United States
Department of
Agriculture

Forest
Service

2005

Environmental Assessment

Collawash Thinning

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

The project is located in T.6S., R.6E.; T.7S., R.6E.; T.7S., R.5E.; Willamette Meridian.

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

Table of Contents

1.0 SUMMARY

The Mt. Hood National Forest proposes a commercial thinning project. The project is located in the Collawash watershed and is within the Clackamas River Ranger District, Mt. Hood National Forest, Oregon.

The purpose of this initiative is to thin young forest stands to achieve multiple objectives. The proposed action (Alternative B) is to thin and harvest wood fiber from approximately 204 acres of matrix land and approximately 88 acres of riparian reserves. Approximately 0.8 mile of new temporary road would need to be constructed to access landings.

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 build no roads and would not thin riparian reserves.
- Alternative D is similar to Alternative C except it would only thin in plantations.

2.0 INTRODUCTION

2.1 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 the following parts:

- *Summary:* This section is a brief overview of the document.
- *Introduction:* This section includes 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 design criteria and Best Management Practices. Finally, this section provides a comparison 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.

- *References and 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.

2.2 Purpose and Need for Action

2.2.1 The purpose of this initiative is to thin young forest stands to achieve multiple objectives:

- Increase health and vigor and enhance growth that results in larger wind firm trees (section 4.3);
- Enhance and/or restore biological diversity by variable density thinning (sections 3.2.6 & 4.3);
- Provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future (section 4.11);
- Enhance riparian reserves by accelerating the development of mature and late-successional stand conditions (sections 3.2.1 & 4.3.3).

2.2.2 This action is needed, because second-growth stands are experiencing a slowing of growth due to overcrowding and some are experiencing suppression caused mortality.

2.2.3 If no action is taken, this overstocked condition would result in stands with reduced vigor, increased mortality, reduced diversity, and increased wind damage susceptibility. There is a need for forest stands that are healthy and vigorous with low levels of mortality and wind susceptibility. If no action were taken in riparian reserves, stands would have reduced capability to produce the size and quantity of coarse woody debris sufficient to sustain physical complexity and stability of the riparian reserves and associated streams.

2.2.4 **Management Direction –** The proposed action has been designed to meet the goals and objectives of the documents listed below. This assessment is tiered to the Environmental Impact Statements and the listed plans are incorporated by reference.

- The Mt. Hood National Forest Land and Resource Management Plan as amended (USDA 1990b) (referred to as the **Forest Plan**).
- The Mt. Hood National Forest Land and Resource Management Plan Final Environmental Impact Statement (USDA 1990a).
- 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 Northwest Forest Plan Final Supplemental Environmental Impact Statement (USDA, USDI 1994a).

- 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).
- The Forest Plan was amended by the 2004 Record of Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy (USDA, USDI 2004a).
- The Forest Plan was amended by the 2004 Record of Decision and Standards and Guidelines to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines. (USDA, USDI 2004b).

2.2.5 The Collawash Thinning project is located within the following **land allocations**: B2 Scenic Viewshed, B8 Earthflow, B6 Special Emphasis Watershed and Riparian Reserves. Refer to Map in section 3.2.5.

Watershed Analysis - The Collawash/Hot Springs Watershed Analysis was completed for this area in 1995. The purpose and need is consistent with the recommendations of that analysis (page 4-5). Note: At that time, two separate fifth-field watersheds were recognized: the Collawash and the Hot Springs Fork. The Watershed Analysis covered both drainages in one document. Since then the two have been combined into one fifth-field watershed and it is called the Collawash Watershed. This EA uses the new terminology and references to the Collawash Watershed include the Hot Springs Fork as well.

2.2.6 **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	Forest stands 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.
Riparian & Aquatic	Riparian reserves contain the level of vegetative and structural diversity associated with mature and late-successional stand conditions. They supply coarse woody debris sufficient to sustain physical complexity and stability. They provide connectivity within and between watersheds. The riparian reserves connections provide unobstructed routes to areas critical to fulfilling life history requirements of aquatic and riparian-dependent species. NFP page B-11.
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. NFP page C-40.

Deer & Elk	The forest contains a mix of habitats including forage, thermal cover and optimal cover. Four-72, FW-202 to 207. High quality forage is created through nutritional forage enhancement. B2-023, B8-016 and B11-012.
Earthflow	Earthflows are hydrologically and physically balanced. Four-264. (Earthflows are naturally occurring geological features on gentle to moderate slopes where earth, and the trees growing there, move downhill very slowly.)
Landscape Health	Landscapes are healthy and productive and provide a mix of forest and non-forest habitats to support diverse populations of desired plant and animal species. Watersheds provide long-term sustained production of high quality water for fish and for on-Forest and off-Forest water users. Landscapes are actively managed. Four-2 to 5. The project is not within a wildland-urban interface and is not in a high fire hazard landscape.
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 Riparian Reserves 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 ROD pages 2 & 3.

2.3 Proposed Action

The proposed action is to thin and harvest wood fiber from approximately 204 acres of matrix land and approximately 88 acres of the dry upland portion of riparian reserves. (See Alternative B section 3.2 for greater detail.) Thinning would be designed to enhance or restore biological diversity by applying variable density prescriptions.

New temporary roads (0.8 mile) are needed to access the landings. These roads would be obliterated and revegetated after completion of the project.

The proposed action would begin as soon as possible.

2.4 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 May 2002. The Forest publishes a schedule of proposed actions (SOPA) quarterly. The project first appeared in the fall 2001 issue, and in subsequent issues. Comments have been received periodically since then. Other formal and informal public involvement efforts have occurred including field trips with interested groups to visit the proposed units. On June 27, 2005 a proposed action that included preliminary analysis was made available for a

30-day public comment period. Several letters and e-mails were received. This Environmental Assessment (EA) includes a response to the substantive comments (Appendix A).

2.5 Issues

Many comments were received during the scoping process. Using the comments 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 natural second-growth stand management, water quality and fish. Refer to the Response to Substantive Comments in Appendix A.

2.5.1 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 0.8 mile) may pose a risk to water quality and fish by contributing sediment to streams. A qualitative assessment of sediment input would be used to describe impacts to water quality and fish.

2.5.2 Issue #2: Water Quality and Fisheries - Riparian Reserve Management

The proposed action involves thinning in the dry upland portions of riparian reserves. There is a concern that this alteration of riparian reserves may cause erosion that may harm water quality and fish.

Issue statement: The thinning of 88 acres of riparian reserves may pose a risk to water quality and fish by contributing sediment to streams and increasing stream temperature. A qualitative assessment of sediment input and stream temperature would be used to describe impacts to water quality and fish.

2.5.3 Issue #3: Natural Second-Growth Forest

The proposed action involves the thinning of plantations and natural second-growth forests (areas of second growth that regenerated naturally after a forest fire, sometimes referred to as native forest). Comments were received expressing a concern over the thinning of natural second-growth stands. Commenters question the science behind the proposal to thin natural second-growth stands and feel that the stands should be left to grow on their own.

Issue statement: The commercial thinning of 55 acres of natural second-growth forest should not occur. A qualitative assessment would be used to describe impacts to these stands.

3.0 ALTERNATIVES

This chapter describes and compares the alternatives considered for the Collawash Thinning 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.

3.1 Alternative A - No Action

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

3.2 Alternative B - The Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to thin and harvest wood fiber from approximately 204 acres of matrix land and approximately 88 acres of the dry upland portion of riparian reserves. Since each stand is different, a silvicultural prescription would be developed to refine the number and types of trees to be retained. Variable density thinning prescriptions would be designed to enhance or restore biological diversity. Thinning would generally remove the smaller trees, leaving approximately 80 to 140 variably spaced trees per acre (exceptions are described below); the average cut-tree size would be approximately 10 to 15 inches in diameter. Design criteria describe the retention of snags and other wildlife trees as well as down logs.

3.2.1 **Riparian** - On areas proposed for riparian reserve thinning, the prescription would be adjusted to create a wider spacing of leave trees. The intention is to enhance riparian reserves by accelerating the development of mature and late-successional stand conditions. Wider spacing would also mean that one thinning entry would create the desired conditions (compared to the matrix thinning spacing where multiple thinning entries would likely occur). Riparian thinning would generally remove the smaller trees, leaving approximately 80 of the largest trees per acre, variably spaced throughout the reserve. For this project, riparian reserve widths are 180 feet for non-fish-bearing streams and 360 feet for fish-bearing streams. Design Criteria #8 discusses no-harvest buffers of approximately 30 to 50 feet along streams. There are some small seeps and wet areas and landslides that are too small to show on the maps (section 3.2.5). These areas would be excluded from harvest.

3.2.2 **Roads** - New temporary roads (approximately 0.8 mile) are needed to access the landings. These roads would be obliterated and revegetated after completion of the project. Some existing closed or overgrown roads need to be reopened (0.7 mile) to access landings. Upon project completion, the roads that were opened would be closed.

There are road repairs and improvements that would be accomplished with this project to facilitate safe access and log haul. On road 6320, two deep patch repairs are needed.

Also on road 6320, 2 miles of pavement would be converted to gravel surfacing. These are on the first two miles of road 6320. Refer to the map in section 3.2.5.

3.2.3 Unit Table

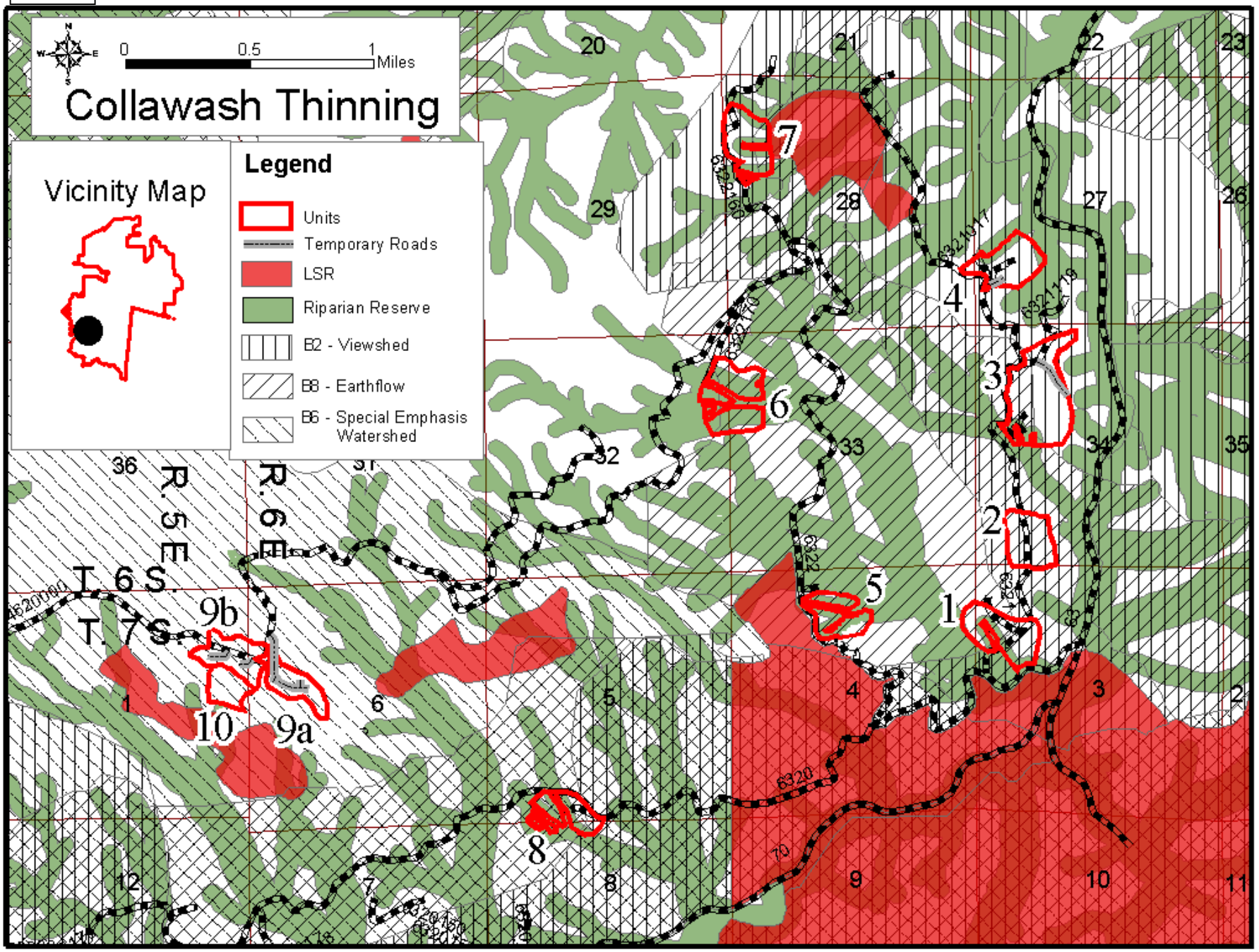
Unit	Size (acres)	Riparian (acres)	Year of Original Harvest	Notes	New Roads (feet)
1	30	10	1955	GB/S/P	
2	25	0	1959	GB/S/P	
3	57	7	1956	S/P	1000
4	27	6	1962	GB/S/P	350
5	20	15	1955	S/P	
6	33	26	1959	S/H/P	
7	27	13	1958	S/P	
8	18	11	1955	GB/S/P	
9a	18	0	N/A	GB/S, age = 95	2000
9b	23	0	N/A	GB/S, age = 95	350
10	14	0	N/A	S, age = 89	400

GB = Ground Based Logging, S = Skyline Logging, H = Helicopter Logging,
P = Plantation

3.2.4 Some documents including Biological Assessments refer to Collawash Thinning units using stand exam numbers. The following is a crosswalk table that shows current EA numbers and the corresponding stand exam numbers.

Unit #	Stand Exam #	Unit #	Stand Exam #	Unit #	Stand Exam #
1	421	5	420	9a	428a
2	422	6	425	9b	428b
3	423	7	487	10	429
4	424	8	484		

3.2.5


0
0.5
1
Miles
Collawash Thinning
Vicinity Map
Legend
Units
Temporary Roads
LSR
Riparian Reserve
B2 - Viewshed
B8 - Earthflow
B6 - Special Emphasis Watershed
T. 6 S.
T. 7 S.
R. 5 E.
R. 6 E.
1
2
3
4
5
6
7
8
9a
9b
10

3.2.6 Variability – Thinning would generally remove the smaller trees, but the objective is to introduce structural and biological diversity through variable spaced thinning. Diversity and variability would be introduced in several ways. This list is a summary of practices that are described in the design criteria and elsewhere in this document.

- Leave tree spacing would vary from 80-140 trees per acre.
- Leave trees would include minor species.
- Small gaps would be created.
- Leave trees would include all large live legacy trees and some smaller trees with the elements of wood decay.
- Leave trees would include some live trees where their crowns touch certain key snags.
- All non-hazardous snags would be retained.
- All existing down logs would be retained and key concentrations of woody debris in the older decay classes would be protected.

3.3 Alternative C

Alternative C is designed to respond to issues #1 and 2. It is similar to Alternative B except it would build no roads, would not thin riparian reserves. Units that are inaccessible from existing roads would be helicopter logged (90 acres). Alternative C would thin and harvest wood fiber from approximately 204 acres of matrix land.

Some existing closed or overgrown roads need to be reopened (0.7 miles) to access landings for many units. Upon project completion, the roads that were opened would be closed.

3.4 Alternative D

This alternative is similar to C but would eliminate the thinning of natural second-growth stands (9a, 9b and 10). This alternative would respond to issue #3 as well as issues #1 and 2. Alternative D would thin and harvest wood fiber from approximately 149 acres of matrix land and would reopen 0.7 mile of closed roads.

3.5 Alternatives Considered But Not Fully Developed

3.5.1 **Forage:** An alternative was considered that would create forage enhancement areas. The decline of forage is still a concern in this and other areas across the Forest, but this alternative was not fully developed because of stability concerns.

3.5.2 **Restoration:** An alternative was considered that would include restoration projects such as road closures and road decommissioning. Comments were received suggesting that we not mix restoration projects with timber harvest projects in the same environmental assessment. These restorations are not connected actions and are not included in the range of

alternatives for this analysis. These restoration projects have been assessed in a separate Forest-wide Restoration Environmental Assessment. There is the possibility that some of the units of the Collawash Thinning may be added to a stewardship contract to achieve some restoration projects that have been approved by other EAs.

3.5.3 **Thin Without Logging:** An alternative was considered that would thin dense stands by cutting trees and leaving them on the ground and chipping the limbs. It was not fully developed because it would not meet the objective of providing forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future. Since there is no source of funding for this type of operation it would be similar to the no-action alternative.

