Table of Contents for Appendix E

COLLAWASH COMMERCIAL THINNING
SILVICULTURAL DIAGNOSIS

Existing Condition

Stands proposed for commercial thinning harvest in the Collawash project area consist primarily of overcrowded mid-seral plantations and two natural second-growth areas that range in age from 38 to 45 and from 89 to 95 years old, respectively. Slopes range from nearly level to relatively steep. Elevations range from approximately 2000 to 3800 feet with variable aspects.

Plant associations found in the proposed Collawash project area include:

- TSHE/BENE (*western hemlock/dwarf Oregongrape)*
- TSHE/BENE/POMU (*western hemlock/dwarf Oregongrape/swordfern*)
- TSHE/BENE-GASH (*western hemlock/dwarf Oregon grape-salal*)
- TSHE/RHMA-GASH (*western hemlock/Pacific rhododendron-salal*)
- TSHE/RHMA-BENE (*western hemlock/Pacific rhododendron/dwarf Oregon-grape*)
- TSHE/VAME/XETE (*western hemlock/big huckleberry/beargrass*)

The stands in the project area display an abundance of species diversity with common overstory and understory species consisting of Douglas-fir (*Pseudotsuga menziesii*), Pacific silver fir (*Abies amabilis*), western hemlock (*Tsuga heterophylla*), and western redcedar (*Thuja plicata*). Ground cover includes Pacific rhododendron (*Rhododendron macrophyllum*), beargrass (*Xerophyllum tenax*), dwarf Oregon grape *(Berberis nervosa*), vine maple (*Acer circinatum*), salal (*Gaultheria shallon*), five-leaved bramble (*Rubus pedatus*), big huckleberry (*Vaccinium membranaceum*), vanilla leaf (*Achlys triphylla*), dogwood bunchberry (*Cornus canadensis*), prince's pine (*Chimaphla umbellata*), twinflower (*Linnaea borealis*), swordfern (*Polystichum munitum*), and golden chinkapin (*Castanopsis chrysophylla*).

The species mix is similar for each of the stands but most exhibit various concentrations and distributions. Douglas-fir and western hemlock generally dominate the overstory with minor to moderate amounts of both Pacific silver fir and western redcedar scattered throughout. Overstory diameters in plantations average approximately 12 to 16 inches with those in natural second-growth stands ranging from 11 to 35 inches. Heights in the project area average approximately 100 feet.

There is a moderate amount of snags and downed wood in the proposed treatment stands; although much of it is small diameter wood. The stands average 3-4 snags/Ac and 3-4 downed logs/Ac (decay classes 1-5) however, the majority of the downed wood is not in desired decay classes 1, 2, or 3 and the distribution is scattered.

The soils in the project area present minimal limitations to timber harvest activities. All of the soil types within the proposed units are suitable for timber management in terms of soil productivity and meet the Mt. Hood National Forest Land and Resource Management Plan Standard and Guide (FW-022).

Disturbance Factors

Fire, wind, and harvest activity have been the major disturbance agents in the project area. Fire, historically, was the dominant landscape pattern-forming disturbance before timber harvest activities began. This watershed is within the Pacific silver fir fire ecology group, which is a stand replacement fire type with a frequency of 50-300+ years.

Windthrow potential in the project area is categorized as moderate by the Soil Resource Inventory and primarily occurs in the stands that have experienced various stem and root diseases coupled with effects of the prevailing winds. Wind has been a factor in a number of the plantations. Tops have been broken out of intermediate size trees due to the high height-to-diameter ratio and crowding in the stands.

Soil Mapping Unit	Windthrow Potential
5	none
15	high
100 - 102	moderate - high
108	moderate
109	moderate
327	moderate

Disturbance by insects and disease is closely associated with windthrow. Forest insects are present at endemic levels throughout the Collawash area. When abundant, favorable breeding habitat (weakened trees) becomes available, usually as windthrow, Douglas-fir bark beetle (*Dendroctonus pseudotsugae Hopkins*) populations can rise to epidemic levels creating mortality in live trees. There have been no known recent insect outbreaks in the project area.

