United States
Department of
Agriculture

Forest
Service

2004

Environmental Assessment

Imp (2004)

Clackamas River Ranger District, Mt. Hood National Forest
Clackamas County, Oregon

The project is located in T.6S., R.7E.; T.6S., R.8E.; T.7S., R.8E.; Willamette Meridian.

For Information Contact: James Rice
595 NW Industrial Way, Estacada, OR 97023
503.630.8710
jrrice@fs.fed.us

Table of Contents

SUMMARY

The Mt. Hood National Forest proposes a timber management project. The project area is located in the Upper Clackamas watershed and is within the Clackamas River Ranger District, Mt. Hood National Forest, Oregon.

The purpose of this initiative is to regenerate older forest stands that are fragmented and growing slowly, to create young productive forest stands, and to provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future. This action is needed, because the project area contains fragmented stands of older forest that are growing slowly due to the effects of diseases, insects and mortality. If no action were taken these stands would continue to grow slowly and would not contribute to a sustainable supply of forest products.

The proposed action (Alternative B) is to harvest trees from approximately 88 acres using the reserve shelterwood regeneration method and to construct approximately 500 feet of new temporary roads.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- Alternative A (No Action)
- Alternative C is similar to Alternative B except it would not construct any new temporary roads.
- Alternative D is similar to Alternative C but would leave more trees.

The decision will be based on which alternative best meets the purpose and need in an economical manner. It will also be based on the nature and intensity of negative and positive affects the action would have on the environment.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

- *Introduction:* This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Alternatives:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on issues raised by the public and other agencies. This discussion also includes Best Management Practices and Design

Criteria. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource. Within each section, the existing situation is described first, followed by the effects of the alternatives. The No-action Alternative provides a baseline for evaluation and comparison of the other alternatives.
- *Consultation and Coordination:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Estacada Ranger Station in Estacada, Oregon.

Background

The proposed action involves the harvest of timber from mature forest stands. This EA replaces an earlier version that was prepared in 1999 but was delayed by court cases that have since been resolved.

Summary of Changes

- To gain greater focus to the analysis, the proposed action includes only the regeneration harvest units.
- Alternatives have been adjusted and new ones added.
- The associated projects that had been part of the proposed action have been separated from this EA and are not connected actions. Public comments suggested that timber projects not be mixed with restoration projects.

Purpose and Need for Action

The purpose of this initiative is to regenerate older forest stands that are fragmented and growing slowly, to create young productive forest stands, and to provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future.

This action is needed, because the project area contains fragmented stands of older forest that are growing slowly due to the effects of diseases, insects and mortality. If no action were taken these stands would continue to grow slowly and would not contribute to a sustainable supply of forest products.

Management Direction – This assessment is tiered to the Environmental Impact Statements listed below and the listed plans are incorporated by reference.

- The Mt. Hood National Forest Land and Resource Management Plan Final Environmental Impact Statement (USDA 1990a).
- The Northwest Forest Plan Final Supplemental Environmental Impact Statement (USDA, USDI 1994a).

- The Mt. Hood National Forest Land and Resource Management Plan as amended (USDA 1990b) (referred to as the Forest Plan). This action responds to the goals and objectives outlined in the Forest Plan, and helps move the project area towards desired conditions described in that plan.
- The Forest Plan was amended by the Record of Decision and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA, USDI 1994b) (hereafter referred to as the Northwest Forest Plan or NFP).
- The Forest Plan was amended by the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA, USDI 2001) (hereafter referred to as the Survey and Manage Plan).

The Imp project is located within the following Matrix land allocations: C1 Timber Emphasis (Units 1,3,4,5 and the East ½ of 6) and B2 Scenic Viewshed (Units 7 and the West ½ of 6). Refer to Land Allocation Map on page 14.

During the 30-day public comment period there appeared to be some confusion on the relationship between the land allocations in the Mt. Hood Forest Plan and the Northwest Forest Plan. The NFP page C-39 states, "Most timber harvest and other silvicultural activities would be conducted in that portion of the matrix with suitable forest lands, according to standards and guidelines." The Matrix section of the NFP amended the Mt. Hood Forest Plan by adding certain standards and guidelines to the Forest Plan land allocations that occur within this area. These include survey and manage, green tree retention, and coarse woody debris. Timber Emphasis allocations in the matrix were not extinguished; the NFP did not eliminate the management goals for allocations that make up the matrix. The matrix is the primary area where commodity production is expected, but not all matrix lands are timber emphasis. The matrix also contains land allocations for recreation, wildlife, scenic areas and other multiple uses. However, most matrix lands in this project are C-1 Timber Emphasis. Timber harvest is being proposed to achieve Forest Plan goals.

The NFP on page B6 states, "Stands in the matrix can be managed for timber and other commodity production, and to perform an important role in maintaining biodiversity. Silvicultural treatment of forest stands in the matrix can provide for retention of old-growth ecosystem components such as large green trees, snags and down logs, and depending on site and forest type, can provide for a diversity of species. Retention of green trees following timber harvest in the matrix provides a legacy that bridges past and future forests."

DESIRED FUTURE CONDITION

The following desired future conditions are derived from the **Mt. Hood Forest Plan** as amended. The desired future conditions from the Forest Plan that are relevant to this proposal are summarized below.

Health	Forests have low levels of disease, damaging insect populations and storm damage. Four-92, FW-382; and Four-292, C1-22.
Growth	Forest stands are healthy and vigorous, and have growth rates commensurate with the sites potential (at a rate at which the mean annual increment has not culminated). Four-5, #44; and Four-86, FW-306; and Four-91, FW-372; and Four-90, FW-361.
Scenery	The forest is visually appealing with a wide variety of natural appearing landscape features. Forest stands and openings are blended with natural landforms and existing vegetation, and have natural shapes, edges, patterns, and sizes. This applies throughout the landscape with increased emphasis for areas seen from sensitive viewing positions. Four-218, goal; Four-113, FW-558; and Four-108.
Deer & Elk	The forest provides high quality summer rearing habitat for deer and elk. The forest contains a mix of habitats including forage, thermal cover and optimal cover. Four-72, FW-202 to 207.
Snags & Down Logs	Snags, down logs, and recruitment trees are well distributed across the landscape in sufficient quantity and quality to support species dependent upon these habitats. Early-seral stands are diverse and contain patches of green trees and snags as well as dispersed green trees and coarse woody debris. NFP pages C-40-41.
C1 Timber Emphasis	The forest consists of stands with an even distribution of age classes, up to approximately 120 years, ranging from seedlings to mature timber. Four-290.
Timber Harvest Levels	Provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future. Timber outputs come primarily from the Timber Emphasis (C-1) portion of the Matrix lands, with lesser amounts coming from the "B" land allocations of the Matrix. Minor amounts of timber may also come from outside the Matrix where harvesting would be used as a tool to enhance resources and move the landscape toward the desired future conditions. Four-86 & Four-289, NFP pages 2 & 3.

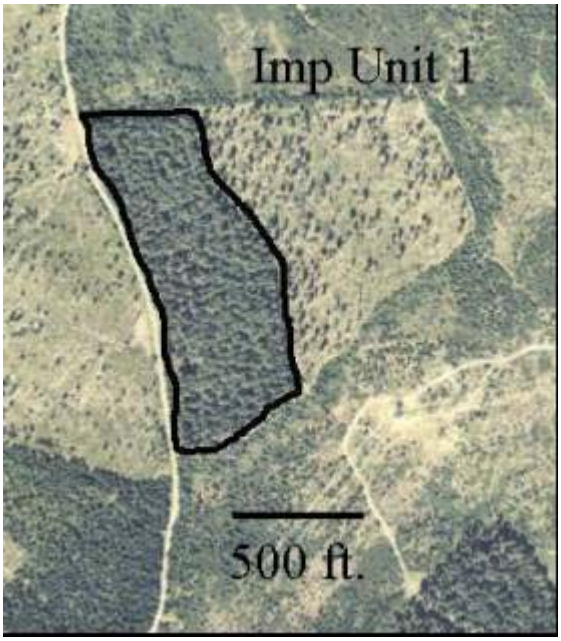
The following statements describe desired future conditions from the **Upper Clackamas Watershed Analysis**. Only the conditions relevant to this proposal are summarized.

- Forests contain a mix of habitats including early, middle and late-seral stands dispersed across the landscape.

- Matrix lands provide the majority of the landscape's early-seral habitats with a variety of sizes and shapes.

One of the key landscape level issues identified in the Watershed Analysis is the fragmentation of late-seral forested habitats. Some of the landscape contains interior patches of late-seral forest. Interior habitat occurs in stands that are at least 500 feet from any openings. Other parts of the landscape however, are fragmented; where late-seral stands are surrounded by openings. The Watershed Analysis recommended that:

- Stand manipulations should be prioritized in a way that minimizes additional fragmentation of remaining late-seral interior patches, while focusing on isolated patches that have little or no interior habitat. This strategy accomplishes two things; it avoids the interior patches that are most valuable to species dependent on late-seral habitats, and it increases the average patch size. (Upper Clackamas Watershed Analysis page 61.) The Proposed Action follows that recommendation and only harvests in patches that contain little or no interior habitat. An example of an isolated patch can be seen in this aerial photograph of proposed unit 1.



During the 30-day comment period there appeared to be some confusion that logging to reduce fragmentation was one of the major justifications for this project. For the Imp project the condition of the landscape and the health of stands is not a justification for harvest but is one means to prioritize where to propose harvest treatments within a watershed. The Clackamas River Ranger District prioritizes harvest treatment areas to meet the timber production as well as the other management goals of the NFP and the Forest Plan. Proposed harvest areas are based on the following and supported in the watershed analysis. These are listed on a priority basis:

1. Thinning of plantations that are economically feasible
2. Thinning of natural second-growth stands that are economically feasible
3. Salvage of dead or downed trees
4. Regeneration harvest of mid or late-seral stands that have little or no interior habitat and are growing slowly due to the effects of diseases, insects and mortality
5. Regeneration harvest of mid or late-seral stands that do not directly affect

important stands with interior habitat

Following these priorities, the Clackamas River Ranger District has planned and implemented many projects in which plantations and natural second-growth stands were thinned. In 1996 a large salvage effort of trees killed by the Douglas-fir bark beetle was also planned and implemented. The District is also currently planning four other projects that would thin plantations and natural second-growth stands. Some plantations are not ready for thinning because the trees are not yet large enough to create an economically viable timber sale. Other thinning projects would be proposed in the future as plantations grow. To gain greater focus on issues relevant to each harvest type, the District has chosen to analyze commercial thinning proposals separate from regeneration harvest proposals. However in cumulative effects analysis, all past, present and foreseeable projects are evaluated.

The Imp project, and others like it, are planned to provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future. The Northwest Forest Plan anticipated that older forest stands would need to be harvested to meet the Probable Sale Quantity (PSQ). During project development, when the harvest of older forest stands was proposed, there was a need to determine which stands to focus on. The agency chose to follow the recommendations of the Upper Clackamas Watershed Analysis and prioritize stands that were fragmented and had forest health concerns and not harvest stands that had interior habitat and were relatively healthy.

Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to harvest trees from approximately 88 acres using the reserve shelterwood regeneration method. Approximately 10% of the harvest area would be retained in patches and scattered large trees would be retained at the rate of 10 to 12 per acre. The scattered leave trees would primarily be selected from the largest component of trees present in the unit except where smaller trees are retained for spacing and species diversity. The scattered leave trees would include some decaying, hollow or dead topped trees where present. Snags and large logs would also be retained. The harvesting operation would generally remove most of the smaller trees as well as some of the larger trees; the average cut tree size would be approximately 20 inches diameter. Visual Quality Objectives would be met.

Unit	Size (acres)	Logging System
1	13	Skyline
3	9	Ground Based
4	12	Ground Based
5	8	Ground Based
6a	27	Ground Based
6b	13	Skyline
7	6	Skyline

This photo is an example of what the regeneration harvest units would look like after project completion (Gum Timber Sale).

A temporary road is needed to access the landings in unit 6. Some new temporary road construction is needed but most of the needed road would be reconstructed from an existing temporary road and a skid trail, which have been recently scarified and are currently closed to vehicle access. The approximate lengths would be: 1400 feet of reconstruction of an old temporary road, 1500 feet of reconstruction on the alignment of an existing skid trail and 500 feet of new temporary road construction. These temporary roads would be obliterated and revegetated after completion of the project. The road to unit 7 (4660.150) is currently closed by a berm. It would be opened for the project and would be closed by a berm upon completion of the project.

Logging methods used would include ground-based tractor and loader skidding and skyline yarding. Fuels reduction and site preparation would be accomplished through broadcast burning and machine piling and burning of logging slash prior to planting. A mix of conifer species that are adapted to the site conditions would be planted. The proposed action would begin as soon as possible.

Public Involvement

A scoping process to request public input for this project was conducted. A letter describing the proposed project and requesting comments was sent out in September 1998. The project first appeared in the Forest's spring 1998 issue of Sprouts, and in subsequent issues. Sprouts is a quarterly publication that is mailed to a wide audience. Comments have been received periodically since then. On November 10, 2003 a proposed action that included preliminary analysis was made available for the 30-day public comment period. Seven letters and e-mails were received. This Environmental Assessment (EA) includes a response to the substantive comments (Appendix A) and also includes some additional analysis and clarification.

Issues

The Forest Service received many comments during the scoping process. Using the comments received from the public, other agencies, local water providers and local environmental organizations, the interdisciplinary team developed the following list of issues. The substantive comments relate to the discussions of water quality, fish and harvesting old trees. Refer to the Response to Substantive Comments in Appendix A.

Issue #1: Water Quality and Fisheries - Roads
Based on the comments received, water quality and fish habitats are concerns for many people. Even though the proposed actions have been designed to meet current standards there is still a public concern about road construction and the effects to water quality.

Issue statement: The temporary road construction (approximately 500 feet) may pose a risk to water quality and fish by contributing sediment to streams. Qualitative measurements of sediment input would be used to describe impacts to water quality and fish. The nearest stream is Pot Creek at a distance of 2,500 feet from the road construction.

Issue #2: Harvesting of Older Forest – Based on the comments received there is a concern that the proposed harvest may impact the habitat of plants and animals associated with older forest. Comments also state that the assertion that the stands are fragmented and have little or no interior habitat is flawed, (Desired Future Conditions – Purpose and section). They go on to state that the stands should be left intact as refugia for plants and animals to use until surrounding plantations mature.

Issue statement: The proposed action may reduce the habitat for animal and plant species within the project area by harvesting older forest stands. The effect on these species would be measured in terms of 1/ quantity of late-seral interior habitat remaining, 2/ effects to species that require late-seral interior habitat, and 3/ the number of older trees remaining on a per acre basis.

ALTERNATIVES

This chapter describes and compares the alternatives considered for the Imp project. It includes a description of each alternative considered and a map. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternative A - No Action

Under the No-action alternative, current management plans would continue to guide management of the project area. No timber harvest or other associated actions would be implemented to accomplish project goals.

Alternative B - The Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to harvest trees from approximately 88 acres using the reserve shelterwood regeneration method.

Northwest Forest Plan standards for green tree retention and coarse woody debris in regeneration harvest would be applied. Approximately 10% of the harvest area would be retained in patches. Scattered trees would be retained to meet the green tree retention standard and to achieve silvicultural and wildlife objectives. The scattered leave trees would be retained at the rate of 10 to 12 per acre and would primarily be selected from the largest component of trees present in the unit except where smaller trees are retained for spacing and species diversity. The scattered leave trees would include some decaying, hollow or dead topped trees where present. Snags and large logs would also be retained.

A temporary road would be constructed to access landings for unit 6 (Approximately 3400 feet total length. Of this distance, 1400 feet would be reconstructed from an old closed temporary road, 1500 feet would be built on existing skid trails and 500 feet would be new temporary road construction). This temporary road would be obliterated and revegetated by the timber sale purchaser after completion of the project. The road to unit 7 (4660.150) is currently closed by a berm. It would be opened for the project and would be closed by a berm upon completion of the project.

Logging methods used would include ground-based tractor and loader skidding and skyline yarding. Fuels reduction and site preparation would be accomplished through broadcast burning and machine piling and burning of logging slash prior to planting. A mix of conifer species that are adapted to the site conditions would be planted.

Alternative C

Alternative C is designed to respond to issue #1 (effect to water quality and fish due to road construction). Alternative C is similar to Alternative B except it would not construct any new temporary roads. Portions of proposed harvest units that are not accessed by existing roads would be harvested by helicopter. Unit 6b would be helicopter logged for a total of 13 acres. Approximately 1400 feet of existing temporary road would be reconstructed to access Unit 6a.

Alternative D

Alternative D is designed to respond to issue #1 (effect to water quality and fish due to road construction) and issue #2 (a concern about the effects to animal and plant species that are dependent on older forest stands). This photo shows what 30 trees per acre would look like after harvest. Alternative D has the same unit boundaries as Alternative B but instead of the 10 -12 leave trees per acre with Alternative B, it would leave approximately 30 of the largest and oldest trees per acre. Stands harvested using this alternative would retain more of

the older forest stand components needed for certain animal and plant species. As in Alternative B, leave trees would primarily be selected from the largest component of trees present in the unit except where smaller trees are retained for spacing and species diversity.

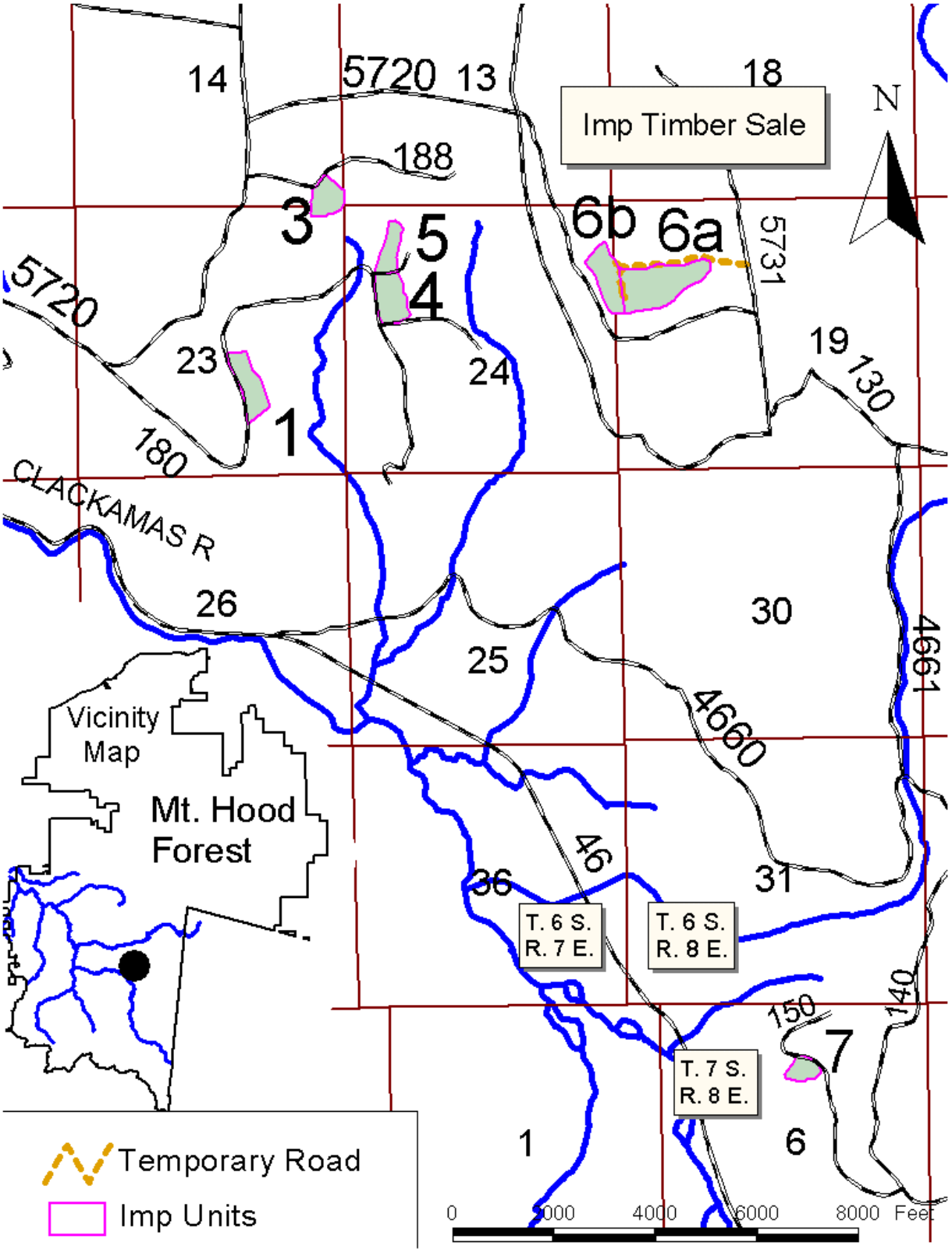
The units would still be considered regeneration harvests and would include site preparation and planting. As with alternative C, portions of proposed harvest units that are not accessed by existing roads (Unit 6b) would be harvested by helicopter.

