proposed to reduce the canopy closure percentage in order to reduce competition on trees that are not shade tolerant.

Timber Stand Exams

Conduct timber stand exams in commercially thinned units 10-12 years following treatment. Compare diameter and height growth of residual trees before and after harvest to ascertain growth patterns after harvest. This information would be used in formulating future stand treatments.

Appendix K

Content

Map of Alternative #1 in relation to Riparian Reserves

Map of Alternative #2 in relation to Riparian Reserves

Map of Alternative #3 in relation to Riparian Reserves