Several forest diseases are present in the Collawash area. Small isolated pockets of laminated root rot (Phellinus weirii) are present throughout these stands with minor occurrences of western hemlock dwarf mistletoe (*Arceuthobium campylopodum tsugense*), and Armillaria root disease *(Armillaria ostoyae)*.

The Benefits of Thinning

The objective of thinning is to redistribute growth potential to fewer trees, while maximizing the site's potential, leaving a stand with a desired structure and composition. In general, thinning tends to improve the overall vigor, growth, health and architecture of trees. Thinning can directly maintain forest health by maintaining growth rates of stands.

With the variable density thinning method, residual trees are distributed throughout the stand in varying concentrations or densities. Minor species components and as well as trees with elements of wood decay that enhance biological diversity can be retained while meeting stand health and growth objectives.

Thinning at an early age provides growing space, which gives the trees with the best competitive advantage and the opportunity to quickly take advantage of this growing space for the longest practical time, fully utilizing the ability of the trees to expand their crowns into the growing room provided by the removal of neighboring trees. Failure to space trees early in their life can have consequences lasting the life of the timber stand. Most of the Collawash plantations were precommercially thinned at approximately 15 to 20 years of age and are now between 38 and 45 years of age. In most units, another thinning in approximately10 to 20 years would be desirable. Thinning would occur sooner in stands at closer spacing 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 the allocation of carbohydrate for diameter growth and finally the tree's defense system. Thinning can improve the resistance of some trees to some pathogens by manipulating the structure and species composition of a young stand.

Thinning provides growing space, which gives the trees with the best competitive advantage the opportunity to take advantage of this growing space for the longest practical time, fully utilizing the ability of the trees to expand their crowns into the growing room provided by the removal of neighboring trees.

Trees with larger crowns have greater stem taper, that is, the base of the tree is relatively large compared with trees that have small short crowns. Trees with more taper are less likely to suffer stem breakage. Large crowns are also more likely to recover from defoliation than a tree that has a short restricted crown.

If thinning is delayed, the crowns of prospective leave trees will be shortened by the intense competition for light. These trees will be slow to respond to the thinning and become susceptible to damaging agents during the time it takes their crowns to grow in to the additional space provided by the thinning.

Thinning can also improve the resistance of some trees to some pathogens by manipulating the structure and species composition of a stand.

Windfirmness

Wind can damage trees by uprooting them, by causing them to snap off and by defoliation or severe injury to their crowns. Thinning increases a tree's resistance to the wind (windfirmness) and therefore, the physical stability of second-growth stands. 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 natural structure of a tree that is exposed to the wind resists damage because trees adapt to the forces exerted upon them by the wind. The bending of the stem by wind causes growth due to stimulation of the cambial layer in both the stem and roots of the tree.

This increased growth aids the tree in resisting the forces of the wind. Increased root growth, especially in the short stout horizontal roots on the leeward side of the tree, improves the anchoring in the soil. Increased stem growth at the base of the tree improves the shape and bending resistance of the stem. Thinning at a young age helps trees maintain more crown. Trees with larger crowns have greater taper, that is, the base of the tree is relatively large compared with trees that have small short crowns. Trees with more taper are less likely to suffer stem breakage. Large crowns also are more likely to recover from defoliation than a tree that has a short restricted crown.

Natural Second-Growth

Units 9 a/b and 10 are natural second-growth stands composed of mid seral natural second-growth and scattered residuals ranging in approximate age from 89 to 95 years as a result of early fire disturbance. At present, these stands are overstocked and are experiencing some suppression mortality. Stem and root decay is affecting small pockets of true fir in the stand. There is an abundance of species diversity throughout these stands but they lack vertical structure since most of the trees are approximately the same height and the trees are so crowded. There is also very little ground vegetation present as a result of their overstocked nature. Thinning at this time would serve to maintain growth and vigor of the stands while providing opportunities for structural diversity and downed wood recruitment.

Riparian Reserves

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 future or subsequent thinning entries would be avoided.

Stand Objectives

The primary silvicultural need and objectives for these stands is to maintain stand growth and health so that long-term resource objectives can be met. The desired forest condition is one in which the risk of present and future damage by natural and human caused stressors is minimized to meet site specific, long term resource management objectives.