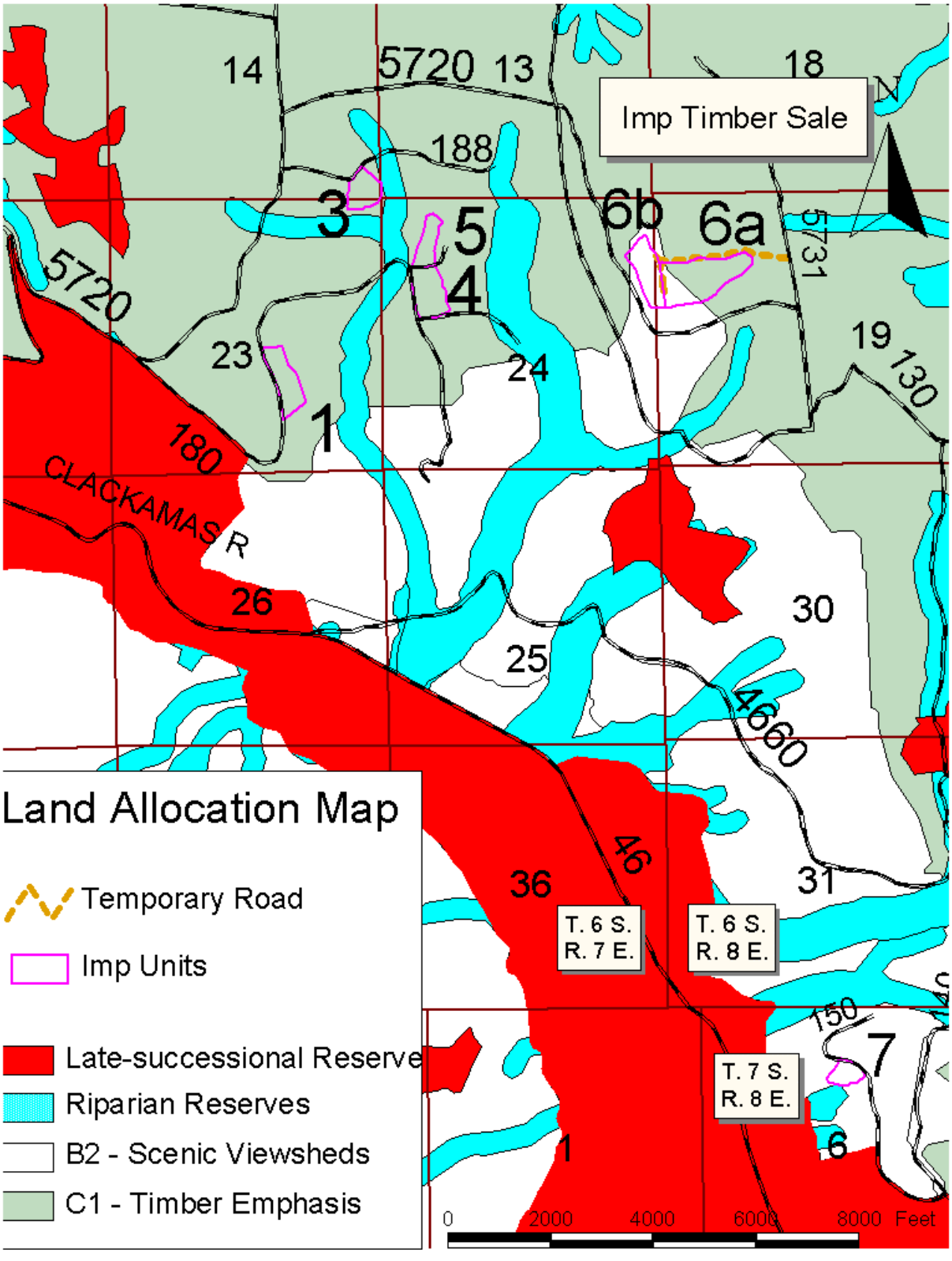
Alternatives Considered But Not Fully Developed

An alternative was considered that would build the temporary roads as described in Alternative B but would retain 30 trees per acre as described in Alternative D. This alternative was not developed separately because it is within the current range of alternatives. In other words, the decision maker could select Alternative B but elect to leave 30 trees per acre.

Alternatives were considered that would include restoration projects such as road closures, road decommissioning and dispersed campsite rehabilitation. Comments were received suggesting that we not mix restoration projects with timber harvest projects. These restorations are not connected actions and are not included in the range of alternatives for this analysis. These restoration projects are being assessed in a separate Forest-wide Restoration Environmental Assessment.

During the 30-day comment period, Oregon Natural Resources Council (ONRC) requested that an alternative that protects all snags be considered. All of the action alternatives would save existing snags where safety permits. ONRC suggested an alternative that would save snags by avoiding all harvesting in the hazardous zone around the snags. Survey data shows that there are approximately 13 snags per acre within the proposed harvest units. The hazardous zone around just one snag would be approximately one acre in size (assuming an average height of 120 feet). Trying to avoid the hazard zone around all 13 snags would eliminate all of the harvest units. It would be very difficult to develop this alternative because snags are continually changing. In the 2 to 3 years between planning and logging, live trees may die and become hazardous snags. Snags that are a hazard today may fall by the time harvest occurs and no longer present a hazard. There is no way to predict today how many hazardous snags would have to be felled to prevent injuries to forest workers. It would be unfeasible to develop an alternative that would protect all snags within a timber sale that occurs over a 2 to 3 year period. ONRC's suggestion of an alternative that protects all existing snags is essentially the same as the no-action alternative.


Imp Timber Sale
N
14
5720
13
18
188
3
5
4
6b
6a
5731
5720
23
24
19
130
1
180
CLACKAMAS R
26
30
25
4661
4660
Vicinity Map
Mt. Hood Forest
46
36
31
T. 6 S. R. 7 E.
T. 6 S. R. 8 E.
150
7
T. 7 S. R. 8 E.
1
6
Temporary Road
Imp Units
0
2000
4000
6000
8000 Feet


Imp Timber Sale
N
14
5720
13
18
188
3
5
4
6b
6a
5731
5720
23
24
19
130
1
180
CLACKAMAS R
26
30
25
4660
46
36
31
T. 6 S.
R. 7 E.
T. 6 S.
R. 8 E.
150
7
T. 7 S.
R. 8 E.
6
1
0
2000
4000
6000
8000 Feet
Land Allocation Map
Temporary Road
Imp Units
Late-successional Reserve
Riparian Reserves
B2 - Scenic Viewsheds
C1 - Timber Emphasis

Best Management Practices (BMPs) and Design Criteria Common to All Alternatives

1. **Soils:** No operation of off-road ground-based equipment would be permitted between November 1 and May 31. This restriction applies to harvest units 3, 4, 5 and 6a as well as the ground-based equipment on connected projects and road construction, reconstruction, and landing construction. This restriction may be waived if soils are dry or frozen or if operators switch to skyline or other non-ground based systems. *This is a BMP and it implements Forest Plan standards and guidelines FW-022 and FW-024.*

2. **Deer and Elk Winter Range:** No log haul or snow plowing would be permitted on a portion of road 4660 in Crucial Winter Range between December 1 through March 31. This could apply to log haul on units 6 and 7, but alternate haul routes are available including roads 5720, 5730 or 4200 that have no restriction. *This implements Forest Plan standard and guideline FW-211 and a memorandum of understanding with Oregon Department of Fish and Wildlife.*

3. Where safety permits existing **snags** would be retained in all units. If a post harvest review of snags indicates that units do not meet the minimum level of 2.4 hard snags per acre, snag creation would be scheduled by the 4th year after harvest. *This implements Forest Plan standard and guideline FW-215.*

4. In regeneration units leave 240 linear feet of **coarse woody debris** per acre greater than or equal to 20 inches diameter. Logs less than 20 feet in length cannot be credited toward this total. *This implements a NFP standard and guideline, page C-40.*

5. To reduce **erosion** from timber sale activities, bare soils would be revegetated. Grass seed and fertilizer would be evenly distributed at appropriate rates to ensure successful establishment. Mulch may be used on slopes greater than 20%. Effective ground cover would be installed prior to October 1 of each year. *This is a BMP and it implements Forest Plan standard and guideline FW-025.*

   Native plant species would be used to meet erosion control needs and other management objectives such as wildlife habitat enhancement. Appropriate plant and seed transfer guidelines would be observed. Non-native species may be used if native species would not meet site-specific requirements or management objectives. Non-native species would be gradually phased out as cost, availability, and technical knowledge barriers are overcome. Undesirable or invasive plants would not be used. *This implements Forest Plan standard and guideline FW-148.*

   Grass seed would preferably be certified by the states of Oregon or Washington or grown under government-supervised contracts to assure noxious weed free status. In certain cases non-certified seed may be used if it is deemed to be free of State of Oregon listed noxious weeds. *This implements Forest Plan standard and guideline FW-148.*

When straw is utilized, it would originate from the state of Oregon or Washington fields which grow state certified seed, or grown under government-supervised contracts to assure noxious weed free status, or originate in annual ryegrass fields in the Willamette Valley. In certain cases, straw or hay from non-certified grass seed fields may be used if is deemed to be free of State of Oregon listed noxious weeds. *This implements Forest Plan standard and guideline FW-148.*

6. All off-road equipment is required to be free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds prior to coming onto National Forest lands. Timber sale contracts and service contracts would include provisions to minimize the introduction and spread of invasive plants. **Invasive plants** are any plant species not native to a particular ecosystem that are likely to cause economic or environmental harm, or harm to human health. These provisions contain specific requirements for the cleaning of off-road equipment. *This implements Executive Order 13112 dated February 3, 1999.*

   Prior to the implementation of ground disturbing activities, a noxious weed survey of proposed landing sites, designated hauling routes, and rock/borrow pits needed for road work would be conducted to ensure that no new weed infestations exist at these locations. Manual control (handpulling and/or clipping) of any Oregon State "B" designated weeds would be conducted if the weeds occur in areas of high ground disturbance that may be utilized during the timber sale operations. Surveys have been conducted, but since weeds may spread quickly it is prudent to look again just prior to ground disturbing activities. *This implements Executive Order 13112 dated February 3, 1999.*

7. Avoid the use of ground-based yarding operations (tractors, skidders, etc.) on slopes greater than 20%, because of the risk of damage to soil and water resources. Skid trails for ground-based equipment would be designated to meet Mt. Hood Forest Plan standards for soils. Existing skid trails would be used where possible. Restrict ground-disturbing activities to non-saturated soil areas. *This is a BMP and it implements Forest Plan standard and guideline FW-022.*

8. When slash is piled in harvest units, one pile per acre would be retained unburned for use by wildlife. *This implements Forest Plan standard and guideline FW-241.*

9. Firewood would be made available to the public at landings where feasible. *This is an opportunity to contribute to Forest Plan - Forest Management Goal #19, and provide forest products consistent with the NFP goal of maintaining the stability of local and regional economies.*

10. Riparian Reserves: All of the harvest units have been designed to avoid riparian reserves therefore; no special riparian design criteria are required. *This is a BMP and implements NFP standards and guidelines, page C-30.*

11. Monitoring: *This Implements Forest Plan and NFP monitoring requirements.*

    Prior to advertisement of a timber sale, a cross walk table would be prepared to check the provisions of the Timber Sale Contract and other implementation plans with this EA to insure that required elements are properly accounted for.

    During implementation, Timber Sale Administrators monitor compliance with the Timber Sale Contract which contains provisions for resource protection including but not limited to: seasonal restrictions, snag and coarse woody debris retention, stream protection, erosion prevention, soil protection, road closure and protection of historical sites.

    Post harvest reviews would be conducted where needed prior to post harvest activities such as slash treatment, site preparation, tree planting, snag creation and firewood removal. Based on these reviews, post harvest activities would be adjusted where needed to achieve project and resource objectives.

    Reforestation monitoring would be conducted and if insufficient survival rates are encountered, replanting would be scheduled. Monitoring of noxious weeds and invasive plants would be conducted where appropriate to track changes in populations over time and corrective action would be prescribed where needed.

    Monitoring is also conducted at the Forest level. For example, water quality is monitored for both temperature and turbidity at several locations across the Forest. Monitoring reports can be found on the Forest's web site at http://www.fs.fed.us/r6/mthood under Forest Publications.

Pages 27 to 29 contain a discussion of effectiveness of BMPs.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

	Alternative A No Action	**Alternative B Proposed Action**	**Alternative C**	**Alternative D**
Issue #1 Affect of Roads on Water Quality and Fish	No road construction. No impacts to water quality from road construction.	500 feet of new temporary road construction. Vegetative buffers would act as an effective barrier to any sediment being transported into streams by surface erosion. Adverse impacts eliminated or substantially reduced by use of BMPs and consistency with ACS.	No road construction. No impacts to water quality from road construction.	No road construction. No impacts to water quality from road construction.
Issue #2 Changes to late-seral interior habitat	No change	Harvest does not impact any late-seral interior habitat.	Same as B	Same as B
Issue #2 Effects on Northern Spotted Owl	No Effect	Would not likely jeopardize the continued existence of the spotted owl or result in the destruction or adverse modification of spotted owl critical habitat.	Same as B	Same as B
Issue #2 Number of older trees remaining per acre	80 to 100	10-12	10-12	30
Approximate Timber Output	0	4,000 CCF or 2 MMBF	4,000 CCF or 2 MMBF	2,000 CCF or 1 MMBF
Acres of Timber Productivity Improved	0	88	88	88
Economic Viability Benefit/Cost ratio	0	1.01	0.95	0.38

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

WATER QUALITY AND FISHERIES (Issue #1)

This section addresses Issue #1: Temporary road construction may pose a risk to water quality and fish by contributing sediment to streams. This section also addresses effects from all other components of the alternatives including logging and fuels treatments. It also includes an assessment of the Aquatic Conservation Strategy and a discussion of the

Clean Water Act and Best Management Practices. The Imp Fisheries Biological Evaluation and Biological Assessment are incorporated by reference and summarized below.

Mt. Hood Forest Plan References

Forestwide Riparian Standards and Guidelines - FW-80 to FW-136, page Four-59
Forestwide Water Standards and Guidelines - FW-54 to FW-79, page Four-53
Forestwide Fisheries Standards and Guidelines - FW-137 to FW-147, page Four-64
General Riparian Standards and Guidelines - B7-28 to B7-39, page Four-257
Mt. Hood FEIS pages IV-22, IV-47, IV-155 to IV-167

Northwest Forest Plan References

Riparian Reserves - page A-5
Aquatic Conservation Strategy - pages B-9 to B-34
Riparian Reserves Standards and Guidelines - pages C-30 to C-38
Watershed Analysis - pages E-4, E-20 to E-21

Existing Situation

The following is a summary of information contained in the Fish Biological Evaluation in the Appendix.

The Imp project area is located on the upper ridges and upland terraces within the Pot, and Big Bottom subwatersheds of the Upper Clackamas River. The Upper Clackamas River corridor is designated a Tier I, Key Watershed under the Northwest Forest Plan because of its crucial refugia for at-risk fish species. The nearest unit is approximately 500 feet outside the Key Watershed boundary. Streams associated with the Imp planning area include Pot Creek, Lost Creek (a tributary to Pot Creek), and an unnamed intermittent tributary within the Big Bottom subwatershed of the Clackamas River. Natural and man-made barriers restrict the passage of anadromous fish species into the planning area. Lower Columbia River (LCR) steelhead and Upper Willamette River (UWR) spring chinook salmon, species listed as threatened under the Endangered Species Act (ESA), occur downstream of project area. These species occur over 1.2 miles downstream of units 1, 3, 4, 5 and 6 within the Pot Creek subwatershed and 0.5 mile downstream of unit 7, which is located within a small non-fish bearing drainage of the Big Bottom subwatershed. All Imp units are located outside of any Riparian Reserves.

Resident populations of cutthroat trout inhabit all perennial stream reaches within the planning area. All of these streams flow directly or indirectly into the Big Bottom segment of the Clackamas River, thus influencing the fish habitat and water quality of the Upper Clackamas River. The Big Bottom area provides excellent quality spawning and rearing habitat for spring-run chinook salmon, coho salmon, steelhead, and resident trout.

Potential effects to listed, proposed, candidate, or sensitive fish species and their habitat from the proposed project include direct, indirect and cumulative effects. An example of direct effects may include increased levels of fine sediment in local streams generated during road building, logging, and hauling. An example of indirect effects may include increased amounts of fine sediment downstream in rivers or at the intake of municipal water providers, due to erosion from harvest units and roads. Cumulative effects in this

watershed would focus around changes in the timing and/or magnitude of flow events resulting from past, present and future forest conditions. Cumulative effects have been evaluated at more than one scale. For example, watershed analysis was conducted to take a watershed scale look at resources. During the consultation process, the regulatory agencies considered the entire range of a species of concern. At the local scale, subwatersheds are used to evaluate risks.

Sediment

Alternative A

In its current condition the project area would remain unchanged in regards to sediment, water quality and fisheries. There would be no effects to water quality or fisheries resources from road construction.

Alternative B

Ground disturbing activities associated with road building have been designed to minimize the risk of erosion and the potential for sediment to be transported to streams. Because of the distance of the proposed temporary roads to any water source, vegetative buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or runoff. Any impact to water quality or fisheries resources caused by sedimentation due to road construction would be short-term and undetectable at a watershed scale. The following factors described previously in the Alternatives section would minimize or prevent any negative impacts to water quality and aquatic resources:

- The proposed temporary road would be constructed on flat terrain, along a ridge top, which would avoid an increase in the drainage network.
- The proposed temporary road is over 2000 feet from any intermittent or perennial stream. The road is located on dry ground outside of any riparian area, would not cross any stream channel, and would have no hydrologic link to any water source.
- The proposed temporary road would be obliterated and revegetated directly following completion of harvest operations. This obliteration and revegetation would help reduce compaction and increase infiltration rates but it would not return the site to pre-disturbance conditions.
- A portion of the constructed road would be on an old temporary road and existing skid trails, which are already partially compacted thus reducing the amount of new ground disturbance.
- Road construction would occur during the dry season between June 1 and October 31.

Established Riparian Reserve widths of two site potential tree heights along fish bearing stream channels and one site potential tree height along other streams would reduce the risk of any sediment being transported to a stream channel. The Riparian Reserve widths would allow soil infiltration between the unit and any water source. Even if some soil movement occurred, the vegetated buffer strips along every stream would act as an effective barrier. The Riparian Reserve widths would also maintain stream shading so there would be no

increase in stream temperatures caused by harvest. Seasonal restrictions on ground-based operations would further reduce the risk of soil disturbance and run-off. The chance that measurable amounts of fine sediment would enter any stream within the project area as a direct result of logging activity is negligible.

Log hauling would not measurably increase the amount of fine sediment in streams. The roads along the haul route are well-rocked or paved at all stream crossings and road ditches have been maintained and are well vegetated. This would decrease the potential of any fine sediment entering stream channels during hauling activities. There are no listed fish species that occur in the vicinity of any aggregate surfaced stream crossing along the haul route. Travel distances along aggregate surface roads average three miles. The distance from any stream crossing to listed fish species or their habitat is 0.5 miles at unit 7, and more than 1.4 miles from the remaining units. No sediment input to stream habitat is expected by hauling along the specified routes. If any sediment did enter stream courses from hauling activities, it would be in very small amounts and for a short-term duration. No adverse effect to listed or resident fish species or their habitat is expected from hauling logs along the specified route.

Alternative C and D

The effects for Alternative C and Alternative D are similar to Alternative B. These alternatives do not include any road construction therefore there would be no risk of erosion due to the construction of roads. There would be less risk erosion from harvest operations since helicopter logging would be used instead of skyline yarding in some areas. Because of less ground disturbance, chances of sediment reaching the stream channel is even less likely than Alternative B.

Fish Stocks of Concern

The effects of the implementation of the Imp Project on fish stocks of concern would be based on local populations of resident cutthroat trout and populations of listed fish species downstream of the project area in the Clackamas River. There are no threatened or candidate fish species present within the project area. The nearest proposed unit to listed fish species or habitat is unit 7 that is located within the Big Bottom subwatershed. This unit is 0.5 miles above the occurrence of listed fish species within the Clackamas River. The remaining units of the Imp Project Area are within the Pot Creek subwatershed, and are over 1.2 miles above the occurrence of listed fish species or their habitat.

Columbia River Bull Trout *(Salvelinus confluentus)* - (Threatened) Bull trout were once prolific in the Clackamas River system. At present, they are believed to be extinct. Adult bull trout that occurred in the Clackamas River exhibited a fluvial life history character, maintaining residence in the main river and larger tributaries. It is quite likely that adult bull trout in the Clackamas River migrated to the Willamette and Columbia rivers prior to construction of River Mill Dam. Adult bull trout would reside in the mainstem and larger tributaries until their spawning period during mid-August through September, at which time they would migrate upstream to smaller tributaries to spawn.

U.S. Forest Service fisheries biologists conduct fisheries sampling on an annual basis on many streams throughout the Clackamas River watershed upstream of North Fork Reservoir. To date, these sampling efforts have never yielded capture of bull trout. After several years of intensive sampling, U.S. Forest Service fisheries biologists believe that bull trout in the Clackamas River are considered to be "functionally extinct." Since bull trout are not present in the Clackamas River system the effects determination for this species is "No Effect" for all alternatives.

Lower Columbia River Steelhead (*Oncorhynchus mykiss*) - (Threatened) Adult steelhead migrate into the waters of the Clackamas River drainage above North Fork Dam primarily during April through June with peak migration occurring in May. Spawning occurs during the months of April thru June in the Upper Clackamas River. Steelhead use the majority of the mainstem Clackamas and the lower 3.7 miles of the Oak Grove Fork as spawning and rearing habitat. Winter steelhead fry emerge between late June and late July and rear in freshwater habitat for one to three years. Smolt emigration takes place March thru June during spring freshets.

