USDA

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Forest
Service

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Environmental Assessment

South Fork Thinning

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

The project is located in T.5S., R.4E.; T.5S., R.5E.; Willamette Meridian.

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1.0 SUMMARY

The Mt. Hood National Forest proposes a commercial thinning project in plantations. The project is located in the western portion of the Clackamas River Ranger District, Mt. Hood National Forest, Oregon. The trees in the plantations are 40 to 60 years old.

The purpose of this project is to thin young forest stands to achieve multiple objectives. The proposed action is to thin and harvest wood fiber from approximately 423 acres of matrix land and approximately 74 acres of riparian reserves.

The Forest Service evaluated the no-action alternative and action alternatives that vary by logging method and road construction.

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*
- *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 following four purposes of this project are derived from the Mt. Hood Forest Plan as amended. Each purpose statement has page references from various Forest Plan documents and has section references where greater detail can be found elsewhere in this document.

The purpose of this project is to:

- Provide forest products

  Action is needed to supply forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies (s. 4.11). There is a need to keep forests healthy and productive to sustainably provide forest products in the matrix in the future. Not only are forest products needed by society, but also the employment created is important to local and regional economies. (Northwest Forest Plan ROD p. 26, Mt. Hood Forest Plan p. Four-26)

- Increase health and vigor and enhance growth that results in larger wind firm trees on 423 acres of matrix in the project area

  This action is needed because these second-growth plantations are experiencing a slowing of growth due to overcrowding and some are experiencing suppression caused mortality (Mt. Hood Forest Plan p. Four-90, Four-292). 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 in the matrix that are healthy and vigorous with low levels of mortality and wind susceptibility (s. 4.3).

- Enhance diversity on 497 acres in the project area

  This action is needed because these plantations lack certain elements of diversity. They do not have the mix of tree species that were present in the original stand and they are relatively uniform in terms of tree size and spacing. There is a need for greater variability of vertical and horizontal stand structure. There is a need for more sunlight on the forest floor to create greater diversity of ground vegetation. (Mt. Hood Forest Plan p. Four-67) If no action is taken, over time the stands would become increasingly dense resulting in a period of low structural diversity that could last more than 100 years. (s. 3.2.1 & 4.3, 4.4.3)

- Enhance riparian reserves on 74 acres in the project area

  This action is needed because these plantations occur in riparian reserves and because the current vegetation does not meet the needs of associated aquatic and riparian resources (Mt. Hood Forest Plan p. Four-17 to 20, Northwest Forest

Plan Standards and Guidelines p. C-32). If no action is taken in these 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. Plantations can be enhanced by thinning to accelerate the development of mature and late-successional stand conditions. (s. 3.2.2, 4.2.6 & 4.3.3)

2.2.2 **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 2005 Record of Decision for Preventing and Managing Invasive Plants (USDA 2005)

2.2.3 The South Fork Thinning project is located within the following **land allocations**: C1 Timber Emphasis and Riparian Reserves. Refer to Map in section 3.2.5. See Appendix E for documentation of riparian reserve standards.

Watershed Analysis - The project area overlaps several watersheds. The Upper Clear Creek Watershed Analysis was completed in 1995 and the South Fork Clackamas River Watershed Analysis was completed in 1997. The purpose and need is consistent with the recommendations of these analyses. Portions of two units (26 acres) are in the Milk Creek watershed of the Molalla River, which has no watershed analysis. The units in the Milk Creek watershed are matrix and have no riparian reserves.

2.2.4 **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.
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 action proposed by the Forest Service to meet the purpose and need is a timber sale that would thin and harvest wood fiber from approximately 497 acres (423 acres of matrix land and 74 acres of the dry upland portion of riparian reserves). On areas proposed for thinning in the matrix, approximately 178 acres would be fertilized. Thinning would be designed to enhance diversity by applying variable density prescriptions. (See Alternatives section for greater detail.) The proposal 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 10/27/05 a preliminary analysis was made available for a 30-day public comment period. Two letters 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 water quality and fish. Refer to the Response to Substantive Comments in Appendix A.

2.5.1 **Key Issue #1: Water Quality and Fisheries - Roads**

Based on the comments received, water quality and fish habitats are concerns for many people.

Issue statement: Temporary road construction 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 **Other Issues:**

Riparian Reserve Management

The proposed action involves thinning in the dry upland portions of riparian reserves. There is support among a wide range of agencies, scientists, and environmental groups that thinning in the upland portion of riparian reserves is desirable to benefit riparian dependent resources. However there are some that are concerned that the alteration of riparian reserves may cause erosion that may harm water quality and fish.

Fertilization
The proposed action involves the aerial application of fertilizer. There is a concern that fertilizer may run off into streams or leach through the soil, harming water quality and fish. There is also a concern that fertilizer may harm soil organisms and interfere with nutrient cycling processes.

3.0 ALTERNATIVES

This chapter describes and compares the alternatives considered for the South Fork 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 Action Alternatives

To achieve the purpose and need, the action alternatives would thin and harvest wood fiber from approximately 497 acres (423 acres of matrix land and 74 acres of the dry upland portion of riparian reserves). A silvicultural diagnosis has been developed including variable density thinning designed to enhance diversity. Thinning would generally leave approximately 80 to 140 variably spaced trees per acre (variations 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. Fuels treatment would be minimal: where a mechanical harvester is used, branches would be crushed under the equipment. Elsewhere there would be no fuels treatment except the piling and burning of incidental quantities of slash and debris at landings.

3.2.1 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.

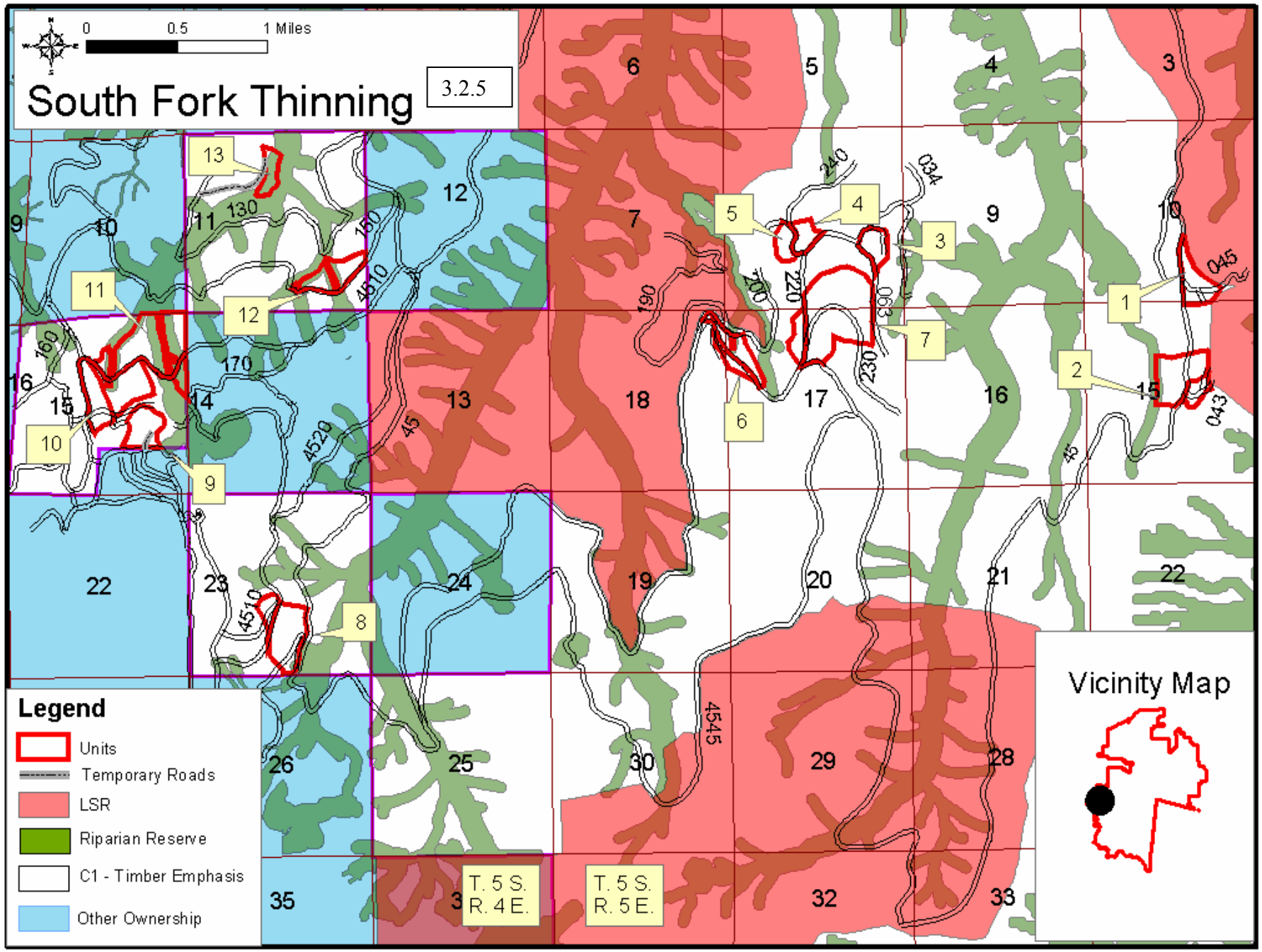
- Leave tree spacing would vary from 80-140 trees per acre
- Leave trees would include minor species
- Small gaps and skips would be created
- Leave trees would include trees with the elements of wood decay
- Leave trees would include some live trees where their crowns touch certain key snags

- 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

3.2.2 Riparian - On areas proposed for riparian reserve thinning, a wider leave tree spacing would be used. 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 discuss no-harvest buffers of approximately 30 to 50 feet along streams. There are some small seeps and wet areas that are too small to show on the maps below. These areas would be excluded from harvest.

3.2.3 Fertilization – Fertilizer would be applied with a helicopter at a rate of 200 pounds of nitrogen per acre on approximately 178 acres of second-growth conifer plantations within the matrix. Fertilization is proposed in units 1, 3, 4, 5 and 7. (Fertilization is not made necessary by thinning; it is a supplemental treatment to enhance growth. Fertilization is contingent upon funding availability. If funding is not immediately available, the thinning of plantations without fertilization is a viable option.) Fertilization would not occur in riparian reserves.

3.2.4 Roads - There are road repairs that would be accomplished with this project to facilitate safe access and log haul. Two deep patch repairs would be needed on road 45; from mile posts 1.75 to 1.95 and from mile posts 9.0 to 9.25 as measured from the Memaloose bridge. The legal description for these repairs is S.½ of section 21 of T. 5 S., R. 5 E., and the N.½ of section 32 of T. 4 S., R. 5 E. Repairs would be within the road prism and are outside of riparian reserves. In addition, approximately 10,950 feet of bermed system roads would be temporarily opened and reclosed upon completion. Also some old temporary roads would be opened and obliterated upon project completion. Refer to the map in section 3.2.5 and maps and details found in Appendix E.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South Fork Thinning
3.2.5
Legend
Units
Temporary Roads
LSR
Riparian Reserve
C1 - Timber Emphasis
Other Ownership
Vicinity Map
T. 5 S. R. 4 E.
T. 5 S. R. 5 E.

3.2.6 Alternative B

With Alternative B, logging systems were selected based on economic viability and primarily used the same or similar systems that were used in the original logging 40 to 60 years ago.