3.5.4 **Fertilization:** An alternative was considered that would fertilize the matrix portion of plantations to enhance growth. It was not fully developed because of the logistics and operational safety of aerially fertilizing steep slopes while avoiding intermixed riparian areas.

3.5.5 **Logging Method:** When contemplating the thinning of plantations it is usually considered most efficient to harvest trees in the same manner as the original logging. For example, the same roads and landings and similar logging equipment would be used. However, in some cases, the current proposed action deviates from the original logging technique to reduce resource impacts. The alternative of logging all units in the same manner as the original was considered but not fully developed. The following is a unit-by-unit description of the rationale for changing the previous logging methods.

Unit 3 – Most of this unit was previously logged with ground-based equipment down hill to a temporary road that traversed the southern part of the unit. This old road crosses two wet areas and has trees growing on it. The proposed action does not reconstruct this old road but instead would build a new temporary road (1000 feet) higher on the slope and would use a skyline system. The option of logging the unit the same way it was originally done was considered but not fully developed because of concerns about potential sedimentation that might occur if the old road were reconstructed and new culverts were installed.

Unit 4- This unit was logged primarily with a skyline system. Logs were yarded across a small stream. The proposed action does not yard across streams but instead would build a short ridge-top temporary road (350 feet) to get the proper lift for one-end log suspension.

Unit 5 – This unit was logged using a skyline system. Logs were yarded across a small stream. The proposed action does not yard across streams but instead would use an existing ridge-top fire line to walk a skyline yarder out to a ridge-top landing location. Logs would be skyline yarded away from the riparian area, and from the landing the logs would be moved with ground based skidding equipment to the existing road. The option of logging the unit the same way it was originally done

was considered but not fully developed because of concerns about the loss of riparian trees in skyline corridors that would have to cross a stream.

Unit 6 – This unit was logged using skyline and ground-based systems. It also utilized a landing that is now cut off because of a culvert failure. The proposed action would use a helicopter to log the south portion of the unit and skyline to log the rest. The option of reconstructing the washed-out road and logging the unit the same way it was originally done was considered but not fully developed because of concerns about potential sedimentation that might occur if the road were reconstructed. A separate restoration EA has authorized the removal of the old culvert and rehabilitation of the site.

3.5.6

During the 30-day comment period, Oregon Natural Resources Council (ONRC) requested the consideration of an alternative that protects ecologically important snags. All of the action alternatives would save existing snags where safety permits but many snags would have to be felled. ONRC suggested an alternative that would save certain snags by avoiding all harvesting in the hazardous zone around the snags. Survey data shows that there are approximately 4-10 medium and large snags per acre within the natural second-growth stands and none in plantations. 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 snags would eliminate all of the natural second-growth 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 snags within a timber sale that occurs over a 2 to 3 year period. ONRC's suggestion of an alternative that protects existing snags is similar to Alternative D (it would eliminate units 9a, 9b and 10). Some snags do not pose a hazard and would be retained. Guard unit 3 is an example of a similar natural second-growth stand that has been logged and some ecologically significant snags were retained.

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

1. **Northern Spotted Owl:** No activity would take place within spotted owl nesting/roosting/foraging habitat during the March 1 to July 15 critical nesting period. This applies to noise generating activities but does not include road use, log hauling or hazard tree removal to protect public safety. This restriction may be waived if the area is found to be unoccupied or there is no nesting activity, as determined by a survey to protocol. This applies to units 9a, 9b and 10. No blasting would occur in conjunction with this project between March 1 and July 15. No helicopter use would occur between March 1 and July 15. *This is a standard requirement from the Biological Opinion.*

2. **Soils:** No operation of off-road ground-based equipment would be permitted between November 1 and May 31. This restriction applies to the ground-based portions of harvest units 1, 3, 4 and 8. It also applies to ground-based equipment such as harvesters or equipment used for fuels treatment, road construction, road reconstruction or 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.*

3. **Peregrine Falcon:** No mechanized slash piling, site preparation, road building, log loading, yarding, helicopter use, or other management activities that produce sound above the ambient noise level of the area would be permitted in units 4 and 7 from January 1st to July 31st. Helicopter use is also restricted below 1500 feet Above Ground Level anywhere within the primary and secondary management zones during this time period as well. This applies to the helicopter portion of unit 6.

4. **Deer and Elk Winter Range:** No harvest operations, road construction, use of motorized equipment or blasting would be permitted in Crucial and High Value winter range areas between December 1 and March 31. The restriction would be waived in the high value zone if snow accumulation levels are less than 12 inches or if it is determined that the area is not being used by elk. Units 1, 2, 3, 5 and 8 are in the crucial zone and unit 4 is in the high value zone.

   No log haul or snow plowing would be permitted on roads in Crucial Winter Range between December 1 and March 31. This applies to all units. *This implements Forest Plan standard and guideline FW-211 and a memorandum of understanding with Oregon Department of Fish and Wildlife.*

5. **Snags and wildlife trees:** Snags would be retained in all units where safety permits. To increase the likelihood that snags would be retained, green trees

would be marked as leave trees where their live crowns touch certain key snags. Certain live trees would also be selected as leave trees that have the "elements of wood decay" as described in the DecAid advisor. This may include trees with features such as dead tops, broken tops and heart rot.

In **natural second-growth** stands, 16.6 live trees per acre greater than 10 inches diameter with "elements of wood decay" would be retained. Of these trees, 4.2 per acre should be greater than 20 inches diameter where available. Large mature trees that occur scattered in some of the natural second-growth stands would be retained, and where they contain the "elements of wood decay" they would be counted toward these totals. This applies to units 9a, 9b and 10.

In **younger second-growth** stands (plantations) in the matrix, 5 live trees per acre with "elements of wood decay" would be retained. All 5 of these trees should be in the largest size class available.

6. **Down Woody Debris:** Old down logs currently on the forest floor would be retained. Prior to harvest, contract administrators would approve skid trail and skyline locations in areas that would avoid disturbing key concentrations of down logs or large individual down logs where possible. Additional down woody debris would be generated by the timber sale. This would include the retention of cull logs, tree tops, broken logs and any snags that would be felled for safety reasons. *This implements Forest Plan standards and guidelines as amended.*

7. **Erosion:** 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.*

8. **Thinning in Riparian Reserves –** *These are BMPs and implement NFP standards and guidelines, pages C-30-32.*

   Perennial streams - Establish a minimum 50 ft. no-harvest buffer along the active channel of all perennial streams. Larger buffer widths may be needed on a site-specific basis to prevent any increase in sediment delivery rates or a decrease in stream shading. Buffer width design would take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability. Falling trees for skyline corridors would be avoided, but where necessary the material would be left as woody debris. Falling any trees within the no-harvest buffer would only be allowed if it would cause no increase to sediment or decrease in stream shading.

   For the next 50 ft. adjacent to the no-harvest buffers, only low impact harvesting equipment such as, but not limited to, mechanical harvesters or skyline systems, which have minimal ground disturbance would be allowed. Mechanical harvesting equipment would be required to operate on slash-covered paths. Trees in this zone would be directionally felled away from the no-harvest buffer to minimize the disturbance to the forest floor. These requirements would maintain the indicators for sediment, stream temperature, stream bank condition, and large woody material indicators.

   Intermittent streams (as defined in NWP) – Establish a minimum 30 ft. no-harvest buffer along the active channel of all intermittent streams. Smaller buffer widths would be allowed if it is determined on a site specific basis that there would be no increase in sediment delivery rates or a decrease in stream shading which would alter stream temperatures. Buffer width design would take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability. Falling trees or any equipment use within the no-harvest buffer would only be allowed if it would cause no increase to sediment or decrease in stream shading.

   Thinning in riparian reserves would emphasize the development of vegetative and structural diversity associated with mature and old-growth stand conditions. Thinning would leave approximately 80 or more trees per acre. While thinning in the riparian reserve may have short-term effects, the thinning would contribute to maintaining or restoring the fifth-field watershed over the long term. Thinning in riparian reserves would increase tree size, adequately protect the zone of shade influence along streams, and minimize the potential for sediment delivery to streams. This prescription would maintain water temperature, large woody debris, disturbance regime, and riparian reserve indicators.

9. **Logging Systems –** *These are BMPs and implement Forest Plan standard and guideline FW-022.*

9.1 Avoid the use of ground based tractors or skidders on slopes generally greater than 30% and mechanical harvesters on slopes greater than 40% because of the risk of damage to soil and water resources.

9.2 Mechanical harvesters and forwarders would be required to work on a layer of residual slash and the operator would place slash in the harvester path prior to advancing the equipment.

9.3 In some units, ground-based logging is proposed for areas that have been previously harvested with ground-based systems. Existing temporary roads, landings and skid trails would generally be reused where feasible. There may be instances where it is not desirable to use an existing skid trail and in such cases, if a skid trail is needed in the area, a new skid trail would be located that minimizes the alteration of surface hydrology.

9.4 On earthflows or where existing detrimental soil conditions exceed Forest Plan standards, existing temporary roads and landings that are reused, would be obliterated and revegetated.

10. **Roads –** *These are BMPs.*

10.1 During the wet season, log haul would only be permitted on asphalt and rocked roads when conditions would prevent sediment delivery to streams.

10.2 If landings are needed in riparian reserves, they would be located on existing roadways that do not require expansion of the road prism or on existing landings that may require only minimum reconstruction (clearing vegetation, sloping for drainage, or surfacing for erosion control purposes) to be made suitable for use.

10.3 The re-opening of old temporary roads is encouraged over the construction of new roads if they are located in areas that would prevent sediment delivery to streams.

10.4 Newly constructed roads would not cross or be constructed parallel to stream channels. They would be built on ridge tops, benches, or gentle slopes and only where conditions would prevent sediment delivery to streams.

10.5 No road construction is proposed within riparian reserves.

10.6 Temporary roads would normally be constructed, used and obliterated in the same operating season. If this is not possible, due to fire season restrictions or

other unforeseen delays, the road would be winterized prior to the end of the normal operating season by out-sloping, water-barring, effectively blocking the entrance, seeding, mulching and fertilizing.

11. **Invasive species:** 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. These provisions contain specific requirements for the cleaning of off-road equipment. *This implements Executive Order 13112 dated February 3, 1999.*

12. **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.*

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

    Prior to advertisement of a timber sale, a crosswalk 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 and firewood removal. Based on these reviews, post harvest activities would be adjusted where needed to achieve project and resource objectives.

    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.

14. **Other**

    The following design criteria were developed based on comments received from members of the Clackamas River Stewardship Partners. This group represents many diverse interests including individuals, associations and agencies interested in resource

management, resource preservation, economic development and restoration. This group has been advocating for the use of Stewardship Contracts where the value of the timber in a restoration thinning can be used to offset the costs of other unfunded restoration projects. Some members of this group are proposing to use the plantation portion in a Stewardship Contract. If recommended by the Stewardship Partners, Stewardship Authority would need to be approved by the Regional Forester.

14.1 For units 1, 3, 4, 5, 6, 7 and 8 – implement a prescription for the matrix portion of the units that would allow trees to grow for a longer period before a second thinning would be needed. Thin to densities so the stand would not need to be thinned again for 30 years. Leave tree spacing would still be within the range of 80 to 140 trees per acre but more acres would be toward the lower end of that range. This is proposed in units that are more than half riparian reserve. It is also proposed in units that would have temporary road construction or reconstruction so that after obliteration, the temporary roads would not need to be reopened again for approximately 30 years resulting in less cumulative road impacts.

14.2 For all units – If any old-growth trees outside the units are used for tail holds or guyline anchors they would not be felled.

14.3 Unit 1 – Do not yard across the stream.

14.4 Unit 2 – Portions of the unit contain trees smaller than the standard minimum size for commercial timber sales. If stewardship authority is approved, include the falling of smaller trees as part of a stewardship contract so that the entire acreage is properly thinned.

14.5 Units 4 – As part of the variable density thinning prescription, create no-cut "skips" between the existing temporary road and the swale.

14.6 Unit 5 – Do not construct any roads for this unit. Use a skyline system with a tractor swing along the north boundary.

14.7 Unit 6 – If stewardship authority is approved, include the removal of the washed-out culvert and restore the stream channel as a conservation project. (This culvert removal project is covered by the Forest-wide restoration EA.)

14.8 Unit 7 – Avoid landslide area.

3.7 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.	Construction of 0.8 mile of temporary roads. 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.	No road construction. No impacts to water quality from road construction.	No road construction. No impacts to water quality from road construction.
Issue #2: Affect of Riparian Reserve Management on Water Quality and Fish	No change	88 acres riparian reserve thinned. 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.	No change	No change
Issue #3: Natural Second-Growth Forest	No natural second growth thinned	55 acres of natural second growth thinned	55 acres of natural second growth thinned	No natural second growth thinned
Approximate Timber Output (million board feet)	0	3.2 mmbf	2.4 mmbf	1.4 mmbf
Acres of Timber Productivity Improved	0	204	204	149
Acres of Riparian Reserve Enhanced	0	88	0	0
Economic Viability Benefit/Cost ratio	0	2.17	1.71	1.93

4.0 ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected 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.

4.0.1 A discussion of cumulative effects is included where appropriate. Cumulative effects are impacts on the environment that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. If the proposed action would have little or no effect on a given resource, a detailed cumulative effects analysis is not necessary to make an informed decision. If an action has an effect on a resource, the incremental impact of that action when combined with the impact of other actions is assessed.

4.0.2 The land area and the time scale used for a cumulative effects analysis would vary by resource. The analyses look at the condition of vegetation as it has been affected by past timber sales, fires, wind, and other disturbances. It also includes the impact of activities on other ownerships. In this area the only other ownership is the Bureau Of Land Management, which manages 843 acres on the western edge of the Collawash Watershed all of which are in Late-successional Reserves (The BLM acreage may or may not overlap the resource specific analysis area used for a given resource). A list of past actions is contained in the analysis file. The analysis includes the effect of roads and permanent openings such as rock quarries and power lines. The analysis also includes other recently completed timber sales that overlap these analysis areas including Bonanza Thinning and the Bonanza Fire Salvage. The time scale includes the effects of all past activities beginning in approximately 1950 when the first timber harvest and road construction projects occurred. It also would include foreseeable future projects. In this area there are no foreseeable future actions with sufficient site specificity to conduct an analysis. Section 4.4.1 describes the likely future scenario for thinning.

4.1 Issue Discussion

The intent of this section is to summarize the issues and to serve as an index to the many places in this EA, and in referenced documents where the issues and other closely related public comments are discussed.

4.1.1 **Issue #1:**

There is a concern about the effects of **temporary road construction** on water quality and fisheries. *The effects to water quality and fisheries can be found in section 4.2. Also refer to design criteria #2, 7 and 10. Section 4.2 summarizes the Biological Assessment, Biological Evaluation and Letter of Concurrence found in the analysis file. The analysis shows that the impact, if any, would be short-term and undetectable at the watershed scale. The chance that measurable amounts of fine sediment would enter any stream as a*

direct result of logging activity is negligible. This is because the proposed roads are located on stable landforms, do not cross steams and would be obliterated. Alternatives A, C and D do not include any road construction. The rationale for proposed road construction can be found in section 3.5.5. The proposed action would construct approximately 4100 feet of new temporary roads and would reopen approximately 3800 feet of existing old roads that were either closed many years ago or in some cases were not closed but are currently overgrown. NOAA Fisheries has been consulted and concurred with the finding that the project would Not Likely Adversely Affect threatened fish species.