Steelhead occur 0.5 miles downstream of an intermittent, non-fish bearing tributary of the Upper Clackamas River along unit 7. This unit is located within the Big Bottom subwatershed. The remaining units, located within the Pot Creek subwatershed, are more than 1.2 miles above any known occurrence of listed fish species or their habitat. Because of the distance of the project area from any presence of Lower Columbia River steelhead or its habitat the effects determination for this species would be "May affect, Not likely to adversely affect" (NLAA) for all of the action alternatives. The no-action alternative would have a rating of "No Effect."

Upper Willamette River Spring Chinook (*Oncorhynchus tshawytscha*) - (Threatened) - Upper Willamette River spring chinook salmon occur in the Clackamas River. The ESU consists of both naturally spawning and hatchery produced fish. These spring chinook enter the Clackamas basin from April through August and spawn from September through early October with peak spawning occurring the 3rd week in September. These fish primarily spawn and rear in the mainstem Clackamas River and larger tributaries.

Adults in the Lower Clackamas drainage spawn in Eagle Creek, below River Mill Dam and between River Mill and Faraday diversion dams. Spawning in the upper Clackamas drainage has been observed in the mainstem Clackamas from the head of North Fork Reservoir upstream to Big Bottom, the Collawash River, Hot Springs Fork of the Collawash River, lower Fish Creek, South Fork Clackamas River and Roaring River.

Spring chinook occur in the Upper Clackamas River 0.5 miles downstream from any proposed unit within the Big Bottom subwatershed and 1.2 miles downstream from any unit within the Pot Creek subwatershed. Because of the distance of the project area to the presence of Upper Willamette River chinook and its habitat, the effects determination for this species would be "May affect, Not likely to adversely affect" (NLAA) for all of the action alternatives. The no-action alternative would have a rating of "No Effect."

Lower Columbia River Fall Chinook (*Oncorhynchus tshawytscha*) (Threatened)
The fall chinook within the Clackamas Subbasin are thought to originate from "tule" stock which was first released into the subbasin in 1952 and continued until 1981. Since 1981 no fall chinook have been released into the Clackamas River. However some adult fall chinook released as juveniles above Willamette Falls may have strayed into the Clackamas River.

Historically fall chinook spawned in the mainstem Clackamas River above the present site of the North Fork Dam before its construction. Currently the "tule" stock of fall chinook spawn below River Mill Dam and in the lower reaches of Clear Creek. Fall Chinook spawn late August through September. These fish primarily spawn and rear in the mainstem Clackamas River and larger tributaries and are not found on the Clackamas River Ranger District. Because of the distance of the occurrence of fall chinook from the project area (greater than 20 miles) the effects determination for this species is "No Effect" for all alternatives.

Lower Columbia River Fall Chum (*Oncorhynchus keta*) (Threatened)
Fall chum historically have inhabited the lower portion of the Clackamas River but no current records are available to confirm any chum presence within the Clackamas River. The effects determination for this species is "No Effect" for all alternatives.

Lower Columbia River/Southwest Washington Coho Salmon (*Oncorhynchus kisutch*) (Candidate for listing) The Clackamas River contains the last important run of wild late-run winter coho in the Columbia Basin. Coho salmon occupy the Clackamas River and the lower reaches of streams in the Upper Clackamas watershed including the lower two miles of the Oak Grove Fork. Adult late-run winter coho enter the Clackamas River from November through February. Spawning occurs mid-January to the end of April with the peak in mid-February. Peak smolt migration takes place in April and May.

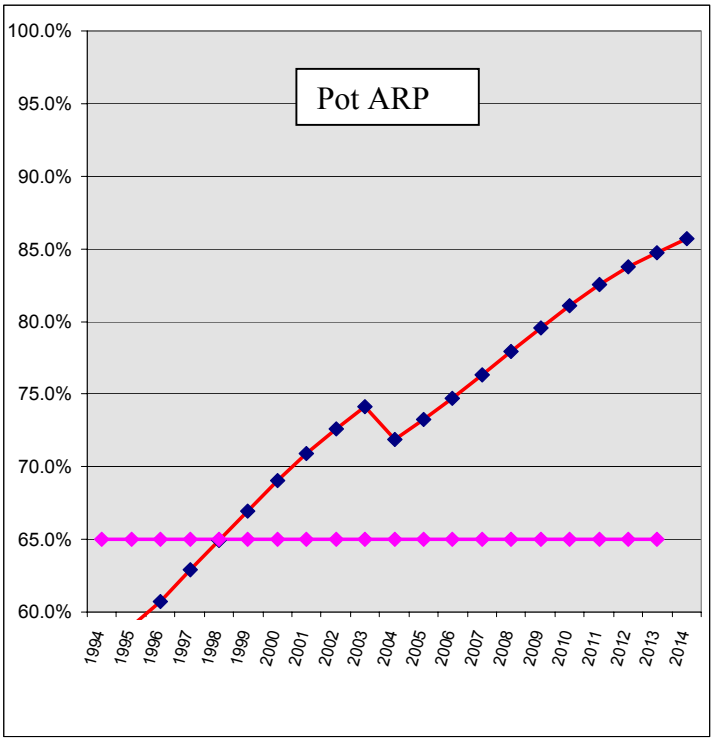
Coho occur 0.5 miles downstream from any unit within the Big Bottom subwatershed and 1.2 miles downstream of any unit within the Pot Creek subwatershed. Because of the distance of the project area to any presence of Lower Columbia River/Southwest Washington coho salmon or its habitat, the effects determination for this species would be "May affect, Not likely to adversely affect" (NLAA) for all of the action alternatives. The no-action alternative would have a rating of "No Effect."

Southwestern Washington/Columbia River Cutthroat Trout (*Oncorhynchus clarki*) - (Sensitive). Searun cutthroat have historically existed in the Clackamas River below River Mill Dam. Cutthroat have been observed going downstream over the dam complex by PGE biologists, but never observed migrating upstream. It is not known whether the Clackamas River above the hydro-complex was part of their historic range.

Coastal cutthroat trout exhibit diverse patterns in life history and migration behaviors. Populations of coastal cutthroat trout show marked differences in their preferred rearing environments (river, lake, estuary, or ocean); size and age at migration; timing of

migrations; age at maturity; and frequency of repeat spawning. Resident coastal cutthroat trout inhabit the upper Clackamas River and its tributaries.
Because of the presence of resident coastal cutthrout trout in the streams within and downstream of the project area the effects determination for Southwestern Washington/Columbia River cutthroat trout is "May impact individuals or habitat but will not likely contribute to a trend towards federal listing" (MIIH) for all of the action alternatives. The no-action alternative would have a rating of "No Impact."

Cumulative Effects – Watershed Impacts to Streams, Water Quality and Fish



The Aggregate Recovery Percentage (ARP) index is often used to calculate cumulative effects of past and future harvest activities. It is also a tool to determine compliance with Forest Plan standards and guidelines. It evaluates the risk of increased peak flows from rain-on-snow events. In stands with little or no canopy, within the transient snow zone, snow accumulation on the ground is subject to rapid melting during periods of rain. Two subwatersheds are affected: Pot and Big Bottom. The Pot graph shows the 20-year trend for ARP values. The other is similar and they show that with all past, current and reasonably foreseeable future actions, that the subwatersheds are experiencing a period of steady hydrologic recovery. The minimum Forest Plan level for harvest dispersion in this watershed is 65% (Forest Plan, Four-53). This level was established based on the sensitivity of landforms in the watershed to potential cumulative watershed effects such as changes in peak flows caused by harvest activities. In relative terms, this watershed is more stable and are not affected by rain on snow events to the extent of some other watersheds within the Clackamas drainage that have thresholds as high as 82%.

ARP Value in 2004

Subwatershed	Alternative A	Action Alternatives
Pot	75.6	72.0
Big Bottom	83.6	83.5

The ARP analysis looks at the existing condition of vegetation as it has been affected by past timber sales, fires, wind, and other disturbances. These disturbances are tracked by

stand age (Data source – GIS data from Veg2000.shp). The analysis includes the effect of roads and permanent openings such as rock quarries and power lines. It also would include the impact of harvest and roads on other ownerships; but in this area there are none. The ARP analysis also includes other planned timber sales that overlap these subwatersheds including Tarzan and Upper Clackamas Thinning.

The examination of potential thinning opportunities is ongoing. While the actual acres and the timing are somewhat speculative at this point, the ARP analysis includes our best estimate of these acres. Approximately 770 acres of thinning are being examined at this time for possible thinning in the Upper Clackamas. This potential thinning is included in the ARP analysis.

The ARP analysis described above is analyzed at the subwatershed scale. However, the Forest Plan contains a standard that indicates that major drainages should not be below 65% recovery (Four-53). An analysis of major drainages indicates that the Upper Clackamas watershed would be at approximately 80% recovered after all of the past, present and reasonably foreseeable projects are included. The analysis shows a trend of 1% hydrologic recovery each year due to the rapid growth of mid-seral plantations. If future harvest were to occur at the rate projected in the watershed analysis (refer to discussion on EA page 25) the resultant affect on ARP figures would be to reduce the 1% annual recovery by approximately 0.2%. In other words, even with future projected harvest the ARP curve would show a steady 0.8% annual increase and a trend toward continual hydrologic recovery.

Other foreseeable projects include restoration actions. These projects do not change the ARP calculation because they do not affect tree canopies but they would have a beneficial effect to aquatic and riparian resources within the Upper Clackamas River watershed. Recent restoration activities within the upper Clackamas River watershed include riparian and fish passage projects. Project work performed during the summer of 2003 included repairing vehicle damage at 11 dispersed campsites within riparian areas and replacing a barrier culvert with a fish friendly culvert that has restored anadromous and resident fish passage to approximately three miles of tributary stream. Foreseeable restoration actions that would have a beneficial effect to aquatic and riparian resources within the Upper Clackamas River watershed have been identified and are awaiting funding. Planned restoration project within the Upper Clackamas River watershed include: replacing five culverts to improve fish passage, road repair along 24 miles of road to reduce erosion problems, and skid trail/temporary road subsoiling and waterbarring. The repair of some road damage is also included under other timber sales including reconstruction of road 5720. While these projects have clear long-term benefits, there is the potential that some projects, that are in close proximity to streams, may contribute to short-term increases in sediment until erosion control measures take effect. The chance that the Imp project would contribute measurable amounts of sediment to any stream is negligible; therefore there would be no significant cumulative effect.

Currently the Mt. Hood National Forest is participating in a collaborative process with a local utility and other federal and state agencies to relicense the Clackamas River

Hydroelectric Project, a series of three hydro facilities along the Lower Clackamas River. Foreseeable beneficial effects to the Upper Clackamas watershed as the result of this effort could include: improved fish passage at the project dams for both upstream migrating adults and downstream migrating juvenile salmonids, culvert improvements for fish passage, and in stream habitat improvement projects.

For more information on cumulative effects on watershed and fisheries, refer to Chapter 5 of the Upper Clackamas Watershed Analysis.

A concern has been raised that the watershed analysis is outdated because harvesting has occurred or been planned since then. The table below shows that harvest levels are below the levels projected in the watershed analysis. The watershed analysis projected future regeneration harvest levels based on the Proposed Sale Quantity from the Northwest Forest Plan and found that those levels were both sustainable and within standards for cumulative effects analysis. Refer to Upper Clackamas Watershed Analysis page 52. Future harvest, if any, would be at or below the projected PSQ level. The figures below are the regeneration harvests that have been planned between 1995 and 2004. The actual time frame for completing these sales would likely extend into the next 2 or 3 years. Contract termination dates for the sales currently under contract such as Lemiti, Cub and Tarzan generally expire between 2004 and 2006.

	Upper Clackamas
Projected	200 acres per year.
Completed or Started	548 acres. Gum, Bazooka and Lemiti.
Foreseeable Projects	539 acres. Bear, Cub, Tarzan, Jane, Slinky and Imp.
Actual 1995 to 2006	99 acres per year. (1087 total acres in 11 years)

The Aquatic Conservation Strategy

The Upper Clackamas Watershed Analysis evaluated the geomorphic and ecological processes operating in this watershed. This analysis set the stage for planning projects that achieve the ACS objectives and made recommendations for future planning efforts so that proposals would not retard or prevent the attainment of the ACS objectives. The action alternatives are consistent with the recommendations made in the watershed analysis.

Riparian Reserve widths for all of the proposed timber harvest are consistent with the recommendations in the watershed analysis. By implementing these reserve widths the projects would be consistent with objectives #1, 2, 3, 4, 5, 8, and 9 of the ACS. Additionally the cumulative watershed effects analysis (ARP) shows that the project is also consistent with ACS objectives #6 and #7 because they would not measurably affect peak flows. Projects were designed to maintain ARP values above the thresholds stated in the Mt. Hood Forest Plan.

The ACS was considered in developing site specific BMPs to limit effects of projects on water quality. These BMPs include practices such as seasonal restrictions on ground disturbing activities, no-cut buffers along streams, erosion control measures, and obliteration of temporary spur roads. Stream shade conditions would remain unchanged and no change in water temperature is expected. Design criteria have been developed to minimize the risk of fertilizer entering streams during grass seeding operations. Direct application is avoided by using a "no application buffer" to avoid application near streams and areas of surface water for protection of fish and other aquatic organisms. Adherence to the BMPs would maintain water quality and the sediment regime, both being consistent with ACS objectives #4 and #5.

The action alternatives maintain, restore, and/or do not prevent the attainment of the ACS objectives at the watershed scale. They are consistent with the ACS strategy of the Northwest Forest Plan.

The Clean Water Act and Best Management Practices

Sections 208 and 319 of the Clean Water Act of 1972, as amended (1977 and 1987), acknowledge land treatment measures as being an effective means of controlling nonpoint sources of water pollution and emphasizes their development. These land treatment measures are known as Best Management Practices (BMPs). BMPs are used to control or prevent nonpoint sources of pollution from resource management activities, and to ensure compliance with the Clean Water Act, as amended, the Oregon Administrative Rules (OAR 340-41-001-975), Department of Environmental Quality (DEQ); and the Memorandum of Understanding between the Oregon DEQ and the USDA, Forest Service.

General BMPs are described in the document General Best Management Practices, USDA Forest Service, Pacific Northwest Region (11/88). The BMPs are flexible in that they are tailored to account for diverse combinations of physical and biological environmental circumstances.

Project Specific BMPs for the action alternatives

- **Design Criteria –** Design criteria 1, 5, 7 and 10 on pages 15 and 16 are specifically designed to protect water quality. They are specific to this proposed action and are tailored to site-specific conditions.

- **Project Design -** The project was designed from its inception to avoid potential water quality related impacts.
  - All harvest units, landing construction and road construction would be outside of riparian reserves.
  - Proposed temporary road construction would be on gentle terrain and would be closed and revegetated upon completion.
  - Logging systems appropriate to the specific terrain of each unit were designed to avoid water quality impacts.

- During unit and road placement, certain areas were avoided such as soil types and landforms with high potential for surface erosion, compaction, displacement, and sedimentation. During unit placement, harvest areas were dispersed across the landscape.
- Site preparation and fuels treatment methods appropriate to the specific terrain of each unit were designed to avoid water quality impacts.
- Areas harvested using the regeneration method would be promptly reforested using a combination of planting and natural seeding.
- Road reconstruction along haul routes is designed to reduce erosion and repair damaged sections. For this project the damaged sections along the haul route would be repaired by another timber sale.

- **Standard and Special Provisions of the Timber Sale Contract –** Several sections of the timber sale contract implement BMPs. CT6.34 Sanitation and Servicing and BT6.341 Prevention of Oil Spills both deal with the prevention of pollution. The following list of contract provisions require practices such as constructing waterbars to divert water from skid trails and spreading grass seed: CT6.315 Sale Operation Schedule, BT6.42 Skidding and Yarding, CT6.42 Yarding/Skidding Requirements, BT6.422 Landings and Skid Trails, BT6.5 Streamcourse Protection, BT6.6 Erosion Prevention and Control, CT6.6 Erosion Control and Soil Treatment by the Purchaser, BT6.62 Wetlands Protection, BT6.63 Temporary Roads, BT6.64 Landings, BT6.65 Skid Trails and Fire Lines, BT6.66 Current Operating Areas, and BT6.67 Erosion Control Structure Maintenance. The contract provisions CT5.1 Temporary Road and Landing Construction, CT5.31 Road Maintenance Requirements, and CT5.32 Road Maintenance Deposit Schedule, ensure that roads are appropriately maintained.

  Adherence to the provisions of the timber sale contract is ensured by the continual inspections of trained and certified Sale Administrators and is backed up by contract provisions such as BT9.1 which requires a performance bond to guarantee faithful performance of the above requirements.

The project as designed, including the avoidance of critical areas, standard design criteria and the provisions of the Timber Sale Contract, implement BMPs and result in providing clean water.

Monitoring implementation of project specific BMPs is ongoing during project layout and sale administration. After the harvesting operations are complete, these projects would be included in the pool of Forest-wide projects available for monitoring the effectiveness of the BMPs. Past monitoring of similar projects types has been documented in the Mt. Hood Monitoring and Evaluation Reports. Specifically, in the 2001 Monitoring Report (page 21), soil degradation was measured at 6% or less. In terms of water quality in the Clackamas River (measured at the Carter Bridge water monitoring station), the 2002 Monitoring Report (page 62) concluded, "Overall, water quality is very good at this particular monitoring site on the Clackamas River."

The Project Specific BMPs and practices listed above are standard operating procedures and they have been implemented in many previous projects. Past experience, research and monitoring indicate that these practices are highly implementable and highly effective based on the criteria found in Forest Plan Appendix H (page 6).

After analyzing the effects of the alternatives with design criteria and BMPs, no significant impacts were found that would require further mitigation to protect water quality.

TIMBER PRODUCTIVITY

Mt. Hood Forest Plan References
Forestwide Timber Management Standards and Guidelines - FW-306 to FW-385, page Four-86
Timber Emphasis Standards and Guidelines – C1-16 to C1-35-39, page Four-296
Mt. Hood FEIS pages IV-50 to IV-76

Northwest Forest Plan References
Matrix Standards - page C-44

Existing Situation

This section addresses the effects to productivity in terms of timber and other wood products. The project area contains stands of trees that are growing slowly, are diseased and are greater than 200 years old. The larger trees in these stands are primarily Douglas-fir and western hemlock averaging approximately 20 to 30 inches in diameter with a component of noble fir and western red cedar. There is also a component of medium to small size Pacific silver fir and western hemlock trees that average 10 to 15 inches in diameter. In terms of timber production, the following conditions are affecting wood fiber production to varying degrees in the proposed harvest units: Moderate to heavy infections of dwarf mistletoe can be found in various species of conifers. Some small pockets of phellinus root disease are present in the stands. These stands are showing a trend toward reduced vigor and increasing mortality. Most of the stands would continue to lose net growth due to mortality caused by insect and diseases and structural weakening. Due to the dense layer of brush that dominates the understory in most areas, young conifers are not becoming established in sufficient quantities to replace the overstory that is experiencing slow mortality. This photo shows Unit 4. All of the stands considered for harvest are past culmination of mean annual increment, meaning that their growth has leveled off or begun to decline. In terms of timber productivity the stands are growing below their

capability. A silvicultural diagnosis and certification can be found in Appendix E.

In some of the stands, the larger trees are gradually dying out leaving rhododendron brush and small diameter but old Pacific silver fir. Most of the trees are western hemlock ranging from 12 to 24 inches diameter. There are areas where rhododendron brush is dense enough to preclude most conifer regeneration.

Effects of Alternatives

Alternative A

Without silvicultural treatments at this time, potential wood fiber productivity for this Matrix land would be foregone. If no action were taken these stands would continue to decline in terms of wood fiber productivity. Disturbances such as fire, wind, insects and disease would affect future stand development. In the long term, the larger trees would gradually die out leaving rhododendron and small diameter but old Western hemlock and Pacific silver fir. Depending on the type and scale of future disturbances, rhododendron biomass could increase as conifers decline and this brush competition could prevent the seeding in of a sufficient quantity of desired new conifer trees.

Alternatives B and C

This treatment could substantially reduce dwarf mistletoe in infected stands and also decrease the number of diseased trees. Replacing these stands with younger trees can help these areas achieve their productive growing potential. All of the harvest units are in the Matrix land allocation where timber productivity is a primary goal.

Site preparation and slash reduction by grapple piling and broadcast burning would occur after harvest. By retaining 10-12 leave trees per acre following logging, there would be ample frost and sun protection provided for the new crop of seedlings that would be planted. Some damage to leave trees is expected from site preparation and fuel reduction activities. The retention of 10-12 leave trees per acre would result in some reduction of long-term growth of the planted trees over what would be expected in direct sunlight but growth would be sufficient to contribute to healthy productive stands. In the long term, the stands would have young fast growing trees that could be managed to provide a future supply of wood products with scattered large trees in the overstory.

Opening the canopy in the Imp units would release young trees in adjacent plantations from competition for sunlight, moisture and nutrients. This would slightly increase the amount of wood fiber production in the plantations. The removal or reduction of sources of pathogens from the Imp units would benefit adjacent plantations because there would be less spread of disease from one stand to the other.

Alternative D

The retention of 30 leave trees per acre would affect the establishment and growth of seedlings planted. The overstory trees would create a canopy closure of approximately

34%. To retain 30 trees per acre, leave trees would have to be selected from trees with dwarf mistletoe, which would eventually be spread to understory trees. With a closer leave tree spacing, it would become difficult to avoid damaging them during site preparation. Overstory density is a determining factor in each understory tree's survival and height growth. Survival rates and growth rates for the shade intolerant species such as Douglas-fir would be lower than for other shade tolerant species (Oliver, 1996). All species slow in height growth as overstory shade increases. The entire new stand would grow at a rate that is considerably lower than its potential. In the long term, the more shade tolerant trees would be affected less and the stand may eventually convert to shade tolerant species such as Pacific silver fir.