The following summarizes the silvicultural objectives for the Collawash timber sale:

- Thin 205 acres on matrix lands to meet desired management objectives
- Thin 88 acres Riparian Reserves to meet desired management objectives
- Promote and maintain healthy vigorous stands with growth rates commensurate with the area's growth potential to meet timber production needs
- Promote growth of stands over the next 80 to 140 years or until culmination of mean annual increment

Treatment Options

Proposed areas under consideration for treatment were field-reviewed by a certified silviculturist and specific silvicultural systems were selected based on site-specific analyses and management area goals and objectives. To meet the silvicultural objectives of these stands, several different treatments could be employed. All options must be considered and addressed.

Treatment options considered in this analysis were: 1. no treatment, 2. thinning, and 3. regeneration harvest.

The **no-treatment option** was not chosen because it would not move any of the stands closer to the desired future condition, nor would it address capturing growth potential and mortality in these stands. (Four-92, FW-382; Four-289; Four-292, C1-016).

The **thinning option** was chosen as the optimal treatment to achieve the desired management goals for stands 1 – 8, 9a & 9b, and 10 because they have not surpassed culmination of mean annual increment and are maintaining their growth capability at a slower rate due to overcrowding and the presence of disease. This treatment method is considered the optimum harvest method for these stands to meet forest health and site productivity objectives for C1 and Matrix lands (Four-86, FW-315; Four-88, FW-348; Four-92, FW-382). Thinning these stands would promote healthy vigorous stands to meet future management options and objectives.

The **regeneration harvest option** was not chosen as the optimal treatment because it would not meet the desired management goals for these stands.

Treatment Proposal

- Commercially thin from below approximately 293 acres of overcrowded, stands in both the Matrix and Riparian Reserves to promote and maintain health and vigor
- Residual stands (Matrix) should retain approximately 115 – 250 trees per acre or approximately 120 – 260 square feet of basal area
- Residual stands (Riparian Reserves) should retain approximately 80 trees per acre
- Retain desired species or those less susceptible to damaging agents

/s/ Glenda Goodwyne

Silviculturist

April 13, 2005
Date

SILVICULTURAL CERTIFICATION FOR NFMA COMPLIANCE

COLLAWASH COMMERCIAL THINNING

The proposed commercial thinning treatment of stands 1 – 8, 9a & 9b, and 10 have been field verified by a certified silviculturist.

Based on my analysis, stand diagnosis and design criteria for the commercial thinning treatment, I recommend the following findings of facts pursuant to NFMA be made in this project decision:

There is reasonable assurance that if prescriptions are implemented as I have prescribed:

1. Soil, slope or other watershed conditions will not be irreversibly damaged.

I further find that:

All lands within this project area that would be harvested are suitable for timber production.

Evenaged management is the optimal appropriate silvicultural system and commercial thinning is the optimum harvest method for those stands prescribed for treatment because it meets the objectives of the *NORTHWEST FOREST PLAN*, the *MT HOOD FOREST PLAN* and the recommendations of the *COLLAWASH WATERSHED ANALYSIS*. These stands have not surpassed culmination of mean annual increment for fiber production.

All units or combination of adjacent units and immediately adjacent existing plantations less than an average of 4.5 feet in height do not create openings greater than 60 acres in size.

/S/ Glenda Goodwyne — April 13, 2005

Silviculturist — Date

RELATIVE DENSITY

Stand densities in the Collawash Timber Sale area were analyzed using Curtis' Relative Density method. Determination of the thinning level for these stands was based on the need to meet resource management objectives. The table below displays the approximate pre and post RDs for the proposed timber sale. All stands will be treated using a variable density thinning where relative density should average ± 15% of the post RD at any given point in the stand.

	Pre RD	Post RD	Std #s	Pre RD	Post RD
1					
2					
3					
4					
5					
6					
7					
8					
9a					
9b					
10					

DecAID Advisor

The following is a summary of snag data contained in the DecAID advisor for three different tolerance levels for both the Western Lowland Conifer Hardwood Forest Oregon Cascades and the Montane Mixed Conifer Forest. The data for each of these habitat types is given for three different structural conditions, which are basically similar to the three different seral conditions identified in the watershed analysis for both the Oak Grove and the Upper Clackamas.