Unit Table For Alternative B

Unit #	Estimated Acres	Ground Based (Ac.)	Sky line (Ac.)	Heli-copter (Ac.)	Reuse Old Temp Roads (ft.)	New Temp Roads (ft.)
1	25	25				
2	50	11	39			
3	16	16				
4	13	13				
5	12	12				
6	28	8	20			
7	112	99	13			
8	48	9	39			
9	25	25			800	
10	25	25			600	
11	105	40	65		600	
12	25		25			
13	13		13			
TOTAL	497	283	214		2000	

3.2.7 Unit specific discussion

Refer to detailed maps in Appendix E.

Units 11D, 11E and 9 – A ground-based logging system would be used even on steep slopes. Existing landings and skid trails would be reused.

Unit 13 – A skyline system would be used to log the unit and a tractor swing would be used to move the logs from skyline landings to Road #130, which is 2300 feet away.

3.2.8 Mitigation – Alternative B would be implemented with the list of Best Management Practices and Design Criteria found in section 3.6. These are standard practices that implement Forest Plan standards and guidelines. No resource impacts were found that would require mitigation for Alternative B.

3.2.9 Some documents including Biological Assessments refer to South Fork Thinning units using stand exam numbers. This crosswalk table shows current EA numbers and the corresponding stand exam numbers.

3.2.9					
Unit #	**Stand Exam #**	**Unit #**	**Stand Exam #**	**Unit #**	**Stand Exam #**
1	526	5	5	9	524
2	527	6	6	10	522
3	3	7	7	11	521
4	4	8	14	12	525
				13	74

3.3 Alternative C

With Alternative B, logging systems were selected based on economic viability and primarily used the same systems that were used in the original logging. Alternative C would be similar to B except where differences are described below. In some units, a new logging method and road system would be proposed. Since future thinning or other forest management is likely to occur in plantations, the new logging method and/or road system would be designed and located to serve long-term management and transportation needs. Units with changed logging systems or roads are highlighted in s. 3.3.1.

3.3.1 Unit Table For Alternative C

Unit #	Estimated Acres	Ground Based (Ac.)	Sky line (Ac.)	Heli-copter (Ac.)	Reuse Old Temp Roads (ft.)	New Temp Roads (ft.)
1	25	25				
2	50	11	39			
3	16	16				
4	13	13				
5	12	12				
6	28	8	20			
7	112	99	13			
8	48	9	39			
9	25		25			500
10	25	25			600	
11	105		98	7	600	
12	25		25			
13	13		13			2300
TOTAL	497	218	272	7	1200	2800

3.3.2 Unit specific discussion

Refer to detailed maps in Appendix E.

Unit 9 - The unit was previously tractor logged and some of the slopes are 30 to 45 percent. To switch this unit to skyline would require the construction of 500 feet of temporary road with new landings.

Unit 11 - Portions of the unit (11D and E) were previously tractor logged and some of the slopes are 30 to 45 percent. Unit 11D would be helicopter logged. Unit 11E would be skyline logged uphill to road 161. Some of the skyline corridors would be outside the unit going through a younger plantation. Existing landings would be used.

Unit 13 – Alternative B would use a tractor swing to move the logs from skyline landings to road #130, which is 2300 feet away. Alternative C would construct a temporary road (2300 ft.) from road #130 to the skyline landings.

3.3.3 Mitigation – Alternative C would be implemented with the list of Best Management Practices and Design Criteria found in section 3.6. These are standard practices that implement Forest Plan standards and guidelines. No resource impacts were found that would require mitigation for Alternative C.

3.4 Alternative D

Alternative D would be similar to C except it would eliminate new road construction. In units affected by the deletion of road construction with this alternative, the units would be logged using helicopter or other logging systems. Units with changed logging systems or roads are highlighted in s. 3.4.1.

3.4.1 Unit Table For Alternative D

Unit #	Estimated Acres	Ground Based (Ac.)	Sky line (Ac.)	Heli-copter (Ac.)	Reuse Old Temp Roads (ft.)	New Temp Roads (ft.)
1	25	25				
2	50	11	39			
3	16	16				
4	13	13				
5	12	12				
6	28	8	20			
7	112	99	13			
8	48	9	39			
9	25	17		8	800	
10	25	25			600	
11	105	0	98	7	600	
12	25		25			
13	13			13		
	497	235	234	28	2000	

3.4.2 Unit specific discussion

Refer to detailed maps in Appendix E. Except where discussed below, the logging systems and roads would be the same as with Alternative B.

Unit 9
With this alternative, the unit would be logged using ground-based systems on the gentler portions of the unit with helicopter being used on the steeper parts. An existing non-system road would be used (800 ft.). The road was never closed or obliterated and would require only minor work to make it useable. Existing landings would be used.

Unit 11
This unit would be logged the same as proposed with Alternative C.

Unit 13
Helicopter would be used to log this unit and no roads would be constructed. Existing landings would be used.

3.4.3 Mitigation – Alternative D would be implemented with the list of Best Management Practices and Design Criteria found in section 3.6. These are standard practices that implement Forest Plan standards and guidelines. No resource impacts were found that would require mitigation for Alternative D.

3.5 Alternatives Considered But Not Fully Developed

3.5.1 **Restoration:** An alternative was submitted by the public that would delete the timber sale aspect of this project and that it be reformatted into a restoration only EA that would decommission roads. This alternative was not developed because it would not meet the objectives outlined in the purpose and need.

3.5.2 **Thin Without Logging:** An alternative was submitted by the public that would thin dense stands by cutting trees and leaving them on the ground and chipping the limbs. It was not 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.

3.5.3 **Fertilization:** An alternative was considered that would fertilize all of the units. It was not fully developed because of the logistics and operational safety of aerially fertilizing steep slopes while avoiding intermixed riparian areas. The units that would be fertilized by the action alternatives would not have this concern.

3.5.4 **Delete Helicopter:** Comments were received that helicopter logging would be expensive and that the helicopter units should be dropped. This alternative was considered but not fully developed because the stands are in need of thinning. If the proposed timber sale does not receive bids, options would be considered to enhance the projects viability, such as including the helicopter units from this project with those of another to create an economically viable contract package.

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

1. **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. 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.*

2. **Snags, wildlife trees, skips and gaps:** To enhance diversity, variable density thinning would include the retention of snags and wildlife trees and the creation of skips and gaps. *This implements Forest Plan standards and guidelines as amended.*
    - 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. Five live trees per acre with "elements of wood decay" would be retained where available. They should be in the largest size class available.
    - Gaps would be created by skyline corridors. Some natural root rot gaps are present.
    - Skips would be created by leaving small portions of the units un-thinned. They would be centered around special microhabitat sites where available such as snags, wildlife trees, concentrations of large down wood, patches of deciduous shrubs, small seeps and springs, or uncommon tree species. Skips would be up to 1/5 acre in size.

3. **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.*

4. **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.*

5. **Riparian Reserves –** These are BMPs and implement NFP standards and guidelines, pages C-30-32. They also implement the guidance of the Northwest Forest Plan Temperature TMDL Implementation Strategies (9/9/05).

5.1 **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.

The no-harvest buffer would be designed to meet stream temperature goals by avoiding harvest in the primary shade zone and by retaining 50% canopy closure in the secondary shade zone.

5.2 **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.

5.3 Within 50 feet of perennial or intermittent stream 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.

5.4 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.

5.5 **Other Riparian Areas** – Other riparian features that are not perennial or intermittent streams such as seeps, springs, ponds or wetlands would be protected by the establishment of no harvest buffers that incorporate the riparian vegetation. Certain perennially wet features that are habitat for the aquatic mollusk *Lyogyrus* n. sp. 1 would be protected by the establishment of a 50 ft. no-harvest buffer.

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

6.1 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.

6.2 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.

6.3 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.

6.4 In some units, ground-based logging at the time of the original clear cuts has resulted in detrimental soil conditions that exceed Forest Plan standards. In these areas there is a greater urgency to reuse existing temporary roads, landings and skid trails. Some new skid trails might be needed as described above, but where detrimental soil conditions exceed 20%, only existing skid trails would be used and only those existing skid trails that do not alter surface hydrology.

6.5 Where existing detrimental soil conditions exceed Forest Plan standards, existing temporary roads and landings that are reused, would be obliterated and revegetated.

7. **Roads –** *These are BMPs.*

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

7.2 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.

7.3 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.

7.4 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.

7.5 No road construction is proposed within riparian reserves.

7.6 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.

8. **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 and the 2005 Record of Decision for Preventing and Managing Invasive Plants (USDA 2005.*

9. **Fertilizer Application –** *These are BMPs.*
   a. Fertilizer would not be applied in the riparian reserves.
   b. Application would not take place under adverse weather conditions: i.e. wind speeds in excess of 10 miles per hour, dense fog, snow, or heavy rain.
   c. Fertilizer spills would be immediately contained and cleaned up. Prior to application, safety, accident and spill plans would be prepared.
   d. Soil conditions would be moist and approximately ½ inch of rainfall should occur within 4 days following application. Application should not be made on more than one inch of snow or during heavy rainfall where there would be a chance of overland flow of fertilizer in solution.

10. **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.*

11. **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.

Water quality would be monitored for the aerial fertilization project. Adjustments in application rate, location and timing would be made 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.

3.7 Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative and a comparison with the purpose and need. 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**	**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.	No road construction. No impacts to water quality from road construction.	Construction of 2800 feet 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.
Approximate Timber Output (million board feet)	0	4.3 mmbf	4.3 mmbf	4.3 mmbf
Acres of Stand Growth and Productivity Improved In Matrix	0	423	423	423
Acres with Diversity Enhanced	0	497	497	497
Acres of Riparian Reserve Enhanced	0	74	74	74
Economic Viability Benefit/Cost ratio	0	2.7	2.46	2.4

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.

4.1 Cumulative Effects

4.1.1 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 affect on a given resource, a more detailed cumulative effects analysis is not necessary to make an informed decision.

4.1.2 The land area and the time scale used for a cumulative effects analysis would vary by resource. The analysis for each affected resource would look at the condition of the resource considering effects from past timber sales, road construction, fires, wind, and other disturbances.

4.1.3 The time scale includes the effects of all past activities beginning in approximately 1940 when the first timber harvest and road construction projects occurred. 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. The analysis includes the administrative activities at the District's seed orchard. The analysis also includes other recently completed timber sales that overlap the analysis area including Clack, Clear, Fork, Guard and Orchard. The analysis would include other projects approved by other EAs such as the Forest-wide Restoration EA, but in the South Fork area there are no restoration projects approved by other EAs except the creation of snags and down logs discussed in the Wildlife section.

4.1.4 The analysis considers the impact of activities on other ownerships. In this area the Bureau of Land Management (BLM) manages several interspersed checkerboard sections. There are adjacent private timber company lands and farther downstream there are residences and farmlands. In this area the Hillock Timber Sale and Clear-Dodger Timber Sale on BLM is a foreseeable future action (USDI 2004).

4.1.5 Section 4.4.1 describes the likely future scenario for thinning on National Forest lands. Similarly, the management of BLM lands and private lands is likely to continue in the future using current strategies. Young stands on BLM lands are likely to be thinned when their age and condition warrant thinning and stands on private forest lands are likely to be regeneration harvested. This anticipated harvest pattern would continue to provide a wide variety of habitat and resource conditions. These activities are discussed in general terms since they lack sufficient site specificity to be included in a numerical analysis.

4.2 WATER QUALITY AND FISHERIES

This section addresses Issue #1 and the riparian purpose and need. This section also addresses effects to water quality and fisheries from all components of the alternatives including roads and logging. It also includes an assessment of the Aquatic Conservation Strategy and a discussion of Best Management Practices. The South Fork Thinning Fisheries Biological Evaluation (found in Appendix C) is incorporated by reference and summarized below.