The long-term production of wood fiber in Alternative D would be lower than with Alternative B or C.

HARVEST OF OLDER FOREST (Issue #2)

This section addresses Issue #2: The proposed action may reduce the habitat for animal and plant species within the project area by harvesting older forest stands. This analysis is organized into two parts: a landscape level look at **Fragmentation**, and the effects of **Wind**. Refer also to the sections on Wildlife and Botany for more discussion of the effects to specific species of animals or plants.

Mt. Hood Forest Plan References

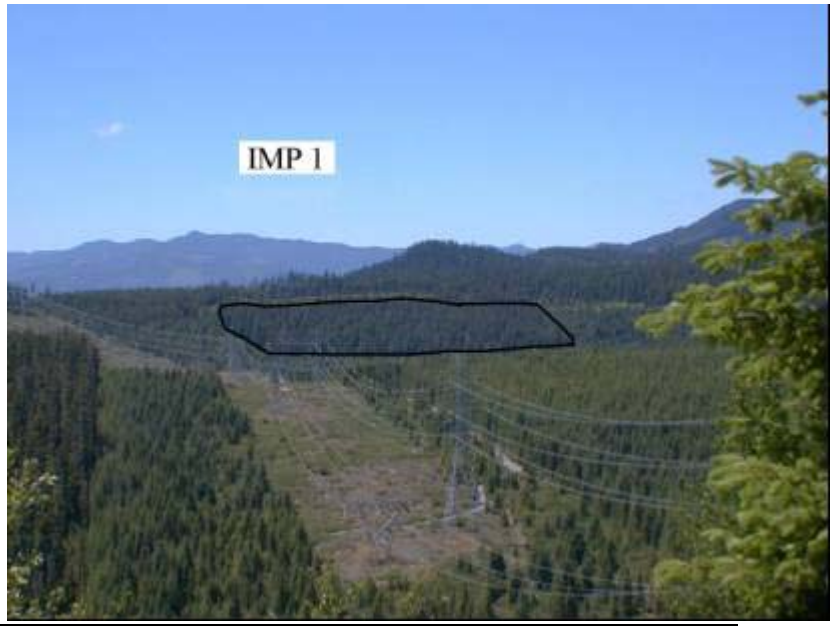
Forestwide Diversity Standards and Guidelines - FW-158 to FW-160, page Four-67
Forestwide Timber Management Standards and Guidelines - FW-306 to FW-385, page Four-86
Timber Emphasis Standards and Guidelines – C1-16 to C1-35-39, page Four-296
Mt. Hood FEIS pages IV-50 to IV-76

Northwest Forest Plan References

Matrix Standards - page C-44

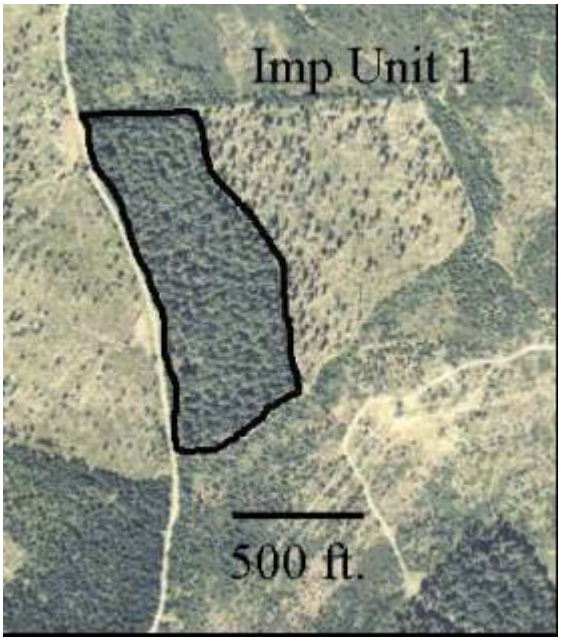
Existing Situation - Fragmentation

This photo shows unit 1. One of the key landscape level issues identified in the Upper Clackamas Analysis is the fragmentation of late-seral forested habitats. Given that some landscapes, including those found in the Imp planning area, are highly fragmented, the Watershed Analysis recommended that stand manipulations in the matrix



should be prioritized in a manner that minimizes additional fragmentation of remaining late-seral interior patches. Stand manipulations, such as regeneration harvest treatments should focus on isolated late-seral patches that have little or no interior habitat (Upper Clackamas Watershed Analysis, p. 61).

Unit 1 is entirely surrounded by relatively young plantations and the edge effect (sunlight and wind penetration into the stand) results in no interior habitat. In a stand with no interior habitat, certain plants and animals will still be found. But the primary species of concern are species that require large intact stands of mature habitat with substantial areas of interior habitat that are not influenced by edge effect. This aerial photograph also demonstrates the fragmented nature of unit 1. The plantations surrounding these units are greater than 4.5 feet in height and are no longer considered created openings for the purpose of opening size computation. None of the Imp units create openings greater than 60 acres.



Effects of Alternatives-Fragmentation

Alternative A

The watershed analysis pointed out that the current landscapes have smaller patch sizes compared with historical fire regimes. This condition would continue. Small patches of older forest with no interior late-seral habitat would continue to occupy the site. Within 60 to 80 years from now, barring any major disturbance event, these small patches of older forest may eventually regain some of the characteristics of interior late-seral habitat as surrounding plantations mature.

Alternatives B, C and D

The strategy of regenerating the smaller isolated stands avoids harvesting the larger and more contiguous stands of interior late-seral habitat. These larger and more contiguous stands are more valuable to species dependent on late-seral habitats. This strategy would also move the landscape toward increased average patch size. As these proposed plantations grow, they would blend in with adjacent existing plantations to form large contiguous patches that are closer to the patch size expected in unmanaged forests. Fifty years from now, the plantations would more resemble and function as one large stand.

The regeneration of fragmented stands would aid in meeting the desired future conditions for maintaining stand health and vigor and would capitalize on the productive capability of

the site. These types of stands are highly productive and are capable of producing a sustainable supply of forest products.

Cumulative Effects

This aerial photo shows a wider landscape view of the area. It shows some large blocks of interior forest (not proposed for logging) that are intact and provide habitats for species dependent on interior habitats.

Cumulative effect for fragmentation would be similar for all action alternatives. The analysis considers the Upper Clackamas watershed.

	Upper Clackamas
Completed, Started or Foreseeable	997 acres. Gum, Bazooka, Bear, Cub, Tarzan, Jane, Slinky
Imp	88 acres.

Analysis of Older Forest

	Upper Clack	
Data source: Watershed Analysis and GIS data from Veg2000.shp	Acres	% of Watershed
Vegetated Acres in Watershed.	100,380	
Amount of older forest at time of Watershed Analysis.	38,144	38%
Current level of older forest.	37,147	37.0%
Level of older forest after Imp.	**37,057**	**36.9%**
Minimum level of older forest specified in the Northwest Forest Plan.		15%
Amount of interior older forest at time of Watershed Analysis.	11,124	11%
Current level of interior older forest.	11,119	11%
Level of interior older forest after Imp.	**11,119**	**11%**

The Northwest Forest Plan recognized the importance of isolated remnant old-growth patches because they function as refugia for species with limited dispersal capabilities. These include fungi, lichens, bryophytes, arthropods, vascular plants, small mammals, amphibians and some bird species. This is the rationale for the green tree retention requirements and for the survey and manage program. There is also a standard (page C-44) that requires the retention of older forest in watersheds that contain 15 percent or less of older forest. The Upper Clackamas watershed contains more than twice that level indicating that the concern for refugia is less at the watershed scale. The Imp action alternatives would reduce older forest by 0.1% in the Upper Clackamas watershed.

At the Forest scale, there is abundant habitat for species with limited dispersal capabilities. More than 80% of the 1 million acres on the Mt. Hood National Forest are in land allocations other than matrix. The late-seral and old-growth forest in other allocations provide habitat for these species.

The no-action alternative would not change the conditions for species with limited dispersal capabilities.

The action alternatives would alter conditions for species that depend on older forests and have limited dispersal capabilities. Some individuals may survive within the harvest units in the green tree retention patches or on individual trees, but others would be eliminated from the harvest units. There is little concern for the persistence of common species because of the large amount of habitat available in late-successional reserves, riparian reserves and in other forested areas not scheduled for harvest. No rare or uncommon species were found in the harvest units.

Existing Situation – Wind

Wind is one of several factors that contribute to the falling of trees in the forest. Other factors include root rot and stem decay in live trees. Of course when trees die they eventually decay and fall. While trees naturally fall in forests for a variety of interrelated reasons, management actions can cause trees to fall at increased rates. This analysis will focus on factors that contribute to increased risk of wind damage from management activities. The term windthrow will be used here and it includes live trees blown down or where treetops are broken out by severe windstorms.

Many factors may contribute to windthrow: wind direction, topography, aspect, position on the slope, rooting depth, soil moisture, root rot and support from other trees, to name just a few. The support from other trees is the primary factor upon which humans have an effect. The least predictable factor is the strength and duration of storms when they pass through an area.

All of the proposed units in Imp are classified as “Moderate” hazard for windthrow in the Soil Resource Inventory (USDA Forest Service. 1979). The definition of Moderate is: “Factors indicate some susceptibility to windthrow but major problems are not likely.

The effective rooting depth is generally between 18 and 36 inches." Site-specific observations from each of the units concur with this assessment.

When young trees grow up in a crowded condition they compete with each other to gain height at the expense of diameter and root strength. They rely on their neighbors holding each other up and the continuous canopy deflects wind. Most of the mature stands in the Imp area grew in this manner and continue to have some degree of reliance on their neighbors for support.

All of the units show evidence of frost cracks in western hemlock, noble fir and Pacific silver fir. These frost cracks not only weaken the tree trunk structurally but may also provide entry to disease organisms that weaken the individuals to a greater degree, making them more susceptible to wind damage. There are also small existing pockets of root rot that weaken stability.

In recent decades, timber harvest has fragmented the landscape with clearcuts in a manner that often causes windthrow along the edge of non-harvested stands. All of the proposed units are adjacent to or surrounded by clearcut harvests of various ages. The abrupt changes in heights from the younger plantations to the fragmented older stands can cause turbulence in the wind flow. This turbulence can last for a considerable distance (one-quarter of a mile or more from the point of initiation), depending upon the wind speed and tree height differential. This can affect not only the taller stand, but also adjacent stands on the downwind side. Winds in the Imp area usually come from the southwest. Several of the Imp units have experienced some windthrow.

Effects of Alternatives-Wind

Alternative A

Past windstorms have tested the edges of the stands in the Imp area. Some windthrow has occurred, but most of the trees that were weak and likely to blow down have already done so.

In the short term, wind may continue minor unraveling of some of the stand edges.

In the long term, other gradual changes would occur. Individual trees would become less vigorous over time and would blow down or fall from other causes, and since there are few if any young conifers present, the stand would become more open and the understory of rhododendron would become denser.

Alternative B and C

Wind may affect leave trees and Green Tree Retention patches (GTR) that are being retained with the action alternatives. If a unit has even a minor concern about windthrow, the GTR patches are placed where they are most likely to resist windthrow. In addition to these GTR patches, 10-12 leave trees per acre would be retained across the units.

While there are at least 10-12 wind-firm trees per acre to select from, Northwest Forest Plan standards indicate that to the extent possible, we should consider leaving some decadent or leaning trees. Since these types of trees are most likely to fall down, it is clear that it was intended for some retention trees to become part of the large woody debris component on the forest floor. In the Imp project, this desired but unspecified level of leave trees falling down would likely come from wind damage. However, since the alternative is leaving approximately twice as many trees as required by Northwest Forest Plan standards, it is unlikely that levels of wind damage would reduce the stand below the minimum level. Leave trees that blow down would be left on the site and would function as large woody debris.

All of the proposed units in Imp have soils with moderate hazard for windthrow where there is some susceptibility to windthrow but major problems are not likely. Across the landscape, there are many examples of previously harvested shelterwood units on similar soils that have not proven susceptible to damaging winds and have not blown down.

Prior to the early 90's, windthrow was more common because timber harvest then focused on clearcut patches that left walls of mature trees with poor windfirmness. The wind would drop down into the clearcut and cause windthrow on the down wind edges. In recent years, regeneration harvest has focused on isolated islands of mature timber surrounded by plantations. This is the case with Imp where the harvest would not create new edges susceptible to windthrow. The downwind forests are young stands that are relatively windfirm.

In the long term, stands with greater windfirmness would develop. The units would be restocked with young conifer seedlings and as they grow and are subsequently thinned to a spacing wide enough to maintain healthy and vigorous growth. Trees grown at wider spacing from the beginning develop windfirmness. Wider spacing allows roots to spread more (Oliver 1990, p105) and to develop stronger roots and stems. Wider spacing allows trees to sway in the wind developing strong reaction tissue in the trunk and they become more wind tolerant (Oliver 1990, p 83 & 84). While mature leave trees would not respond as quickly as young trees do in response to a thinning, the leave trees in the Imp units would eventually develop increased root and trunk strength.

Cumulative Effects

Since wind turbulence can have an effect for approximately ¼ mile, other current and foreseeable actions being considered for cumulative effects would be Upper Clackamas Thin. Specifically, unit 468 is near Imp unit 7.

These two units are 600 feet apart on opposite sides of a ridge. Due to the location of these units in relation to each other, the prevailing wind direction and topography, the Imp unit is not likely to affect the commercial thinning unit and the thinning unit is not likely to affect Imp.

Alternative D

This alternative would leave 30 trees per acre. With more trees per acre remaining, it is anticipated that many of the leave trees would have to be selected from trees with poor windfirmness characteristics. Some of these trees may fall. Since the alternative is leaving approximately five to six times as many trees as required by Northwest Forest Plan standards, it is unlikely that levels of wind damage would reduce the stand below the minimum level. Cumulative effects would be similar to the discussion for Alternatives B and C.

WILDLIFE

The Imp Wildlife Biological Evaluation and Biological Assessment are located in the appendix and are incorporated by reference and summarized below.

Northern Spotted Owl (Threatened)

Existing Situation - The entire timber sale consists of late-seral stands and is considered nesting/roosting/foraging (NRF) habitat as well as dispersal habitat for the spotted owl. This area has high potential for species occurrence. (Data source for this analysis – GIS data from Veg2000.shp)

Effects – Including Direct, Indirect and Cumulative Effects

Alternative A - No short-term effects to the owl would be predicted with this alternative. Units would continue to function as spotted owl suitable nesting habitat well into the future. These stands are currently 200-300 years old and in the long term, they would likely start to become increasingly more susceptible to damaging agents. Future small-scale disturbances such as insects, disease, and wind would create gaps and openings, eventually changing the stand structure. This could create a more open structure than what is currently present. The stands could become increasingly more open in canopy closure to the point at which they may no longer be considered nesting/roosting/foraging habitat for spotted owls (i.e. a canopy closure less than 60% is considered too open to meet nesting requirements for spotted owls).

Alternatives B, C and D - There are no units or associated activities that are within ¼ mile of historic spotted owl activity centers: no seasonal restriction is required.

The action alternatives would have an effect on dispersal habitat as well as NRF habitat. All of the proposed units within the Imp T.S are considered both NRF habitat and dispersal habitat (All NRF habitats meet the requirements of dispersal habitat, but not all dispersal habitats meet the requirements of NRF habitat). Dispersal habitat described in this analysis is a combination of NRF and dispersal-only habitat. The Imp Timber Sale would occur in the Upper Clackamas watershed that contains approximately 70% dispersal habitat (11 inch diameter trees with an average canopy cover of 40%). Although, the proposed action would remove dispersal habitat for the northern spotted owl, the change would be minimal.

NRF habitat is considered to be the limiting factor for spotted owls. Approximately 40% (40,817 acres) of the Upper Clackamas Watershed contains NRF habitat. The proposed action would remove 88 acres of spotted owl NRF (nesting, roosting, and foraging) habitat within this watershed. In effect, the timber sale would reduce the percentage of NRF habitat within the Upper Clackamas Watershed by 0.1% - minimal change at the watershed scale.

Harvest unit 7 occurs in Critical Habitat Unit OR-11. Currently the percentage of NRF and dispersal habitat in this CHU is 50% (21,461 acres) and 58% (24,917 acres), respectively. The proposed action would remove a total of 6 acres of both dispersal and NRF habitat from this CHU. The loss of NRF and dispersal habitat at the CHU scale would be negligible.

In addition, these patches of NRF habitat are isolated late-seral patches surrounded almost entirely by relatively young plantations. The Imp harvest units have little to no interior habitat and are mostly edge habitat. The spotted owl's preferred habitat occurs in mature/old-growth stands of a more unfragmented nature (large tracts of forest land with more interior habitat). However, it is not unknown for spotted owls to nest in fragmented pieces of suitable habitat. Especially considering the current condition of spotted owl habitat on a regional scale and the loss of habitat and increase in fragmentation that has occurred in its habitat within the last half century. This has resulted in the owl being found more often in fragmented habitat even though that is not considered its preferred habitat.

Although there are no known spotted owl nests within the Imp timber sale units, the area is considered suitable habitat for owls. The removal of this habitat from the watershed could cause detrimental effects to owl(s) currently residing in the unit(s) and would remove habitat from the landscape that has the potential to be occupied by owls. Therefore, in the context of the local and watershed scale, the proposed action is determined to have an adverse effect on the spotted owl and its habitat.

The current condition figures for habitat for spotted owls within the watershed includes recently harvested or soon to be harvested timber sales that will remove or have removed suitable habitat from the area. These timber sales include the following: Slinky, Bazooka, Bear, Cub, Jane, and Tarzan. The landscape pattern of vegetation has been affected by historic and recent timber harvest activities and fire suppression, thus impacting the habitat for spotted owls. Mostly because of past management, the Upper Clackamas watershed is a very fragmented watershed within a highly fragmented sub-basin (USDA 1995).

The barred owl has been expanding its territory from northeastern Canada since about 1900, moving into Washington, Oregon, and Northern California and in some cases has been displacing spotted owls. Although there is no research within the watershed or district to substantiate that this is happening in this area, it is a possibility since barred

owls are known to be present on the district. Barred owls may be expanding their range because of changes to forest structure from logging, wildfire or climate change.

A combination of loss of suitable habitat, increase in fragmentation, and the possibility of some displacement of spotted owls by barred owls has substantially reduced the amount of useable suitable habitat for spotted owls currently present within the watershed.

The Imp timber sale adds to the effects of the above by removing an additional 88 acres of suitable habitat. However, the stands removed are small, isolated pockets of mature timber that are already part of the fragmented landscape. Thus the current proposal would not further add to the fragmentation of later-seral stands within the watersheds.

Risk Assessment - Risk to habitat would be high with the action alternatives and low for the no-action alternative. Risk to individuals would be high under all action alternatives and low for the no-action alternative. There would be no risk to the population with any of the alternatives.

All action alternatives are likely to adversely affect the spotted owl and its habitat. The U. S. Fish and Wildlife Service (USFWS) issued an opinion on the effects of the Imp Timber Sale as well as many other projects within the document titled "Willamette Province Fiscal Year 1999 Habitat Modification Biological Opinion for Listed Species." The conclusion they reached is the following: "After reviewing the current status of the spotted owl, the environmental baseline for the action area, the effects of the proposed actions and the cumulative effects, it is the Service's biological opinion that the FY 1999 Habitat Modification Projects in the Willamette Province are **not likely to jeopardize the continued existence of the spotted owl or result in the destruction or adverse modification of spotted owl critical habitat** (USDI, 1998). The Biological Opinion did not specify any additional terms and conditions that would apply to this project.

The viability of the northern spotted owl is provided by the system of reserves and other standards and guidelines established by the Northwest Forest Plan.

During the 30-day comment period on the proposed action there appeared to be some confusion concerning the Roaring River/Upper Clackamas General Area of Concern identified in the North Willamette Late Succession Reserve Assessment and the interim connectivity design cells in the Watershed Analysis.

The Upper Clackamas Watershed Analysis recommended the retention of a connectivity network of late-successional stands until plantations in the LSR and Riparian Reserves developed into dispersal habitat (USDA 1995, page 61). These areas are called interim connectivity design cells and are not within LSRs but are matrix lands. The LSR Assessment identified General Areas of Concern. The Roaring River/Upper Clackamas General Area of Concern was identified as an important connectivity area to provide some habitat redundancy between two LSRs. The LSR Assessment determined that there is enough area within the interim connectivity design cells that connectivity objectives between two LSRs should be met (USDA 1998, p. 3-80). Because none of the Imp units are in the interim connectivity design cells, there would be no effect to connectivity objectives.

Northern Bald Eagle (Threatened)

Existing Situation - The bald eagle is a permanent resident in Oregon. Their nests are usually located in multi-storied stands with old-growth components, and are near water bodies that support an adequate food supply. Marginal habitat is available within the planning area and is likely used only for very occasional foraging and travel habitat.

Effects
Alternative A - No effect to the bald eagle would occur with implementation of this alternative. The planning area would continue to provide poor quality habitat for the species.

Alternatives B, C and D - The Imp timber sale units are comprised of trees that could conceivably serve as nesting trees for bald eagles, though the potential is quite low for two reasons: 1) Bald eagles usually nest within ¼ mile of a water body in the Cascades. The closest Imp harvest unit to the nearest water body (Upper Clackamas River) is less than ½ mile away. 2) The adjacent sections of the Clackamas River represent marginal nesting and foraging habitat at best. Limiting factors include the topography and physical features of the river (a narrow strip of open water and low flows) and represent significant obstacles to successful foraging by eagles. No eagles have been known to nest along these portions of the two rivers.