Other related comments:

4.1.1.1 The roads themselves and the effects of these roads are not temporary. Temporary roads still cause serious adverse impacts. Obliterating such roads is not entirely successful and the soil compaction effects can last for decades. *The proposed roads are called temporary roads because it is a contractual term and refers to roads that experience temporary use, only for timber harvesting, and are obliterated by the operator when harvesting is completed. The obliteration of a temporary road is done to prevent use and to improve infiltration rates. The Forest has considerable successful experience with obliterating temporary roads on similar terrain. Since the temporary roads are located where they serve the long-term transportation needs of the area, it is likely that they would be reopened and used again in the future.*

4.1.1.2 Since the project is in a key watershed, if no funds are available to decommission roads, no new roads may be built. What are your plans to decommission roads within the watershed? *Since the Northwest Forest Plan created key watersheds with the standard that there should be no net increase in road mileage (page B-19) – the Forest has decommissioned 66.5 miles of roads in the Collawash key watershed and has built none. There are no immediate plans to decommission other roads.*

4.1.1.3 The Forest does not have enough funding to properly maintain existing roads. With shrinking budgets, agency resources should be going to obliteration of existing roads to reduce the burden of long-term maintenance costs, rather than to design and facilitate the construction of new roads, no matter how long they will be in use or how well the impacts of the road construction is mitigated. *The cost of construction, maintenance and obliteration would be born by the contractor. Temporary roads would not result in any expenditure of the Forest's road maintenance funds (s. 4.5.5).*

4.1.1.4 Considering that there are 6.2 miles of roads per square mile within the Fan Creek subwatershed, there should be no additional roads in the Fan Creek subwatershed – temporary or otherwise. *The 6.2 figure was present at the time of the Watershed Analysis (page 3-10) but since then several roads have been decommissioned. The current road density in Fan Creek is approximately 5.25 miles per square mile. The remaining roads are needed to manage the landscape including access to a power line corridor. None of the proposed temporary roads are in the Fan Creek subwatershed.*

4.1.2 **Issue #2:**

There is a concern about the effects of **thinning in riparian reserves** on water quality and fisheries. *The effects to water quality and fisheries can be found in section 4.2. Also refer to design criteria #8 & 9. Section 4.2 summarizes the Biological Assessment, Biological Evaluation and Letter of Concurrence found in the analysis file. The no-harvest buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or run-off and would minimize the risk of any water quality impacts. Seasonal restrictions would further reduce the risk of soil disturbance and run-off. The chance that measurable amounts of fine sediment would enter any stream as a direct result of logging activity is negligible. Thinning in riparian reserves would result in long-term benefits because thinning would develop the type of mature forest that is desired in riparian reserves. It would result in larger healthy trees with the increased capability to produce large coarse woody debris that would eventually fall into streams creating desirable diversity. Alternatives A, C and D do not include any riparian thinning.*

Other related comments:

4.1.2.1 Riparian areas do not need thinning in this area because they are already recovering well on their own. The forest floor is covered with a vibrant understory of plants. *Stand exams indicate that the trees are becoming too crowded and that growth and health would begin to decline if there were no thinning. If there were no thinning, the plants on the forest floor would begin to change as shade increases.*

4.1.2.2 It does not make sense to have smaller no-harvest buffers on intermittent streams because all of the streams flow water in the spring when erosion is likely to occur. *Design Criteria #8 was developed in conjunction with NOAA Fisheries to minimize effects to threatened fish species. One of the functions of the no-harvest buffer is to trap sediments that may move overland. However, on perennial streams, the no-harvest buffers are wider to provide shade (to prevent increases in stream temperature) during the late summer months when intermittent streams are dry.*

4.1.3 **Issue #3:**

There is a concern about the effects of thinning **natural second-growth** stands. Commenters question the science behind the proposal and feel that the stands should be left to grow on their own. *Units 9a, 9b and 10 are natural second growth. The discussion of natural second-growth can be found in section 4.3.2. The silvicultural diagnosis and stand exam data can be found in the analysis file. It is most effective to thin stands at an early age to achieve the desired growth and health objectives. However, this was not done in most natural second-growth stands because they were inaccessible at the time (50 years ago) and there was no funding. Today there is the opportunity to thin to maintain stand health while providing wood products to local and regional economies. The few scattered large trees that are present in portions of some of the units would be retained. Alternatives A, and D do not include any harvest of natural*

second growth.

Other related comments:

4.1.3.1 There should be no harvest of natural second-growth forests because there are plenty of plantations that need thinning that could be used to provide timber. There are approximately 37,000 acres of young managed stands on the Clackamas District that are at least 35 years old. *Most of the 37,000 acres are not ready for a commercial thinning. Within the Clackamas River Ranger District there is a wide range of site productivity based on soils, elevation and the environment. Other factors affect tree growth such as the tree species present, the seed source used, and the presence of competing brush or diseases such as dwarf mistletoe. While plantations at the lowest elevation and on moist sites may be ready for commercial thinning at 35 years of age, there are many plantations at higher elevations and on drier sites that may not be ready for a commercial thinning until age 55 to 65. The plantations in the proposed action are 45 to 50 years old and have just reached the point of economic viability for thinning. As plantations grow, stand exams are conducted. If the analysis of the data shows that thinning may be desired to achieve Forest Plan goals, the stands are grouped and the planning process begins. It is currently not possible to meet the Forest's Proposed Sale Quantity by thinning only plantations. Logging in mature forests or in natural second growth are other options to provide timber to local and regional economies.*

4.2 WATER QUALITY AND FISHERIES

This section addresses Issues #1 and 2. This section also addresses effects from all components of the alternatives including logging and fuels treatments. It also includes an assessment of the Aquatic Conservation Strategy and a discussion of Best Management Practices. The Collawash Thinning Fisheries Biological Evaluation and Biological Assessment are incorporated by reference and summarized below.

Informal consultation with NOAA Fisheries concerning threatened or endangered **anadromous fish** and Essential Fish Habitat established under the Magnuson-Stevens Fishery Conservation and Management Act has been completed for this project. The Letter of Concurrence from NOAA Fisheries dated January 26, 2005 is in the analysis file.

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 - Riparian Reserve Standards and Guidelines – pages C-31 to 38
Aquatic Conservation Strategy – Record of Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy pages 6-10

4.2.1 **Existing Situation**

The Collawash Thinning Project proposes to thin and commercially harvest wood fiber in young plantations and natural fire-created stands within the Collawash River watershed. The watershed is designated Tier I, Key Watershed under the Northwest Forest Plan because it contains crucial refugia for at-risk fish species. The Collawash watershed supports populations of winter steelhead, coho salmon, chinook salmon, and resident cutthroat and rainbow trout.

The stands proposed for thinning are located within five subwatersheds of the Collawash River. The total area of the five watersheds is 16,157 acres and includes: Fan Creek, Thunder Creek, Dutch Creek, Lower Collawash Tributaries, and the Hot Springs Fork Tributaries. All watersheds are 100% federally owned and managed by the Mt. Hood National Forest. There are no 303(d) listed water bodies near the project. Any effects that might result from the proposed action are not expected to directly or indirectly affect listed or proposed fish species or their habitat outside of the project.

The stands within the Collawash Project range in age from 45 to 95 years. The average tree height is 85 feet with an average diameter between nine and 13 inches. The timber to be harvested is primarily Douglas-fir, western hemlock, and small amounts of other species. The current stocking levels range from 211 trees per acre to 398 trees per acre. Currently the stands identified for thinning are overcrowded, causing reduced growth and the potential for increased mortality. These even-aged stands have low levels of species and structural diversity.

Endangered Species Act (ESA) listed or proposed species are not known to utilize any habitat within the project although there is potential use of habitat in the lower reaches of Fan, Thunder, and Dutch Creeks downstream of the project. ESA listed fish species that occur downstream of the project include Lower Columbia River (LCR) steelhead, Lower Columbia River coho salmon and Upper Willamette River (UWR) chinook salmon. These species occur in the mainstem Collawash River, Hot Springs Fork of the Collawash River, and the Clackamas River. Resident cutthroat and rainbow trout occur within the perennial fish bearing streams that flow through the proposed units. The proposed Collawash thinning units range from 0.14 miles to 1.6 miles away from habitat where LCR steelhead, UWR chinook, and LCR coho occur.

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. Increased levels of sediment in streams could reduce feeding efficiency during times of increased turbidity. Fish rely on sight to feed so feeding success could be hampered during those times turbidity is increased. Increased sediment loads could also cause increased stress or mortality to fish by abrasion of the gills during episodes of high turbidity. 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. Potential impacts from increased

amount of fine sediments are degradation of spawning habitat and a reduction in rearing habitat caused by sediments filling in pools.

Cumulative effects associated with the Collawash Project center around changes in peak and base flows resulting from vegetation management. 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 of rain on snow events (ARP analysis).

4.2.2 Effects

Alternative A

In terms of sediment, water quality and temperature, there would be no short-term effects to water quality or fisheries resources from road construction or harvest. If no action were taken in riparian reserves, there would be negative long-term effects because stands would have reduced capability to produce the size and quantity of coarse woody debris sufficient to sustain physical complexity and stability of the riparian reserves and associated streams. More detail on the consequences of not thinning in dense stands can be found in the Timber Productivity and Landscape Health sections below.

Alternative B

4.2.3 Sediment

Ground disturbing activities associated with temporary road building within the Collawash Project have been designed to minimize the risk of erosion and the potential for sediment to be transported to streams. The proposed temporary roads are located on dry ground, would not cross any stream channels, and would have no hydrologic link to any water source. The new roads would be located over 330 feet from the nearest stream and over 0.4 mile from any ESA listed fish habitat. These roads would be constructed on relatively flat terrain, which would avoid an increase in the drainage network. Because of the distance of the proposed temporary roads to any water source and the fact that these roads do not cross any perennial or intermittent streams, vegetative buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or runoff. Road construction would be restricted to the dry season between June 1 and October 31. This restriction would reduce the risk of any surface erosion due to ground disturbance. All temporary roads would be obliterated and revegetated directly following completion of harvest operations to help reduce compaction and increase infiltration rates. Impact to water quality or fisheries resources caused by sedimentation due to road construction, if any, would be short-term and undetectable at a watershed scale.

Thinning within riparian reserves is a ground disturbing activity that has the potential to cause a temporary reduction in water quality by allowing sediment to enter the stream channel from surface erosion or run-off. No-harvest buffers, a minimum of 50 ft. wide,

along perennial streams and a minimum buffer width of 30 ft. along intermittent channels, have been established for the Collawash Project. Buffer width design would take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability. No-harvest areas would include any buffer of hardwood vegetation occurring along the stream bank. No-harvest buffers would generally be at the top of slope breaks on steeper ground and would circumvent all wet areas to maintain canopy cover along riparian areas. These vegetative buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or run-off and would minimize the risk of any channel or water quality impacts. These buffer widths would allow soil infiltration between the unit and any water source. Seasonal restrictions on ground-based operations would further reduce the risk of soil disturbance and run-off. Even if some soil movement occurred, the vegetated buffer strips along every perennial or intermittent channel would act as an effective barrier. The chance that measurable amounts of fine sediment would enter any stream within the project 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. Vegetation is well established on the fill slopes and the approaches to the crossings are relatively flat. The vegetated fill slopes and ditch lines will likely intercept any road related sediments before they reach any stream channel. This would decrease the potential of any fine sediment entering stream channels during hauling activities. There are no listed fish species that occur immediately downstream of any aggregate surfaced stream crossing along the haul route. 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 fish or their habitat would occur from hauling logs.

Erosion and the transport of material to streams is a natural process, however in these watersheds there are some human caused sources of sediment that add to the natural baseline level of sediment. Other timber sale projects use similar design criteria to minimize or eliminate the potential for erosion to occur in a way that transports soil to streams. Unsurfaced roads that cross streams or are on steep and unstable slopes are a primary source of human caused sediment in streams in these watersheds. Downstream monitoring in the Clackamas River (measured at the Carter Bridge water monitoring station) indicates that, "Overall, water quality is very good" (Mt. Hood 2002 Monitoring Report, page 62). Because of the precautions to minimize or eliminate sources of sediment described above for the Collawash project, and considering other potential sources of sediment, the Collawash project would not result in any adverse cumulative effect.

4.2.4 **Temperature**

The no-harvest buffers along perennial and intermittent streams would also insure that the majority of shade producing vegetation would remain. Since the streams within the project are relatively small (3-10 ft. width), the no-harvest buffers would provide adequate canopy cover and sufficient stream shading to maintain stream temperatures. The intermittent streams within the project only carry water during wet times of the year (winter and spring)

when temperatures are cooler, and no measurable increase in stream temperature is expected downstream. No water quality effects are foreseen, and the small probability of effects would decrease, as the canopy and ground cover are re-established to pre-harvest conditions.

4.2.5 Riparian Reserve Stand Structure

Alternative B would result in long-term benefits because thinning would develop increased capability of stands to produce the size and quantity of coarse woody debris sufficient to sustain physical complexity and stability of the riparian reserves and associated streams.

4.2.6 Alternatives C and D

The potential effects to water quality and fisheries for Alternative C and D would be less than that of Alternative B. These alternatives do not include any road construction, therefore there would be no risk of erosion or sediment entering streams due to the construction of roads. Riparian Reserves would not be harvested under these alternatives. The probability of any sediment reaching a stream course or any decrease in stream shading would be less due to the greater distance a full Riparian Reserve buffer provides. There would be slightly less risk of erosion from harvest operations since helicopter logging would be used instead of ground based or skyline yarding systems on parts of some units. Because of less ground disturbance, the chance of sediment reaching the stream channel is even less likely than Alternative B. On units where temporary access roads would not be built, longer skidding distances may be used. This would result in many passes of equipment over a mainline skid trail, which when completed would have a very similar effect to that of a temporary road. Under these alternatives there would be negative long-term effects in riparian reserves because stands would have reduced capability to produce the size and quantity of coarse woody debris sufficient to sustain physical complexity and stability of the riparian reserves and associated streams.

4.2.7 Fish Stocks of Concern

The effects of the implementation of the Collawash Thinning Project on fish stocks of concern would be based on local populations of resident cutthroat trout and populations of listed fish species within and downstream of the project in the Collawash River and the Hot Springs Fork of the Collawash River.

ESA listed or proposed species that occur within one mile downstream of the project are Lower Columbia River (LCR) steelhead, Upper Willamette River chinook (UWR) salmon, and Lower Columbia River (LCR) coho salmon. The closest occurrence of these species to the project is within the mainstem Collawash River approximately 0.14 mile downstream of intermittent non-fish bearing tributaries that flow through proposed units. These tributaries are located within the Lower Collawash Tributaries subwatershed.

The no-action alternative would have ratings of "No Effect" for fish stocks of concern. The following effects determinations apply to the action alternatives.

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 or Collawash River systems the effects determination for this species is “No Effect” (NE) for the action 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 through June in the Collawash, Hot Springs Fork, and Clackamas Rivers. Winter steelhead that occur within the Collawash River watershed are included in the Lower Columbia River ESU and are listed as threatened (NMFS, 1998a). Adult winter steelhead enter the waters of the Mt. Hood National Forest primarily during February through June. Spawning occurs March through June within the mainstem Clackams River and larger tributaries. Very little spawning has been documented in tributaries of less than 4th order. Spawning in the upper Clackamas River basin has been observed in Fish Creek, North and South Forks of the Clackamas, Oak Grove Fork, Roaring River, and the Collawash River, including the Hot Springs Fork. Past steelhead redd surveys show that approximately 50% of the wild winter steelhead present in the subbasin above the confluence of the Clackamas River and Collawash, used the Collawash watershed for spawning. 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 through June during spring freshets.

LCR steelhead are not known to occur in any of the stream reaches within the proposed units of the Collawash Project. However, LCR steelhead do occur in the mainstem Collawash River and Hot Springs Fork of the Collawash River near the mouths of streams such as Fan, Dutch, and Thunder Creeks. The nearest occurrence of LCR steelhead to any unit ranges from 0.14 to 0.7 mile downstream of intermittent tributaries and over one mile downstream of any perennial tributary. Because of the distance of the project to any presence of Lower Columbia River steelhead or its habitat and the low probability that project activities would impact any habitat where LCR steelhead occur, the effects determination for this species is “May Affect, Not Likely To Adversely Affect” (NLAA) for the action alternatives.

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 including the Collawash River and Hot Springs Fork.

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, and Hot Springs Fork of the Collawash River, lower Fish Creek, South Fork Clackamas River and Roaring River.

Upper Willamette River chinook do not occur within any of the streams that flow within the proposed Collawash units. They do occur in the mainstem Collawash River and Hot Springs Fork of the Collawash downstream of project units. Adult spring chinook have been documented in the mainstem Collawash River and Hot Springs Fork at the mouths of Fan Creek, Dutch Creek and Thunder Creek. Due to the steep gradients and low flows of these streams, chinook cannot utilize these tributaries for spawning or rearing. The nearest occurrence of UWR chinook to any proposed unit ranges from 0.14 to 0.7 mile downstream of intermittent tributaries and over one mile downstream of any perennial tributary. Because of the distance of the project to any presence of Upper Willamette River chinook or its habitat, and the low probability that project activities would impact any habitat where chinook occur, the effects determination is “May Affect, Not Likely to Adversely Affect” (NLAA) for the action alternatives.

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 (greater than 20 miles) the effects determination for this species is “No Effect” (NE) for the action 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" (NE) for the action alternatives.

Lower Columbia River Coho Salmon (*Oncorhynchus kisutch*) (Threatened) 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 Collawash River and Hot Springs Fork of the Collawash. 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 salmon occur in the mainstem Oak Grove Fork and Upper Clackamas Rivers and near the mouths of some streams such as Fan, Thunder, and Dutch Creeks. The nearest Coho salmon are approximately 0.14 to 0.7 mile downstream of intermittent tributaries that flow within or adjacent to proposed Collawash thinning units. Because of the distance of the project to any presence of Lower Columbia River coho salmon or its habitat, and the low probability that project activities would impact any habitat where LCR coho occur, the effects determination for this species is "May Affect, Not Likely to Adversely Affect" (NLAA) for the action alternatives.