Consultation with NOAA Fisheries is not required for this project because there would be no effect to threatened or endangered fish. Recently, NOAA Fisheries listed critical habitat for several fish species, none of which occurs in the project area.

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

4.2.0.1 **Issue #1:**

There is a concern about the effects of **temporary road construction** on water quality and fisheries. *The effects to sediment can be found in section 4.2.3. Also refer to design criteria #1, 5, 6 and 7. Section 4.2 summarizes the Biological Evaluation found in Appendix C. Alternatives B and D do not include any road construction but would reopen approximately 2000 feet of existing old temporary roads. For Alternative C the rationale for proposed road construction can be found in section 3.3.2. Alternative C would construct approximately 2800 feet of new temporary roads and would reopen approximately 1200 feet of existing old temporary roads. 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. The Biological Evaluation found that there would be No Effect on threatened fish species.*

Other related comments:

4.2.0.2 There is a concern that the roads themselves and the effects of these roads are not temporary and that obliterating such roads is not entirely successful and the soil 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. See section 4.12.

4.2.0.3 There is a concern about the effects of **thinning in riparian reserves** on water quality and fisheries. *Support for active management of riparian reserves to restore them to a condition where they can grow into maturity is growing among a wide range of agencies, scientists, and environmental groups. The effects to sediment can be found in section 4.2.3 and the effects to riparian resources can be found in section 4.2.6. Also refer to design criteria #5 & 7. Section 4.2 summarizes the Biological Evaluation found in Appendix C. 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. Alternative A does not include any riparian thinning.*

4.2.0.4 **Purpose and need discussion**

One of the aspects of the purpose and need (s. 2.2.1) is to enhance riparian reserves. All of the action alternatives would equally meet this objective while the no-action alternative would not. A discussion of riparian resources is in section 4.2.6. A general discussion of stand health and growth in section 4.3.1 and 4.3.3 are also relevant to trees growing in riparian area.

4.2.1 Water Quality and Fisheries Existing Situation

The South Fork Thinning Project proposes to thin and commercially harvest wood fiber in young plantations within the Middle Clackamas, Lower Clackamas, and the Milk Creek fifth-field watersheds. Milk Creek is a tributary of the Molalla River. The 5th field watersheds are subdivided into subwatersheds. The subwatersheds that are within the South Fork Thinning Project area include: South Fork and Upper Clear Creek watersheds of the Clackamas River and the Canyon Creek subwatershed of Milk Creek. These watersheds are non-Key Watersheds under the Northwest Forest Plan. The South Fork and Clear Creek watersheds support populations of spring and fall chinook salmon, winter steelhead, and coho salmon. Winter steelhead and coho salmon occur in Canyon Creek. These anadromous species all occur downstream of the project area. Resident cutthroat and rainbow trout along with non-native brook trout inhabit most of the perennial stream reaches that flow through the project area.

The stands within the South Fork Project range in age from 40 to 60 years. The average tree height ranges from 60 feet to 90 feet with diameters averaging between 10 and 16

inches. The timber to be harvested is primarily Douglas-fir and western hemlock, as well as small amounts of western red cedar, silver fir and noble fir. The current stocking levels range from 190 trees per acre to 361 trees per acre. The management strategy is for a one-time entry into the Riparian Reserves. The objective of this action is to hasten tree growth to achieve a mature forest that is structurally diverse and to accelerate future large woody debris recruitment potential and snag habitat production. Currently the stands identified for thinning have low levels of structural diversity and are overcrowded, causing reduced growth and the potential for increased mortality.

The stands proposed for thinning are located within the Memaloose Creek, Lower South Fork, Upper South Fork, Little Clear Creek and Upper Clear Creek subwatersheds. Approximately 26 acres of two proposed units are located within the upland headwater region of the Canyon Creek subwatershed. There are no riparian reserves associated with this area of the watershed. There are no 303(d) listed water bodies in the project area.

The South Fork watershed consists of 0.4 miles of anadromous streams, 24 miles of resident fish bearing streams and 69 miles of non-fish bearing streams. A 70-foot falls on the South Fork Clackamas River at river mile 0.4 is a migration barrier for anadromous fish. Native populations of cutthroat and rainbow trout occupy both South Fork and Memaloose Creek as well as major tributaries such as the East Fork of the South Fork, Oscar Creek, Elbow Creek and Cultus Creek. Brook trout introduced into the South Fork watershed by lake stockings have proliferated throughout the drainage and may be a competitive concern for resident trout. The anadromous portion of the South Fork Clackamas has been considered a crucial spawning area to late-run coho because of its location as a low elevation tributary.

The Upper Clear Creek watershed contains 29.1 miles of fish bearing streams, including 4.0 miles of streams that support anadromous fish. Resident cutthroat trout are present throughout the watershed. Anadromous species that utilize the watershed include winter steelhead, coho salmon, fall chinook, cutthroat trout, and pacific lamprey. Barrier falls located at the confluence of Clear Creek and North Fork Clear Creek, approximately one mile upstream of the mouth of Little Clear Creek, is the upstream limit of anadromous species. Little Clear Creek is the downstream boundary of the Upper Clear Creek watershed. The Clear Creek watershed downstream of Little Clear Creek contains approximately 24 miles of anadromous streams.

The Canyon Creek watershed is 3,288 acres and contains approximately 7.5 miles of fish bearing streams including 3.5 miles of stream that supports anadromous fish species. The anadromous species that utilize the watershed include winter steelhead and coho salmon. Resident cutthroat trout occur throughout the fish bearing section of Canyon Creek. This section is located outside of Forest Service land.

There are no fish species listed under the Endangered Species Act (ESA) in the vicinity of proposed thinning units. Resident cutthroat trout, rainbow trout, and non-native brook trout occur within the perennial fish bearing streams that flow through the project area. ESA listed fish species that occur downstream of the project area include Lower

Columbia River (LCR) steelhead, Upper Willamette River (UWR) chinook salmon, and Lower Columbia River (LCR) coho salmon. These species occur in the lower 0.4 miles of the South Fork of the Clackamas River. Lower Columbia River fall chinook occur within the lower 2 miles of Clear Creek while and LCR coho occur in Clear Creek up to RM 24. Upper Willamette River (UWR) steelhead and coho salmon occur within the Canyon Creek subwatershed. This stock of coho originates from a hatchery stock that and is not a listed species under the ESA. The nearest occurrence of listed fish species to the project area is over four miles.

Project elements of the action alternatives that could potentially impact aquatic species or their habitats include timber harvest, road construction, yarding, log haul, and road decommissioning or obliteration. 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 South Fork Thinning Project include an analysis of peak 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.

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 could 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.

Alternatives B, C and D

4.2.3 Sediment

Sediment from road construction – Included is potential sediment from temporary road construction with Alternative C and from the reopening of old temporary roads and road work along the haul route with all of the action alternatives. Refer to detailed maps in Appendix E. Road related ground disturbing activities have been designed to minimize the risk of erosion and the potential for sediment to be transported to streams. Road work 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. The proposed new temporary roads are located on dry ground, would not cross any stream channels, and would have no hydrologic link to any water source. These roads would be constructed on relatively flat terrain along ridgetops, which would avoid an increase in the drainage network. Because of the distance of the proposed new temporary roads and the old temporary roads that would be reopened 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. All new temporary roads and reopened temporary roads would be obliterated and revegetated directly following completion of harvest operations to help reduce compaction and increase infiltration rates. Some road work is needed along the haul route to make the roads serviceable for log haul. This includes blading the road surface, cleaning the ditches, removing berms, and removing encroaching brush. Of the action alternatives, the risk of sediment from road sources would be least with Alternative D and greatest with Alternative C. Impact to water quality or fisheries resources caused by sedimentation due to road construction, reconstruction, maintenance or obliteration, if any, would be short-term and undetectable at a watershed scale.

Sediment from logging - Thinning, particularly 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-cut 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 South Fork 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-cut areas would include any buffer of hardwood vegetation occurring along the stream bank. No-cut 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. The use of skyline or helicopter yarding systems on steeper ground within riparian reserves would minimize ground disturbance. 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.

Of the action alternatives, the risk of sediment from logging system sources would be least with Alternative D and greatest with Alternative B. Alternative B would utilize ground-based systems on steep ground, while the other alternatives would use skyline and helicopter systems instead. Helicopter systems would use existing landings. The probability that measurable amounts of fine sediment would enter any stream within the project area as a direct result of logging activity is low.

Sediment from road use – (similar effect for all action alternatives). Log hauling and other traffic would not measurably increase the amount of fine sediment in streams. The roads along the haul route are rocked or paved at stream crossings, and road ditches are well vegetated. The potential for sediment input into streams along the haul routes would be minimized by permitting haul only when conditions would prevent sediment delivery to streams. Any sediment that would enter a stream during haul activities would be at crossings along aggregate surfaced roads. The majority of these crossings are at small streams that would not be flowing, or would have very little flow, during the normal season of operation (June 1 to October 31). Any sediment that leaves the road surface due to run-off is expected to disperse over land or be stored within these small channels. It is very unlikely that any measurable amount of sediment produced during log haul would be transported to stream channels where fish species occur. 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 affect to fish or their habitat would occur from hauling logs.

Sediment cumulative effects – Other potential sediment sources include OHV use, normal road use, and other timber sales listed in s. 4.1.3 & 4.1.4. The anticipated impact of the project to sediment is so small that it would not likely result in a significant incremental effect to streams.

4.2.4 Temperature

Effects would be similar for all action alternatives. The design criteria for the primary and secondary shade zones along perennial streams would insure that the majority of shade producing vegetation would remain. Since the streams within the project area are relatively small (3-10 ft. width), the no-cut buffers would provide adequate canopy cover and sufficient stream shading to maintain stream temperatures. Intermittent streams within the project area only carry water during wet times of the year (winter and spring) when temperatures are cooler, and no significant increase in stream temperature is expected downstream. No water quality effects are foreseen, and the low probability of effects would decrease, as the canopy and ground cover are re-established to pre-harvest conditions. The Oregon Department of Environmental Quality has recognized that the Northwest Forest Plan Temperature TMDL Implementation Strategies (9/9/05) as a mechanism to meet the Clean Water Act in terms of temperature.

4.2.5 Fertilization

Effects would be similar for all action alternatives. Fertilization of the commercially thinned stands would hasten the recovery of forest canopy to pre-harvest conditions. Fertilization would only occur in the matrix and not in Riparian Reserves. This would minimize the risk of fertilizer contaminating any water supply. Fertilization would be with forestry grade urea at an application rate of 200 lbs. Nitrogen/acre. Aerial application of urea fertilizer has the potential to enter the aquatic environment by direct application, drift, overland flow and subsurface drainage, which may result in increased nitrogen levels in streams. Small amounts of fertilizer in streams would likely have little affect on fish and may encourage increased productivity of algae and periphyton.

Urea can be used by plants directly to some extent, but is more commonly used after converting to ammonia or nitrogen. After converting, it becomes readily soluble and subject to leaching, but ammonification considerably reduces the leaching losses. Ammonia is more likely to volatilize, rather than leach, due to the ionic attractions of organic matter and clay fractions within the soil. Soil texture can be an important determinant of the level of nitrate that reaches the groundwater. Coarser soils would have faster movement of dissolved nitrate and lower rates of uptake by vegetation. The soil types in the project area have relatively fine textures and consequently, nitrate leaching to the groundwater is not likely.