It is also conceivable but unlikely that the Imp timber sale units would be used as a roosting site due to the lack of a nearby abundant food source. The Imp timber sale would result in the loss of 88 acres of poor quality potential bald eagle habitat. In terms of cumulative effects, Batwings and Slinky Timber Sales are the only other adjacent projects that may affect potential nest trees. It has similar poor quality nest tree potential.

It is unlikely that bald eagles would be affected by the proposed action or by Batwings. In the rare instance that a bald eagle would be present in the stand during project implementation, they would have the ability to quickly move to adjacent acceptable habitat.

All action alternatives would have a determination of "**may affect, not likely to adversely affect**."

Canada Lynx (Threatened)

Existing Situation - In the Pacific Northwest, lynx are associated with high elevation, boreal forests that typify northern latitudes. They are found primarily above 1220m (4000 ft.) in Washington (WDW 1993). High quality lynx habitat is comprised of a mosaic of early-successional forests with high prey densities (especially snowshoe hare) for foraging and of late-successional forests with an accumulation of down logs used for denning, thermal and security cover. Intermediate successional stages are used mainly for travel and landscape connectivity but may also provide foraging opportunities.

The Forest lacks structural components essential for high snowshoe hare densities. Young trees do not have dense spreading low branches to provide cover for snowshoe hares. In addition the snow characteristics on the Forest do not provide the light fluffy snows for a long enough period of time to provide an ecological advantage for foraging lynx. Research has shown that when snowshoe hare densities are low that lynx will abandon the area or starve.

In a letter dated December 3, 2003 (USDA 2003b), the Mt. Hood National Forest has made a determination, based on the best available scientific and commercial data, that the Canada lynx and its habitat are currently not present on the Forest. This letter follows the Canada lynx conservation agreement and is consistent with the Lynx Conservation Assessment and Strategy (USDA, USDI 2001, p. 35).

The elevation of the Imp Project varies between 2800 and 3800 feet. Forest-wide winter tracking surveys have been conducted during the winters of 1994-1995, 1995-1996, 2000-2001 and 2001-2002. No lynx were detected during these surveys.

Effects - No effects are expected from any of the alternatives due to lack of the species and its habitat on the Forest.

Sensitive Species

The following table summarizes effects from the Biological Evaluation, which is incorporated by reference. Alternative A would have No Impact for all species.

Species	Step #1 Pre-field	Step #2 Field Recon.	Step #3 Risk Assessment by Alternative				Impact for Action Alternatives
	Suitable Habitat Presence	Potential for Species Presence	A	B	C	D	
Oregon Slender Salamander	Yes	Mod-high	L	H	H	H	MII-NLFL
Larch Mountain Salamander	No	None	N	N	N	N	NI
Cope's Giant Salamander	No	None	N	N	N	N	NI
Cascade Torrent Salamander	No	None	N	N	N	N	NI
Oregon Spotted Frog	No	None	N	N	N	N	NI
Painted Turtle	No	None	N	N	N	N	NI
Northwestern Pond Turtle	No	None	N	N	N	N	NI
Horned Grebe	No	None	N	N	N	N	NI
Bufflehead	No	None	N	N	N	N	NI
Harlequin Duck	No	None	N	N	N	N	NI
American Peregrine Falcon	No	Low	N	N	N	N	NI
Gray Flycatcher	No	None	N	N	N	N	NI
Baird's Shrew	Yes	Low-High	L	H	H	M	MII-NLFL
Pacific Fringe-tailed Bat	Yes	Low	N	N	N	N	NI
California Wolverine	Yes	Low-Moderate	N	L	L	L	MII-NLFL
Pacific Fisher	Yes	Moderate	L	M	M	M	MII-NLFL

RISK ASSESSMENT:
"N" = No Risk to species or habitat
"L" = Low Risk to species or habitat
"M" = Moderate Risk to species or habitat
"H" = High Risk to species or habitat

EFFECTS / IMPACT CALL:
"NI" = No Impact
"MII-NLFL" = May Impact Individuals but not likely to cause a trend to federal listing or loss of viability

Survey and Manage Wildlife Species

Surveys have been competed to protocol for mollusks and red tree vole and no species requiring the management of known sites were found. Surveys were not conducted for salamanders or great gray owls because habitat for these species is not present in the Imp project area.

Snags and Down Wood

Existing Situation - The harvest units are in the Pacific silver fir zone. Based on surveys completed by Forest inventory and ecology crews and summarized in the Upper Clackamas Watershed Analysis, snag density for unmanaged large conifer stands averages approximately 8 large and 5 medium snags per acre. Down log density averages approximately 9 hard and 7 soft down logs per acre. Since the area is fragmented, younger plantations surround these units with much lower levels of snags and down wood. (Data source for this analysis – GIS data from Snag.shp)

The primary and secondary cavity nesting species for the Pacific silver fir zone area are as follows: pileated woodpecker, Northern flicker, hairy woodpecker, Williamson's sapsucker, red-breasted sapsucker, and the red-breasted nuthatch. The 100% biological potential level is 4 snags per acre (Austin 1995). In the Imp planning area, the standard and guideline from the Forest Plan for harvest units is 60% of the full biological potential, which translates into 2.4 snags per acre in the mid and late-seral stages. Also for cumulative effects the standard for landscapes is 40% of biological potential which equates to 1.6 snags per acre (Forest Plan Four-74).

Comments received by ONRC during the public comment period suggested the Forest Service do site-specific surveys for snags and coarse woody debris, including an analysis of the number of snags protected versus felled for safety reasons. Snags are continually changing; In the 2 to 3 years between planning and logging, snags or live trees that were stable may become hazardous due to decay. Snags that are a hazard today may fall by the time harvest occurs. There is no way to predict today how many hazardous snags would have to be felled to prevent injuries to forest workers, but actual monitoring of similar past harvest units has shown that an average of approximately 2.5 snags per acre are present after harvest and fuels treatment activities.

DecAID Advisor - DecAID is a planning tool intended to help advise and guide managers as they conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen 2003). Refer to this web site for more detail and for definition of terms. This advisory tool focuses on several key themes prevalent in recent literature concerning this subject and are as follows:

- Important decayed wood elements consist of snags, down wood and live trees with dead tops or stem decay.
- Decayed wood provides habitat and resources for a wide array of organisms and their ecological functions.
- Wood decay is an ecological process important to many organisms.

The DecAID tool provides information on the array of key ecological functions and functional groups of wildlife that use snags and down wood, and can be used to describe the effect of changing snag and down wood levels on those functions and functional groups. This tool is not a wildlife population simulator nor is it an analysis of wildlife population viability.

A critical consideration in the use and interpretation of the DecAID tool is that of scales of space and time. DecAID is best applied at scales of subwatersheds, watersheds, subbasins, physiographic provinces, or large administrative units such as Ranger Districts or National Forests. DecAID is not intended to predict occurrence of wildlife at the scale of individual forest stands or specific locations. It is intended to be a broader planning aid not a species or stand specific prediction tool.

Appendix E of the EA contains an analysis that compares the snag data from the watershed analysis to the tolerance levels for the different wildlife habitat types and structural conditions identified in the DecAID advisory tool. For the Upper Clackamas watershed most of the habitat types and structural conditions for unmanaged mid-seral stands currently contain snag numbers that average less than the 30% tolerance level for snag density and size based on inventory data. The late-seral stands in the Pacific silver fir zone (described as part of the Westside Lowland Conifer-Hardwood Forest Wildlife Habitat Type, Western Oregon Cascades) are currently between the 30% and 50% tolerance levels for snag density and size. Both the early and mid-seral managed stands are less than the 30% tolerance level for snag density and size. Within the Pacific silver fir zone the DecAID advisor identifies the 30% tolerance level for early-seral stands as 5 snags per acre greater than 10 inches with more than 2.1 of these snags per acre greater than 20 inches. For both mid and late-seral stands in this zone the DecAID advisor identifies the 30% tolerance level as 5.3 snags per acre greater than 10 inches with more than 4.8 of these snags per acre greater than 20 inches. All of the proposed harvest units are within late-seral stands in the Pacific silver fir zone.

For down woody debris within the Pacific silver fir zone the DecAID advisor identifies the 30% tolerance level for wood larger than four inches in diameter as: early-seral stands - 2.3% cover, mid-seral stands - 4.5% cover, late-seral stands - 6% cover.

Effects - Alternative A - The stands would continue to provide one of the few sources of high quality snag and down log habitat in the area. In the future, these stands would likely start to become increasingly more susceptible to damaging agents such as insects and diseases creating new snags and down logs within the units. Stands would continue to average approximately 8 large and 5 medium snags per acre and approximately 9 hard and 7 soft down logs per acre. This is above the level of snags required for 100% biological potential. It is also between the 30% and 50% tolerance level for snags within the applicable habitat type and structural condition identified in the DecAID advisor. There would be no short-term change in the amount of cover in down wood greater than 4 inches in diameter.

Alternative B - Snags are difficult to retain during logging because of their inherent instability and danger. It is likely that some snags would need to be cut down during harvest operations due to safety considerations and that some downed logs would be degraded through the process of logging. Snags retained in the green tree retention patches would be more secure. Due to the creation of corridors involved in skyline logging, this method usually involves a greater loss of snags than in tractor logging. Approximately 56 acres are proposed for tractor and 32 acres for skyline logging.

Snags that are left standing after the timber sale would be more prone to wind damage and snow breakage than they were before the stands were harvested. There would likely be some loss of the remaining snags within 10 years after the harvest. These would become down wood. Another result of the timber sale would be the reduction of any natural selection that would occur through the process of stress and mortality. Snags and downed logs that might have formed in the future would be removed through the timber harvest.

If down woody debris is insufficient to meet standards and guidelines after timber harvest and post-sale activities, logs from cut trees would be retained to make up the difference. Down logs would be retained at a rate of 240 lineal feet per acre, which equals approximately 12 logs per acre. Snags or green trees that fall down after the harvest operation would contribute to the down wood component of the future stand. Snags and green trees for snag creation would be retained at the level of 2.4 per acre. A post harvest review would be conducted and snag creation would occur if necessary to achieve this level. Newly created snags would not be fully functional immediately but would be used over time as decay occurs. This would meet the 60% biological potential level for snag dependent species.

Approximately 10% of the harvest area would be retained in unharvested patches and scattered large trees would be retained at the rate of 10 to 12 per acre. These retained unharvested patches and scattered individual trees would include some of the largest, oldest and most decadent live trees as required in the NWP. There is a high likelihood that some of these retained trees would be decayed or hollow, and some would have large broken branches or mistletoe brooms. These living trees would serve as wildlife habitat and most likely would stand longer than snags, providing habitat over a longer period of time.

The DecAID advisor identifies the 30% tolerance level for early-seral stands as 5 snags per acre greater than 10 inches with more than 2.1 of these snags per acre greater than 20 inches. For both mid and late-seral stands in this zone the DecAID advisor identifies the 30% tolerance level as 5.3 snags per acre greater than 10 inches with more than 4.8 of these snags per acre greater than 20 inches. The alternative would retain all non-hazardous snags, as well as 10 to 12 green trees per acre and the unharvested patches equal to 10% of the area to be harvested (these areas contain approximately 100 trees per acre). Due to this level of retention, Alternative B has the potential to maintain snag densities within harvest units above the 30% tolerance level as they progress over time through the early and mid-seral stages.

The harvesting operations would add large and small woody debris to the site. The site preparation and hazardous fuels treatments would remove some of the smaller material to create planting spots and reduce fire risk but would leave larger material. The DecAID advisor identifies the 30% tolerance level for down wood within early-seral stands as 2.3% cover greater than 4 inches in diameter. Due to the retention of 240 linear feet per acre of down wood greater than 20 inches plus the smaller existing down wood, the wood from tree tops and broken logs and wood from trees that may fall, there is predicted to be present in the units after timber harvest and post-sale activities down wood at the 30% tolerance level. This tolerance level is expected to be maintained in the units as the stands progress over time through the early and mid-seral stages.

The effectiveness of artificially created snags is being examined. A long-term monitoring project was started in 1997 on the adjacent Willamette National Forest to determine wildlife use of artificially created snags. The report found that nearly half of the created snags had new foraging excavations by woodpeckers and other unidentified excavators, indicating that one or more species that occur in the elevation range of the study were using the snags for foraging (Boleyn 2002). The report also documents that the majority of the created snags monitored were recently killed (within the last 10 years) and had little decay. As the amount of decay increases and the snags become soft enough for cavity foraging excavation, it is expected that nesting and roosting activities would increase (Boleyn 2002).

Alternative C - Affects are similar to Alternative B except that helicopter logging would be required on unit 6b, for a total of 13 acres. Helicopter logging typically results in a loss of snags greater than in both tractor and skyline logging. Helicopter logging has less effect on the existing down wood. Tolerance levels for down wood cover would be similar to Alternative B.

Alternative D - Affects are similar to Alternative B except it would leave approximately 30 trees per acre. This alternative would reserve more of the current snag levels within the units as well as maintain options for the future. By leaving these additional trees per acre, it would decrease the percentage of snags that would need to be cut down due to safety considerations. However, since the helicopter logging is still a part of this alternative, it is likely there would be a loss of snags within part of unit 6. There would also be less of a chance for snag loss to occur through wind and snow breakage, or at

least there would be more snags left in the unit so such occurrences would not have as much of an effect on the resource.

A long-term benefit of leaving these additional large-diameter trees is that there would be more large snags and downed logs available during the early and mid-seral stages. There would also be more decayed and hollow living trees, as well as mistletoe infected trees. Due to the higher level of retention, this alternative has the potential to maintain snag densities above the 50% tolerance level as the stands progress over time through the early and mid-seral stages.

Cumulative Effects – Down log affects are very localized and generally do not extend outside a unit boundary. Some snag dependent bird species are known to forage on down logs but affects to these species are measured by changes to snag habitats. Snags however are utilized by species that have wider home ranges so a larger analysis area is used to calculate cumulative effects for snags. There are no other foreseeable regeneration timber sales in the Imp snag analysis area. The regeneration areas have approximately 13 snags per acre. For thinning timber sales, the plantations generally have no snags and the "natural" second growth has approximately 5 snags per acre. The planned thinning timber sales include portions of Upper Clackamas Thin.

Acres and snag numbers in the table below were generated from field surveys. (Snags per acre data by stand type and plant association was summarized in the Watershed Analysis and was based on surveys completed by Forest inventory and ecology crews. Weighted averages include private land inclusions as well as all non-forest areas within the analysis area. Large snags are > 21 inches diameter and Medium snags are between 15 and 21 inches. For cumulative effects, the standard for landscapes is 40% of biological potential, which equates to 1.6 snags per acre.)

Snag Analysis	
	Imp Area
Acres	6,809
Existing Total Snags (Large and Medium)	39,884
Existing weighted average snags per acre	5.9
Completed, Started or Foreseeable Thinning Sales	217 acres – Upper Clackamas Thin
Completed, Started or Foreseeable Regeneration Sales	0 acres
Imp	88 acres
Total Planned Regeneration Sales	88 acres
Change in Snag Levels *	-1,497
Remaining Snags	38,387
Weighted average snags per acre after implementation (4 snags per acre is 100% biological potential)	5.6
Minimum to meet 40% biological potential, snags per acre	1.6

*13 snags per acre before and 2.4 per acre after for regeneration sales; 5 per acre before and 2.4 per acre after for thinning sales.

The analysis shows that within the snag analysis area, the snag levels after the past, present and foreseeable future harvest activities occur would still be greater than the

100% biological potential level. The analysis may overestimate the loss of snags since it assumes that all snags within the harvest units would need to be felled for safety purposes. The alternatives are designed to maintain all current snags unless it is determined to be a hazard at the time of the timber harvest. Many snags in the green tree retention patches would be retained since they would be far enough away from logging operations to not be a safety hazard. All of the action alternatives would provide enough snags to provide habitat for populations of cavity dependent species based on biological potential concept. The biological evaluation contains a discussion of effects to sensitive, threatened or endangered snag dependent species.

Appendix E of the EA contains an analysis of tolerance levels for the different wildlife habitat types and structural conditions identified in the DecAID advisory tool. It displays the percentage of the watershed in each structural condition and the tolerance level for snags. The percentages are based on all past, present and foreseeable future actions. Since the NFP was implemented, approximately 1087 acres within the Upper Clackamas watershed have been or would be converted from late-seral snag habitat to early-seral snag habitat. In the Upper Clackamas the late-seral snag habitat would go from 29.1 to 28.9 percent while early-seral plantations would increase from 28 to 28.2 percent.

Deer and Elk Habitat (Management Indicator Species)

Existing Situation - Most of the harvest units are located within summer range and are encompassed by the Summer Range 8 (SR8) analysis area. Harvest unit 7 is located within winter range and is encompassed by the Key Winter Range 6 (KW 6) analysis area. There are no known calving or rearing areas identified within the project area. Forest Plan Standards and Guidelines have minimum requirements for optimal cover and thermal cover habitat components but no level for forage. (Data source for this analysis – GIS data from Veg2000.shp and Roads.shp)

Existing Condition for Deer and Elk Management Areas

Analysis Area	Acres	Current Optimal Cover	Minimum Level for Optimal Cover	Current Total Thermal Cover (all optimal cover is also thermal cover)	Minimum Level for Total Thermal Cover (all optimal cover is also thermal cover)	Current Forage
SR 8	4707	34%	20%	48%	30%	38%
KW 6	4519	66%	25%	74%	50%	14%

Deer and elk are not known to be particularly abundant in this area. Forage is widely available within the analysis area but is generally of low quality. The low quality of the forage and the lack of wetlands and permanent low-gradient streams probably remains the limiting factor for elk and possibly deer within the area.

Summer Range 8 and Key Winter Range 6 both currently have an open road density of approximately 1.8 miles per square mile. In summer range the Forest Plan Standard and Guideline is 2.5 miles per square mile and in this particular winter range area the standard is 1.5 miles per square mile.

The current condition figures include all past harvest and reasonably foreseeable projects that have not been implemented yet. In these analysis areas there are no other regeneration harvests planned or foreseeable at this time and no other projects that would remove cover. The Upper Clackamas Thin does overlap these analysis areas. The thinning would occur in thermal cover stands and changes to thermal cover characteristics would be minimal and short term. The thinning would affect approximately 2% of each analysis area.

Effects – Including Direct, Indirect and Cumulative Effects
Alternative A - These 88 acres of late-successional stands would continue to function as optimal cover for deer and elk. No cover would be lost and no forage would be gained in this alternative.

Alternative B - The removal of an additional 88 acres with Imp would cause a loss of approximately 1.7% of the existing optimal cover in Summer Range 8 and 0.1% in Key Winter Range 6. Forage would be gained at the same rate. Optimal cover is not considered a limiting factor for deer and elk in this area. The loss of this cover could alter the distribution of deer and elk use of the area in the summertime but is not predicted to cause a measurable reduction in deer and elk numbers utilizing the area. In the analysis areas as a whole, the resulting percentages of optimal and thermal cover would remain within the Mt. Hood standards and guidelines for this area.

Road Density - Approximately 500 feet of new temporary roads would be constructed and 2900 feet of closed road would be reopened to access unit 6 in Summer Range 8. This increase is slight and would temporarily cause an increase of 0.09 mile per square mile of open road density in a summer range area that is already well below Forest Plan standards and guidelines for open road density. The roads would not be open to the public and road use would occur during logging when the disturbance and noise of logging equipment is already present. After logging, the roads would be closed and road density would be back to the current level. These new temporary roads would not contribute to the long-term harassment of deer and elk. There would be no increase in permanent "system" roads open to the public and therefore no increase in open road density with this project.

Haul Routes - There are potential haul routes that go through deer and elk winter range. Road 4660 goes through crucial winter range and a seasonal restriction would be required. No log haul or snowplowing would be permitted on this route from December 1st to March 31st. Other potential haul routes are on "backbone roads" where no seasonal restrictions are required.

Disturbance - The logging and road-building activities could potentially disturb animals that happened to be in the area at the time of implementation. However, deer and elk would likely not be in most of the area during the winter season, the period when they are most vulnerable to disturbance. Disturbance that occurs during the spring/summer/fall would probably only displace animals and would not likely affect their health. The exception is unit 7, which occurs in moderate value winter range. Although some displacement could occur to deer and elk wintering in the area, the disturbance is

predicted to be very small scale and temporary in nature, lasting only as long as the logging was occurring.

Alternative C – Cumulative effects would similar to Alternative B except that no roads would be built eliminating the slight short-term increase in road density that is discussed in alternative B. However, because no roads would be constructed, helicopter logging would occur in unit 6. At the time of helicopter use, disturbance to deer and elk would increase in the area due to the noise and activity of the helicopter. This disturbance would be short-term in nature, lasting only as long as the helicopter was in flight.

Alternative D - Cumulative effects would be similar to Alternative C except that 30 trees per acre would be left. It would still remove the optimal cover currently being provided in the stands but due to the increased canopy closure, less forage would be created.

Management Indicator Species

Existing Situation - Indicator species for this area include deer and elk, pine martin and pileated woodpecker. Management indicator species are key species that have been identified in the Forest Plan. The status and condition of these species are presumed to represent the status and condition of many other species. This EA focuses on certain key species and does not specifically address common species such as bear, bobcats or squirrels except to the extent that they are represented by management indicator species. Deer and elk have already been discussed above. All of the proposed harvest units contain habitat for the pine marten and pileated woodpecker. These animals rely on older forest structure and pileated woodpeckers also rely on snags.