Southwestern Washington/Columbia River Cutthroat Trout (*Oncorhynchus clarki*)
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 Clackamas and Collawash Rivers and its tributaries including the Oak Grove Fork and Hot Springs Fork.

Because of the presence of resident coastal cutthrout trout in the streams within and downstream of the project 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" (NI).

4.2.8 **Essential Fish Habitat**

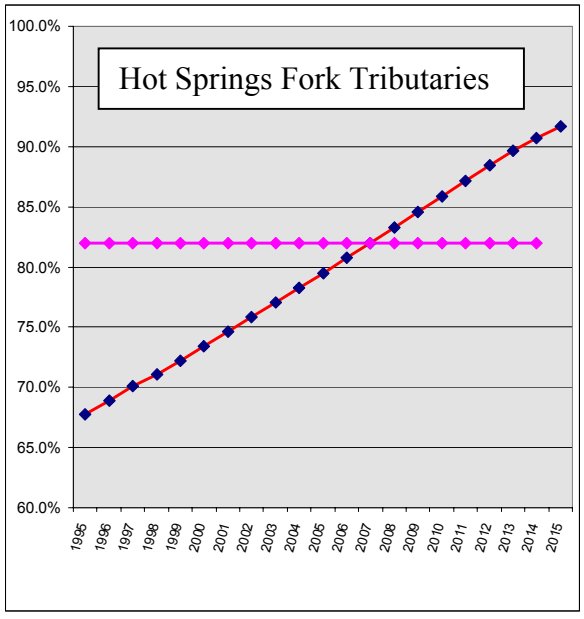
Essential Fish Habitat (EFH) established under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) includes those waters and substrate necessary to ensure the production needed to support a long-term sustainable fishery (i.e., properly functioning habitat conditions necessary for the long-term survival of the species through

the full range of environmental variation). EFH includes all streams, lakes, ponds, wetlands, and other water bodies currently, or historically, accessible to salmon in Washington, Oregon, Idaho, and California. Three salmonid species are identified under the MSA, chinook salmon, coho salmon and Puget Sound pink salmon. Chinook and coho salmon occur on the Mt. Hood National Forest in the Clackamas River, Hood River, and Sandy River basins. The effects determination for the action alternatives is **"May Not Adversely Affect"** EFH as designated under the 1996 Amendment to the MSA, or have any negative long-term effect on water or substrate essential to the life history of coho, chinook, or chum salmon that occur within the watersheds where the project would take place.

4.2.9 **Other Aquatic Species** - The FSEIS to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines was issued in 2004. The Record of Decision moved many species from the requirements of the Survey and Manage Standards and Guidelines to sensitive species. However, it also indicated that projects still in the planning stage that had begun or completed surveys using the Survey and Manage Standards and Guidelines could proceed without conducting a new sensitive species analysis. The aquatic mollusk (*Lyogyrus* n. sp. 1) is known to occur in many streams on the district. It is presumed to be present in the streams near the Collawash units. Riparian Reserve standards and guidelines and project design criteria are sufficient to provide for the habitat needs of this species.

4.2.10 **Other 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.



Several subwatersheds are affected. This graph shows the 20-year trend for ARP for the Special Emphasis Watershed – Hot Springs Fork Tributaries (red line) with the effect of the proposed thinning and all past and foreseeable future projects. The threshold of concern from the Forest Plan in the Hot Springs Fork Special Emphasis Watershed is 18% (B6-020, page Four-249), which corresponds to an ARP level of 82% (magenta line). Units 9a, 9b, 10 and 8 are in the Special Emphasis Watershed. The rest of the Collawash Thinning units are in subwatersheds that have a 35% threshold of

concern. All of the subwatersheds have a similar trend and they show that with all past, current and reasonably foreseeable future actions, that the watersheds are experiencing a period of steady hydrologic recovery. The threshold of concern was established based on the sensitivity of landforms to potential cumulative watershed effects such as changes in peak flows caused by harvest activities.

The District has been divided into subwatersheds that are used to conduct cumulative effects analysis. Forest Plan standard and guideline FW-064 gives direction for this scale of analysis. Refer to the Watershed Analysis on page 3-10. Section 4.4.1 describes the likely future scenario for thinning. It is presumed that future thinning would have a similar effect to that of the current proposal (little or no effect to hydrology) and that subwatersheds would continue with a trend of steady hydrological recovery.

The following table shows the range of possible ARP values. All alternatives are well above 65%. For the Hot Springs Fork Tributaries, the ARP value would reach 82% in 2007 with all of the alternatives including no action. The action alternatives would have little or no affect on hydrologic recovery.

Subwatershed	Forest Plan Level	Historical Low	ARP Value in 2006	
			Alternative A	Alternative B
Hot Springs Fork Tributaries	82%	65.8 (1992)	80.8	80.7
Fan	65%	57.8 (1993)	77.1	76.6
Lower Collawash	65%	76.9 (1978)	88.0	87.8

Alternatives C and D would be similar but the ARP number would be slightly greater than Alternative B.

An exception to Forest Plan standard and guideline FW-065 is proposed for the Hot Springs Fork Tributaries. The ARP value of 82% would be achieved in 2007 with or without thinning. The analysis presumes that harvest could occur as early as 2006, but there is a possibility that it could occur in 2007 or later. The effect of the proposed action is so slight that delay is not warranted. The graph above indicates a steady recovery for this watershed.

The Forest Plan contains a standard that indicates that major drainages should not be below 65% recovery (FW-63, page Four-53). An analysis of major drainages indicates that the Collawash would be at 83% 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.

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 watersheds. Planned projects include: replacement of culverts to improve fish passage and repairing roads. These projects may

result in a short-term increase in sediment but would result in long-term benefits.

For more information on cumulative effects on watershed and fisheries, refer to page 3-8 to 3-30 of the Watershed Analysis.

4.2.11 Aquatic Conservation Strategy

The Record of Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy (USDA USDI, 2004a) contains new guidance on how to implement the Aquatic Conservation Strategy. Some highlights of the clarification include: (1) Project plans are not required to assess the contribution of a site-specific project to achieving Aquatic Conservation Strategy objectives. (2) The Aquatic Conservation Strategy objectives are not to be interpreted as standards and guidelines applicable to individual projects. (3) Project would be designed to contribute to maintaining or restoring the fifth-field watershed over the long term, even if short-term effects may be adverse. Appendix E contains documentation of consistency with Riparian Reserve standards and guidelines and summaries of existing conditions for the fifth-field watersheds.

4.2.12 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 Forest Plan, as amended, the Clean Water Act, as amended, the Oregon Administrative Rules (OAR Chapter 340-41-0004,0028, and 0036), 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. The Forest has documented typical BMPs and assessed their effectiveness (USDA 2004a). The following is a summary of the items applicable to the Collawash project.

4.2.13 Project Specific BMPs for the action alternatives

- **Design Criteria –** Design criteria 2, 7, 8, 9, 10, and 13 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.
  - 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 sensitive soil types and landforms. Harvest areas were dispersed across the landscape.
- Road reconstruction along haul routes is designed to reduce erosion and repair damaged sections.

- **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. The contract provision numbering may vary depending on which contract type is used.

  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.

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 implementable and effective. See Appendix E for an analysis of BMPs.

After analyzing the effects of the alternatives with design criteria and BMPs, no adverse

impacts were found that would require further mitigation to protect water quality.

4.3 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

Alternative B

4.3.1 **Plantations**

One of the objectives of thinning is to redistribute growth potential to fewer trees, while maximizing the site's potential, leaving a stand with a desired structure and composition. In general, thinning tends to improve the overall vigor, growth, health and architecture of trees. Thinning can directly maintain forest health by maintaining growth rates of young stands. Variable density thinning that retains minor species components and retains some trees with the elements of wood decay would still meet health and growth objectives while enhancing or restoring biological diversity.

Thinning at an early age provides growing space, which gives the trees with the best competitive advantage the opportunity to quickly take advantage of this growing space for the longest practical time, fully utilizing the ability of the trees to expand their crowns into the growing room provided by the removal of neighboring trees. Failure to space trees early in their life can have consequences lasting the life of the timber stand. Most of the Collawash plantations were precommercially thinned at approximately 15 to 20 years of age and are now between 45 and 50 years of age. In most units, another thinning would be desirable in 15 to 30 years; it would be sooner in stands that had closer spacing in the first thinning and later in stands thinned to a wider spacing.

When trees are given the competitive advantage, the first response would be an expansion of fine roots and leaf area. This equates to more photosynthesis and carbohydrate production. The second response is an allocation of carbohydrate to diameter growth and finally, to the tree's defense system. Thinning can improve the resistance of some trees to some pathogens by manipulating the structure and species composition of a young stand.

Thinning increases windfirmness and stability of second-growth stands. Wind can damage trees by uprooting them, by causing them to snap off and by defoliation or severe injury to their crowns. Trees that have been exposed to winds when they are young and rapidly growing are less likely to suffer severe damage at a later age than those that have grown in tight stands initially. The bending of the stem by wind causes stimulation of the cambial layer in both the stem and roots of the tree. This increased growth aids the tree in resisting the forces of the wind. Increased root growth, especially in the short stout

horizontal roots on the leeward side of the tree, improves the anchoring in the soil. Increased stem growth at the base of the tree improves the shape and bending resistance of the stem. Thinning at a young age helps trees maintain more crown. Trees with larger crowns have greater taper, that is, the base of the tree is relatively large compared with trees that have small short crowns. Trees with more taper are less likely to suffer stem breakage. Large crowns also are more likely to recover from defoliation than a tree that has a short restricted crown. The plantations proposed for thinning have been precommercially thinned in the past. As a result, they have strong stems and root systems at this time. Thinning would add to their continued stability in the wind.

Several forest diseases are present in the Collawash area. Small isolated pockets of laminated root rot are present throughout these stands with minor occurrences of western hemlock dwarf mistletoe and armillaria root disease. These diseases, when present at low to moderate levels do not seriously compromise timber productivity and they result in down wood, some trees with the elements of wood decay and variability of spacing. Thinning to enhance tree growth is one way to give trees the advantage they need to resist these diseases or delay mortality. Wind is usually the mechanism that causes root diseased trees to fall but they would eventually fall in the absence of wind.

4.3.2 Natural Second Growth

Units 9a, 9b and 10 are natural second-growth stands. The stands originated after forest fires and the majority of the trees are 95 years old. At present, these stands are in an overstocked condition and are experiencing suppression mortality, making the stands more susceptible to damaging agents such as decay, insects and diseases. Early in their life, these stands grew much slower due to delayed stand establishment, brush competition and/or overcrowding than a similar aged plantation. Dwarf mistletoe is present in the western hemlock trees in the project causing reduced growth and wood quality, and increased mortality. The discussion above for plantations applies to natural second growth except that in some cases the stands have grown closely spaced for longer than desirable. Biological diversity would be enhanced by variable density thinning that changes vertical and horizontal stand structure and brings more sunlight to the forest floor to establish ground vegetation.

In these stands, another thinning would be desirable in 10 to 20 years; it would be sooner in stands that had closer spacing in the first thinning and later in stands thinned to a wider spacing.

4.3.3 **Riparian Reserves**

Some riparian reserves would be thinned to a wider spacing than would be optimal for timber productivity. However, riparian objectives would be better served by a wider spacing where leave tree size would be maximized and the need for a future thinning entry would be avoided.

Alternative C would have similar discussion to Alternative B except that riparian thinning would not be included. For the acres not thinned with this alternative, the discussion under Alternative A would apply.

Alternative D would have similar discussion to Alternative C except that natural second-growth would not be included. For the acres not thinned with this alternative, the discussion under Alternative A would apply.

Alternative A - Without thinning, the live crowns of trees would be reduced because of shading. Stands would experience increased loss of productivity. Growth would decline, mortality would increase and crown size and density would decline. This condition would increase the physiological stress level of the forest, thereby, increasing the susceptibility of these stands to disturbances such as pests, fire or wind damage. Stands would also maintain their mid-seral structure for many decades or until some disturbance or stand differentiation allows stand development to continue or reinitiate. Stands under this condition would be denser, less diverse (structurally), have smaller diameter trees with few larger diameter trees, shorter crowns positioned higher on the stem, and less understory development than stands intensively managed.

4.4 LANDSCAPE HEALTH

Mt. Hood Forest Plan References
Forest Management Goals - #6, 7, 8, 11, 12, 13, 19 and 44, page Four-2
Forestwide Wildlife Standards and Guidelines – FW-194 to 197, page Four-71
Northwest Forest Plan - Aquatic Conservation Strategy Objectives - page B-11

This section addresses Issue #3 at a landscape scale and takes a look at long-term thinning opportunities. Stand growth and health in natural second-growth stands are discussed in the Timber Productivity section. The proposed action involves both the thinning of plantations and natural second-growth forests (areas of second growth that regenerated naturally after a forest fire). Since the watershed analysis was completed ten years ago, changes have occurred on the landscape primarily from the considerable growth in younger stands.

4.4.1 **Long-term Thinning Opportunities -**

As young stands grow they eventually reach an age where thinning would enhance growth and prevent stand stagnation that might otherwise occur where trees are

overcrowded. As stands mature they reach an age at which thinning may not result in the same growth response that would be expected in younger stands. Age is only one consideration in the potential timing of thinning. Species composition, elevation, site quality, presence of root rot and other diseases, and accessibility also affect the feasibility and timing of thinning.

For plantations, precommercial thinning (small trees are cut and left on site) is often considered desirable at age 15 to 20. Commercial thinning (using a timber sale to achieve the desired stand condition) requires cut-trees to be of sufficient size, value and quantity per acre to be economically viable. Compared to timber sales of mature timber, thinning is often economically marginal because trees are smaller and of lower value and volume per acre is low. A first commercial thinning for plantations on the Clackamas District is often considered desirable at age 40 to 50. For natural second-growth stands, commercial thinning may not be viable until age 70 or later, because of their slow start and overcrowding early in life. Refer to the Timber Productivity section for more detail on health and growth. The following table displays the approximate acres of plantations created each decade and natural second growth at the landscape scale.

Second Growth on Clackamas River Ranger District (Acres)

Plantations (All Land Allocations)						Natural Second-Growth Stands and Older Plantations in Matrix
1990-present	1980s	1970s	1960s	1950s	1940s	All ages
17,000	35,000	26,000	26,000	10,000	730	14,000

The Clackamas River Ranger District has been increasing the level of thinning timber sales over time, beginning in the 1970s. In the early 1990s the planning and implementation of thinning timber sales became and emphasis. Since that time approximately 1500 acres of young plantations and 5800 acres of natural second-growth stands and older plantations have been commercially thinned. Planned commercial thinning projects would add another 2400 acres of plantations and 2700 acres of natural second-growth and older plantations. The table above indicates that thinning opportunities will increase in the coming decades as stands grow.

4.4.2 **Landscape Health –**

One of the key landscape-level issues identified in the watershed analysis is the fragmentation of late-seral forested habitats. Given that some landscapes, including those found in the Collawash planning area, are highly fragmented, the watershed analysis recommended thinning (Watershed Analysis p. 4-5 to 4-10).

In reaching this recommendation, the agency considered the long-term health of ecosystems, watersheds, habitats and human needs. The proposed action is part of a long-term thinning program designed to meet the following landscape-level goals: providing

long-term sustained production of high quality water, providing for the stability of earthflows, providing forage for deer and elk, providing an appropriate mix of plant and wildlife habitats, providing healthy forest stands that are part of a landscape where wildfire risk is minimized, and providing timber outputs to meet human needs consistent with NFP goals and providing for the health and productivity of forest stands for future wood product needs. The no-action alternative would not meet these goals or move the landscape in that direction. The action alternatives do move the landscape toward these goals to varying degrees depending on acres managed and other factors.

4.5 WILDLIFE

Mt. Hood Forest Plan References
Forestwide Wildlife Standards and Guidelines – FW-187 to 247, page Four-71
Northwest Forest Plan - Matrix Standards and Guidelines - page B-39

This section includes a discussion of many wildlife analyses. The Collawash Biological Evaluation is located in the appendix and is incorporated by reference and summarized below. The Collawash project is covered by a Programmatic Biological Assessment (USDA 2004) and in it this project is referred to as the Collawash Timber Sale on page 70. Formal consultation with U.S. Fish & Wildlife Service has been completed for this project. The Biological Opinion written by U.S. Fish & Wildlife Service is dated March 30, 2005 (USDI 2005). The Biological Assessment and Biological Opinion remain valid for decisions signed before December 31, 2006.