Direct application poses the greatest risk to water quality and the aquatic environment, but can be prevented by adequate buffer strips around streams and wet areas. Design criteria have been incorporated to minimize the risk of fertilizer entering streams. No fertilizer would be applied within Riparian Reserves or wet areas. And units that have multiple streams or steep slopes making helicopter application in the matrix portion difficult, have not been considered for fertilization. Buffers where no fertilizer would be applied would be two-site potential tree heights along fish bearing streams and one-site potential tree height along other streams and wet areas. These buffer widths would prevent the introduction of fertilizer into streams by direct application, overland flow and subsurface drainage. Drift would be avoided by limiting aerial application to days with little or no wind. Application of fertilizer would not take place under adverse weather conditions such as: when wind speeds are in excess of 10 miles per hour, dense fog, snow, or heavy rain. Fertilization would only occur when soil conditions are moist and approximately 0.5 inch or less of rainfall is forecast within 4 days following application. Application of fertilizer would not be made on more than one inch of snow or during heavy rainfall where there would be a chance of overland flow of fertilizer in solution. Adherence to design criteria #9 would insure that very little, if any fertilizer would enter any stream course and would substantially negate any adverse effects to fish species or water quality.

Other projects also involve the use of fertilizer including the projects from the Cloak EA in the Upper Clackamas and Oak Grove drainages and restoration projects across the Forest that apply fertilizer near streams for erosion control. The Forest also adds fish carcasses to rivers to boost nutrient levels. As carcasses decay they benefit fish and other aquatic organisms and they release nitrogen and other nutrients into the water. Because of the precautions described

above, and considering other potential sources of aquatic nutrients, the South Fork fertilization project would not significantly add to the downstream nutrient levels.

4.2.6 Riparian Reserve Stand Structure

Refer to section 4.3.1 for a discussion of health and growth of plantations and a discussion of relative density. The current stand structure within the upland portions of the riparian reserves has an average stand diameter of 11 to 16 inches, and stocking is at levels where growth suppression and mortality is occurring (with relative densities (RD) exceeding 55).

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. 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 compared to the action alternatives. Without thinning, the average stand diameters in 40 years would range from 16 to 21 inches, with stocking at levels where growth suppression and mortality continues to occur (with RD exceeding 55). The understory vegetation would continue to be suppressed.

Alternatives B, C and D 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. Average stand diameters in 40 years would range from 22 to 30 inches. At that time, tree size and stocking levels again begin to approach the stocking levels where growth suppression and mortality would occur (with RD of 50 to 55). Understory vegetation would have developed for 40 years without suppression from the overstory conifers.

4.2.7 Comparison of Alternatives

The potential effects to water quality and fisheries for Alternative B and D would be less than that of Alternative C because they do not include any new temporary road construction; therefore there would be no risk of erosion or sediment entering streams due to the construction of temporary roads. There would be slightly less risk of erosion from harvest operations under alternatives C and D 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. With Alternative B, long skidding distances would be used for unit 13. This would result in many passes of equipment over a mainline skid trail, which when completed would have a very similar affect to that of a temporary road.

4.2.8 Fish Stocks of Concern

This summarizes the Biological Evaluation in Appendix C. The effects of the implementation of the South Fork Thinning Project on fish stocks of concern would be based on local populations of resident cutthroat and rainbow trout which are classified as management indicator species in the Mt. Hood Forest Plan and populations of listed fish species downstream of the project area in the South Fork of the Clackamas River, Clear Creek, Canyon Creek, and the mainstem Clackamas River. There are no threatened, proposed, candidate, or sensitive fish species that occur within any of the proposed units of the project area.

ESA listed species that occur downstream of the project area are Lower Columbia River steelhead, Upper Willamette River chinook salmon, Lower Columbia River chinook, and Lower Columbia River coho salmon. The closest occurrence of these species to the project area is within the lower South Fork of the Clackamas River and lower Clear Creek over four miles downstream of any proposed harvest unit.

The **no-action** alternative would have ratings of "No Effect" for fish stocks of concern. The following effects determinations would 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 system the effects determination for this species is "No Effect" (NE) for the South Fork Thinning Project.

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 Upper Clackamas River and during the months of March through June in the Oak Grove Fork. Steelhead use the majority of the mainstem Clackamas and major tributaries such as the South Fork of the Clackamas River, Fish Creek, Roaring River, Oak Grove Fork, Collawash River, and the Hot Springs Fork of the Collawash as spawning and rearing habitat. Winter steelhead

fry emerge between late June and late July and rear in freshwater habitat for one to three years. Smolt emigration takes place March through June during spring freshets.

LCR steelhead do not occur in any of the streams that flow within proposed units of the South Fork Project. The nearest occurrence of LCR steelhead is over 4 miles downstream. Because of the distance of the project area to any presence of Lower Columbia River steelhead or its habitat the effects determination for this species is "No Effect" (NE).

Upper Willamette River Steelhead (*Oncorhynchus mykiss*) - (Threatened) Upper Willamette River steelhead occur in the Willamette River and its tributaries upstream from Willamette Falls. Adults migrate into the Upper Molalla drainage during late January through the end of April. Spawning occurs from February through May in tributary streams such as Milk Creek, lower Canyon Creek, the North Fork Molalla River, Table Rock Fork Molalla River and the mainstem Molalla River. Smolt emigration takes place March through July.

UWR steelhead do not occur in any of the streams that flow within proposed units of the South Fork Project. The nearest occurrence of UWR steelhead is over 4 miles downstream within Canyon Creek. Because of the distance of the project area to any presence of Upper Willamette River steelhead or its habitat the effects determination for this species is "No Effect" (NE).

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

Adults in the lower Clackamas drainage spawn in lower Clear Creek, Deep Creek, and Eagle Creek, below River Mill Dam and between River Mill and Faraday diversion dams. Spawning in the upper Clackamas drainage has been observed in the mainstem Clackamas from the head of North Fork Reservoir upstream to Big Bottom, the Collawash River, Hot Springs Fork of the Collawash River, lower Fish Creek, Roaring River, and the first 0.4-mile of the South Fork Clackamas River.

Upper Willamette River chinook do not occur within any of the streams that flow within the South Fork units. The nearest occurrence of UWR chinook to any proposed unit within the Clackamas River, South Fork Clackamas, or Clear Creek watershed is over 4.0 miles. Because of the distance of the project area to any presence of Upper Willamette River chinook or its habitat, the effects determination for this species is "No Effect" (NE).

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 in the mainstem Clackamas River 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 above River Mill Dam. Because of the distance of the occurrence of fall chinook from the project area (greater than four miles) the effects determination for this species is "No Effect" (NE).

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).

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 lower two miles of the Oak Grove Fork. Adult late-run winter coho enter the Clackamas River from November through February. Spawning occurs mid-January to the end of April with the peak in mid-February. Peak smolt emigration takes place in April and May.

Coho salmon occur in the mainstem Clackamas River and in the lower reaches of the South Fork of the Clackamas River and Clear Creek. The anadromous portion of the South Fork Clackamas has been considered a crucial spawning area to late-run coho because of its location as a low elevation tributary. The nearest occurrence of LCR coho salmon to the South Fork Project area is over four miles downstream of any proposed thinning unit. Because of the distance of the project area to any presence of Lower Columbia River coho salmon or its habitat, the effects determination for this species is "No Effect" (NE).

Southwestern Washington/Columbia River Cutthroat Trout (*Oncorhynchus clarki*). (Management Indicator Species)
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 Molalla Rivers and their tributaries including the South Fork of the Clackamas, Clear Creek, and Canyon Creek.

Because of the presence of resident coastal cutthrout trout in the streams within and downstream of the project area the effects determination for Southwestern Washington/Columbia River cutthroat trout is "May impact individuals or habitat but will not likely contribute to a trend towards federal listing" (MIIH) for all of the action alternatives. The no-action alternative would have a rating of "No Impact." (NI).

4.2.9 Designated Critical Habitat

Critical habitat for twelve Evolutionary Significant Units (ESUs) of West Coast salmon and steelhead listed under the Endangered Species Act of 1973 (ESA) was designated on September 2. 2005. The ESUs that have designated critical habitat occurring within the watersheds associated with the South Fork Thinning Project include: UWR Chinook, UWR steelhead, LCR Chinook and LCR steelhead. Critical habitat includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water line or bankfull elevation. Within these areas, the primary constituent elements essential for the conservation of these ESUs are those sites and habitat components that support one or more life stages, including: freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, near-shore marine areas, and off-shore marine areas that support growth and maturation.

There is no critical habitat that occurs within the South Fork Project area. Designated critical habitat occurs downstream of the project area in the mainstem Clackamas River (UWR Chinook, LCR Chinook, and LCR steelhead), South Fork Clackamas River ((UWR Chinook and LCR steelhead), Lower Clear Creek (UWR Chinook, LCR Chinook, and LCR steelhead), Milk Creek (UWR Chinook and UWR steelhead), and Canyon Creek (UWR steelhead). Because the distance of the project area to any designated critical habitat is over three miles the effects determination for the South Fork Thinning Project on Designated Critical Habitat is "No Effect" (NE) for all of the project alternatives.

4.2.10 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 in the Mt. Hood National Forest in the Clackamas River, Hood River, and Sandy River basins. Chinook and coho salmon utilize the Clackamas River, the South Fork Clackamas River, and Clear Creek for rearing and spawning habitat. The proposed project is located approximately 4 miles above any habitat that could be utilized by chinook or coho. Implementation of the South Fork Thinning project would have **No Effect** on essential fish habitat for chinook or coho salmon. The proposed project would not have any affect 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.

This activity would not jeopardize the existence of any of the species of concern or adversely modify critical habitat and would not adversely affect Essential Fish Habitat as designated under the 1996 Amendment to the Magnuson-Stevens Act.

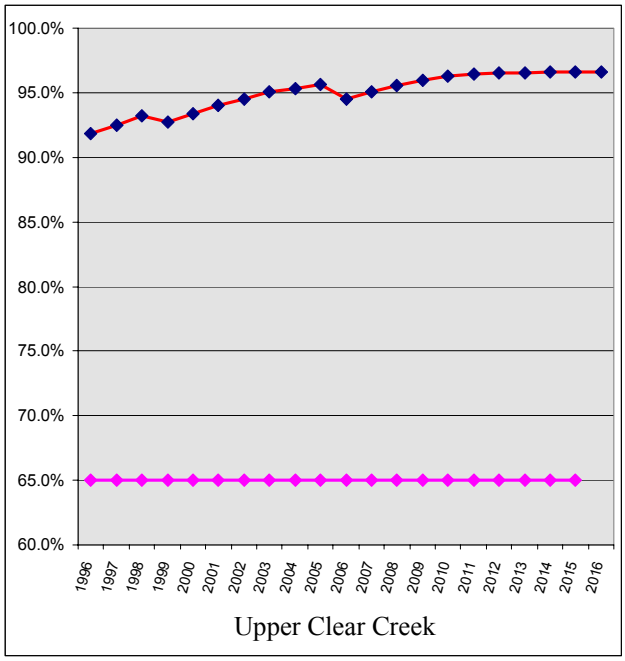
4.2.11 Other Aquatic Species - The aquatic mollusk (*Lyogyrus* n. sp. 1) is both a survey and manage species and a sensitive species. This mollusk has been found in many areas across the Forest and is highly likely to be present in the streams near this project. For this reason, instead of conducting surveys in all adjacent streams, species presence is presumed. According to the latest Management Recommendations (Aquatic Mollusks v. 2.0) it is important to maintain cool, clean water that is well oxygenated and to maintain and/or restore native plant communities. It also indicates that in most cases, the riparian reserve standards and guidelines will be sufficient for management of this species.

The riparian reserve standards and guidelines and project design criteria are sufficient to provide for the habitat needs of this species. This project will have 50 foot no-cut buffers around perennial streams and other features that are considered habitat in the Management Recommendations. This will maintain the native plant communities and will result in sufficient shade to maintain cool water temperature. This buffer plus the other design criteria would minimize the risk of erosion and sedimentation. Because the habitat for this species is being protected, this project would not cause a significant negative effect on the species habitat or persistence of the species at the site.