Effects – Including Direct, Indirect and Cumulative Effects - Alternative B, C, and D would remove habitat for pine marten and pileated woodpecker and alternative A would retain it. The NFP removed land allocations for pine marten and pileated woodpecker in Mt. Hood Forest Plan (B5 land allocation) because other land allocations such as late-successional reserves and riparian reserves would meet the habitat needs for these species. Cumulative effects for pine marten, pileated woodpecker and other mature forest dependent species, would be similar to the analysis shown in the Harvest of Older Forest section (page 31). Approximately 1% of the older forest has been or would be removed by implementing this project and other foreseeable projects. Pileated woodpecker, a snag dependent species, has already been addressed along with other snag dependent species in the Snag section (page 42).

Migratory Birds

Existing Situation - Over 27 species of migratory birds occur within the Upper Clackamas Watershed, some of which are likely present within the Imp Timber Sale during the breeding season. Some species favor late-successional habitat and others favor early-successional habitat with large trees.

Effects – Including Direct, Indirect and Cumulative Effects
Alternative A - There would be no alterations of habitat for migratory birds.

Alternative B and C - The harvesting of 88 acres of late-successional habitat would reduce the amount of habitat for some migratory bird species using the area; particularly those that require mature habitats and snags and that do not require interior habitat. Some migratory species that could be negatively affected are: Vaux's swift, brown creeper, red crossbill, pileated woodpecker, varied thrush, hermit warbler, Hammond's flycatcher, Wilson's warbler, and winter wren.

Cumulative effects for migratory birds that rely on late-successional habitats would be similar to the discussion for northern spotted owl nesting/roosting/foraging habitat. Although there would be a loss of habitat for these species as well as others, there is considered to be abundant potential habitat for these migratory species in protected lands on the Forest including wilderness areas, riparian reserves and late-successional reserves.

There are also some species of migratory birds that could benefit from the proposed regeneration harvest with reserve trees. These are the species that prefer early-seral habitats with certain habitat attributes such as snags, residual canopy trees, and a deciduous shrub layer. A few of these species that are potentially present within the watershed and could benefit from the proposed action are the olive-sided flycatcher, Western bluebird, and orange-crowned warbler. Historically these habitats were created from fire events that would create early-seral habitat with abundant snags and down wood. Since fires have been suppressed, this habitat component has been on the decline. There has been abundant regeneration harvest during the past 50 years, but until recently most left little or no legacy structures such as snags and down wood logs, often a necessary habitat component for migratory birds preferring early-seral habitats.

In conclusion, the Imp Timber Sale would have a combination of positive and negative impacts on migratory bird species, depending on the habitat preference of the species.

Alternative D

Affects would be similar to Alternatives B and C except that 30 trees per acre would be left in the units and more legacy structures would remain after treatment. These stands would still be considered early-seral habitat but there would be much less deciduous understory development, which is an important habitat component for some migratory birds.

In conclusion, this alternative would benefit early-seral migratory bird species that are more dependent on a residual stand and legacy structures, whereas alternatives B & C would benefit early-seral species that are more dependent on a diverse and abundant deciduous understory.

SOILS

Mt. Hood Forest Plan References
Forestwide Soil Productivity Standards and Guidelines - FW-22 to FW-38, page Four-49
Forestwide Geology Standards and Guidelines - FW-1 to FW-21, page Four-46
See Mt. Hood FEIS pages IV-11, and IV-155 to IV-167

Northwest Forest Plan References
Coarse Woody Debris Standards and Guidelines - page C-40
Soil Disturbance Standards and Guidelines - page C-44
Modify Fire and Pesticide Use, Minimize Soil Disturbance Standards and Guidelines - page C44
Fire and Fuels Management Standard and Guideline - page C-48

For soil resources, cumulative effects are analyzed for each harvest unit. The percentage of the unit that has been detrimentally impacted by past practices and the expected additional impact from the current proposal such as road building, logging, site preparation and fuels treatments were calculated.

Existing Situation

Large-scale geologic mapping by Hammond et. al. (1982) indicate the Imp project area is underlain by Quarternary basalts, basaltic andesites and glacial deposits. Soils in the project area have been derived from glacial till deposits and are mapped as 304, 305, 306, 308, 323, and 324 (USDA 1979). Within any soil-mapping unit, there is a possibility of finding up to 25% inclusions of other associated soils and/or bedrock outcrops. Primary inclusions in this area may include 307, 309, and 337. The soil temperature class is frigid for units 1,3,4,5, and 7, and mesic for unit 6.

Soil Mapping Unit Attributes

Mapping Unit and Project *Unit #*	Landform	Vegetation Zone	Surface Soil Texture, % course fragments	Surface Erosion Potential	Compaction Hazard	Susceptibility to Soil Displacement	Sedimentation Yield Potential	Potential for Regeneration
(304) *1 (part), 3, 4, 5*	Nearly level to undulating sideslopes	Pacific silver fir	gravelly and cobbly loams, 30-60%	Slight	Low-Moderate	Low	Low	Moderate
(305) *1 (part)*	Steep north and east slopes	Pacific silver fir	gravelly and cobbly loams, 40-50%	Slight-Moderate	Low	Low-Moderate	Low	Moderate
(306) *7 (upper part)*	Gentle mountain slopes	Western hemlock	loams, 20%	Slight	Moderate	Low	Low-Moderate	Moderate-High
(308) *7 (lower part)*	Steep south and east facing slopes	Western hemlock	loams, 15-20%	Moderate	Moderate	Low-Moderate	Low-Moderate	Moderate-High

Mapping Unit and Project *Unit #*	Landform	Vegetation Zone	Surface Soil Texture, % course fragments	Surface Erosion Potential	Compaction Hazard	Susceptibility to Soil Displacement	Sedimentation Yield Potential	Potential for Regeneration
(323) *6 (eastern part)*	Nearly level to sloping, smooth glaciated uplands	Western hemlock	gravelly silt loams, 30-60%	Slight	Moderate	Low	Low	High
(324) *6 (western part)*	Sloping to steep, south and west facing, smooth glaciated uplands	Western hemlock	gravelly silt loams, 20-40%	Moderate	Moderate	Moderate	Low-Moderate	Moderate

The percentage of area in a detrimental soil condition varies from stand to stand, due to the occurrence, manner and extent of past activities such as timber salvage harvesting. Field surveys were conducted to determine the current level of detrimental soils. All of the proposed units meet the Mt. Hood Forest Plan Standard and Guideline (FW-022) with detrimental soil conditions less than 15% of the activity area. All of the harvest areas are suitable for timber management in terms of soil productivity.

Effects

Analysis Methodology

Potential impacts such as soil compaction caused by ground-based harvest and fuels treatment are measured by percent of harvest area in detrimental soil condition. This is a cumulative measurement that includes soil compaction, puddling, displacement, and severe burning, and their relationship to erosion and long-term site productivity. To provide for long-term site productivity the Forest Plan has set the maximum for detrimental soils at 15% (FW-022). Soils and long-term productivity are also protected by standards and guidelines for the retention of woody debris, ground cover, and live trees. All of these standards and guidelines protect soil structure and macropore space and soil organisms such as mycorrhizal fungi.

Alternative A

Short-Term Effects

There would be no direct or indirect effects to soil. Percent detrimental soil condition would remain unchanged. There would be no net change in short-term surface erosion rates.

Long-Term and Cumulative Effects

There would be no impacts to soil resources at this time. Soils would continue to develop through natural processes. The percent of existing detrimental soil condition would slowly decline as compacted areas recover due to physical and biological processes.

Alternative B
A combination of tractor, loader and cable yarding, and ground based site preparation would occur. Potential soil disturbances that have been considered are road and landing construction, harvest operations, site preparation and burning. Temporary roads would be constructed but most of the needed road would be reconstructed from existing temporary roads and skid trails, which have been recently scarified. The approximate lengths would be: 1400 feet of reconstruction of an old temporary road, 1500 feet of reconstruction of existing skid trails and 500 feet of new temporary road construction. Use of Best Management Practices and project design for harvest units and temporary road construction would result in meeting applicable standards for soil protection and long-term site productivity.

A net increase in detrimental soil condition is predicted where more skidtrails, landings and roads would be constructed than already exist.

Cumulative Effects - Alternative B (Percent detrimental soil condition by unit)

Unit #	Acres	Logging System	Site Prep	Existing	Yarding & landings	Roads	Site prep	Cumulative
1	13	S	BCB	0%	4%		2%	6%
3	9	L	GP	0%	6%		4%	10%
4	12	L	GP	0%	6%		4%	10%
5	8	L	GP	0%	6%		4%	10%
6a	27	L	GP	6%	4%		4%	13.0%
6b	13	S	BCB	4%	4%	1.5%	2%	
7	6	S	BCB	0%	4%		2%	6%

Logging system:	Site Prep:
L = Loader	GP = grapple piling
S = skyline	BCB = broadcast burn

Short-Term Effects
Soil damage within proposed units would increase from the current condition but should remain below 15 percent, providing for long-term site productivity. Past monitoring of similar projects types has been documented in the Mt. Hood Monitoring and Evaluation Reports. Specifically, in the 2001 Monitoring Report (page 21), soil degradation was measured at 6% or less. If implementation monitoring reveals damage in excess of 15 percent, compaction can be mitigated through subsoiling of skidtrails and landings. Restoration by subsoiling and revegetation would initiate recovery of productivity, but is unlikely to return the soil to its original condition and productivity. There may be a slight increase in surface erosion rates, however the duration and extent should be minimal, and no erosion is expected to impact riparian areas. Some soil organism types would be converted from those prevalent in closed, older forest stands to those prevalent in more open stands.

Long-Term Effects
The detrimental soil condition would slowly decline as compacted areas recover due to

physical and biological processes. Surface erosion rates would decline as exposed soils become revegetated. Soil organism types prevalent in more open stands would continue producing as conditions permit. Soil organisms prevalent in older forest stands that had been maintained in leave areas would very slowly populate leave area perimeters as the canopy closes in.

Alternative C & D

The effects of these alternatives are expected to be very similar to those of alternative B. The difference is that no roads would be built into unit 6b, where helicopter yarding would occur on 13 acres.

Cumulative Effects – Alternatives C and D (Percent detrimental soil condition by unit)

Unit #	Acres	Logging System	Site Prep	Existing	Yarding & landings	Roads	Site prep	Cumulative
1	13	S	BCB	0%	4%		2%	6%
3	9	L	GP	0%	6%		4%	10%
4	12	L	GP	0%	6%		4%	10%
5	8	L	GP	0%	6%		4%	10%
6a	27	L	GP	6%	4%		4%	11.7%
6b	13	H	BCB	4%	1%		2%	
7	6	S	BCB	0%	4%		2%	6%

Logging system:	Site Prep:
L = Loader	GP = grapple piling
S = skyline	BCB = broadcast burn
H = Helicopter	

Short-Term Effects
These alternatives would reduce the amount of soil disturbed compared to Alternative B and reduce the risk for erosion from construction and use of temporary roads and skid trails.

Long-Term Effects
These alternatives would have long-term effects similar to Alternative B.

SCENERY

Mt. Hood Forest Plan References
Forestwide Visual Resource Standards and Guidelines - FW-552 to FW-597, page Four-107
Scenic Viewsheds Standards and Guidelines - B2-12 to B2-42, page Four-221
Mt. Hood FEIS pages IV-127, IV-131, IV-142, and IV-155 to IV-167

This analysis will consider past timber harvest and road construction as well as concurrently planned timber sales and reasonably foreseeable future actions that have occurred or may occur in the area seen from the Imp viewer positions. The other future project that may be seen from the Imp viewer positions would include Upper Clackamas Thin.

Existing Situation

This analysis is in two parts. The first task is to look at primary viewer positions such as heavily traveled highways, rivers or campgrounds to evaluate whether people can see the project and if the project meets Visual Quality Objectives (VQO) assigned to these important viewer positions. The second part involves the evaluation of the project close up, as seen from less traveled backcountry roads.

The primary viewer position is from the Clackamas River and Road 46, which parallel each other closely. A portion of unit 6 and all of 7 are in the middle ground portion of the viewshed. There are no views into the timber sale area from the Clackamas River due to topography and vegetative screening. From road 46, Unit 6 is screened from sight by vegetation. The tops of some of the trees within unit 7 are seen from road 46 at a distance of approximately 9000 feet but the ground is screened from view by trees on an intervening slope. This photo shows unit 7 looking north from road 46. The VQO is partial retention for this area. The VQO of partial retention means that activities may be evident but subordinate to the characteristic landscape. The current viewshed from road 46 meets the cumulative VQO of middle-ground partial retention.

There is also a VQO of modification for other landscapes. The viewer positions would be from open roads that are traveled by the recreating public. Some roads are not considered viewer positions for the purpose of this analysis and would include temporary roads, closed roads, and roads that are maintained for high clearance vehicles with drivable waterbars that are maintained primarily for timber harvest operations. The primary focus for this analysis would be the viewer positions from road 5731 (units 1 to 6), and road 5720180 (units 1, 4 and 5). Views from 5731 would be at a distance of 3000 to 6000 feet while the views from 5720180 would be very close. Road 5731 ties through to other collector roads and gets more traffic than 5720180, which is a dead-end route. Views are dominated by large power line towers. Under the modification VQO, human activity may dominate the characteristic landscape but would utilize natural established form, line, color, and texture. The roads listed above were built by timber operators to access past timber sales, but they

are now used by a wide range of forest visitors. Prior to arriving at the viewer positions near the Imp units, a visitor would have driven through several miles of landscape dominated by a checkerboard pattern of forest plantations at many different ages and heights. The current condition of power line towers, rectangular patterns, straight lines, and high vertical contrast between plantations and taller stands are elements that prevent the area from meeting the VQO of modification.

Effects

Alternative A:
In the absence of the Imp timber harvest, changes in scenery would be expected to come slowly from forest growth. Gradually, over approximately 50 years, the existing checkerboard pattern seen from some local forest roads would become less evident as early and mid-seral trees adjacent to late-seral forest stands grow tall enough to cover the trunks and soften straight lines. Panoramic views from 5731 would eventually be screened by young trees except under the power line where vegetation is regularly cut for safety reasons.

Alternatives B and C:

Effects to scenery as seen from road 46: Alternatives B and C would have similar effects to scenery. Units 7 and the west ½ of 6 are in the B2 Scenic Viewshed land allocation. These units would meet the VQO of partial retention because of vegetative screening, the number of green trees retained, the distance and the viewer angle. These factors combined would result in no noticeable change to the casual observer; the viewer would not notice any dramatic changes in forest structure or see bare ground or slash. There are many examples of similar harvest prescriptions (e.g. Bazooka, Gum, Bars Timber Sales) that have been completed. These units when viewed from 1.5 miles are not readily noticeable to the casual observer.

Effects to scenery as seen from local roads: Design features for regeneration harvest units seen from roads 5731 and 5720180 (including green tree retention) would soften the straight lines and square corners of the existing checkerboard pattern. As with Alternative A, the action alternatives would gradually meet the VQO of modification over time as adjacent trees grow. From a landscape perspective, the action alternatives would result in a softening of visual contrast as young trees planted in the harvest units grow up and blend with the adjacent young trees. There are many examples of similar harvest prescriptions (e.g. Bazooka, Gum, Bars Timber Sales) that have been completed. These units when viewed from adjacent roads do not look like clearcuts but more like open park like stands. There are no other current or foreseeable future timber sales that can be seen from the Imp viewer positions described above.

This photo is an example of what Imp units would look like.

Alternative D

Alternative D would have 30 leave trees per acre and would have less impact on scenery compared to alternatives B and C. This photo shows an example of what 30 trees per acre would look like after harvest.

Effects to scenery as seen from road 46: Alternative D would be similar to alternatives B and C in terms of effects to scenery. Because of distance, the angle of view and the number of green trees retained there would be no noticeable change to the casual observer; the viewer would not notice any dramatic changes in the skyline silhouette or see bare ground or slash.

Effects to scenery as seen from local roads: In terms of short distance views from local roads, alternative D would have less visual impact compared to alternatives B and C. The greater number of leave trees would screen views of stumps and red slash. Landings and landing slash would still be visible.

BOTANY

Mt. Hood Forest Plan References
Forestwide Threatened, Endangered and Sensitive Plants and Animals Standards and Guidelines - FW-170 to FW-186, page Four-69
See FEIS pages IV-76 and IV-90

Northwest Forest Plan References
Appendix J2
Survey and Manage Plan

Proposed, Threatened, Endangered, and Sensitive Plant Species & Habitat:

Existing Situation - The original EA input was based on 1998 data. The current Threatened, Endangered and Sensitive Species List has been checked for botanical species added since then. No listed or proposed plant species are known to occur on the Mt. Hood National Forest. Of the newly listed Sensitive species, none of them have potential habitat in the Imp project area. The Imp Botany Biological Evaluation as amended is in the appendix and is incorporated by reference and summarized below.

Effects – Including Direct, Indirect and Cumulative Effects
Surveys were conducted for Sensitive plant species, in the proposed units and in similar and connected habitats (e.g. streams) if immediately adjacent to the proposed units. No Sensitive plant species were documented in the project area.

The closest known population of a listed Sensitive plant, *Corydalis aque-gelidae* (cold water corydalis), is located approximately one half mile from the project area. Potential threats to this species include alteration of site habitat and hydrology. None of the proposed actions in any of the alternatives would adversely affect this population site.

None of the alternatives would have any adverse effects on Proposed, Threatened, Endangered or Sensitive plant species.

Survey and Manage Botanical Species

Surveys were conducted for species requiring pre-disturbance surveys in and adjacent to the proposed timber harvest units and proposed temporary roads. No species were found.

There are no documented sites of Survey and Manage vascular plant, lichen, bryophyte or fungi species that require the management of known sites, in or near the proposed units.

None of the alternatives would have any adverse effects on survey and manage species.

MANAGEMENT OF COMPETING AND UNWANTED VEGETATION

This analysis is guided by the Record of Decision and Mediated Agreement for the "Managing Competing and Unwanted Vegetation" Final Environmental Impact Statement (referred to as VEG EIS). The purpose of this analysis is to provide information to decision makers and interested publics about proposed treatments and how they might affect unwanted vegetation. Of particular interest is the question of herbicide use. Since slash is considered unwanted vegetation, another key question is what post harvest and road construction treatments of slash and brush would be needed to achieve reforestation goals. Noxious weeds would also be addressed.

Appropriate design criteria have been identified and would be incorporated into any vegetation management project work to minimize potential adverse impacts to the environment, project workers, and public.

The use of herbicides is not being proposed for any of the activities associated with the Imp project.

Site Analysis For Site Preparation
Site-specific vegetation management objectives have been developed. The following list of objectives will be used to identify the "damage thresholds" for vegetation management, vegetation management strategies and the feasible treatment methods.

Site Specific Objectives:
- Meet the recommended stocking levels within five years after harvesting.
- Meet standards for minimizing soil erosion and soil degradation.
- Maintain adequate levels of downed woody debris and snags.

Nature and Role of Associated Vegetation
Currently, the overstory in the stands proposed for site preparation treatment is comprised of mixed conifers with some heavy mistletoe infestation in some areas. Harvest operations would put slash on the ground creating physical barriers to planting. Some units have an understory of rhododendron, which could compete very strongly with the planted tree seedlings for light, nutrients, and moisture. Removal of this live vegetation prior to planting would be necessary in order to meet management objectives for conifer seedling establishment. The large woody debris contributes to the productivity of the site by providing a long-term source of nutrients.

Damage Thresholds
Post-treatment/preplanting "damage thresholds" have been identified for this site based upon operational experience and the site-specific management objectives. If slash or live vegetation exceeds the following levels prior to planting, treatment would be needed.

Damage thresholds:

1. Greater than 20% cover of live vegetation.
2. Less than 350 well-distributed planting spots per acre.
3. Greater than 15 tons/acre of slash in the 0-3" size class (could exceed 15 tons per acre if the arrangement of the fuels do not present a fire hazard).

Harvest units are expected to need treatment of both live vegetation and slash so that management objectives can be attained. Past experience in this area shows that if trees are established immediately after site preparation, no release treatments from competing brush are required to meet the stand growth objectives. This past experience includes professional expertise of local silviculturists and monitoring data from plantation survival exams and precommercial thinning exams from adjacent plantations.

Strategies

Five strategies for controlling unwanted vegetation are identified in the FEIS and Exhibit A of the Mediated Agreement. These are prevention, early treatment, maintenance, correction and no action. The following analysis will focus on the prevention, correction and no action strategies (refer to Section II-72 through 11-74 in the *Vegetation Management FEIS*). The prevention strategy is a required element and the preferred strategy in the VEG EIS to consider and analyze.

No Action Strategy

"No Action" means that after harvest, planting would occur with no site preparation activity and slash and brush would be left unaltered on the site. It would be the appropriate strategy anytime there is evidence that the damage thresholds would not be exceeded. Within the Imp harvest units, there is evidence that the no-action strategy would not meet management objectives and standards and guidelines because the damage thresholds would be exceeded.

Prevention Strategy

The prevention strategy would not involve direct treatment but would detect and ameliorate the conditions that cause or favor the presence of competing or unwanted vegetation before damage thresholds are reached. Prevention is the selected strategy for herbicide use. Early corrective action to reduce slash and brush prior to planting (described below) would result in successful reforestation and no herbicide treatments now or in the future would be needed.