4.5.1 Northern Spotted Owl (Threatened)

Existing Situation – The landscape pattern of vegetation has been affected by historic and recent timber harvest activities and fire suppression, substantially impacting the habitat for spotted owls. Some ecologically important features of landscape pattern are: amount of edge habitat, degree of fragmentation of late-successional forest, and amount of interior forest. As fragmentation increases, the amount of interior forest habitat decreases, impacting organisms that prefer large patches of interior habitat, such as the spotted owl. Late-seral habitat is available in the Collawash watershed in somewhat larger and less fragmented blocks than elsewhere in the subbasin (USDA 1995). A combination of the loss of suitable habitat and increase in fragmentation has substantially reduced the amount of suitable habitat for spotted owls currently present within this watershed.

The proposed action would have an effect on dispersal and nesting/roosting/foraging (NRF) habitat. Nesting/roosting/foraging habitat is also referred to as suitable habitat. Dispersal habitat is defined as forested stands with average diameters of 11 inches or greater and with average canopy cover of 40% or more. All of the harvest units are dispersal habitat. Three of the harvest units (55 acres) contain the habitat components that comprise suitable habitat for the spotted owl. These are natural second-growth stands that have some scattered large remnant trees (9a, 9b and 10).

The terms and conditions from the Biological Opinion include a seasonal restriction for activities within activities occurring within suitable spotted owl habitat between March 1 and July 15th. Refer to design criteria #1 in section 3.6.

The barred owl has been expanding into northern spotted owl territory from northeastern Canada since about 1900, moving into Washington, Oregon and Northern California and in some cases has been displacing spotted owls. Barred owls are known to be present on the Forest. Barred owls may be expanding their range because of changes to forest structure from logging, wildfire or climate change.

Effects – Including Direct, Indirect and Cumulative Effects

Alternative A - No short-term effects to the owl would be predicted with this alternative. The units would continue to function as spotted owl suitable or dispersal habitat for the short term. It is likely that the stands that are currently suitable habitat would remain suitable habitat for a long time. Considering long-term effects, there is the potential that some of the plantations that are currently dispersal habitat would obtain some late-seral characteristics and become suitable habitat for the spotted owl. However, plantations can take much longer to become suitable habitat, due to the density and composition of tree species. Recent studies have indicated that dense, closed-canopy second growth without legacy trees can not only be devoid of exploitable prey populations but also poorly suited for owl roosting, foraging or nesting. This period of low structural diversity can last more than 100 years and can have profound effects on the capacity of the forest to develop biocomplexity in the future (Courtney 2004, appendix 5, p. 3-24).

Alternative B

Effects to Suitable and Dispersal Habitat on a Local and Watershed Scale

In the short term, thinning in plantations would degrade dispersal habitat. Although the dispersal habitat characteristics of the units would be reduced in quality, they would still function as dispersal habitat for the owl. No loss of dispersal habitat would occur. In the long term, the variable-density thinning proposed in the plantations could result in acceleration of the development of spotted owl habitat and dense prey populations (Courtney 2004, appendix 5, p. 3-24).

Even though the natural second-growth stands are mid-seral, they contain some large remnant trees and are considered suitable habitat. These 55 acres of suitable habitat would be downgraded to dispersal habitat but they would eventually become suitable habitat again. It would take approximately 15 years in units 9a and 9b and approximately 20 years in unit 10. The natural second-growth stands are currently considered low quality suitable habitat because they do not contain enough of the features that would make them more effective suitable habitat. For example, these stands would make better suitable habitat if they had more large trees, more down wood and snags, and a more diverse multi-layered structure.

During consultation with the U.S. Fish and Wildlife Service, the Biological Assessment and the Biological Opinion anticipated that 68 acres of dispersal habitat would be removed by heavy thinning and 62 acres of suitable habitat would be downgraded (USDI 2005, p. 121). After refinement of the proposed action and field verification, the current assessment of impact is zero acres of dispersal removed and 55 acres of suitable habitat downgraded.

Two of the harvest units (9b and 10) occur within Critical Habitat Units OR-12. As described above, there would be a downgrade of 35 acres of suitable habitat to dispersal.

There are no known spotted owl nests within the Collawash units. The downgrading of suitable habitat could cause detrimental effects to owls that may use the area and would alter habitat from a landscape that has the potential to be occupied by owls. These stands are still relatively young stands, the oldest stand age being 95 years. Although they have just begun to have the structural characteristics required for classification as suitable habitat. The Collawash project would not further add to the fragmentation of late-successional stands. In the context of the local and watershed scale, the project would adversely affect the spotted owl and its habitat.

Cumulative Effects

Effects to spotted owl on a province scale (Willamette Province)

The US Fish and Wildlife Service (USFWS) issued a biological opinion (USDI, 2005). The conclusion reached after considering the cumulative effects of this and other projects is that the projects are not likely to jeopardize the continued existence of the spotted owl and are not likely to destroy or adversely modify designated critical habitat for the spotted owl.

Effects to spotted owl on the entire range of the species (Washington, Oregon, and California)

The Northwest Forest Plan established a system of land allocations and a rate of timber harvest (probable sale quantity) that is considered to be consistent with maintaining viability for the northern spotted owl across its range (USDA USDI 1994b). The Collawash project is not within late-successional reserves. The Collawash project would not significantly alter the landscape's capability to provide for the continued viability of the northern spotted owl on Federal Lands.

A report titled "Scientific evaluation of the status of the Northern Spotted Owl" was published by Sustainable Ecosystems Institute (Courtney 2004). The report is a review and synthesis of information on the status of the Northern Spotted Owl. The report was prepared to aid the US Fish and Wildlife Service in their 5-year status review process, as set out in the Endangered Species Act. The report did not make recommendations on listing status or on management, but focused on identifying the best available science and the most appropriate interpretations of that science. The focus is on new information developed since the time of listing in 1990. The report relied on demography studies summarized in a report titled "Status and Trends in Demography of Northern Spotted

Owls, 1985-2003" (Anthony 2004). The Forest examined these documents and evaluated the new information and it's relevance to the Collawash project (Appendix E).

The information does not reveal effects concerning the impacts of the Collawash thinning proposal in a manner or extent not previously or currently considered.

In addition to the scales discussed above, the Collawash Watershed and Critical Habitat Units (CHU) are used to conduct cumulative effects analysis. The time scale includes the effects of all past activities beginning in approximately 1950 when the first timber harvest and road construction projects occurred. Units 9b and 10 are in the CHU.

Effects of Alternative B on Spotted Owl Dispersal and Suitable Habitat as Compared to Historical Conditions

Analysis Scale	**Dispersal Habitat**		**Suitable Habitat**		
	Historic Level (1950)	Current Level (2005) & Level After Timber Harvest	Historic Level(1950)	Current Level (2005)	Level After Timber Harvest
Collawash Watershed (96,476 acres)	94% (86,649 acres)	70% (67,291 acres)	75% (72,689 acres)	49% (47,559 acres)	49% (47,504 acres)
Critical Habitat Unit OR-12 (36,293 acres)	97% (35,040 acres)	64% (23,078 acres)	90% (32,551 acres)	56% (20,369 acres)	56% (20,332 acres)

A combination of the loss of habitat and increase in fragmentation has reduced the amount of habitat for spotted owls. Dispersal habitat has not been a limiting factor in this area. Nesting/roosting/foraging habitat quantity and quality has declined over time resulting in reduced populations of spotted owls. The incremental effect of the proposed action is negligible therefore there would be no discernable cumulative effect.

In this area there are no foreseeable future actions with sufficient site specificity to conduct an analysis. It is presumed that future plantation thinning would occur and would result in short-term effects to dispersal habitat while providing long-term benefits. The analysis areas would show a trend of steady transition from dispersal habitat to nesting/roosting/foraging habitat as stands mature.

Alternative C
The effects would be similar to Alternatives B except that it would only degrade 204 acres of dispersal-only habitat due to reduced riparian reserve acres. The amount of suitable habitat downgraded is the same as in alternative B. In effect, this alternative would still adversely affect the spotted owl and its habitat but would not likely jeopardize the continued existence of the spotted owl and would not likely destroy or adversely modify designated critical habitat for the spotted owl.

Alternative D
This alternative would not harvest the natural second-growth stands that contain suitable habitat. A total of 204 acres of dispersal-only habitat would be degraded but would still function as dispersal habitat. For this reason, in the context of the local and watershed scales, this alternative would not likely adversely affect the spotted owl or its habitat.

4.5.2 Northern Bald Eagle (Threatened)

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. Nest sites are usually within ¼ mile of water in the Cascades.

There is no nesting/roosting/perching habitat available within the proposed harvest units. The only water source within the area that has potential habitat for the bald eagle and is within ¼ mile of the project area is a portion of the Collawash River between the confluences of the Clackamas River and Hot Springs Fork of the Collawash River. However, the four Collawash units that are within ¼ mile of this river do not have the stand characteristics necessary for nesting, roosting, or perching by the bald eagle.

None of the alternatives would have any effect due to lack of habitat.

4.5.3 Sensitive Species

The following table summarizes effects from the Biological Evaluation, which is incorporated by reference.

Species	Suitable Habitat Presence	Impact of Alternatives*		
		B	C	D
Oregon Slender Salamander	Yes	MII-NLFL	MII-NLFL	NI
Larch Mountain Salamander	No	NI	NI	NI
Cope's Giant Salamander	Yes	NI	NI	NI
Cascade Torrent Salamander	Yes	NI	NI	NI
Oregon Spotted Frog	Yes	NI	NI	NI
Painted Turtle	No	NI	NI	NI
Northwestern Pond Turtle	No	NI	NI	NI
Horned Grebe	No	NI	NI	NI
Bufflehead	No	NI	NI	NI
Harlequin Duck	No	NI	NI	NI
American Peregrine Falcon	Yes	NI	NI	NI
Gray Flycatcher	No	NI	NI	NI
Baird's Shrew	Yes	MII-NLFL	MII-NLFL	NI
Pacific Fringe-tailed Bat	Yes	NI	NI	NI
California Wolverine	No	NI	NI	NI

* Impact abbreviations
"NI" = No Impact
"MII-NLFL" = May Impact Individuals but not likely to cause a trend to federal listing or loss of viability

Effects to the species listed above include changes to habitat as well as potential harm to individuals caused by physical impacts of logging equipment, falling and dragging trees, noise, fertilization, fuels treatment, road construction and reconstruction and log haul.

The FSEIS to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines was issued in 2004. The Record of Decision moved many species from the requirements of the Survey and Manage Standards and Guidelines to sensitive species. However, it also indicated that projects still in the planning stage that had begun or completed surveys using the Survey and Manage Standards and Guidelines could proceed without conducting a new sensitive species analysis.

Surveys have been competed to the Survey and Manage protocol for red tree vole and terrestrial mollusks and no individuals were found. Surveys were not conducted for the Larch Mountain Salamander and great gray owl because habitat for these species is not present within the Collawash project area.

4.5.4 Snags and Down Wood

Existing Situation – The snag and down woody debris density and conditions found within the Collawash watershed is based on the 1986 Forest Inventory data for unmanaged stands, 1992 Forest Inventory data in managed stands for the mid-seral stages, and 1992 contract data for the early-seral stands.

According to this data, unmanaged stands similar to the Collawash natural second-growth units have approximately 5 medium snags (≥15" DBH) per acre and approximately 2.9 large snags (≥21" DBH) per acre. The down woody debris density in the unmanaged stands that are most similar to the Collawash natural second-growth units was found to be approximately 8 hard down logs per acre and 7 soft logs per acre.

Managed stands similar to the Collawash plantations have approximately 0.1 medium and 0.1 large snags per acre. In addition, managed stands similar to the Collawash plantations have approximately 2 hard down logs per acre and 4 soft logs per acre.

In addition, snag surveys were conducted during the 2002 field season in all three of Collawash's natural second-growth stands. The average snag density was found to be 7.5 medium (<20" DBH) and 2.7 large (≥20" DBH) snags per acre.

The primary and secondary cavity nesting species for the western hemlock zone are pileated woodpecker, northern flicker, hairy woodpecker, red-breasted sapsucker, and red-breasted nuthatch. The 100% biological potential level is 3.7 snags per acre (Austin 1995). The primary and secondary cavity nesting species for the Pacific silver fir zone area are 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 Collawash planning area, the standard and guideline from the Forest Plan (FW-215) 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 for the units within the Pacific Silver fir zone and 2.2 snags per acre for those units occurring within the Western Hemlock zone.

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 the DecAID web site listed in the References section 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:

- Decayed wood elements consist of more than just snags and down wood, such live trees with dead tops or stem decay.
- Decayed wood provides habitat and resources for a wider array of organisms and their ecological functions than previously thought.
- Wood decay is an ecological process important to far more organisms than just terrestrial vertebrates.

DecAid is an advisory tool to help managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags and down wood. DecAid also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. 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.

Modeling biological potential of wildlife species has been used in the past. DecAid was developed to avoid some pitfalls associated with that approach. There is not a direct relationship between the statistical summaries presented in DecAid and past calculations or models of biological potential.

Snags and Down Wood Levels Compared to DecAid Data

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. All of the plantations within the Collawash project are located within the habitat type identified in DecAid as the Westside Lowland Conifer-Hardwood Forests of Western Oregon Cascades and vegetation condition of “small/medium trees.” The natural second-growth stands are

located in the Montane Mixed Conifer Forests and vegetative condition of "small/medium trees."

For this watershed, all of the habitat types and structural conditions for plantations currently contain snag numbers that are much less than the 30% tolerance level for snag density and size based on inventory data. Using the site-specific data that was collected within the natural second-growth stands, they are estimated to be at approximately the 30% tolerance level for snag density and size.

Within the Westside Lowland Conifer-Hardwood Forests and vegetation condition of small/medium trees noted above, the DecAID advisor identifies the 30% tolerance level for these mid-seral stands (small/medium trees) as 5.3 snags per acre greater than 10 inches with almost 5 per acre greater than 20 inches in diameter. The 50% tolerance level for these mid-seral stands would be 18.6 snags acre greater than 10 inches with 8 per acre greater than 20 inches in diameter. Within the Montane Mixed Conifer Forests and similar vegetative condition noted above, the DecAid advisor identifies the 30% tolerance level for mid-seral stands as 10 snags per acre greater than 10 inches with 2.7 per acre greater than 19.7" in diameter. The 50% tolerance level for these stands would be 16.6 snags per acre greater than 10 inches with 4.2 per acre greater than 19.7" inches in diameter.

DecAID advisor identifies the down wood 30% tolerance level for Western Lowland Conifer-Hardwood Forest mid-seral stands as up to 4.5% cover of down wood (including all decay classes) with sizes of pieces averaging 8-12 inches in diameter. The 50% tolerance level for these mid-seral stands would be up to 10% cover of down wood with sizes of pieces averaging 8-12 inches in diameter. The down wood 30% tolerance level for Montane Mixed Conifer Forest mid-seral stands is 2.5% cover for down wood with sizes of pieces greater than 4.9 inches in diameter. The 50% tolerance level for these mid-seral stands would be 4% cover of down wood with sizes of pieces greater than 4.9 inches in diameter.

Effects - Alternative A - The natural second-growth stands would continue to provide a source of relatively abundant snag and down log habitat. The plantations would continue to be deficient in snags and down wood. Based on snag surveys completed in each of the natural second-growth stands, it is presumed that there would continue to be on average approximately 2.7 large and 7.5 medium snags per acre for those units within the Collawash project. This is above the level of snags required for 100% biological potential. In terms of the tolerance levels for snags within the applicable habitat type and structural condition identified in the DecAID advisor, these areas are approximately at the 30% tolerance level. Levels would be higher if live trees with the elements of wood decay were included.

Based on Forest Inventory surveys the natural second-growth stands within the Collawash watersheds would continue to provide approximately 8 hard and 7 soft down logs per acre in the vegetation zone. The plantations within the watershed would continue to provide about 2 hard and above 4 soft logs per acre.

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 from the smaller intermediate and suppressed trees.

Alternatives 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. Skyline logging usually involves a greater loss of snags than in tractor logging because of safety issues near skyline corridors. Helicopter logging would result in the greatest loss of snags due to the hazard associated with the rotor downwash. Approximately 39 acres would be tractor, 233 acres for skyline and 20 acres with helicopter.

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. Some of the snags and downed logs that might have formed in the future from the death of the smaller intermediate and suppressed trees would be removed through the timber harvest.