4.2.12 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 Upper Clear Creek (upper line) with the effect of the proposed thinning and all past and foreseeable future projects. The threshold of concern from the Forest Plan is 35% for these watersheds (B6-020, page Four-249), which corresponds to an ARP level of 65% (lower line). 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. In relative terms, these watersheds are more stable and are not affected by rain-on-snow events to the extent of some other watersheds within the Clackamas drainage that have thresholds of concern as low as 18% (ARP level of 82%).



This subwatershed is displayed because it has the greatest change in ARP with the action alternatives. The data for the other subwatersheds similarly show that with all past, current and reasonably foreseeable future actions, the subwatersheds are either quite stable or are experiencing a period of steady hydrologic recovery.

The following table shows the range of possible ARP values. All alternatives are well above 65%.

ARP Value in 2006

Subwatershed	Alternative A	Alternatives B&D	Alternative C
Upper Clear Creek	95.8	94.4	94.3
Little Clear Creek	95.5	95.1	95.1
Canyon Creek	95.0	94.0	94.0
Memaloose Creek	84.5	84.3	84.3
Lower South Fork Clackamas River	95.3	95.0	95.0
Upper South Fork Clackamas River	78.4	78.2	78.2

The ARP analysis looks at the existing condition of vegetation as it has been affected by past timber sales, fires, wind, and other disturbances. These disturbances are tracked by stand age (Data source – GIS data from Veg2004.shp and Roads.shp). The analysis also includes other planned timber sales that overlap these subwatersheds including Clack, Clear, Fork, Guard and Orchard. The analysis includes the effect of roads and permanent openings such as rock quarries. The analysis includes the effects of the proposed harvest and the effects

of constructing roads and reopening old roads. The resulting effects are so small that there is no measurable difference between the action alternatives.

The ARP figures displayed above indicate that the South Fork Thinning would have little or no affect on the hydrology of the subwatersheds.

The above analysis is conducted for the purpose of demonstrating compliance with Forest Plan standard and guideline FW-64 and applies only to National Forest lands and does not include other ownerships such as BLM or private lands. The watershed analyses for South Fork Clackamas River and Upper Clear Creek that do include all ownerships indicate that the watersheds are stable in terms of hydrology (South Fork p. 2-21, Upper Clear p. 64). As discussed in section 4.1.5, young stands on BLM lands are likely to be thinned when their age and condition warrant thinning and stands on private forest lands are likely to be regeneration harvested. A numerical cumulative effects analysis that would include BLM and other private lands is not necessary in this case because the incremental affect of South Fork Thinning would still be negligible regardless of what management were to occur on other lands. It is clear that the South Fork Thinning would have no direct, indirect or cumulative detrimental affect to forest hydrology. The anticipated impact of the project to forest hydrology is so small that it would not likely result in a significant incremental affect to the watershed as a whole. Thinning would result in long-term health of the watersheds by increasing health and vigor and enhancing growth that results in larger wind firm trees.

4.2.13 Aquatic Conservation Strategy

This 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.

4.2.14 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). A project specific assessment is in the analysis file and the following is a summary of the items applicable to the South Fork project.

Project Specific BMPs for the action alternatives

- **Design Criteria –** Design criteria 1, 4, 5, 6, 7, 9 and 11 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 if any, would be outside of riparian reserves.
  - Temporary road construction if any, 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.

  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.

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

4.3 STAND GROWTH AND PRODUCTIVITY

This section addresses the health and growth purpose and need and the effects and benefits to trees and other vegetation from the alternatives. The Silvicultural Diagnosis (found in Appendix E) is incorporated by reference and summarized below.

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

4.3.0.1 **Purpose and need discussion**

One of the aspects of the purpose and need (s. 2.2.1) is to increase health and vigor and enhance growth that results in larger wind-firm trees. All of the action alternatives would equally meet this objective while the no-action alternative would not. The following section elaborates on the objectives of health and growth.

4.3.1 **Plantations**

The term plantation is used informally to describe managed stands that were logged using the regeneration harvest method and were subsequently reforested by a combination manual planting of trees and trees that seeded in from adjacent live trees.

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 (Smith 1962). 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 diversity.

Thinning 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, while fully utilizing the ability of the trees to expand their crowns into the growing room provided by the removal of neighboring trees (Oliver 1996). Failure to maintain tree spacing while they are young can have consequences lasting the life of the timber stand (Smith 1962). Most of the South Fork plantations were precommercially thinned at approximately 15 to 20 years of age. They are now between 40 and 60 years of age, young enough to benefit from thinning and old enough to provide a commercial product. 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 (Oliver 1996). 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 (Smith 1962). 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 (Smith 1962). 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 South Fork 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.

Relative Density (RD) is a measure of how crowded a forest is. The scale ranges from 0 (no trees) to 100 (maximum biological potential). When a stand reaches or exceeds a RD of 55, suppression, mortality and stand decline would be expected.

The current stand structure in the units has an average stand diameter of 11 to 16 inches, and stocking is at levels where growth suppression and mortality is occurring (with RD exceeding 55). The understory vegetation is generally suppressed, and mortality of some trees in the suppressed and intermediate crown classes is occurring.

Alternative A - Without thinning, the average stand diameters in 20 years would range from 14 to 19 inches, with stocking at levels where growth suppression and mortality continues to occur (with RD exceeding 55). The understory vegetation would continue to be suppressed.

Alternatives B, C and D would result in long-term benefits for stand growth and productivity. Average stand diameters in 20 years would range from 17 to 23 inches. At that time, tree size and stocking levels again begin to approach the stocking levels where growth suppression and mortality would occur (with RD of 50 to 55). Understory vegetation would have developed for 20 years without suppression from the overstory conifers.

4.3.2 **Fertilization**

Plantations in the matrix would be fertilized to raise productivity. The objective of forest fertilization is to improve the nutrient status of soils by adding readily available sources of nutrients over the short or long-term (Daniel 1979).

A response period of ten years or less can be expected after a single application of nitrogen fertilizer. For trees to respond well to nitrogen fertilization, they need to be able to build more crown. Younger stands or well-spaced stands respond better, at least until crown closure occurs. Fertilization early in the rotation is important because the time before canopy closure is when greatest demands are made on the available nutrient capital of the site (Daniel 1979).

A typical result of fertilizer application, particularly in lower-quality sites, is to increase growth rates and competition causing a faster expression of dominance. Fertilization in combination with thinning provides an additive effect (Scanlin 1979) in terms of a greater and faster growth response from the stand. Stands experience an increase in crown densities, root systems, overall vigor, and vigor in their defense systems. This response allows desired objectives (forest health, larger diameters, timber production, increased site productivity, crown closures) to be met sooner than if allowed to occur naturally.

Stand selection for fertilization is based on stand and site characteristics that indicate a probable increase in growth with the addition of nitrogen fertilizer. Past monitoring studies in the Clackamas River Ranger District have shown a 30% increase in basal area

growth in unthinned and fertilized stands compared to a 70% increase in basal area growth in thinned and fertilized stands on Ladee Flat.

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. Refer to section 4.2.6 for a discussion on riparian reserve stand structure.

4.4 LANDSCAPE HEALTH AND DIVERSITY

Section 4.3 addresses stand dynamics and the effects of thinning or not thinning at the stand scale. This section addresses the landscape scale situation and the diversity purpose and need.

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

4.4.0.1 **Purpose and need discussion**

One of the aspects of the purpose and need (s. 2.2.1) is to enhance diversity. All of the action alternatives would equally meet this objective while the no-action alternative would not. Section 4.4.3 elaborates on diversity.

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. Within the Clackamas River Ranger District there is a wide range of site productivity based on soils, elevation and the environment. A first commercial thinning for plantations at lower elevations is often considered desirable at

age 40 to 50 while higher elevations may not be ready for thinning until age 60. Refer to the section 4.3 for more detail on health and growth. As plantations grow and become ready for thinning, stand exams are conducted and if they are found to need thinning, and are economically viable they are put into the planning program. 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) Acres of Regeneration Harvest by Decade						Natural Second-Growth Stands and Older Plantations (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 an 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 would increase in the coming decades as stands grow.

4.4.2 **Landscape Health –**

The South Fork and Upper Clear Creek Watershed Analyses both recommended thinning (South Fork Watershed Analysis p. 5.1, Upper Clear Creek Watershed Analysis p. 78).

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 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.

4.4.3 **Diversity –** Diversity can be considered at many scales but for the purpose of this project it is discussed at the landscape scale and at the stand scale. Diversity is the distribution and abundance of different plant and animal communities and species within an area. There are many elements of diversity including but not limited to genetic, structural, horizontal, and vertical. At the landscape scale, a mix of forest types and ages can provide habitat for a

wide range of plants and animals. At the stand scale other elements become more relevant such as species composition, snag abundance or the number of canopy layers.

Both human actions and natural processes or events have the potential to alter diversity. Some actions or natural processes or events may seem to benefit one aspect of diversity while at the same time be detrimental to another.

The action alternatives would thin plantations. At the stand scale, plantations are generally considered to be lacking in diversity because they may not have the mix of tree species present in the original stand and/or because they tend to be relatively uniform in terms of tree size and spacing. The trees are very close to the same age and the stands are dense; and generally limit sunlight penetration to the forest floor. While every stand has slight variations, the above generally describes the plantations of South Fork.

The action alternatives would thin to provide for health and growth and to provide forest products. While accomplishing this, the thinning prescription would incorporate many features that would enhance some elements of diversity that are lacking in plantations.

Leave trees would be left at variable spacing. Instead of trees being uniformly spaced and uniformly sized they would be variable. In some areas two trees might be left that are very close to each other and nearby there might be a place where two leave trees are 25 feet apart.

Leave trees would include minor species such as western hemlock, western red cedar and red alder. The plantations were planted primarily with Douglas-fir and noble fir in this area and other species either are present because they survived the clear cutting or because they seeded in from the edge. Thinning would remove the more common tree species.

Small gaps and skips would be created. Gaps are openings in the canopy that are created by landings, skyline corridors. In this project there would be no gaps specifically created for forage enhancement. Skips are areas where no trees are removed. Skips would be created by marking leave trees around special sites up to 1/5 acre in size.

Leave trees would include trees with the elements of wood decay such as forked trees or trees with dead tops. These trees would become important as they age and develop cavities.

The units are plantations and do not contain large snags because they were cut down when the area was clear cut. There are some small second-growth snags and some short crumbled remnants of old large snags. These types of snags are not generally hazardous but if they are hazardous to the logging operation they would have to be felled. All non-hazardous snags would be retained, and some live trees would be marked to leave where their crowns touch certain key snags to increase the likelihood that they would be retained. Also all existing down logs would be retained.

The No-action Alternative would not affect snags but it would also not change the stands uniformity, species composition, or the vertical or horizontal structure. Recent studies have indicated that dense, closed-canopy second growth without legacy trees can result in a 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).

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

The South Fork Biological Evaluation is located in Appendix B and is incorporated by reference and summarized below. The South Fork Project is covered by a Programmatic Biological Assessment (USDA 2004) and is referred to as the "South Fork Timber Sale" within Appendix C of the Biological Assessment. 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 29, 2005 (USDI 2005). This Biological Assessment and Biological Opinion remain valid for decisions signed before January 1st, 2007. The units are not in a late-successional reserve or a critical habitat unit.