Correction Strategies

Vegetation management action would likely be necessary to reduce the amount of post-harvest live vegetation and slash to a point below the damage threshold. A post-harvest review would be conducted to make a final determination because there may be small areas where the no-action strategy is appropriate. Mechanical treatment and burning or broadcast burning may occur where the correction strategy is selected.

- Mechanical Treatment and Burning - This method could use a track-mounted vehicle with a grapple-type device to pile a large portion of the slash. It would also be used to pull out the larger live vegetation and pile it with the slash. This method could also use a track-mounted vehicle with a masticating device to crush and/or chip slash and cut brush. Grapple piling and burning is a very effective corrective method on sites with less than 30% cover of larger vegetative plants such as vine maple or rhododendron. Mechanized equipment using a masticating type device is a very effective corrective method on sites with more than 30% cover of larger vegetative plants such as vine maple or rhododendron. Both of these treatments would remove the larger vegetation, but are not very effective on the smaller individual plants or species such as beargrass. They are both very effective at reducing fire hazards on slopes less than 40%. More than 500 well-distributed planting spots per acre would be made available. Piles would be burned prior to planting. Piles can be burned in the fall when smoke dispersal conditions are favorable and pile burning has a relatively low level of safety concern for workers doing the burning and there is low risk of escaped fire situations. This method would cost approximately $300 per acre.

- Broadcast burning is the intentional application of fire, usually on larger more continuous fuels where the use of other treatments is not appropriate. Jackpot burning is similar but is used to describe a situation where fuels are not continuous. It would be applied under a very specific set of weather and fuel moisture conditions. Measures would be used to minimize the loss of green trees during burning. Burning would be executed in compliance with Oregon Smoke Management Regulations.

The following are standard practices and are also general guidelines are from Chapter 2 of the Vegetation Management FEIS:

- Develop a silvicultural prescription, approved by a certified silviculturist with a site-specific diagnosis and treatment needs.
- Develop a site specific prescribed burning plan approved by a line officer.
- A job hazard analysis would be developed and discussed by workers to reduce exposure to hazards such as use of power tools, fire and walking in difficult terrain.

Human Health Effects

The human health effects of mechanical treatments would be very low and would be limited to the operator who is inside a protected machine. Risks would increase as slopes increase. Risks for broadcast burning are greater. The risk to the general public would be very low.

Prescribed burning has the potential for both short and long-term effects to both workers and members of the public. There is the possibility of an escaped fire situation. Burning

is only conducted during specific parameters of fuel moisture, humidity and wind speeds when the risk of catastrophic fire is low.

Alternatives and Vegetation Management Strategies

Alternative A
The No Action Strategy for vegetation management would apply.

Alternatives B and C
A combination of prevention and correction strategies would be most effective. The corrective strategy would reduce both the amount of live vegetation presently on site and the expected level of fuel loading and/or fire hazard following harvesting. Successful completion of this treatment would prevent the need for the use of herbicide to control unwanted vegetation at a later date.

Alternative D
The strategy and effects of Alternative D would be similar to those of Alternative B or C, with the following exceptions. Because of the large number of trees being left and the close spacing, there would be an increase in damage to the leave trees from equipment during the site preparation and piling. In addition, the tighter spacing presents an increased risk of damage to the residual trees when the piles are burned and during broadcast burning. The cost of treatment would be higher due to the extra time that would be necessary to work around the larger number of leave trees.

Project Monitoring
Post treatment monitoring would be conducted to determine the effectiveness of site preparation and survival rates for planted trees.

Site Analysis for Noxious Weeds

Existing Situation - A review of known noxious weed population maps was conducted and surveys were conducted in the proposed project area. In addition, all potential sources of off-site weed seed were considered. These off-site sources with the potential to transport weed seed into the area include equipment used for logging and road maintenance and seed and mulch used in erosion control. There are no grazing permits in the area.

Noxious weeds found within the proposed timber sale area include *Cirsium arvense* (Canada thistle), and *Cirsium vulgare* (bull thistle). These weeds are considered to be Oregon State "B" designated weeds (ODA 2002). They are defined as regionally abundant, but with limited distribution in some counties and are limited to intensive control at the state or county level on a case-by-case basis. On the Mt. Hood National Forest, control is limited to manual control (handpulling, clipping) and biocontrol where infestation in the immediate project site is determined to be of moderate to high risk.

Other noxious weeds of concern known to occur on the Clackamas River Ranger District, which have the potential to invade the project area, include *Cytisus scoparius* (Scot's broom), *Centaurea diffusa* (diffuse knapweed), *Centaurea maculosa* (spotted knapweed), *Hypericum perforatum* (St. Johnswort), and *Senecio jacobaea* (tansy ragwort). These weeds occur in areas adjacent to the proposed timber sale area.

The two thistle species that occur within the proposed timber sale units are considered to be well-established weeds throughout the United States. Biological controls (thistle stem gall fly, *Urophora cardui* for Canada thistle and bull thistle gall fly, *Urophora stylata* for bull thistle) have been utilized by the Oregon State Department of Agriculture Weed Control Program to reduce infestations in some areas of the Mt. Hood National Forest (under a Memorandum of Understanding) and on other state and federal lands. Biological controls have not been used specifically in the proposed timber sale area but are one of the integrated methods that are considered in the treatment of noxious weeds.

Forest Service policy for projects that may affect noxious weeds includes (1) determine the factors that favor establishment and spread of noxious weeds, (2) analyze weed risks in resource management projects, and (3) design management practices to reduce these risks. The February 1999 Executive Order 13112 on Invasive Species requires federal agencies to use relevant programs and authorities to prevent the introduction of invasive species.

Invasive plants can displace native plant species and affect terrestrial and aquatic diversity. Noxious weeds can also reduce productivity of forest systems by displacing desirable species and capturing and utilizing valuable resources (ODA 2002).

Effects – Including Direct, Indirect and Cumulative Effects
With Alternative A, the current rate of introduction and spread of weed species to the project area would continue. Road maintenance activities such as brushing and blading as well as road use by vehicles are some ways weeds may spread.

There would be the potential for the introduction or spread of noxious weed species to the project area due to ground disturbance resulting from logging operations and site preparation in Alternative B, C, and D, and the building of temporary roads in Alternative B. Weed seed sources may include off-road equipment brought in from infested areas and seed or mulch used for erosion control that are contaminated with weed seeds.

The design criteria that are incorporated into the project would reduce the risk of noxious weed introduction and establishment in the action alternatives. The *Guide* to Noxious Weed Prevention Practices, (USDA 2001) contains greater detail on the implementation of these practices.

With the implementation of the design criteria, the risk of spreading existing noxious weeds or of introducing new species in the project area would be low.

Other foreseeable projects such as Batwings and Oak Grove Thin would utilize some of the same roads as Imp. These projects would include similar requirements to reduce the risk of spreading noxious weeds.

AIR QUALITY

Mt. Hood Forest Plan References
Forestwide Air Quality Standards and Guidelines - FW-39 to FW-53, page Four-51
See Mt. Hood FEIS pages IV-19, and IV-155 to IV-167

Existing Situation – Air quality may be affected by burning of slash. Currently the harvest units have slash accumulations of approximately 20-30 tons per acre.

Effects – Including Direct, Indirect and Cumulative Effects
Alternatives B, C and D

Dust from vehicles would not pose an air quality problem. The primary haul routes are paved except for local roads near harvest units. Dust from these roads would not drift toward campgrounds or any other area of popular public use.

Burning would occur with the action alternatives. All harvest units would have existing slash, the branches and tops of harvest trees and brush piled with a grapple machine or broadcast burned. Harvest would increase fuels by 20 tons per acre for Alternatives B and C and 10 tons per acre for Alternative D. Slash piles in the units and at landings would be burned. Burning has the potential to degrade air quality for short periods of time. The principal impact to air quality from burning of slash piles and broadcast burning is the temporary visibility impairment caused by smoke to the recreational users. Past experience has shown that air quality declines are limited in scope to the general burn area and are of short duration. The effects on air quality should be minimal due to the burning being scheduled in the fall (October - December) or during periods of inclement weather.

Indirect Effects - The following are areas of concern for smoke intrusion: Portland-Vancouver Metropolitan Area, Mt. Hood Wilderness, Bull of the Woods Wilderness, Salmon-Huckleberry Wilderness and Mt. Jefferson Wilderness. To protect visibility in these Class I areas, prescribed burning would be restricted from the July 4th weekend to September 15. All prescribed burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan to minimize the adverse effects on air quality. Burning would be conducted when smoke dispersion conditions are favorable to minimize the potential for adverse effects.

Direct Effects - Health risks are considered greater for those individuals (workers and others) in close proximity to the burning site. Particulate matter is measured in microns and calculated in pounds per ton of fuel consumed. Particulate matter that is 10 microns or less in size create the greatest health risk. At this size the material can move past normal pulmonary filtering processes and be deposited into lung tissue. Particulates larger than 10 microns generally fallout of the smoke plume a short distance down range. Members of the

public are generally not at risk. Few health effects from smoke should occur to Forest users due to their limited exposure. Due to the distance involved and the season of the burn, strong inversions are unlikely to develop and hold a dense smoke plume to adversely affect residential areas.

Alternative A

In the short term, Alternative A would not change air quality. However, the current fuel accumulation of 20-30 tons per acre would remain. If a wildfire were to burn through the project area, Alternative A would generate more smoke than the action alternatives.

Cumulative Effects – The areas of highest concern for possible impacts to air quality discussed above are far from the project area. The project area is outside Class I airsheds. The area of analysis is a large "airshed" which encompasses much of the Forest as well as adjacent forest, farm and urban areas. The Forest's contribution to the air pollution of the region is only partially controllable or predictable due to the wildfire situation. When prescribed burning associated with Imp or any other timber sale on the Forest, or other burning projects is scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan, smoke dispersion conditions would be favorable and potential cumulative effects would be minimized. Any time fuels are reduced whether by prescribed burning or other means, the potential for wildfire smoke intrusion into high concern areas is reduced.

ECONOMICS

Mt. Hood Forest Plan References
Forest Management Goals - 19, page Four-3
See FEIS page IV-112

One of the dual goals of the Northwest Forest Plan is to provide a sustainable level of forest products for local and regional economies and to provide jobs. The purpose of this analysis is to provide a comparison of alternatives. The analysis tiers to the Northwest Forest Plan Final Environmental Impact Statement, which has an in-depth analysis of the economic basis behind the goal of providing forest products for local and regional economies. It also contains an analysis of the social and economic benefits and impacts of preservation, recreation and other values.

For all alternatives, most of the costs for planning have already occurred. Alternative A would not provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future. As the table below shows, there would be no return on the planning costs already used for this project.

The action alternatives would provide for jobs associated with logging and sawmill operations and would contribute to meeting societies forest product needs. The NFP

(p. 3&4-297) contains an analysis of employment in the timber industry. The incremental contribution of each million board feet of timber is approximately 8.3 jobs.

A timber sale would be appraised just prior to advertisement, so the figures below would likely change in today's fluctuating markets, but the relative difference between the alternatives would remain approximately the same. Competitive bidding may result in increased value. This section displays costs and economic returns for a timber sale.

Costs and Benefits

	Alternative A	Alternative B	Alternative C	Alternative D
Administrative Costs and Essential KV	$84,000	$231,000	$231,000	$231,000
Estimated Bid Value	0	$260,000	$244,000	$48,000
Net Present Value	-$84,000	$3,000	-$11,000	-$132,000
Benefit Cost Ratio	0	1.01	0.95	.38

(Data source – economic analysis spreadsheets located in analysis file)

Administrative Costs and Essential KV: This figure (undiscounted) is based on Regional and Forest averages. For the action alternatives it includes costs that have not yet occurred such as sale administration and planting costs.

Net Present Value: This is the present day project value where estimated administrative costs and essential KV costs (discounted), are subtracted from total revenue generated (discounted).

Benefit Cost Ratio: This is a ratio derived from dividing the estimated bid value (discounted) by the estimated administrative and essential KV costs (discounted). A benefit/cost ratio greater than 1.0 indicates that benefits exceed costs.

The bidding results of the timber sales sold since September of 2001 indicates substantial competition for forest products in the region as well as a high demand for forest products from the Mt. Hood National Forest. Timber sales prepared from the Imp EA would provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future.

TRANSPORTATON

The recently established Roads Analysis rule requires that decisions about road management be informed by roads analysis. A Roads Analysis has been developed at the Forest scale (USDA 2003a). Road management decisions are informed by this Forest-level analysis, and are focused by project-level specifics.

Across the Forest, funding for road maintenance is lower than the level needed to properly maintain the approximate 3000 miles of open roads on the Forest. The Forest-wide Roads Analysis identified, for approximately half of the current road system, the need to change maintenance levels to lower standards, to store roads in a maintenance

level one category or decommission.

The objective of this project-level roads analysis is to provide information to decision makers so that the desired future road system is one that is safe, environmentally sound, affordable and efficient. A project level roads analysis may include topics such as: 1) construction of new permanent system roads, 2) reconstruction of existing roads needed for the project, 3) making changes to road maintenance levels, 4) decommissioning system roads, 5) storm proofing, 6) road closures and 7) the construction or reconstruction of temporary roads. The item particularly relevant to the Imp project is #7.

Existing Situation

There are no inventoried roadless areas near the Imp project. The Roaring River roadless area is more than 3 miles away from Imp with many roads in between. The Imp project area can be accessed from several directions but road 5720 is the primary haul route. Alternate haul routes exist over road 5730, either directly down to road 57 and on to OR highway 224, or up 5730 to 5740 to 57 and on to road 42 leading out to OR highway 26. Another alternate haul route could follow 4661 and 4660, allowing access to road 46.

Road 5720 between road 57 and the 5710 junction, is a paved road that is identified in the ATM as a secondary mainline route, being needed for the long-term road system. It has an operational maintenance level of 3 and an objective maintenance level of 2. Through the years, cracks and settling have occurred along portions of the road. The road is need of deep patch repairs, leveling courses, drainage repairs and surface treatment. The long-term goal is to convert the asphalt surface to aggregate as opportunities arise. The current plan is for the timber sales from the Slinky EA to make the needed repairs on road 5720. Timber from Unit 7 would be hauled on 4660; a route which would be converted from asphalt to aggregate surface by other timber sales in the summer of 2004. Because these road repairs would be incorporated into other timber sales, the Imp project has no planned road reconstruction. If for some reason, the timber sales that would complete these road repair projects were delayed, one option would be to attach the repairs to the Imp Timber Sale.

The roads to be used for Imp would also be used by other timber sales including Upper Clackamas Thin, Oak Grove Thin, Slinky, Solo and Batwings.

There are many closed roads in the Imp project area. However, on some roads the closure devices are damaged by vandalism.

Alternative A

No roads would be built.

Alternative B

A temporary road is needed to access the landings in unit 6. Some new temporary road construction is needed but most of the needed road would be reconstructed from an existing temporary road and a skid trail, which have been recently scarified and are currently closed to vehicle access. The approximate lengths would be: 1400 feet of reconstruction of an old temporary road, 1500 feet of reconstruction on the alignment of an existing skid trail and 500 feet of new temporary road construction. These temporary roads would be obliterated and revegetated after completion of the project. The road to unit 7 (4660.150) is currently closed by a berm. It would be opened for the project and would be closed by a berm upon completion of the project. All lengths are approximate. The proposed roads are located on gentle landforms near ridge tops that serve the long-term need for access with skyline and ground based systems. They also avoid streams and wet areas. All of these roads would likely be needed again in the future for timber management.

Alternatives C and D

Alternative C and D would be similar to alternative B but would build no new roads. Helicopters would be used where necessary to remove logs. Portions of unit 6 would be helicopter logged to landings on existing roads. Approximately 1400 feet of existing temporary road would be reconstructed to access Unit 6a.

Public Comment

Public involvement efforts for this project resulted in comments that relate to roads. Some said there should be no road construction. Alternatives C and D have been specifically developed to address these concerns.

Some said that the roads shouldn't be called 'temporary' because they would last a long time. It is not likely that these questions of semantics can ever be resolved. Temporary roads would be obliterated by the purchaser upon completion of operations. This obliteration and revegetation would help reduce compaction and increase infiltration rates but it would not return the site to pre-disturbance conditions. This road would likely be needed again in the future for timber management.

HERITAGE RESOURCES

Mt. Hood Forest Plan References
Forestwide Timber Management Standards and Guidelines - FW-598 to FW-626, page Four-118
See FEIS page IV-149 and IV-155 to IV-167

Surveys conducted for this project located no new sites. This project is discussed in heritage resource report number 99-05-03. There are no anticipated affects on heritage

resources. Contracts would contain provisions for the protection of sites found during project activities.

ENVIRONMENTAL JUSTICE – CIVIL RIGHTS

Executive Order 12898 directs agencies to identify and address disproportionately high and adverse human health or environmental effects of projects on certain populations. This includes Asian Americans, African Americans, Hispanics, American Indians, low-income populations and subsistence uses. The Civil Rights Act of 1964 prohibits discrimination in program delivery and employment.

The Imp project is in the middle of a large contiguous block of the Mt. Hood National Forest with no nearby private or other ownership. For the purpose of this analysis, the term "Imp area" is used to include the timber sale units and approximately 6 square miles of adjacent National Forest. (Data source – U. S. Census Bureau)

Potentially Affected Communities

There are communities with minorities and low-income populations that may be affected by the Imp Project. The town of Estacada (the nearest community) is approximately 25 miles away. Other more distant communities that may have an interest in the Imp area would include the Detroit and Mill City area, the Molalla area, the Woodburn area, and the Portland metropolitan area. Individuals from these communities may work, recreate or have other interests in the Imp area. There are no known special places for minority or low-income communities in the Imp area.

Census data confirm that all of these communities contain minority and low-income populations. Poverty status ranges from 4 to 10 percent and minority populations range from 9 to 21 percent. In the rural communities and small towns, income is lower than the state and national averages and unemployment is higher than state and national averages. In recent decades, rural areas have experienced an influx of high-income families that have moved to the country and commute to work in the Portland metropolitan area. However there is still a small town and rural population that relies more on earning their living or supplementing their income on the Forest. Some of these rural communities have experienced downturns in their economies due to reductions in timber harvest and closure of sawmills and other associated facilities.

Even farther away, but potentially affected are the American Indian communities of Warm Springs and Grande Ronde. Tribal groups have been contacted about the proposed action and did not express any interest. There are no known areas of religious significance in the Imp area.

Potentially Affected Workers

Many people work in the Mt. Hood National Forest. In the Imp area, employment opportunities include logging and other work associated with timber sales such as truck drivers and Forest Service inspectors. Post sale employment includes contractors and

Forest Service employees that pile and burn slash and plant trees. In recent years, the percentage of Hispanics working on the Forest has increased. Alternatives B and C would provide employment to woods workers on the Forest as well as mill workers in adjacent communities. Alternative D provides ½ the timber volume of the other action alternatives and would supply ½ the employment. The no-action alternative would not provide this employment. There are hazards and risks associated with working in the woods with heavy equipment, chainsaws, falling trees, burning and driving narrow roads. These risks do not fall disproportionately on minorities or low-income workers and there are safety practices in place to provide appropriate levels of protection.

A report titled, Employment Transitions in Oregon's Wood Products Sector During the 1990's (Helvoigt, 2003) documents statistics for displaced wood products workers. It indicates that only 51 percent of workers displaced from the wood products sector during the 1990's remained employed in Oregon by 1998. Of these, 45% found employment in the service and wholesale-retail trade sectors. The median wage of separated workers in 1998 was below their wage when employed in the wood products sector and below the median wage of all Oregon workers. The report expressed a concern that many of those who remained in rural areas are chronically underemployed.

Some minorities and low-income people work in the forest gathering products. In the Imp area, the primary products would include boughs, firewood and beargrass. Other products that are harvest at much lower levels, with few if any harvested in the Imp area, may include mushrooms, salal, huckleberries, Christmas trees and landscaping plants. Some of this gathering is for resale to generate income and some is for personal use or subsistence use. Permits are issued for most gathering but some minor uses occur without need for a permit. A large percentage of commercial forest product gathering is by minority and low-income individuals to supplement their income or as a primary job (Richards 2003). Asian Americans and Hispanics are frequent product gatherers. In recent years, the Imp Timber Sale units have not specifically been requested for gathering permits. The Imp action alternatives may result in a short-term increase in firewood opportunities and a short-term decrease in other products. However, forest product availability on a landscape level would not be negatively affected. Many thousands of acres are available for special forest product gathering and the Imp Timber Sale units do not represent a special or unique source of products that are not available elsewhere. The no-action alternative would not provide any firewood.

Potential Affect to Recreation

Minorities and low-income people recreate on the Mt. Hood National Forest. In the Imp area there are no campgrounds, trails or other destination recreation features.
The Imp area is used for dispersed camping as well as hunting. There is no indication that recreators including minorities or low-income people focus on the Imp area to recreate more than any other similarly remote portion of the Forest. With the action alternatives, there may be short-term movement of dispersed campers or hunters during project implementation. The no-action alternative would not have this affect. See recreation section.

Potential Affect to Health

The Imp project would not be a significant source of pollution. Refer to the water and air quality discussions. An example of indirect effects may include increased amounts of fine sediment downstream at the intake of municipal water providers, due to erosion from harvest and road construction. Because of the distance of the proposed temporary roads and harvest units to streams, vegetative buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or runoff. Any impact to water quality caused by sedimentation would be short-term and undetectable at a watershed scale. The proposed action does not involve the use of herbicides or pesticides.