To increase the likelihood that snags would be retained after timber harvest, green trees would be marked as leave trees where their live crowns touch certain key snags (Design Criteria #5). Certain live trees would also be selected as leave trees that are defective or have the elements of decay as described in the DecAid advisor. Hollow structures are created in living trees by heartrot decay organisms over many years. These hollow structures in living trees provide especially valuable habitat for a variety of wildlife, especially cavity users. Trees that have heartrot decay present may include features such as openings in the bole, broken boles with bayonet tops, large dead tops or branches, punk knots, flattened stem faces, old wounds on the bole, crooks in the bole signifying previous breakage, and the presence of fruiting bodies. Defective trees with deformities such as forked tops, broken tops, damaged and loose bark or brooms caused by mistletoe or rust can also provide important habitat for a number of species.

Snags and wildlife trees described in Design Criteria #5 are combined for the purpose of determining DecAID levels for the action alternatives. After project implementation, the snag and defective tree resource in the natural second-growth stands would remain at the 30% tolerance level as determined in the DecAid advisor. Due to the lack of large diameter trees and snags in the plantations, most would have snag and defective tree densities and size guidelines well below the 30% tolerance level. Leave trees damaged during the harvesting operation have the potential to become defective or decayed trees useful for wildlife species.

In the Collawash planning area, the standard and guideline from the Forest Plan (FW-215) for harvest units is 60% of the full biological potential, which translates into 2.2 snags per acre in the mid and late-seral stages for the units within the western hemlock stands and 2.4 snags per acre in the pacific silver fir stands. Past experience and monitoring indicate that there would likely be some snags remaining after harvest. Design Criteria #5 would result in additional protection to snags. Forest Plan standard and guideline FW-215 would likely be met in the natural second-growth units but not in the plantations.

There are few if any medium or large snags in plantations. Some small suppressed planted trees have died but they are not large enough to provide much snag habitat and they do not last long. None of the alternatives, including no-action, would achieve the 60% biological potential level in plantations in the short term. An exception to Forest Plan standard FW-215 is proposed because the stands are not capable of achieving those levels in the short term. Design Criteria #5 results in leaving live trees with the elements of wood decay which would provide habitat in the interim until trees grow large enough to produce snags of the desired size, (greater than 22 inches diameter, FW-234). When these trees with elements of wood decay die they would provide small snags that would benefit some snag dependent species. Additionally, there is potential for an enhancement project within the 2003 Forest-wide Restoration EA that would create additional medium snags in the plantations of the Collawash project, if funded. The action alternatives would accelerate the growth and size of plantation trees and would eventually provide large snags. The objective of providing long-term snag habitat would be met with the action alternatives.

Logs existing on the forest floor would be retained. Prior to harvest, contract administrators would approve skid trail and skyline locations in areas that would avoid disturbing key concentrations of down logs or large individual down logs where possible. The harvesting operations would also add large and small woody debris to the site. This would include the retention of cull logs, tree tops, broken logs and any snags that would be felled for safety reasons. Snags or green trees that fall down after the harvest operation would contribute to the down wood component of the future stand.

Based on the design criteria and previous experience, plantations would have down wood at the 30% tolerance level (approximately 3% cover from all decay classes) and the natural second-growth stands would be at least the 50% tolerance level after harvest (approximately 4% cover from all decay classes). The project would not remove any existing coarse woody debris; it would add some small size woody debris of the size class of the cut trees; and in the long term, it would result in larger trees that could eventually produce coarse woody debris of the desired size class (greater than 20 inches diameter and greater than 20 feet in length). (Northwest Forest Plan p. C-40 and Forest Plan p. Four-74). The proposed action involves leaving the largest trees standing and growing. Some would eventually die and fall to create future coarse woody debris.

These predicted tolerance levels for both snags and down wood would be maintained or slowly increase in the units as they progress over time.

Alternative C - The effects would be similar to Alternative B except that helicopter logging would occur on 90 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. Riparian reserves would not be harvested in this alternative, resulting in 88 fewer acres being harvested. The snag and down woody debris impacts would be similar to Alternative A for the riparian reserves.

Predicted tolerance levels for down wood cover and snags would be similar to Alternative B where harvest would occur and would be similar to Alternative A for the deleted portions.

Alternative D – The effects would be similar to Alternative C for plantations. In this alternative there would be no harvest of the natural second-growth stands. This would eliminate thinning from 55 acres that contain the highest snag and down woody debris densities in the project, the effects of this being similar to Alternative A. Of the action alternatives, D would have the least negative impact on the snag and down wood resource.

Cumulative Effects –

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 the entire land base including all forest types including non-forest areas within the analysis area. Large snags are $\geq$ 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 about 1.5 snags per acre in the Pacific Silver Fir zone and 1.6 snags per acre in the Western Hemlock zone. The 100% biological potential level would be between 3.7 and 4 snags per acre, respectively.

The analysis of snag habitat within the snag analysis areas includes all past, present, and foreseeable future projects including Collawash Thinning. There is potential for a foreseeable future action that involves snag and down woody creation in young plantations. An enhancement project was included in the 2003 Forest-wide Restoration EA to add snags and down wood to plantations some of which are included in the Collawash project. Funding for this work may come from Collawash timber sales or from other sources. If funding is available, snags and down woody debris would be created. This applies to units: 1, 2, 3, 4, 5, 6, 7, and 8. Snags would be created by heart rot inoculation or by topping with explosives or chainsaws. Down woody debris would be created by girdling or felling. An average of two structures per acre would be created, with a maximum of six structures per acre. Since funding for this enhancement project is not certain, the snag and down wood numbers were not added to the analysis below. If the projects are funded the actual figures would be slightly higher.

Snags are utilized by species that have medium sized home ranges, therefore appropriate size analysis areas (using topographic features similar to subwatersheds) were delineated

across the District to conduct snag analysis. Forest Plan standard and guideline FW-216 gives direction for this scale of analysis. Refer to the Watershed Analysis on page 3-3. The time scale includes the effects of all past activities beginning in approximately 1950 when the first timber harvest and road construction projects occurred.

Snag Habitat (analysis areas that overlap Collawash units)

Snag Analysis Area →	Thunder		Fan	
Total Acres	5353		3567	
Type of Snag	Large >21"	Medium> 15"	Large > 21"	Medium > 15"
Total Pre-management (Circa 1950)	22254	15611	16263	11448
Snags/ac. Pre-management	4.2	2.9	4.6	3.2
Total Today	12167	7973	9335	6396
Snags/ac. Today	2.3	1.5	2.6	1.8
Total After Collawash Thin	12007	7698	9335	6396
Snags/ac. After	2.3	1.4	2.6	1.8

Both analysis areas exceed the Forest Plan standard of 40% biological potential (FW-216). The biological evaluation contains a discussion of effects to sensitive, threatened or endangered species that utilize snags.

The analysis shows that within the snag analysis areas, the snag levels after the past, present and foreseeable future harvest activities occur would still be either greater than or very close to the 100% biological potential level for all alternatives. In addition to snags, live trees with the "elements of wood decay" would be retained providing additional habitat.

Snag habitat has declined over time. The incremental effect of the proposed action is negligible therefore there would be no discernable cumulative effect.

4.5.5 Deer and Elk Habitat (Management Indicator Species)

Existing Situation – The harvest units are located within both summer and winter range. Forest Plan Standards and Guidelines have minimum requirements for optimal cover and thermal cover habitat components but no specific level for hiding cover or forage.

The District has been divided into deer and elk analysis areas to conduct cumulative effects analysis. Forest Plan standards and guidelines FW-197 and FW-202 give direction for this scale of analysis. The time scale includes the effects of all past activities beginning in approximately 1950 when the first timber harvest and road construction projects occurred.

Habitats for Deer and Elk (analysis areas that overlap Collawash units) Forest Plan standards FW-203 & 205

Analysis Area	Acres	Current Optimal Cover (%)	Minimum Level for Optimal Cover (%)	Current Total Thermal Cover (%) *	Minimum Level for Total Thermal Cover (%) *	Current Forage %	Current Road Density (mi./sq. mi.)	Target Road Density (mi./sq. mi.)
WR24	1779	48	20	61	40	18	1.7	2.0
WR25	4904	53	20	59	40	17	2.1	2.0
SR39	3528	38	20	55	30	22	3.2	2.5

* Optimal cover also provides thermal cover habitat. These columns represent optimal and thermal cover combined.

Deer and elk are known to occur throughout this area, although the elk population is considerably smaller and more scattered than the deer population. Forage is widely available within the analysis area but is generally of low quality. The low quality of the forage, especially in winter range, and the lack of wetlands and permanent low-gradient streams within winter range on the District is considered the limiting factor for elk and possibly deer within the project. See Landscape Health section. Based on a projected long-term trend of declining forage, there is expected to be a commensurate decline in deer and elk populations (USDA 2004c, p. 72). Forage in the Collawash area is declining by approximately 1% per year.

Effects – Including Direct, Indirect and Cumulative Effects

Alternative A - The 55 acres of stands (9a, 9b, and 10) with late-seral characteristics and a multi-story would continue to function as optimal cover for deer and elk. An additional 237 acres of plantations would continue to serve as thermal cover. No cover would be lost and no forage would be gained in this alternative. In the long term, deer and elk populations would steadily decline, as forage is lost.

Alternative B - Approximately 55 acres of optimal cover within SR39 would be downgraded to thermal cover. This analysis area would still remain well above minimum cover requirements for optimal cover. (55 acres equals 1.5% of SR39). The natural second-growth stands are currently considered low-quality optimal cover because they do not contain enough of the features that would make them more effective optimal cover. For example, they would be better optimal cover if they had more large trees and a more diverse multi-layered canopy with gaps in the stand to provide some forage. After thinning it would take approximately 15 years in units 9a and 9b and 20 years in unit 10 for the stands to become optimal cover again.

Approximately 237 acres of thermal cover in plantations would be downgraded. The analysis areas would still remain above minimum cover requirements. These changes to the thermal cover characteristics would exist for about 15 to 30 years. The 237 acres would return to thermal cover as the trees grow and canopy cover increases.

Analysis Area	Acres	Thermal Cover Downgraded (Ac)	Post Harvest Thermal Cover (%)	Optimal Cover Downgraded (Ac)	Post Harvest Optimal Cover (%)
WR24	1779	68	57	0	48
WR25	4904	128	56	0	53
SR39	3528	41	54	55	36

The loss of optimal cover and thermal cover could alter distribution of deer and elk use of the area in the summer and winter, but is not predicted to cause a reduction in deer and elk numbers utilizing the area due to the abundant remaining cover available.

On the 292 areas proposed for thinning, a moderate increase in forage for deer and elk in these areas would occur. The increase in forage would be caused by increased sunlight reaching the forest floor as a result of the thin. This forage created by the commercial thinning is predicted to be low to moderate in quality, and be most abundant on the landings and skid trails. Canopy closure and forage levels are expected to reach pre-harvest levels after approximately 15 to 30 years. This proposed action would benefit deer and elk since forage is considered one of the limiting factors for deer and elk herds.

Road Density - Approximately 0.8 miles new temporary roads would be constructed and 0.7 miles of closed or overgrown roads would be reopened to access several of the units. These roads would not be open to the public and use by loggers would occur when the disturbance and noise of logging equipment is already present. There would not be any additional disturbance from using the roads over the level of disturbance caused by the logging. After logging, the roads that were opened would be closed and open road density would be back to the current level. 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 any alternative.

The closure of currently open system roads is not part of the Collawash proposed action. A future Forest-wide restoration EA may address road closures. An exception to Forest Plan standard and guideline FW-208 is proposed. Roads in this area are used for forest management, recreational driving, hunting, fire suppression and power line maintenance.

Haul Routes - There are potential haul routes that go through deer and elk winter range. Hauling and snow plowing is permitted on certain "backbone" roads but is restricted on other roads (Design Criteria #4). This results in predictable areas where animals can rely on solitude during critical winter months.

Disturbance - The logging and road-building activities could potentially disturb animals that happened to be in the area at the time of implementation. Disturbance that occurs during the spring/summer/fall would probably only displace animals and would not likely affect their health. Design Criteria #3 would limit the season of logging to protect animals from disturbance during the most critical times of the year. Disturbance is predicted to be small in scale and temporary in nature.

The incremental effect of the proposed action is negligible therefore there would be no discernable cumulative effect. There has been a trend of declining forage levels that is a limiting factor for deer and elk in the area.

Alternative C – Effects would be similar to Alternative B except that no roads would be built, eliminating some of the temporary increases in disturbance that are discussed in Alternative B. However, because no roads would be constructed, helicopter logging would occur in some of the units. 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.

There would be fewer acres managed with this alternative. The 88 acres in riparian reserves would not be managed and would retain their thermal cover characteristics. There would no increase forage within these riparian reserves deferred from treatment.

Alternative D - Cumulative effects would be similar to Alternative C. In addition, Alternative D would defer the 55 acres in the natural second-growth stands, thus retaining their optimal cover characteristics. There would be no increase of forage in these natural second-growth stands.

4.5.6 Pine Marten & Pileated Woodpecker (Management Indicator Species)

Existing Situation - The status and condition of management indicator 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. The natural second-growth stands contain good habitat for the pine marten and pileated woodpecker while the plantations do not provide habitat for these species. These animals rely on older forest structure and pileated woodpeckers also rely on snags and live trees with the elements of wood decay.

Most of the management areas for pine marten and pileated woodpeckers in Mt. Hood Forest Plan (B5 land allocation) were removed because other land allocations would meet the habitat needs for these species. The nearest remaining B5 land allocation is 3.5 miles from Collawash and would not be affected. Trends are stable for pine marten and pileated woodpecker. The FEMAT report showed pileated woodpecker to be well distributed on 100% of its range and pine marten to be well distributed on 67% of its range and locally restricted on 27% of its range (USDA et al. 1993, p. IV-166). It also found martens to be relatively abundant in the Cascades of Washington and Oregon (USDA et al. 1993, Appendix J2 p. J2-471). Late-successional reserves, riparian reserves and wilderness areas are providing sufficient habitat and anecdotal evidence indicates that populations appear to be viable (USDA 2004c, p. 72).

Effects – Including Direct, Indirect and Cumulative Effects

Alternative A
There would be no effects to the pine marten or pileated woodpecker with this alternative. The natural second-growth stands would continue to function as potential habitat. In time, the young plantations could eventually grow into a mature structural stage and become potential habitat for these species. However, plantations would take much longer to become suitable habitat for these species, due to their density and composition of tree species. With no action, it is likely that the plantations would take longer to become suitable pine marten and pileated woodpecker habitat than with the action alternatives.

Alternatives B & C
Approximately 55 acres of natural second-growth stands that provide habitat for pine marten and pileated woodpeckers are proposed for commercial thinning. The change in microclimate, the reduction in structural diversity, as well as the loss of snags and trees with elements of wood decay within the units as a result of the timber harvest would likely cause the units to become marginal habitat for the two species for a period of approximately 15 years. As noted within the snag and down wood section and snag design criteria, all non-hazardous snags would be left as well as up to 16.6 trees per acre that are defective or contain elements of wood decay. This design criteria would hasten the attainment of the units to habitat present at pre-harvest conditions. Adequate levels of snags and defective trees would be maintained across the landscape to provide habitat for the pileated woodpecker. These alternatives would result in a reduction of 55 acres of potential pileated woodpecker and pine marten habitat.

Alternative D
Due to the elimination of the natural second-growth stands, there would be no reduction in pine marten and pileated woodpecker habitat with implementation of this alternative. Commercial thinning would still occur within the plantations, thus potentially speeding their attainment of habitat characteristics amenable to the pine marten and pileated woodpecker.

Cumulative Effects

The Collawash Watershed is used to conduct cumulative effects analysis. The time scale includes the effects of all past activities beginning in approximately 1950 when the first timber harvest and road construction projects occurred. It is presumed that future plantation thinning would result in long-term benefits. The analysis areas would show a trend of steady transition from second growth to mature forests.

The analysis of habitat in the Collawash Watershed for pine marten, pileated woodpeckers and other species that use older forest shows that older forest declined from the historic level of 75% to the current level of 49%. Alternatives B and C would temporarily degrade 55 acres of suitable habitat. The watershed would still be at 49% after Alternatives B and C.

Pine marten and pileated woodpecker habitat has declined over time. The incremental effect of the proposed action is negligible therefore there would be no discernable cumulative effect.

4.5.7 Migratory Birds

Existing Situation – Close to 30 species of migratory birds occur within the Collawash watershed, some of which are likely present within the Collawash project area during the breeding season. Some species favor habitat with late-seral characteristics while others favor early-successional habitat with large trees.

Effects – Including Direct, Indirect and Cumulative Effects

Alternative A - There would be no alteration of habitat for migratory birds. There would be no benefits to species that prefer thinned stands or small openings. There would also be no loss to species that benefit from stands with late-seral characteristics.