Management Indicator Species for this portion of the Mt. Hood National Forest include northern spotted owl (s. 4.5.1), pileated woodpecker(s. 4.5.14, s. 4.5.10, s. 4.5.11, s. 4.5.12), pine marten (s. 4.5.14), deer (s. 4.5.13), elk (s. 4.5.13), salmonid smolts and trout (4.2) (Forest Plan p. four-13).

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, thus 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 of a landscape pattern increases, the amount of interior forest habitat decreases and the amount of edge habitat increases. 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 limited and connectivity of late-seral habitats is poor in all three watersheds (USDI 1995, USDA 1997, and USDI 1999). 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 these watersheds.

Dispersal habitat is adequate in the project area, but is potentially limited in adjacent areas outside the Forest in the Clear Creek and Molalla River watersheds due to their land-base being predominantly in private ownership.

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 in 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

4.5.2 **Alternatives A:** No direct effects to the owl would be predicted with this alternative. For the short term, the units that are considered dispersal-only habitat (units 4-13) would continue to function as dispersal. It is estimated that the units currently providing no habitat for the owl (units 1-3) would obtain dispersal habitat characteristics in approximately eleven years (4 years slower than in the action alternatives). In 20-30 years dispersal habitat would improve a little in all units, but not substantially due to projected low growth rates of these stands (see s. 4.3.1). Mortality would occur, improving a little on the dispersal habitat characteristics.

4.5.3 Alternatives B, C and D

Effects to Dispersal Habitat on a Local and Landscape Scale

The proposed action would have an affect on dispersal-only 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. Ten of the proposed units (406 acres) within the South Fork Environmental Assessment are considered dispersal-only habitat. The remaining three of the harvest units (91 acres) are considered non-habitat (or capable habitat) for the spotted owl. Dispersal habitat described below is a combination of nesting/roosting/foraging (NRF) and dispersal-only habitat (i.e. All NRF habitat meets the requirements of dispersal habitat).

The spotted owl analysis area (20,041 acres) includes BLM and other ownerships. It comprises all of the South Fork Clackamas Watershed and small portions of Clear Creek and Molalla Watersheds. The analysis area is 62% dispersal habitat. The project would degrade (reduce in quality) less than 4% of that total.

Although the dispersal habitat characteristics within units 4 through 13 would be reduced in quality, they would still function as dispersal habitat for the owl. No loss of dispersal habitat would occur.

Since current spotted owl surveys have not been completed for the area, it must be assumed that all suitable habitat has the potential to contain spotted owl activity centers.

Since there is no adequate suitable habitat adjacent to the proposed thinning stands that are currently providing dispersal habitat, there is no potential for adverse impacts to any active spotted owl activity center.

Although the dispersal habitat characteristics of units 4-13 will be reduced in quality, they will still function as dispersal habitat for the owl. No loss of dispersal habitat will occur. It is estimated that these units would again provide the same quality of habitat in approximately nine years after harvest. Units 1, 2 and 3 are currently providing no habitat for the spotted owl and will benefit the most from this proposed treatment by hastening their attainment as dispersal habitat. It is estimated that these units currently providing capable habitat would become dispersal habitat in about seven years (e.g. four years quicker than no action). All of the units would provide for better quality dispersal habitat within approximately 15-20 years after thinning compared to no action. The action alternatives would have an effects determination of "May Affect, Likely to Adversely Affect" because of the affect to dispersal habitat.

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

The United States Fish and Wildlife Service (USFWS) issued a biological opinion for the South Fork Timber Sale (USDI, 2005). The conclusion reached after considering the cumulative effects of this and other projects is that all 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.

4.5.5 Effects to spotted owl in 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 South Fork project is not within late-successional reserves. The South Fork 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 U.S. 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 information does not reveal effects concerning the impacts of the South Fork thinning proposal in a manner or extent not previously considered.

4.5.6 Cumulative Effects

Dispersal habitat is potentially limited in adjacent areas outside the Forest in the Clear Creek and Molalla River Watersheds due to their land base being predominantly in private ownership. The spotted owl analysis area for this project has adequate dispersal habitat for spotted owls. See table in s. 4.5.7 for a display of cumulative effects. The more likely limiting factor for spotted owl occupancy in the analysis area, is the lack of spotted owl suitable habitat and lack of connectivity between these suitable habitat blocks. Foreseeable future actions that are likely to occur within this spotted owl analysis area are the BLM Hillock and Clear-Dodger Timber Sales which proposed to degrade dispersal-only habitat and other Forest Service projects listed in s. 4.1.3. Considering past actions and these foreseeable actions, the incremental effect on dispersal habitat from the South Fork Project would still be minor, mainly because overall only a small percentage of dispersal habitat would be affected and it is not likely the limiting factor for owls in the analysis area. There would be no effect to suitable owl habitat.

4.5.7 Current Condition of Spotted Owl Dispersal and Suitable Habitat as Compared to Historical Conditions

Analysis Scale	**Dispersal Habitat**		**Suitable Habitat**	
	Historic Level (1940)	Level Before & After Proposed Timber Harvest	Historic Level (1940)	Level Before & After Proposed Timber Harvest
South Fork Thinning Analysis Area (20,041acres)	86%	62%	85%	35%

4.5.8 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.

Bald eagles are observed occasionally in the District, especially in late summer through late winter. Due to low numbers and sporadic use, no communal roost areas are known to exist in the District. There has been consistent use by adults in two areas of the Clackamas River Ranger District, one of which has had recent nesting success by a bald eagle pair. These areas are greater than 20 miles away from the proposed project site.

Although bald eagles are commonly seen along the South Fork of the Clackamas River late summer through early fall, this river and other parts of the watershed do not appear to contain adequate foraging habitat for the species (USDA 1997). Prey availability may also to be the limiting factor for bald eagles within the Clear Creek Watershed. According to the Hillock Environmental Assessment (USDI 2005), bald eagles have never been observed in the Hillock Area. No further analysis needed due to lack of habitat.

4.5.9 Sensitive Species and Survey and Manage 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	No	NI	NI	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	No	NI	NI	NI
Gray Flycatcher	No	NI	NI	NI
Baird's Shrew	No	NI	NI	NI
Pacific Fringe-tailed Bat	Yes	NI	NI	NI
California Wolverine	No	NI	NI	NI
Puget Oregonian*	No	NI	NI	NI
Columbia Oregonian*	No	NI	NI	NI
Evening Fieldslug*	Yes	MII-NLFL	MII-NLFL	MII-NLFL
Dalles Sideband*	No	NI	NI	NI
Crater Lake Tightcoil*	No	NI	NI	NI

*These are Survey and Manage species and are also Sensitive species on the Region 6 Regional Forester's Sensitive Species list for the Mt. Hood National Forest.

** Impact abbreviations

"NI" = No Impact

"MII-NLFL" = May Impact Individuals, but not likely to Cause a Trend to Federal Listing or Loss of Viability to the Species

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, reconstruction, obliteration and log haul.

Surveys have been competed using the Survey and Manage protocol for terrestrial mollusks. No species that require the management of known sites occur within the affected area. Surveys were not conducted for the red tree vole, Larch Mountain salamander and great gray owl because habitat for these species is not present within the project area.

One of the proposed actions is to apply nitrogen fertilizer (i.e. urea) at a rate of approximately 200 lbs. per acre to approximately 178 acres within the matrix. Research has shown some effects to aquatic organisms such as amphibians from exposure to

nitrogen fertilizer, especially indirect effects as a result of reduced water quality from non-point source pollution from fertilizers (Johnson and O'Neil 2001). Application would not occur within the riparian reserves or in other locations where riparian dependent species may be found. There has been little evidence to suggest that application of nitrogen at the rates proposed would have serious detrimental effects to terrestrial organisms outside of riparian areas.

4.5.10 Snags and Down Wood

Existing Situation – The snag and down woody debris density and conditions found within the South Fork Clackamas River watershed is based on the 1987 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, managed stands similar to the South Fork timber sale units within the South Fork Clackamas River watershed have approximately 0.1 medium snags (>15" DBH) per acre and approximately 0.1 large snags (>21" DBH) per acre. The down woody debris density in these managed stands that are most similar to the South Fork units within this watershed were found to be approximately 2 hard down logs per acre and 4 soft logs per acre.

The South Fork timber sale units within the Clear Creek watershed are also deficient in snags and down logs. The areas that have been surveyed indicate that the quantity and quality of snags and down logs present are very low. The last century has seen the forested portions of the watershed become less diverse with the removal of snags, down logs, cull and suppressed trees through wildfire, harvesting and land clearing operations (USDI 1995).

Walk-through surveys for all units were completed in September 2005 and confirm the above analyses of snags and down wood. All the units contain few if any snags $\geq$15" diameter. Down wood of saw log size is scattered and mostly in decay classes 4 and 5. Occasionally there is a piece of down wood in decay class 3, and few if any pieces in decay class 1 & 2.

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 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 South Fork 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 is as follows:

- Decayed wood elements consist of more than just snags and down wood, such as 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 to the tolerance levels for the different wildlife habitat types and structural conditions identified in the DecAID advisory tool. Units 1, 2, 3, 4, 5, 6, 12, and 13 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." Units 7, 8, 9, 10 and 11 are located in the Montane Mixed Conifer Forests and vegetative condition of "small/ medium trees."

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.

All the units within the South Fork timber sale currently contain snag numbers that are much less than the 30% tolerance level for snag density and size based on the analyses discussed above. These units also contain down woody debris densities that range from much less than 30% tolerance level to just below the 50% tolerance level.

Effects - Alternative A - The plantations would continue to be deficient in snags and down wood. Based on the data discussed above, it is presumed that there would continue to be on average approximately 0.1 large and 0.1 medium snags per acre for the units within the South Fork project. This is well below the level of snags required for 60% 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 well below the 30% tolerance level. Levels would be slightly higher if live trees with the elements of wood decay were included.

Based on Forest Inventory surveys, the units within the South Fork project would continue to provide approximately 2 hard and 4 soft down 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. This is already beginning to occur in unit 5.

Alternative B

Snags are difficult to retain during logging because of their inherent instability and danger. It is likely that some snags would need to be cut down during harvest operations due to safety considerations and that some downed logs would be degraded through the

process of logging. Due to the creation of corridors involved in skyline logging, this method usually involves a greater loss of snags than in ground-based logging. Approximately 283 acres would be logged using a ground-based system and 214 would be harvested using a skyline logging system.

Snags that are left standing after the timber sale would be more prone to wind damage and snow breakage than they would have been without thinning. There would likely be some loss of the remaining snags within 10 years after 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 #2). 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, including 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 #2 are combined for the purpose of determining DecAID levels for the action alternatives. Due to the lack of snags and trees with elements of wood decay within all the units, most would have snag and defective tree densities and size guidelines below the 30% tolerance level. Leave trees damaged during the harvesting operation sometimes have the potential to become defective or decayed trees useful for wildlife species.

In the South Fork 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 #2 would result in additional protection to snags. Forest Plan standard and guideline FW-215, would likely not be met in South Fork timber sale units.

There are few if any medium or large snags in the units. 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 #2 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 that would create additional medium snags, 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, the units would have down wood at approximately the 30% tolerance level (2.5 to 4.5 percent cover from all decay classes). The project would not remove any existing coarse woody debris; although it would likely damage some of the pieces in decay class 3, 4, and 5, especially in the areas utilizing a ground-based system. Project implementation 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 fall naturally to create 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 only 218 acres would utilize a ground-based system (65 acres less than in alternative B). These 65 acres would be harvested instead utilizing a skyline logging system (58 acres) or via helicopter (7 acres). Helicopter logging typically results in a loss of snags greater than in both ground based and skyline logging and typically has less effect on the existing down wood. The 58 acres that would be skyline logged instead of using a ground-based system would result in a decrease in the loss of snags and resultant damage in down woody debris.