An example of effects to air quality may include smoke caused by slash burning. Burning has the potential to degrade air quality for short periods of time affecting primarily visibility for recreation users. Usual wind direction during burning would carry smoke away from nearby communities and there would be little if any health affect. Health risks for employees or contractors conducting the burning would be greater than for the general public. Risks are minimized by training and using job hazard analyses.

Potential Affect to Historical or Cultural Sites

Surveys have been conducted and the project would not affect any sites that are historically or culturally significant to minority or low-income communities.

Potential Affect to Environment

Many resources were evaluated to determine the extent of environmental benefit or impact that may affect minority or low-income communities. The following resources may be of particular value to these communities: Rare plants and animals, fish, water quality, wildlife, old growth, soils, scenery, air quality and heritage resources.

No adverse impacts were identified that would have a disproportionate affect on minority or low-income communities. No adverse civil rights impacts were identified.

RECREATION

In the Imp area there are no campgrounds, trails or other destination recreation features. The Imp area is used for dispersed camping as well as hunting. Several fire rings are present at old landings and road junctions. Based on inspection of fire rings and other recreation indicators, the Imp area does not seem to receive more dispersed recreation than any other similarly remote portion of the Forest. With the action alternatives, there may be short-term movement of dispersed campers or hunters during project implementation. Even with this temporary displacement, dispersed camping availability on a landscape level would not be negatively affected. Many thousands of acres are available for camping and other forms of recreation and the Imp Timber Sale units do not

represent a special or unique recreational opportunity that is not available elsewhere. The no-action alternative would not have this affect.

Hunting opportunities within the harvest units may increase over the next 10 to 15 years, as more early-seral vegetation is available as forage for deer or elk. The no-action alternative would not have this affect.

The effects to recreational fisheries would be minimal because fish habitat conditions downstream would not be detrimentally affected and because the roads in the project area are not used by fishers to access fish bearing streams. Access to streams for angling is not altered by any of the action alternatives.

OTHER

Farm And Prime Range Land
There would be no effect upon prime farmland or prime rangeland. None are present.

Flood Plains Or Wetlands
No flood plains or wetlands are affected by the alternatives.

Laws, Plans and Policies
There are no identified conflicts between the proposed action and the objectives of Federal, Regional, State laws and local land use plans, or policies.

Productivity
The relationship between short-term uses and the maintenance of long-term productivity; no reductions in long-term productivity are expected. See soils section.

Irreversible and Irretrievable Commitments
The use of rock for road surfacing is an irreversible resource commitment.

Other Disclosures

Some of the comments received during the 30-day public comment period included references to research papers, reports, letters and other documents that relate to forest management issues. The commenters wanted the agency to consider this information and to make the decision maker aware of other points of view. The documents have been examined and the agency is aware of the information contained in them.

Pollock, Michael M., Ph.D. Kieran Suckling. 1995. **An Ecologically Integrated Approach to Management of Dwarf Mistletoe (Arceuthobium) in Southwestern Forests.** Southwest Forest Alliance May 5, 1995.
http://www.sw-center.org/swcbd/Programs/science/mistltoe.html

Conklin, David A., **Dwarf Mistletoe Management and Forest Health in the Southwest** USDA Forest Service, Southwest Region.
http://www.forestpests.org/diseases/pdfs/dwarfmistletoe.pdf

Pennings, Steven C., and Ragan M. Callaway. 2002. **Parasitic plants: parallels and contrasts with herbivores.** Oecologia.
http://biology.umt.edu/Callaway%20Lab/Full%20text%20papers%20and%20abstracts/oecologia2002%20parasitic%20plants.htm

Geils, Brian W.; Cibrián Tovar, Jose; Moody, Benjamin, tech. coords. 2002. **Mistletoes of North American Conifers**. Gen. Tech. Rep. RMRS–GTR–98. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 123 p.
http://extension.usu.edu/forestry/Reading/Assets/PDFDocs/RMRS_GTR_098.pdf

Bennetts, Robert E., Gary C. White, Frank G. Hawksworth, and Scott E. Severs. 1996. **Dwarf Mistletoes: Biology, Pathology, and Systematics The Influence of Dwarf Mistletoe on Bird Communities in Colorado Ponderosa Pine Forests.** Agriculture Handbook 709. USDA Forest Service, Washington, DC. Mar 1996.

Maloney, P.E.; Rizzo, D.M. 2002. **Dwarf mistletoe-host interactions in mixed-conifer forest in the Sierra Nevada**. Phytopathology. 92(6):597-602.

Hawksworth, F. G. 1985. **Insect-Dwarf Mistletoe Associations**. P. 49-50, In, Proceedings Of The 36th Annual Western Forest Insect Work Conference, Boulder, Colorado. March 4-7, 1985. Northern Forestry Centre, Canadian For. Service, Edmonton, 54p.

Johnson, D. W.; Yarger, L. C.; Minnemeyer, C. D.; Pace, V. E. 1976. **Dwarf Mistletoe As A Predisposing Factor For Mountain Pine Beetle Attack Of Ponderosa Pine In The Colorado Front Range**. U.S. For. Serv., Rocky Mountain Region, Forest Insect And Disease Manage. Tech. Rept. R2-4, 7 P.

Some of these documents above deal with Ponderosa pine forests and are not particularly applicable to the Imp area. The other papers were reviewed and found to contain no new relevant information and no opposing scientific viewpoints.

Talberth, J. and K. Moskowitz. 2003. The Economic Case Against Logging. available from the Forest Conservation Council, Santa Fe, New Mexico.

Niemi, E. and A. Fifield. 2000. Seeing the Forest for Their Green; Economic Benefits of Forest Protection, Recreation and Restoration. ECONorthwest and Sierra Club.

These papers were reviewed and found to contain no new relevant information. While the information may be interesting it is not within the scope of this analysis. The reports were prepared for, or funded by, interest groups known to oppose most logging within the National Forest. The issues presented in these documents are not new issues or new information. The Northwest Forest Plan considered these issues and opposing viewpoints.

1. Coats, R.N., T.O. Miller, and D.W. Kallstrom. 1979. Assessing cumulative effects of silvicultural activities. John Muir Institute. Napa, 160p. (1979) (significant increases in peak flow post-harvest)
2. Robert Harr, et al., *Changes in Storm Hydrographs after Road Building and Clear-Cutting in the Oregon Coast Range*, 11 Water Resour. Res. 436-44 (1975) (same; timber harvest leads to soil compactions and increased floods)
3. Robert Harr, et al., Pacific Northwest Research Station, U.S. Dep't of Agriculture, Changes in Stream-Flow Following Timber Harvest in Southwestern Oregon, PNW-249 (1979)
4. Robert Harr, et al., Pacific Northwest Research Station, U.S. Dep't of Agriculture, Effects of Timber Harvest on Rain-on-Snow Runoff in the Transient Snow Zone of the Washington Cascades, PNW 88-593 (1989)
5. J. Jones & G. Grant, *Peak Flow Responses to Clear-Cutting and Roads in Small and Large Basins, Western Cascades, Oregon*, 32 Water Resour. Res. 959-74 (1996)
6. K. Lyons & L. Beschta, *Land Use, Floods, and Channel Changes: Upper Middle Fork Willamette River, Oregon (1936-1980)*, 19 Water Resour. Res. 463-71 (1983)
7. M. Reid & T. Dunne, *Sediment Production from Forest Road Surfaces*, 20 Water Resour. Res. 1753-61 (1984)
8. Johnson, D. H. and T. A. O'Neil. 2001. Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press. Chapter 24. Decaying Wood in Pacific Northwest Forest: Concepts and Tools for Habitat Management. Rose, et al. < http://nwhi.org/nhi/whrow/overview.asp>

These eight research papers were reviewed and found to contain no new information. Most of this information has been available for a long period of time. The analysis in the EA considers this information. Much of the information contained in the reports that predate 1990 was also available during development of the Forest Plan.

Perry, D. A. et al. 2001. Letter from Scientists to the Regional Interagency Executive Committee. Contains recommendations regarding management of late-successional and old growth forests. September 4, 2001.

This letter does not present new scientific information. It concludes, "that there is insufficient economic justification to warrant further logging of the region's late-successional and old growth forest. We urge you to protect all remaining late-successional and old-growth forest throughout the Pacific Northwest Region."

The authors are mostly environmental scientists, with experience in the Pacific Northwest and expertise that includes conservation biology, disturbance ecology, geomorphology, zoology, ecosystem science and the ecology of lichens, fungi, invertebrates, and mollusks, as well as economists who are familiar with the situation in the Pacific Northwest. The information presented in these letters is not new science since the development of the NFP. The authors present their suggested policy principles and land management recommendations based on their opinion. The NFP considered the issues presented in these letters. The NFP analyzed the probability of maintaining viable populations of organisms as well as the effect to the regional economy. An alternative was considered and evaluated when developing the NFP that did what these letters requested. The Record of Decision and the FEIS for the NFP explains the rational for the decision as well as the trade-offs and risk associated with this decision. The Imp EA is consistent with the NFP and its standards and guidelines, which address the issues presented in these letters.

Tepp, 2002, Assessing Visual Soil Disturbance on Eight Commercially Thinned Sites in Northeastern Washington. USDA Forest Service. Pacific Northwest Research Station. PNW-RN-535. <http://www.fs.fed.us/pnw/pubs/rn535.pdf>

Landsberg, Miller, Anderson, Tepp, USDA 2003 Bulk Density and Soil Resistance to Penetration as Affected by Commercial Thinning in Northeastern Washington. USDA Forest Service. Pacific Northwest Research Station. PNW-RP-551. <http://www.fs.fed.us/pnw/pubs/rp551.pdf>

Luce, C.H., 1997. Effectiveness of Road Ripping in Restoring Infiltration Capacity of Forest Roads, Restoration Ecology 5(3):265-270. <http://www.fs.fed.us/rm/boise/teams/soils/People/luce.htm>

PNW Research Station, "Coming Home To Roost: The Pileated Woodpecker As Ecosystem Engineer" Science Findings, October 2003 http://www.fs.fed.us/pnw/sciencef/scifi57.pdf

These papers were reviewed and found to contain no new relevant information and no opposing scientific viewpoints.

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

FEDERAL, STATE, AND LOCAL AGENCIES

U.S. Fish and Wildlife Service	National Marine Fisheries Service
Oregon Historic Preservation Office	Bonneville Power Administration
Northwest Power Planning Council	Clackamas River Water
South Fork Water Board	Oak Lodge Water Board
Mt. Scott Water District	Bureau of Land Management
Metro	Clackamas River Basin Council
City of Estacada	City of Gresham
City of Lake Oswego	City of Gladstone
City of Oregon City	City of West Linn
Clackamas County	Oregon Department of Transportation
Oregon State Parks	Oregon Department of Forestry
Oregon Department of Fish and Wildlife	Oregon Division of Lands
Oregon Marine Board	Eagle Creek National Fish Hatchery
Environmental Protection Agency	

TRIBES

Confederated Tribes of Warm Springs
Confederated Tribes of Grande Ronde
Yakima Indian Nation Tribal Council

OTHERS

A scoping process to request public input for this project was conducted. A letter describing the proposed project and requesting comments was sent out in September 1998. The project first appeared in the Forest's spring 1998 issue of Sprouts, and in subsequent issues. Sprouts is a quarterly publication that is mailed to a wide audience. Comments have been received periodically since then. A notice was sent to a list of persons and organizations known to be interested in this project. Comments were received on the 2003 proposed action that was made available for its 30-day comment period. Responses to substantive comments are included in Appendix A. A list of persons and organizations that were sent notice is in the analysis file along with a list of commenters and the complete text of comments.

List of Preparers

Ivars Steinblums - Forest Hydrologist. Ivars has a B.S. in Forestry from Humboldt State University (1973), and a M.S. in Forest Engineering (Watershed Management) from Oregon State University (1977). He has worked 2 years as a timber appraiser for county government in Northern California, and 26 years as a hydrologist for the Forest Service in California and Oregon.

Glenda Goodwyne, - Forester, Certified Silviculturist. Glenda has a B.S. Forest Management from Oregon State University, 1985 and an A.A.S. Forest Management from Tuskegee University, 1980. She completed Silviculture Institute at Oregon State University/University of Washington in 1998, and is certified as silviculturist and most recently re-certified in 2003. Glenda has worked as a forester with the Forest Service for 23 years in Oregon, Washington, and California.

Jerry Polzin - Logging Systems Specialist. Jerry received a certificate of completion from Missoula Technical Center in 1977. He completed Forest Engineering Institute at Oregon State University in 1981 and Sale Area Layout and Harvest Institute in conjunction with Oregon State University and the University of Idaho in 2002. He has worked in timber sale preparation for the Forest Service for 23 years.

Gale Masters - Botanist. Gale has a B.S. in Forest Botany from S.U.N.Y. Environmental Science & Forestry and post baccalaureate coursework from University of Washington. She has worked for the Forest Service for 18 years in Oregon, Colorado, and Washington. She has also worked for the National Park Service in Washington, the former Crown Zellerbach Genetics Research in Oregon, University of Washington Arboretum, SUNY ES&F greenhouses, and commercial plant nurseries in Washington.

Carol Horvath - Botanist. B.S. Community Health from Oregon State University in 1975 and B.S. in Biology with a Botany emphasis from Portland State University in 1994. Worked summer 1991 for The Nature Conservancy and as a Co-op Education Student for the Forest Service during the summers of 1992 and 1993. She has worked for the Mt. Hood National Forest since 1994.

Bob Bergamini – Fisheries Biologist. A.A. Fisheries Technology, Mt. Hood Community College, B.A. Biology, University of Connecticut. He has worked for the Forest Service for 14 years.

Sharon Hernandez - Wildlife Biologist. Sharon graduated from Michigan State University in 1992 with a B.S. in Wildlife Management. She has worked as a biologist for the Forest Service for 10 years in Washington and Oregon.

Diane Hildebrand – Plant Pathologist. Diane earned her PhD and M.A. degrees in Environmental Biology at the University of Colorado, and took courses in plant pathology at Colorado State University. She has been a Plant Pathologist with the USDA Forest Service for 19 years, working in the Rocky Mountain and Pacific Northwest Regions. She is currently Plant Pathologist at the Westside Forest Insect & Disease Service Center based in Sandy, Oregon.

Jim Roden - Writer/Editor. Jim has a B.S. in Forest Management from Northern Arizona University. He has worked as a forester for the Forest Service for 24 years in Wyoming, California, Idaho and Oregon. He is a specialist in timber sale planning, geographic information systems and economic analysis.

James Rice – Supervisory Forester. Jim has a B.S. in Forest Science from Humboldt State University. He has worked for the Forest Service for 25 years in Southern California, Northern California and Oregon. He was a certified silviculturist in Region 5 and is currently a certified silviculturist in Region 6.

Gwen Collier - Soil Scientist. Gwen has a B.S. in Biology and Environmental Science from Willamette University and a B.S. in Soil Science from Oregon State University. She has worked for the Forest Service for 25 years in Oregon, Washington and Idaho. She is a specialist in soil science and hydrology.

Mike Redmond - Environmental Analysis Review - Mike has a B.S and a M.S. degree in Forestry from the University of Illinois. Mike has worked for the Forest Service for 26 years. He is a specialist in the preparation of environmental documents under the National Environmental Policy Act.

Burnham Chamberlain – Road System Manager. Burnham received a B.S. degree from Western Carolina University in 1976. He has worked on the Mt. Hood NF for 24 years as a forestry and engineering technician.

Susan Rudisill - Archaeological Technician. Susan has worked for the Forest Service for 20 years. She has served as an Archaeological Technician for the Forest Service for 13 years in Oregon. Training: Archaeology at Mt. Hood Community College, Anthropology at Clackamas Community College, Lithic Analysis at The University of Nevada, Reno. She has also received the following training sessions through the Forest Service: Rec. 7, Federal Projects and Historic Preservation Laws.

References

Austin, K. and K. Mellon. 1995. Cavity-Nesting Bird Habitat Guide: Western Cascades. Mt. Hood National Forest and Gifford Pinchot National Forest. USDA Forest Service. Pacific Northwest Region.

Beschta, R., et al. 1995. Cumulative Effects of Forest Practices in Oregon: Literature and Synthesis. Prepared for the Oregon Department of Forestry. Chapter 7.

Boleyn, P., E. Wold, and K. Byford. 2002. Created Snag Monitoring on the Willamette National Forest. USDA Forest Service. Pacific Southwest Research Station. Gen. Tech. Rep. PSW-GTR-181. p. 765-775. < http://www.fs.fed.us/psw/publications/documents/gtr-181/056_Boleyn.pdf>

Duncan, S. 1999. Dead and Dying Trees: Essential for Life in the Forest. Science Findings, Nov. 1999. Pacific Northwest Research Station. USDA Forest Service.

Hammond, Paul E., K. Manning Geyer, and J.L. Anderson. 1982. Preliminary Geologic Map and Cross Sections of the Upper Clackamas and North Santiam Rivers Area. Department of Earth Sciences, Portland State University.

Helvoigt, T. L., D. M. Adams and A. L. Ayre. 2003. Employment Transitions in Oregon's Wood Products Sector During the 1990's. Journal of Forestry, June 2003.

Mellon et al. 2003. DecAID, the Decayed Wood Advisor for Managing Snags, Partially Dead Trees, and Down Wood for Biodiversity in Forests of Washington and Oregon. Pacific Northwest Research Station, USDA Forest Service. <http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf>

ODA, Oregon Department of Agriculture. 2002. Noxious Weed Policy and Classification, Oregon Department of Agriculture Noxious Weed Control Program.

Oliver, Chadwick D., and B. C. Larson. 1996. Forest Stand Dynamics, Updated Edition. John Wiley & Sons, Inc.: p. 291-292.

Oliver, Chadwick D., and B. C. Larson. 1990. Forest Stand Dynamics. McGraw-Hill, Inc.: p. 83, 84 &105.

Richards, Sue. 2003. Personal communication, 6/2003. Special Forest Product Coordinator, Mt. Hood National Forest.

USDA Forest Service. 1979. Soil Resource Inventory, Pacific Northwest Region, Mt. Hood National Forest.

USDA Forest Service. 1988. General Best Management Practices, Pacific Northwest Region, 11/88.

USDA Forest Service. 1990a. Final Environmental Impact Statement for the Mt. Hood National Forest Land and Resource Management Plan and Record of Decision (Forest Plan).

USDA Forest Service. 1990b. Mt. Hood National Forest Land and Resource Management Plan. (Forest Plan).

USDA Forest Service.1995. Upper Clackamas Watershed Analysis. Final Report. Pacific Northwest Region, Mt. Hood National Forest.

USDA Forest Service. 1998a. Final Environmental Impact Statement on Managing Competing and Unwanted Vegetation and the Record of Decision and the Mediated Agreement. Pacific Northwest Region.

USDA Forest Service. 1998b. North Willamette Late Succession Reserve Assessment. Pacific Northwest Region, Mt. Hood National Forest.

USDA Forest Service. 2001. The *Guide* to Noxious Weed Prevention Practices. 7/2001

USDA Forest Service. 2003a. Mt. Hood National Forest Roads Analysis. Pacific Northwest Region. <http://www.fs.fed.us/r6/mthood/documents/current/forest-wide-roads-analysis/roads-analysis-0903.pdf>

USDA Forest Service. 2003b. Memorandum finding no lynx habitat on the Mt. Hood National Forest. December 3, 2003.

USDA Forest Service and USDI Bureau of Land Management. 1994a. 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 (Northwest Forest Plan). Portland, Oregon.

USDA Forest Service and USDI Bureau of Land Management. 1994b. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl; Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest related Species within the Range of the Northern Spotted Owl (Northwest Forest Plan). Portland, Oregon.

USDA Forest Service and USDI Bureau of Land Management. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. (Survey and Manage Plan)

USDA Forest Service and USDI Bureau of Land Management. 2002. Memorandum on implementation of 2001 Survey and Manage Annual species Review.

USDI Fish and Wildlife Service. 1998. Biological Opinion For The Willamette Province Fiscal Year 1999 Habitat Modification Biological Assessment For Effects To Listed Species.

WDW, Washington Department of Wildlife. 1993. Status of the North American lynx (LYNX CANADENSIS). Unpublished Report, Washington Department of Wildlife. 101p.

Other References

The following data sources and analyses (compact disc format) were referenced and are in the project analysis file:

GIS shape files:
- Snag.shp (snag data)
- Veg2000.shp (timber type and age data, elk habitat data, owl habitat data)
- Roads.shp (road data)

Spreadsheets:
- Arp Imp.xls(Aggregate Recover Percentage model)
- Cover Imp.xls (Deer and elk optimal and thermal cover calculations)
- Econ_altB.xls (Economic analysis for Alternative B)
- Econ_altC.xls (Economic analysis for Alternative C)
- Econ_altD.xls (Economic analysis for Alternative D)
- Open road density Imp.xls (Deer and elk open road density calculations)

Text Documents:
- Sold Sale Analysis.doc (Status of bidding on recent timber sales)
- BA_1998.doc (The Willamette Province, Fiscal Year 1998 Habitat Modification Biological Assessment For Effects To Listed Species)
- Imp Preliminary Assessment.doc
- Lynx Effects Determination memo, dated December 3, 2003

The following documents (paper format) were referenced where appropriate and are in the project analysis file:

Text Documents:
- Biological Opinion For Listed Species, Letter from U.S.D.I. Fish and Wildlife Service, dated September 29, 1998

Public Involvement:
- Letters and e-mail documents from commenters.
- Letters to interested persons requesting comments.
- Mailing list
- Commenter list