Alternative B – Research has demonstrated that thinning enhances habitat for a number of migratory species and provides habitat for some species that are rare or absent in un-thinned stands. However, some species of migratory songbirds have been shown to decline following thinning. The effects of commercially thinning 237 acres of young plantations would most likely have a combination of positive, neutral, and negative impacts on migratory songbird use within the stands depending on which species are present. An example of some migratory species present in the watershed that would benefit from thinning is as follows: Hammond's flycatcher, warbling vireo, and western tanager. The following are species could be negatively impacted by thinning on the Mt. Hood National Forest: hermit warbler, Pacific slope flycatcher, black-throated warbler, and Swainson's thrush. This project covers only a very small portion of the migratory songbirds breeding habitat on the Clackamas River Ranger District. Since young managed plantations on the district are very common, this loss of habitat would not result in any measurable population change of the species, only a redistribution of the individuals affected.

The thinning of 55 acres of habitat with late-seral characteristics would reduce the quality of this habitat for some migratory bird species using the area, particularly those that require mature habitats and snags. 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. For these species that prefer these stands with late-seral characteristics, there is abundant habitat in wilderness areas, late-successional reserves and some areas in the matrix and riparian reserves.

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 quality habitat for these species, there is abundant

habitat in wilderness areas, late-successional reserves, and some areas in the matrix and riparian reserves.

Alternative C – The effects would be similar to Alternative B except that it would only thin 204 acres of young plantations. None of the riparian reserves would be thinned which would have both positive and negative effects depending on the species of migratory bird.

Alternative D –The effects would be similar to Alternatives C except that there would no harvest of any of the natural second-growth stands and there would be no reduction in the quality of habitat with late-seral characteristics.

4.5.8 Canada Lynx (Threatened)

In a letter dated December 3 of 2003, the Mt. Hood National Forest 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 (Ruediger et al. 2000).

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.

4.6 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
Earthflow Standards and Guidelines - B8-28 to B8-41, page Four-264
See Mt. Hood FEIS pages IV-11, and IV-155 to IV-167
Northwest Forest Plan - 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.

4.6.1 Existing Situation

Soil information was developed from field visits in 2004 and 2005, office interpretation of aerial photos with flights in 1946, 1959, 1967, 1972, 1984, and 1995, and the Soil Resource Inventory (SRI) for the Mt. Hood National Forest (Howes, 1979) containing a general map of the soils associated with landforms in the Collawash analysis area.

Suitability - The Collawash Watershed has areas that are considered unsuitable for timber management as defined by the Forest Plan. Areas unsuitable for timber management would include wet areas, soils that are excessively rocky and unstable areas. These areas

would be excluded from harvest. Some are too small to show on the map in section 3.2.5.

Detrimental Conditions - Appendix E contains a description of the analysis methodology and tables that show soils conditions. All of the natural second-growth stands have soils with little or no detrimental impact.

Some Collawash units are plantations that were logged approximately 50 years ago. The percentage of each unit in a detrimental soil condition was determined through aerial photo interpretation and field reconnaissance. Detrimental condition varies from stand to stand due to the occurrence, manner, and extent of past timber harvest, road construction and fuel treatment activities and the sensitivity of soils.

Forest Plan standard and guideline FW-022, is designed to protect long-term soil productivity, and sets a 15% level for cumulative impacts. Forest Plan standard and guideline B8-040, is designed to provide for earthflow stability, and sets an 8% level for cumulative impacts in earthflows. Due to past management practices that included tractor logging, landing construction, site preparation and fuels treatment, several of the Collawash units exceed theses standards and guidelines.

Soils that are compacted take time to recover; tree roots and burrowing animals eventually penetrate hardened soil. There is the opportunity to speed the recovery process by using machines such as subsoilers that fracture compacted soils. Landings and temporary roads are good candidates for mechanical treatment. Skid trails in plantations pose a dilemma for mechanical treatment because tree roots have penetrated the skid trails. Mechanical treatment in these cases may cause excessive root damage that would lead to reduced growth, and increased root disease and tree mortality.

Organic Matter/Soil Fertility - Duff layers are relatively thin in the plantation units due to clearcutting and subsequent slash burning or piling treatments. Duff layers range from ¼ to 1½ inches with an average of ½ inch on units. Large down logs are also lacking in plantations due to past logging practices.

Soil Erosion - In the Collawash area, surface soil erosion potential varies from slight to moderate for soils derived from glacial till and moderately severe to severe for soils derived from pyroclastics. Existing surface erosion is mainly confined to exposed soil on active landslides, unpaved road surfaces, road cutbanks and ditches and on unvegetated skidroads.

4.6.2 Effects

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 states detrimental soils should not exceed 15% (FW-022) of project activity areas. 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.

Existing and projected percent detrimental soil condition.

Unit #	Earthflow	Existing Condition	Alt. A	Alt. B	Alt. C	Alt. D
1	X	12.1%	11.6 %	13.6 %	14.5 %	14.5 %
2	X	8.1%	8.1 %	11.9 %	11.9 %	11.9 %
3	X part	23.1%	23.1 %	24.6 %	24.9 %	24.9 %
4		16.2%	16.2 %	15.9 %	16.1 %	16.1 %
5	X	11%	11 %	13 %	11.4 %	11.4 %
6	X	25.4%	25.4%	26.0 %	23.9 %	23.9 %
7		3.6%	3.6%	5.6 %	5.6 %	5.6 %
8	X	8.3%	8.3%	10.3 %	9.6 %	9.6 %
9a		0	0	8.6 %	1 %	0
9b		0	0	8.4 %	2.1 %	0
10		0	0	7.5 %	1 %	0

Alternative A

Short-Term Effects

There would be no impact or benefit to soil productivity. Detrimental soil condition would remain unchanged. There would be no change to surface erosion rates.

Long-Term Effects

Soils impacted in the past would continue to develop through physical and biological processes. The percent of detrimental soil condition would slowly decline as areas recover. Forest organic litter input, duff layer development and soil fauna and microbe activity would continue and tree roots and burrowing animals would eventually penetrate hardened soils. As unthinned stands age, some trees would eventually die and fall over. In the absence of large scale disturbances such as widespread insect, disease, wind or fire events, these stands would eventually produce large trees and large down logs. This would take much longer than would occur with the action alternatives.

Alternative B

Approximately 237 acres of plantations and 55 acres of natural second-growth stands would be thinned using a combination of ground based, skyline, and helicopter logging systems. Ground-based systems have the greater potential to impact soils. Mechanical felling equipment may be used in many units, depending on slope. Existing roads, skid trails and landings would be reused where appropriate to minimize additional compaction. Mechanical decompaction would occur on landings and new and re-opened temporary roads that are used by the contractor (Design Criteria #9).

Short-term Effects

Bare soil would be exposed where machines travel over the ground surface and where logs

are dragged. Approximately 7 acres of roads, skid trails, skyline corridors and landings would be exposed. These areas would have potential increased erosion. Disturbed areas could be potential sources of erosion until they are successfully revegetated.

The suspension of logs during skyline operations and designated skid trails in ground-based yarding operations would minimize duff layer disturbance. Soil microbial populations would likely be reduced initially until soil organic matter and litter layer builds back up. Even though trees would be removed that represent potential future nutrient input (when they die and become down wood), branches, treetops and needles would be left on site, which should help maintain carbon and nutrient levels. Leaving large woody debris would benefit soil fauna and microbes, and decomposer organisms. The design criteria for coarse woody debris and snags, would increase the amount of moderate-sized woody debris in the short term until larger diameter trees develop and return naturally or artificially onto the forest floor.

Some soils have severe erosion potential. Erosion would not occur where duff and other effective ground cover is retained. Therefore, practices which limit the amount of soil exposure, or which re-establish ground cover after soil is exposed, would result in less erosion occurring. Of the proposed yarding systems, ground based systems result in a greater amount of ground exposure than skyline and helicopter systems. Units that are prescribed for ground-based systems generally have flat to gentle terrain, so even if the potential for erosion may be high, eroding materials would not move far before redeposition occurs. With Best Management Practices there is a low potential for sediment to be delivered to streams. All of the units are located on severely erosive soil, but ground-based logging would occur only on gentle slopes, and the designation of skidtrails and the establishment of effective ground cover by applying seed, fertilizer, and straw mulch on the disturbed soils would aid in minimizing erosion.

Long-Term and Cumulative Effects

The harvest units are used to conduct cumulative effects analysis for soil productivity. The analysis looks at the ground disturbance created by past timber sales and other disturbances. The time scale includes the effects of all past activities beginning in approximately 1950 when the first timber harvest and road construction projects occurred.

A net increase in detrimental soil condition is predicted where more skid trails, yarding corridors, landings and roads would be constructed than already exist. The level of detrimental soil condition would remain below 15% in all natural second-growth stands.

Design criteria #9 indicates how existing temporary roads, landings and skid trails would be reused and restored.

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 microbial populations would slowly increase as soil organic matter and the litter layer build back up.

Of the 8 plantations, 3 are currently above 15% detrimental soil condition and would remain above with all the alternatives. Of the 6 plantations on earthflows, all are currently above 8% detrimental soil condition and all would remain above 8% with all alternatives. Exceptions to Forest Plan standards and guidelines FW-022, FW-028 and B8-040 are proposed. FW-028 suggests rehabilitation of impacted soils. While this is proposed for temporary roads and landings that are used by the contractor, it is not proposed for skid trails in plantations. Mechanical treatment in these cases may cause excessive root damage that would lead to reduced growth, and increased root disease and tree mortality. The opportunity to mechanically rehabilitate skid trails may come in the future if and when regeneration harvest occurs.

The objective of maintaining long-term site productivity would still be met. Surface erosion and runoff from old skid trails is not occurring. Even though there was no standard for long-term soil productivity when the original clearcuts were logged, the stands continue to grow well and are projected to continue to grow well after the proposed thinning. Stand exams show that plantations that have detrimental soils above 15% have similar growth rates compared to nearby similar plantations that are below 15%. Mean annual increment is a measure of growth taken from stand exam data: a larger number indicates greater growth.

Unit #	Existing Soil Disturbance	Mean Annual Increment (cubic feet per acre per year)
7	3.6	139
2	8.1	114
6	25.4	153
3	23.1	198

The objective of providing for earthflow stability would still be met. For all action alternatives, ground based yarding would be used in plantations where ground-based systems were used in the original logging. Forest Plan standard and guideline B8-36 indicates that this should not occur. An exception to B8-36 is proposed because examination of the units has found that the use of existing roads, skid trails and landings with restoration, would result in minimal impact. One option is to switch to a skyline system, which would overlay the impact of skyline corridors over an existing network of skid trails. This option is proposed for units 3 and 6 because of water quality issues but is not proposed for the other units. (The new temporary road that would be constructed in unit 3 is outside the earthflow while the existing temporary road that would not be used is in the earthflow.) The objective of earthflow stability would still be met by thinning to create healthy, productive stands. The no-action alternative would result in stagnated slow-growing stands.

The incremental effect of the proposed action would result in some additional degradation of soils. No significant reductions of growth and productivity were found nor are they expected. Some active restoration would take place where appropriate but in

other areas, soils would continue to develop and recover from detrimental conditions caused by past harvesting through physical and biological processes.

Alternative C
Approximately 149 acres of plantations and 55 acres of natural second-growth stands would be thinned. New roads would not be constructed. Helicopter yarding rather than skyline yarding would occur where road access is not available (approximately 87 acres). Soil would be exposed on approximately 3 acres of roads, skid trails, skyline corridors and landings. These areas would have potential increased erosion.

Short-Term Effects
The effects of this alternative would be similar to Alternative B, except for road and skyline corridor disturbance. This alternative would reduce the amount of soil disturbed from harvesting activities and reduce the risk for erosion because no new temporary roads would be constructed. No detrimental soil effects would occur within riparian reserves adjacent to harvest units.

Long-Term and Cumulative Effects
Cumulative effects would be similar to Alternative B. Most of the units would have very similar percentage of detrimental soil condition, except for the natural second-growth stands, which would be much reduced.

Alternative D
This alternative is similar to C but would eliminate the thinning of natural second-growth stands.

Short-Term Effects
Within plantations, the effects of this alternative would be similar to those of Alternative C. No change in soil condition would occur within the unthinned natural second-growth stands.

Long-Term and Cumulative Effects
For plantations, cumulative effects would be similar to Alternative C.

4.6.3 Earthflows

Earthflows are very large naturally-occurring geological features on gentle to moderate slopes where earth, and the trees growing there, move downhill very slowly. Two moderate risk earthflows overlap the units of the Collawash project. Some areas are exhibiting localized movement such as active slumping, large cracks in the ground, and dips in road surfaces.

Earthflow information and percent recovery by alternative (2005 baseline).

Earthflow	*Risk Category*	*Goal**	*Alt. A*	*Alt. B*	*Alt. C*	*Alt. D*	*Collawash units*
Fan	Moderate	>=75%	90.7 %	138 ac. 89.6%	80 ac. 90.1%	80 ac. 90.1%	Units 1, 2, 5, 6 and part of 3
Pink	Moderate	>=75%	80.3 %	18 ac. 80.2%	7 ac. 80.2%	7 ac. 80.2%	Unit 8

* Goal figures are from Forest Plan standards and guidelines B8-31 and B8-32.

All alternatives are above the minimum for recovery.

4.6.4 Landslides

Active landslide features observed near four Collawash units occur on steep slopes with shallow soil over bedrock. It is not likely that the slides located in plantations were present prior to the original harvest. They were likely triggered by the loss of root strength after harvest. In the natural second-growth stands, the slides appear to be older than the fire that created the stands, (based on observations of ages of trees growing on the slide and adjacent to it). Landslide depositional material was observed in one Collawash unit.

Active and potentially active landslide areas have been identified by the Forest Geologist and would not have any thinning or other ground disturbance.

For all alternatives, active and potentially active landslide areas would continue to stabilize as trees grow. For the action alternatives new slides are not likely to occur because of the root strength of live trees. The roots of harvested trees would provide some stability until they decay. As they slowly decay, new roots from the remaining live trees would expand into the available space.

4.7 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 considers 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 Collawash Thin viewer positions. There are no current or foreseeable future projects that may be seen from the Collawash viewer positions.

4.7.1 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 positions are from Roads 63 and 70 and the recreation sites adjacent to these roads. Areas within the foreground and middleground viewing distances from these roads have a Visual Quality Objective (VQO) of partial retention. The VQO of partial retention means that activities may be evident to the casual forest visitor but would be subordinate to the characteristic landscape. This would include portions of units 8 and 1 and units 2, 3, 4 and 7. The current condition of the landscape as seen from roads 63 and 70, meets the cumulative VQO of partial retention.

There is also a VQO of modification for other landscapes. Under the modification VQO, human activity may dominate the characteristic landscape but would utilize naturally established form, line, color, and texture. The viewer positions would be from local roads that are traveled by the recreating public. Most of the local roads were built by timber operators to access past timber sales, but they are now used by a wide range of forest visitors. Currently, the local landscape near harvest units meets the VQO of modification. The forest visitor would experience older second-growth stands and mature forest without obvious straight lines or high levels of vertical contrast.

Effects

4.7.2 **Alternative A:**
Changes in scenery would come slowly from forest growth. Gradually, over approximately 50 years, the contrast between plantations and mature forest would become less evident.

4.7.3 **Effects to scenery as seen from roads 63 and 70 for the action alternatives:** Thinning units and road construction would meet the VQOs of partial retention because of vegetative screening, the number of green trees retained, the distance and the viewer angle. No log landings would occur on, or be visible from roads 63 or 70. 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. The units would meet the VQO of partial retention from these viewer positions.

4.7.4 **Effects to scenery as seen from local roads for the action alternatives:** Some minor changes to foreground views from local open roads would occur. Log landings, temporary roads, landing slash piles and skid trails and skyline corridors that lead to the landings would be noticeable in the short term by viewer positions at the landings. Landing size would be kept to the minimum size needed for safety and areas of bare soil would be seeded with grass for erosion control. The thinned forest may have some bare soil, red slash and stumps visible in the short term, but over time this would become less noticeable. From other more distant viewer positions, the thinning would not be evident to the casual observer. The units would meet the VQO of modification from these viewer positions.

4.8 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 - Appendix J2

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

There are no Proposed, Threatened or Endangered botanical species affected by the proposed action.

Surveys were conducted for Sensitive botanical species in 2004, in the proposed units and in similar and connected habitats (e.g. streams) if immediately adjacent to the proposed units. Several fungi that have potential habitat in the Collawash area are not considered practical to detect with field surveys. It is assumed that these species are present. The following list contains the species that have potential habitat for this project. None were found during surveys. The effect determination for the vascular plants and lichens is "No Impact." Since the fungi are assumed to be present, the effects determination for all of them would be "May Impact Individuals but would not lead to a trend toward federal listing."