Approximately 2800 feet of temporary road would be constructed to access units 9 and 13 with this alternative. The stands affected consist of stand types with snag and down wood levels similar to the proposed harvest units. This would likely result in a loss of a few snags and some down wood.

Taking all the above in consideration, the predicted tolerance levels for down wood cover

and snags would similar to Alternative B.

Alternative D – The effects would be similar to Alternative C except that only 234 acres of skyline harvest would occur (38 acres less than in alternative C). These acres would be harvested instead using helicopter and ground-based logging systems. As described above, helicopter logging typically results in a loss of snags greater than in both ground based or skyline logging and typically has less effect on the existing down wood.

No new road construction would occur with this alternative.

Taking all the above in consideration, the predicted tolerance levels for down wood cover and snags would similar to Alternative C.

4.5.11 Cumulative Effects –Snags are utilized by species that have medium size home ranges so appropriate size analysis areas (subwatersheds) are used to calculate cumulative effects for snags.

Acres and snag numbers in s. 4.5.12 were generated from field surveys. (Snag data by stand type and plant association was based on surveys completed by Forest inventory and ecology crews. Weighted averages include the entire land base including all forest types, as well as all non-forest areas within the analysis area. For cumulative effects, the standard for landscapes is 40% of biological potential, which equates to about 1.5 in the western hemlock zone and 1.6 snags per acre in the Pacific silver fir zone. The 100% biological potential 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 South Fork. For purposes of this analysis, it is assumed some snags would need to be felled for safety reasons in the planned sales. Past experience and monitoring indicate that there would likely be some snags remaining and past timber sales have had projects to create snags afterward.

There is potential for an enhancement project to create snags and down woody debris, if funded. Snags could be created by heart rot inoculation or by topping with explosives or chainsaws. Down woody debris could be created by girdling or felling. 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.

4.5.12 **Snag Habitat** (analysis areas that overlap South Fork units)

Snag Analysis Area →	Memaloose		East Fork of South Fork		Upper Clear Creek		Oscar	
Total Acres	4686		5428		2316		6215	
Type of Snag*	L	M	L	M	L	M	L	M
Total snags removed by past regeneration harvest	12386	6302	19165	9125	9289	3851	13799	4671
Snags/ac. Today	4.7	2.5	2.9	1.4	0.2	5.2	2.1	5.3
Acres in South Fork Thin	140		48		194		115	
Snags/ac. After South Fork Thin	4.7	2.5	2.9	1.4	0.2	5.2	2.1	5.3

*L = Large snags > 21”
M = Medium snags > 15” and < 21”

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 above the 100% biological potential level for all alternatives. This exceeds the Forest Plan standard of 40% biological potential (FW-216).

4.5.13 Deer and Elk Habitat (Management Indicator Species)

Existing Situation – The harvest units are located within summer range (SR). 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. (Data source for this analysis – GIS data from Veg2004.shp and Roads.shp, summarized in open road density and cover spread sheets in analysis file.)

Existing Condition for Deer and Elk Management Areas (analysis areas that overlap South Fork units) Forest Plan standards FW-203, 205 & 208

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.)	Forest Plan Road Density (mi./sq. mi.)
SR54	6684	42	20	52	30	18	1.9	2.5
SR55	7738	25	20	51	30	12	3.5	2.5

The project overlaps two analysis areas: SR54 is the summer range portion of the Memaloose Creek subwatershed and SR55 is the summer range portion of South Fork and Clear Creek drainages.

* 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 displayed above, 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 in the District is considered the limiting factor for elk and possibly deer within the project area. 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 area is declining by approximately 1% per year.

Effects – Including Direct, Indirect and Cumulative Effects

Alternative A – Approximately 497 acres of plantations would continue to serve as thermal cover. No cover would be lost and no forage would be gained in this alternative.

Alternative B - Approximately 497 acres of thermal cover would be downgraded to non-habitat. This would result in a thermal cover decrease of approximately 171 acres for SR 54 and 326 acres for SR55. This would bring the total thermal cover to 49% for SR54 and 47% for SR55, still above the minimum cover requirement of 30%, see table above and unit table s. 3.2.6. The table above includes all past, present and foreseeable future actions. The 497 acres would return to thermal cover when the canopy cover reaches 70%, in about 10 years.

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

On the 497 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 thinning is predicted to be low to moderate in quality, and be most abundant in the small gaps created by the harvest. Canopy closure is expected to eventually increase to the point in which all forage benefits are lost, in approximately 9 years. Consequently forage levels would return to pre-harvest levels at this time. Even considering the loss of thermal cover, this alternative would benefit deer and elk for approximately 9 years, since forage and not thermal cover is considered one of the limiting factors for deer and elk herds.

Road Density – Approximately 2000 feet of old existing temporary roads would be reopened to access several of the units. In addition, approximately 10,950 feet of bermed roads would be opened. These roads would not be open to the public and the only disturbance occurring as a result of these roads being opened is their use by the loggers, truck drivers and associated Forest Service personnel required to accomplish the logging operations. After logging, the roads that were opened would be closed and open road density would be back to the current level. There would be no increase in the long-term

harassment of deer and elk with this alternative; effects would be short term only. There would be no increase in the permanent roads open to the public, and therefore no increase in open road density with this alternative.

The closure of currently open system roads is not part of the South Fork proposed action. An exception to Forest Plan standard and guideline FW-208 is proposed as described in FW-210. Roads in this area are used by several owners for forest management, recreational driving, hunting and fire suppression and to access the telecommunications towers at Goat Mountain.

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 including road 45, which is the primary haul route for this project.

Disturbance - The logging and road re-opening activities could potentially disturb animals that happen to be in the area at the time of implementation. The project area is summer range and disturbance that occurs during the spring/summer/fall could potentially displace animals, and may have the potential to affect the health of individuals if the disturbance occurs near active calving sites.

Disturbance is predicted to be small in scale, temporary in nature and only affect a few individuals negatively. The project is not predicted to cause a noticeable reduction in the current local population size.

Alternative C – Effects would be similar to Alternative B except that 2800 feet of new temporary roads would be built, creating an additional temporary increase in disturbance that is discussed in Alternative B. Approximately 1200 feet of old existing temporary roads would be reopened to access several of the units. Refer to unit table s. 3.3.1. Approximately 10,950 feet of bermed roads would be opened. After logging, the roads that were built or opened would be closed and open road density would be back to the current level. There would be no increase in the long-term harassment of deer and elk with this alternative; effects would be short term only. There would be no increase in the permanent roads open to the public, and therefore no increase in open road density with this alternative. There would be increased wildlife disturbance over the level of Alternative B with 7 acres of helicopter logging. 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, lasting only as long as the helicopter was in flight. This additional disturbance that occurs during the spring/summer/fall could potentially displace animals, and may affect the health of individuals if the disturbance occurs near active calving sites.

Alternative D – Effects would be similar to Alternative B. After logging, the roads that were opened would be closed and open road density would be back to the current level. There would be no increase in the long-term harassment of deer and elk with this alternative; effects would be short term only. There would be no increase in the permanent roads open to the public, and therefore no increase in open road density with

this alternative. There would be increased wildlife disturbance over the level of Alternatives B or C with 28 acres of helicopter logging. Refer to unit table s. 3.4.1. 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. This additional disturbance that occurs during the spring/summer/fall could potentially displace animals, and may affect the health of individuals if the disturbance occurs near active calving sites.

4.5.14 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. None of the proposed harvest units provide habitat for these species. These animals rely on older forest structure, while the pileated woodpecker also relies on snags and live trees with the elements of wood decay. None of the harvest units contain the stand structure or adequate snags to provide habitat for these species.

No further analysis necessary due to lack of habitat

4.5.15 Migratory Birds

Existing Situation – Close to 30 species of migratory birds occur within the South Fork Clackamas River, Clear Creek, and Molalla River watersheds, some of which are likely present within the South Fork 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 negative effects to species that prefer un-thinned stands.

Action Alternatives – 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 497 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 in 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 in the Clackamas River Ranger District. Since young managed plantations in 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.

4.6 SOILS

This section addresses soil impacts. A soil report (found in Appendix E) is incorporated by reference and summarized below.

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
Fire and Fuels Management Standard and Guideline - page C-48

4.6.1 Existing Situation

The soil interpretations and recommendations were developed from field visits in 2004 and 2005, office interpretation of aerial photos with flights in 1946, 1958, 1959, 1961, 1972, 1995, and 2004, topographic maps, 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 Southfork project area. Field verification reveals that the SRI soil mapping of this area is generally accurate.

Suitability –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. The table to the right displays the existing detrimental conditions by unit.

4.6.2	
Unit #	Existing Condition
1	12.5 %
2	9.3 %
3	13.7 %
4	11.9 %
5	14.0 %
6	13.0 %
7	16.1 %
8	15.2 %
9	18.8 %
10	23 %
11	9.1 %
12	9 %
13	8 %

All of the South Fork units were logged before. 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. Due to past management practices that included tractor logging, landing construction, site preparation and fuels treatment, three units exceed 15% and one exceeds 20%

(See s. 4.6.2).

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 South Fork area, surface soil erosion potential varies from slight to moderate. Existing surface erosion is mainly confined to exposed soil on skidtrails, unpaved road surfaces, road cutbanks, and ditches. Heavy Off Highway Vehicle (OHV) use of old skidtrails and roads in the Goat Mountain area has resulted in ongoing erosion. Where subsurface water flow has been intercepted by skidtrails and roads, gullies have formed.

4.6.3 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.

4.6.4 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 from the existing condition. Four units would remain above the 15% level for detrimental soil conditions (See s. 4.6.2).

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.

4.6.5 Alternative B

Units would be thinned using a combination of ground based and skyline 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 re-opened temporary roads that are used by the contractor (Design Criteria #6).

Short-term Effects

Bare soil would be exposed where machines travel over the ground surface and where logs are dragged. Approximately 21 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. Most of the 21 acres exposed would be from existing old roads, skid trails, skyline corridors and landings that had been revegetated or covered with duff or debris.

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.

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 1940 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

4.6.6 Alt. B detrimental soil condition			
Unit #	Existing (%)	Direct effect (%)	Cumulative Effect (%)
1	12.5	2.5	15.0
2	9.3	1.9	11.2
3	13.7	2.3	16.0
4	11.9	2.5	14.4
5	14.0	2.0	16.0
6	13.0	1.8	14.8
7	16.1	1.4	17.5
8	15.2	2.0	17.2
9	18.8	0.3	19.1
10	23.0	-0.3	22.7
11	9.1	2.3	11.4
12	9.0	2.3	11.3
13	8.0	5.5	13.5

roads would be constructed than already exist. Refer to table 4.6.6 (a negative number under direct effect indicates improved soil conditions).

Existing temporary roads, landings and skid trails would be reused and restored (Design Criteria #6).

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.

Six units would be above 15% detrimental soil condition with the action alternatives. The highest unit would actually decline because of post harvest decompaction efforts. Exceptions to Forest Plan standards and guidelines FW-022 and FW-028 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. 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 exam data displayed in the table below 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 (board feet per acre per year)
13	8.0	362
2	9.3	480
9	18.8	500
10	23.0	541

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 scarification of landings and roads 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

New roads (2800 ft.) would be constructed with this alternative. Helicopter yarding would occur on 7 acres. Soil would be exposed on approximately 13 acres of roads, skid trails, skyline corridors and landings. These areas would have potential increased erosion. Refer to table 4.6.7 (a negative number under direct effect indicates improved soil conditions).

4.6.7 Alt. C detrimental soil condition			
Unit #	Existing (%)	Direct effect (%)	Cumulative Effect (%)
1	12.5	2.5	15.0
2	9.3	1.9	11.2
3	13.7	2.3	16.0
4	11.9	2.5	14.4
5	14.0	2.0	16.0
6	13.0	1.8	14.8
7	16.1	1.4	17.5
8	15.2	2.0	17.2
9	18.8	2.3	21.1
10	23.0	-0.3	22.7
11	9.1	2.2	11.3
12	9.0	2.3	11.3
13	8.0	6.3	14.3

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.

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. Six units would be above 15% detrimental soil condition with the action alternatives. The highest unit would actually decline because of post harvest decompaction efforts.

Alternative D

This alternative is similar to C but would eliminate the road construction and would have more helicopter logging. Refer to table 4.6.8 (a negative number under direct effect indicates improved soil conditions).

4.6.8 Alt. D detrimental soil condition			
Unit #	Existing (%)	Direct effect (%)	Cumulative Effect (%)
1	12.5	2.5	15.0
2	9.3	1.9	11.2
3	13.7	2.3	16.0
4	11.9	2.5	14.4
5	14.0	2.0	16.0
6	13.0	1.8	14.8
7	16.1	1.4	17.5
8	15.2	2.0	17.2
9	18.8	-0.5	18.3
10	23.0	-0.3	22.7
11	9.1	2.2	11.3
12	9.0	2.3	11.3
13	8.0	2.3	10.3

Short-Term Effects
The effects of this alternative would be similar to those of Alternative B.

Long-Term and Cumulative Effects
Cumulative effects would be similar to Alternative C and B except that units 9 and 13 would have reduced impacts. Six units would be above 15% detrimental soil condition with the action alternatives. The two highest units would actually decline because of post harvest decompaction efforts.

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 South Fork Thin viewer positions.

4.7.1 Existing Situation

The project cannot be seen from any primary viewer positions such as heavily traveled highways, rivers or campgrounds. The Visual Quality Objective (VQO) assigned to this area is Modification. The primary concern is how the area appears as seen from less traveled open backcountry roads. 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. The proposed harvest areas are surrounded by other second growth forest stands; therefore there is not much vertical or horizontal contrast.

Effects

4.7.2 **Alternative A:**

Changes in scenery would come slowly from forest growth. Stands would continue to have unbroken uniformity.

4.7.3 **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

This section addresses effects to threatened or endangered botanical species including species proposed for listing. It also addresses botanical sensitive and survey and manage species. The South Fork Thinning Botany Biological Evaluation (found in Appendix D) is incorporated by reference and summarized below.

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

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 habitats (e.g. streams) if immediately adjacent to the proposed units. Several fungi that have potential habitat in the South Fork area are not considered practical to detect with field surveys with the exception of Bridgeoporus nobilissimus. It is assumed that these species are present. The following list contains the species that have potential habitat for this project. One fungus was found during surveys in an adjacent riparian area.

NI = No Impact
MIIH = May Impact Individuals but would not lead to a trend toward federal listing.

Species	Group	Impact
Aster gormanii	Vascular Plant	NI
Botrychium minganense	Vascular Plant	NI
Botrychium montanum	Vascular Plant	NI
Botrychium pinnatum	Vascular Plant	NI
Cimicifuga elata	Vascular Plant	NI
Corydalis aquae-gelidae	Vascular Plant	NI
Montia howellii	Vascular Plant	NI
Ophioglossum pusillum	Vascular Plant	NI
Sisyrinchium sarmentosum	Vascular Plant	NI
Rhizomnium nudum	Bryophyte	NI
Schistostega pennata	Bryophyte	NI
Tetraphis geniculata	Bryophyte	NI
Chaenotheca subroscida	Lichen	NI
Hypogymnia duplicata	Lichen	NI
Leptogium burnetiae var. hirsutum	Lichen	NI
Leptogium cyanescens	Lichen	NI
Lobaria linita	Lichen	NI
Pannaria rubiginosa	Lichen	NI

Species	Group	Impact
Peltigera neckeri	Lichen	NI
Peltigera pacifica	Lichen	NI
Ramalina pollinaria	Lichen	NI
Usnea longissima	Lichen	NI
Bridgeoporus nobilissimus	Fungi	NI
Cordyceps capitata	Fungi	MIIH
Cortinarius barlowensis	Fungi	MIIH
Gomphus kauffmanii	Fungi	MIIH
Gyromitra californica	Fungi	MIIH
Leucogaster citrinus	Fungi	MIIH
Mycena monticola	Fungi	MIIH
Otidea smithii	Fungi	MIIH
Phaeocollybia attenuata	Fungi	MIIH
Phaeocollybia californica	Fungi	MIIH
Phaeocollybia olivacea	Fungi	MIIH
Phaeocollybia oregonensis	Fungi	MIIH
Phaeocollybia piceae	Fungi	MIIH
Phaeocollybia pseudofestiva	Fungi	MIIH
Phaeocollybia scatesiae	Fungi	MIIH
Ramaria amyloidea	Fungi	MIIH
Ramaria gelatiniaurantia	Fungi	MIIH
Sowerbyella rhenana	Fungi	MIIH

Surveys have been competed to the Survey and Manage protocol. No species that require the management of known sites occur within the affected area.

4.9 MANAGEMENT OF COMPETING AND UNWANTED VEGETATION

This section addresses invasive plants and unwanted vegetation. A report has been generated by the team botanist titled "The South Fork Thinning Risk Assessment and Recommendations to Minimize the Introduction and Spread of Invasive Plants for South Fork Commercial Thinning." It is included in the analysis file and is incorporated by reference and summarized below.

Mt. Hood Forest Plan References

Forestwide Timber Management Standards and Guidelines - FW-375 to FW-385, page Four-91
Record of Decision for Preventing and Managing Invasive Plants (2005)

The Record of Decision and Mediated Agreement (MA) for the "Managing Competing and Unwanted Vegetation" Final Environmental Impact Statement (FEIS) apply to invasive plants (sometimes called noxious weeds), unwanted native vegetation, brush control and fuel treatments. Invasive plant management is now covered by the 2005 Record of Decision for Preventing and Managing Invasive Plants (USDA 2005) that amended the Forest Plan.

The use of herbicides is not being proposed for any of the activities associated with the South Fork Thinning project. Fuels treatments are exempt from the requirements above in thinning projects. Slash treatments associated with road construction is included.

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) 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; *Hypericum perforatum,* St. John's wort; *Senecio jacobea,* tansy ragwort; *Circium arvense,* Canada thistle and *Circium vulgare,* bull thistle.

The action alternatives would have a risk ranking of high but the design criteria (#4 and 8) 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 Scotch broom and St. John's wort. 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.

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**.** 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 South Fork or any other timber sale in 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

4.11.1 Purpose and need discussion

One of the aspects of the purpose and need (s. 2.2.1) is to provide forest products. In terms of volume outputs, all of the action alternatives would equally meet this objective while the no-action alternative would not. In terms of the economic viability, each alternative would be slightly different as shown below.

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.

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

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 sale contracts based on haul routes, location and harvesting systems. 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	$2,814,500	$2,706,250	$2,701,920
Present Value - Cost	0	$1,043,432	$1,098,924	$1,125,696
Present Net Value	0	$1,771,068	$1,607,326	$1,576,224
Benefit/Cost Ratio	NA	2.7	2.46	2.4

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 recently 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 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.

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 in 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. This discussion relates to system roads. There are also many temporary roads constructed and closed by loggers that do not result in the expenditure of road maintenance funds.

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 South Fork project are #2 and 7.

Existing Situation

There are no inventoried roadless areas or other unroaded areas in the South Fork Thinning project. The South Fork project can be accessed from road 45, the primary haul route. Roads in this area are used for forest management, recreational driving, hunting and fire suppression and to access the telecommunications towers at Goat Mountain. An administrative site (seed orchard) is accessed by road 4500-220. The western portion of

the project area has a "checker board" ownership pattern with BLM and private management. Road management in this area is guided by agreements between the various land managers.

There are road repairs that are needed on road 45 to facilitate safe access for the public and for log haul. During the original road construction, root wads and other debris were buried in the road fill that have since rotted and settled causing cracking of the pavement. The cracking has lead to water penetration into the subgrade which has caused further deterioration. Two deep patch repairs would be needed on the paved section of road 45; from mile posts 1.75 to 1.95 and from mile posts 9.0 to 9.25 as measured from the Memaloose bridge. The legal description for these repairs is S.½ of section 21 of T. 5 S., R. 5 E., and the N.½ of section 32 of T. 4 S., R. 5 E. Repairs would be within the road prism and are outside of riparian reserves.

Alternative A

No roads would be built or repaired.

Alternative B and D

Refer to detailed maps in Appendix E. Approximately 2000 feet of old existing temporary roads would be reopened to access several of the units. These roads are on dry stable landforms and do not cross any streams. In addition, approximately 10,950 feet of bermed system roads would be opened. These roads are also on dry stable landforms and do not cross any streams. These roads would not be open to the public. They would temporarily be used by the loggers, truck drivers and Forest Service personnel. After logging, the roads that were opened would be closed. There would be no increase in the permanent roads open to the public.

The closure of currently open system roads is not part of the South Fork proposed action. An exception to Forest Plan standard and guideline FW-208 is proposed as described in FW-210. Roads in this area are used by several owners for forest management

There are road repairs and improvements that would be accomplished with all of the action alternatives. Approximately $280,000 would be needed for deep patch repairs on road 45.

Alternative D would require the use of helicopter landings. There are existing landings along existing roads that will meet the needs of helicopter operations.

Alternative C

Alternative C would be similar to B except that new temporary roads would be constructed (2800 feet) to access landings. The new temporary roads are located on dry stable landforms and do not cross any streams. Alternative C would require the use of

helicopter landings. There are existing landings along existing roads that will meet the needs of helicopter operations.

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 2003-06-06-05-0001. There would be no anticipated effects on 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. An analysis 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 South Fork Project. The town of Estacada (the nearest community) is approximately 12 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 South Fork area. There are no known special places for minority or low-income communities in the South Fork area. Individuals may work, recreate, gather forest products or have other interests in the South Fork area. The report found that impacts and benefits of the South Fork 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 South Fork units there are no campgrounds, trails or other destination recreation features. The South Fork area is used for dispersed camping, Off Highway Vehicle (OHV) riding, hunting and for gathering special forest products such as mushrooms. Fire rings are present at old landings and road junctions. Based on inspection of fire rings and other recreation indicators, the South Fork 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 individuals or groups

during project implementation. Even with this temporary displacement, the availability of dispersed recreation opportunities on a landscape level would not be negatively affected. Many thousands of acres are available for camping and other forms of recreation and the South Fork Timber Sale units do not represent a special or unique recreational opportunity that is not available elsewhere. The no-action alternative would not have these effects.

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 11/28/2005. 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. The Clackamas River Stewardship Partners is a collaborative group that is assisting with the recommendation of potential 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.

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

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.

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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)
	List of Past Projects – South Fork List of Past Projects.xls	
Text Documents:	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 from the U.S. Department of the Interior; Bureau of Land Management, Eugene District and Salem District, the U.S. Department of Agriculture; Mt. Hood National Forest and Willamette National Forest And the Columbia River Gorge National Scenic Area, Calendar Years 2005-2006, Habitat Modification Activities within the Willamette Province	
	Environmental Justice.doc	
	BMP.doc	
	Preliminary Assessment.pdf	
	Lynx Effects Determination memo December 3 of 2003.doc	
	Letters and e-mail documents from commenters	
	Mailing list	