Species	Group
Botrychium minganense	Vascular Plant
Botrychium pinnatum	Vascular Plant
Cimicifuga elata	Vascular Plant
Corydalis aquae-gelidae	Vascular Plant
Montia howellii	Vascular Plant
Chaenotheca subroscida	Lichen
Leptogium burnetiae var. hirsutum	Lichen
Leptogium cyanescens	Lichen
Lobaria linita	Lichen
Pannaria rubiginosa	Lichen
Peltigera neckeri	Lichen
Peltigera pacifica	Lichen
Usnea longissima	Lichen
Cordyceps capitata	Fungi
Cortinarius barlowensis	Fungi
Gyromitra californica	Fungi
Leucogaster citrinus	Fungi
Otidea smithii	Fungi
Phaeocollybia attenuata	Fungi
Phaeocollybia californica	Fungi

Species	Group
Phaeocollybia olivacea	Fungi
Phaeocollybia piceae	Fungi
Phaeocollybia oregonensis	Fungi
Phaeocollybia pseudofestiva	Fungi
Ramaria amyloidea	Fungi
Ramaria gelatiniaurantia	Fungi
Sowerbyella rhenana	Fungi

The FSEIS to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines was issued in 2004. The Record of Decision moved many species from the requirements of the **Survey and Manage** Standards and Guidelines to sensitive species. However, it also indicated that projects still in the planning stage that had begun or completed surveys using the Survey and Manage Standards and Guidelines could proceed without conducting a new sensitive species analysis. Surveys have been competed to the Survey and Manage protocol and no species were found that require the management of known sites.

4.9 MANAGEMENT OF COMPETING AND UNWANTED VEGETATION

The Record of Decision and Mediated Agreement (MA) for the "Managing Competing and Unwanted Vegetation" Final Environmental Impact Statement (FEIS) apply to road and landing slash and invasive plants and noxious weeds. The use of herbicides is not being proposed for any of the activities associated with the Collawash EA.

Invasive plants are species not native to a particular ecosystem that may cause economic or environmental harm, or harm to human health. They include, but are not limited to, the Oregon Department of Agriculture (ODA 2003) Noxious Weed list. Invasive Plants may disrupt natural ecosystems by displacing native species and reducing natural diversity through the replacement of native communities with invasive monotypic weed stands.

The noxious weeds of concern (Oregon Department of Agriculture “B” rated weeds) are located along roads that lead into and adjacent to the proposed project. They are *Cytisus scoparius* (Scotch broom), *Senecio Jacobea* (Tansy Ragweed), and *Hypericum perforatum* (St. Johnswort). These weeds are well distributed on the Clackamas River Ranger District. In the project area, they occur primarily along roads and are not common in forest stands.

The action alternatives would have a risk ranking of high but the design criteria (#7 and 11) would be followed to reduce the chances of these weeds spreading to new areas. Bio-control insects are established and are the primary means of control for all three of these species for this area. With the shade provided by the forest canopy, these weeds are not likely to spread into the stands. Equipment cleaning would prevent weeds from spreading along roads to new uninfested sites.

The following analysis covers the proposed treatment of slash from temporary roads and landings. Appropriate design criteria would be incorporated into project work to minimize potential adverse impacts to the environment, project workers, and public.

Site Specific Objectives for Roads and Landing Related Slash and Vegetation:

- Vegetation control shall be completed along Forest roads to provide for user safety (FW-428).
- Dead, down woody material loading levels shall be managed to provide for multiple resource objectives. Fuel profiles shall be identified, developed and maintained that contribute to the most cost effective fire protection program consistent with Management Area objectives (FW-263 and FW-265).

Expected Site Conditions

Site conditions do exist that favor the presence of slash from newly constructed roads and other vegetative debris created during road maintenance or other reconstruction projects. Treatment of road related slash and vegetation would be needed to meet the safety needs and fuel management objectives. Damage thresholds for road projects would be exceeded if slash and debris obscures driver visibility or if there is greater than 15 tons/acre of slash in the 0-3" size class adjacent to the road. Road construction, reconstruction and maintenance projects are expected to need treatment of both live vegetation and slash so that management objectives can be attained.

For road projects, the correction strategy is selected when the damage thresholds are exceeded. The following methods would be used where needed: Lop and Scatter - this method would entail manually cutting the slash or brush with chain saws and then scattering it outside the road prism. Piling and Burning - this method would use mechanical equipment to pile the slash. The piles would then be burned under a set of prescribed weather conditions.

The potential effects of the above treatments that have been considered include soil compaction, puddling, surface erosion, consumed coarse woody debris, removal of surface organic matter, overheating the soil, scorch or death of reserve trees, air quality degradation and the potential for an "escape" becoming a wildfire. A more complete discussion of the effects on these resources can be found elsewhere in this document.

Adverse impacts would be prevented or minimized by the proper use of equipment, project supervision, training, the seasonal timing of activities, the development of a site specific burn plan, and the incorporation of appropriate design criteria.

4.10 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 5-10 tons per acre.

Effects – Including Direct, and Indirect and Cumulative Effects

Alternative A would not change air quality.

Action Alternatives

Dust from vehicles would not likely affect air quality**.** 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.

Landing slash would be burned. Burning has the potential to degrade air quality for short periods of time. The principle impact to air quality from 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 to forest visitors would be minimal because burning would happen after the peak recreation season, in the fall (October – December) or during periods of inclement weather. Slash in the harvest units would not be burned. In addition to existing slash, the branches and tops of harvested trees would increase fuels by approximately 5 tons per acre.

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 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 risk 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.

Cumulative Effects - The areas of highest concern for possible impacts to air quality discussed above are far from the project. The project 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 Collawash 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. The incremental effect of the proposed action is negligible therefore there would be no discernable cumulative effect.

4.11 ECONOMICS – FINANCIAL ANALYSIS

Mt. Hood Forest Plan References
Forest Management Goals - 19, page Four-3, See FEIS page IV-112
Northwest Forest Plan Standards and Guidelines page A-1, and FSEIS pages 3&4-288 to 318

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 Northwest Forest Plan Final Environmental Impact Statement 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. To benefit local and regional economies, timber is auctioned to bidders. For contracts to sell they must have products that prospective purchasers are interested in and they must have log values greater than the cost of harvesting and any additional requirements.

The harvest trees may be considered for inclusion in a Stewardship Contract where the value of the timber is used to pay for restoration work. The removal of timber would be combined into a contract that also includes the implementation of restoration projects such as correcting fish passage problems, precommercial thinning or obliterating roads elsewhere in Clackamas County. These other restoration projects would be covered by their own EAs where necessary. If the timber sale is used for a stewardship contract, the value of the timber described below would remain the same but there would be no receipts to the treasury; instead the value of the timber would be used to achieve needed restoration projects. Where stewardship contracting is used there would be additional benefits to local and regional economies from increased jobs.

There is often a concern about the viability of thinning timber sales that often have small low-valued logs and high logging costs when compared to other types of timber sales. In the future it is likely that timber values would fluctuate with market conditions and logging costs may also change with fluctuations in fuel prices. The purpose of this analysis is to approximate the economic feasibility of timber sales, estimate the potential value generated and to provide a comparison of the alternatives.

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. It

also would not generate any revenue that could be used for restoration projects associated with a stewardship contract. The action alternatives would provide for jobs associated with logging and sawmill operations and would contribute to meeting societies forest product needs and may generate revenue that could be used for restoration projects. The NFP (p. 3&4-297) contains an analysis of employment in the timber industry. The annual incremental contribution of each million board feet of timber is approximately 8.3 jobs. Restoration projects would also create jobs, but the number depends on the specific type of project included in a stewardship contract.

The following table displays a summary of the cost and benefits associated with the timber harvesting only, for each alternative. The table displays present value benefits, cost, and net value, as well as the benefit/cost ratio for each alternative as if it was sold as one timber sale. The selected alternative may be divided into two separate timber sales or stewardship contracts based on haul routes, location, harvesting systems and recommendations from the collaborative efforts. These figures display the relative difference between the alternatives. If timber prices or other factors fluctuate in the future, the relative ranking of alternatives would not likely change.

Costs and Benefits

	Alternative A	Alternative B	Alternatives C	Alternative D
Present Value - Benefits	0	$2,037,500	$1,505,000	$904,176
Present Value - Cost	0	$937,320	$880,680	$468,630
Present Net Value	0	$1,100,180	$624,320	$435,546
Benefit/Cost Ratio	NA	2.17	1.71	1.93

Present Value - Benefits: This is the present day value based on delivered log prices (estimated at $652/mbf).

Present Value - Cost: This is the present day value of the cost associated with harvesting (estimated harvesting cost is $190/mbf for mechanical, $290/mbf for skyline and $450/mbf for helicopter).

Present Net Value: This is the present net value of the alternative, which is based on the value of delivered logs to a mill minus the value of cost associated with harvesting.

Benefit Cost Ratio: This is a ratio derived from dividing the "Present Value – Benefits" by the "Present Value – Cost".

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 or stewardship contracts prepared from the Collawash Thinning 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. Any restoration project included as part of a stewardship contract would also contribute to the stability of the local and regional economies.

Administrative costs are not included in the analysis above. Administrative costs for planning are already spent and would be the same for all alternatives including the no-action alternative. Other costs for timber sale preparation and sale administration for the action alternatives would be approximately proportional to the acres of each alternative.

4.12 TRANSPORTATION

Mt. Hood Forest Plan References
Forestwide Timber Management Standards and Guidelines - FW-407 to FW-437, page Four-95
See FEIS page IV-123

Roads Analysis is a process of considering landscape-level information before making site-specific decisions about road management. 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 specific information.

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 future road system can be 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 items particularly relevant to the Collawash project are #2 and 7.

Existing Situation

There are no inventoried roadless areas in the Collawash Thinning project. The Collawash project can be accessed from road 6320 and 6321, the primary haul routes.

In the Collawash Watershed approximately 66.5 miles of roads have been decommissioned.

Alternative A

No roads would be built or repaired.

Alternative B

There are road repairs and improvements that would be accomplished with all of the action alternatives. Included are two deep patch repairs as well as the conversion of 2 miles of pavement to gravel on 6320.

New temporary roads would be constructed (0.8 mile) to access landings. Some existing roads are closed or overgrown and would be need to be reopened prior to use (0.7 mile). All lengths are approximate. The new temporary roads are located on gentle landforms near ridge tops, and they avoid streams and wet areas.

Alternative C and D

No new temporary roads would be constructed and harvest units would be logged with helicopter. Some existing roads are closed or overgrown and would be need to be reopened prior to use (0.7 mile).

4.13 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 numbers 2002-06-06-05-0003. There would be no anticipated effects on heritage resources. Project design criteria have been incorporated to protect heritage resources. Contracts would contain provisions for the protection of sites found during project activities. Documentation of this information has been forwarded to the State Historic Preservation Office.

4.14 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. A report detailing Environmental Justice and Civil Rights issues is in the analysis file and is summarized here. There are communities with minorities and low-income populations that may be affected by the Collawash Project. The town of Estacada (the nearest community) is approximately 30 miles away. Even farther away, but potentially affected are the American Indian communities of Warm Springs and Grande Ronde. There are no known areas of religious significance in the Collawash area. There are no known special places for minority or low-income communities in the Collawash area. Individuals may work, recreate, gather forest products or have other interests in the Collawash area. The report found that

impacts and benefits of the Collawash Thinning would not fall disproportionately on minorities or low-income populations. No adverse civil rights impacts were identified.

4.15 RECREATION

Mt. Hood Forest Plan References
Forestwide Timber Management Standards and Guidelines - FW-453 to FW-466, page Four-98
See FEIS page IV-127

In the vicinity of the Collawash units there are no campgrounds, trails or other destination recreation features. Road 70 is the route to Bagby Hot Springs but the Collawash thin units cannot be seen from this road. The Collawash area is used for dispersed camping as well as hunting. Fire rings are present at old landings and road junctions. Based on inspection of fire rings and other recreation indicators, the Collawash 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 Collawash 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 effect.

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 are not used by fishers to access fish bearing streams. Access to streams for angling is not altered by any of the action alternatives.

4.16 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.

5.0 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 May 2002. The Forest publishes a schedule of proposed actions (SOPA) quarterly. The project first appeared in the fall 2001 issue, and in subsequent issues. Comments have been received periodically since then. A 30-day comment period ended on July 27, 2005. 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.

Other formal and informal public involvement efforts have occurred including field trips with interested groups to visit the proposed units and presentations made at meetings held by groups such as the Clackamas River Basin Council. One or more of the timber sales from the Collawash project may be considered for

inclusion in a Stewardship Contract where the value of the timber is used to pay for restoration work. The removal of timber would be combined into a contract that also includes the implementation of restoration projects such as correcting fish passage problems elsewhere in Clackamas County. Where stewardship contracting is used, there would be additional benefits to local and regional economies from increased jobs. The Clackamas River Stewardship Partners is a collaborative group that is assisting with the recommendation of potential restoration and thinning projects to include in stewardship contracts.

List of Preparers

Glenda Goodwyne, - Forester, Certified Silviculturist. Glenda has 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 25 years in Oregon, Washington, and California.

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 16 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 12 years in Washington and 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 26 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 27 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 27 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 28 years. He is a specialist in the preparation of environmental documents under the National Environmental Policy Act.

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 28 years as a hydrologist for the Forest Service in California and Oregon.

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 25 years.

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 26 years as a forestry and engineering technician.

Susan Rudisill - Archaeological Technician. Susan has worked for the Forest Service for 21 years. She has served as an Archaeological Technician for the Forest Service for 15 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

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R.J. Gutierrez, P. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, & S.G. Sovern. 2004. Status and Trends in Demography of Northern Spotted Owls. A Draft Report to the Interagency Regional Monitoring Program. Portland, Oregon.

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.

Courtney, S P, J A Blakesley, R E Bigley, M L Cody, J P Dumbacher, R C Fleischer, AB Franklin, J F Franklin, R J Gutiérrez, J M Marzluff, L Sztukowski. 2004. Scientific evaluation of the status of the Northern Spotted Owl. Sustainable Ecosystems Institute of Portland Oregon. September 2004. <http://www.sei.org/owl/finalreport/finalreport.htm>

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. 2003. Noxious Weed Policy and Classification, Oregon Department of Agriculture Noxious Weed Control Program.

Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

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. Collawash/Hot Springs 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. 2004a. General Water Quality Best Management Practices, Mt. Hood National Forest, June 2004.

USDA Forest Service. 2004b. Programmatic Biological Assessment for Projects with the Potential to Modify the Habitats of Northern Spotted Owls and/or Bald Eagles or Modify Critical Habitat of the Northern Spotted Owl, Willamette Province – FY 2005-2006. August 13, 2004.

USDA Forest Service. 2004c. Monitoring Report Fiscal Year 2003, Mt. Hood National Forest Land and Resource Management Plan, September 2004.

USDA Forest Service, USDI Bureau of Land Management, USDI National Park Service, USDI Fish and Wildlife Service, USDC National Oceanic and Atmospheric Administration, EPA. 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. FEMAT Report, July 1993

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.

USDA Forest Service and USDI Bureau of Land Management. 2004a. Record of Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy. March 2004.

USDA Forest Service and USDI Bureau of Land Management. 2004b. Record of Decision and Standards and Guidelines to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines. March 2004.

USDI Fish and Wildlife Service. 2005. Biological Opinion For The Willamette Province Fiscal Year 2005-2006 Habitat Modification Projects, March 29, 2005.

Other References

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

GIS shape files:
- Snag (snag data)
- Veg2004 (timber type and age data, elk habitat data, owl habitat data)
- Roads (road data)

Spreadsheets:
- arp.xls (Aggregate Recover Percentage model)
- cover.xls (Deer and elk optimal and thermal cover calculations)
- snagxacres.xls (snag analysis)
- Open road density.xls (Deer and elk open road density calculations)
- List of Past Projects – Collawash.xls

Text Documents:
- Collawash Fish BA.doc - Fish Biological Assessment
- Wildlife BA.doc - Programmatic Biological Assessment for Projects with the Potential to Modify the Habitats of Northern Spotted Owls and/or Bald Eagles or Modify Critical Habitat of the Northern Spotted Owl Willamette Province - FY 2005-2006
- Wildlife BO.doc - Biological Opinion and Letter of Concurrence for Effects to Bald Eagles, Northern Spotted Owls and Northern Spotted Owl Critical Habitat
- Preliminary Assessment.doc
- Lynx Effects Determination memo December 3 of 2003.doc
- Letters and e-mail documents from commenters
- Mailing list