DecAID – Snag Density and Sizes for 3 Different Tolerance Levels

"Western Lowland Conifer Hardwood Forest Oregon Cascades" vegetative condition best fits with the Western Hemlock And Pacific Silver fir Plant Series

Vegetative Conditions Western Lowland Conifer Hardwood Forest Oregon Cascades	80% Tolerance Level for Snag Density and Diameter	50% Tolerance Level for Snag Density and Diameter	30% Tolerance Level for Snag Density and Diameter l
Larger (Late Seral)	36.4/acre > 10 in. with more than 14/acre > 20 in.	18.6/acre > 10 in. with more than 8.1/acre > 20 in.	5.3/acre > 10 in. with more than 4.8/acre > 20 in.
Small/Medium (Mid Seral)	36.4/acre > 10 in. with more than 15/acre > 20 in.	18.6/acre > 10 in. with more than 8.1/acre > 20 in.	5.3/acre > 10 in. with more than 4.8/acre > 20 in.
Open Canopy (Early Seral)	26/acre > 10 in. with more than 12.5/acre > 20 in.	9.4/acre > 10 in. with more than 4.2/acre > 20 in.	5/acre > 10 in. with more than 2.1/acre > 20 in.

"Montane Mixed Conifer Forest" vegetative condition best fits with the Mountain Hemlock Plant Series

Vegetative Conditions Montane Mixed Conifer Forest	80% Tolerance Level for Snag Density and Diameter	50% Tolerance Level for Snag Density and Diameter	30% Tolerance Level for Snag Density and Diameter l
Larger (Late Seral)	27/acre > 10 in. with more than 15/acre > 20 in.	15/acre > 10 in. with more than 9/acre > 20 in.	11/acre > 10 in. with more than 6.5/acre > 20 in.
Small/Medium (Mid Seral)	32/acre > 10 in. with more than 9.5/acre > 20 in.	16.6/acre > 10 in. with more than 4.2/acre > 20 in.	10/acre > 10 in. with more than 2.7/acre > 20 in.
Open Canopy (Early Seral)	23/acre > 10 in. with more than 5.3/acre > 20 in.	8.5/acre > 10 in. with more than 2.1/acre > 20 in.	4/acre > 10 in. with more than 1.1/acre > 20 in.

The following tables contain a summary of the snag data provided in the watershed analyses. The data in the watershed analysis is summarized in a slightly different manner than the information in the DecAID advisor. The watershed analysis separates snags into large (> 21

inches) and small (15 to 21 inches). The DecAID advisor generally uses large (>20 inches) and small (10 to 20 inches). In terms of comparison, the watershed analysis under estimates the amount of snags.

The following analysis compares the snag data from the watershed analysis to the tolerance levels for the different wildlife habitat types and structural conditions identified in the DecAID advisory tool. It displays the percentage of the watershed in each structural condition and the tolerance level for snags. The percentages are based on all past, present and foreseeable future actions. Since the Watershed Analyses were completed, approximately 577 acres within the Oak Grove and 1087 acres within the Upper Clackamas 5th field watersheds have been or would be converted from late-seral snag habitat to early-seral snag habitat.

Average Snag Levels and Tolerance levels for Unmanaged and Managed Stands within the Collawash 5th Field Watershed

Series and Seral Stage	Large Snags > 21 in.	Small Snags 15 to 21 in.	Current Tolerance Level at the Landscape Scale	Percent of Watershed
Western Hemlock Late Seral	4	2.1	Close to 30%	
Western Hemlock Mid Seral	2	2.4	Less than 30%	
Pacific Silver Late Seral	6.4	6.1	Between 30% and 50%	
Pacific Silver Mid Seral	2.9	5.0	Close to 30%	
Mountain Hemlock Late Seral	1.8	0.2	Less than 30%	
Mountain Hemlock Mid Seral	0.9	1.9	Less than 30%	
All Series, Early Seral Plantations	1.8	0.5	Less than 30%	
All Series, Mid Seral Plantations	0.1	0.1	Less than 30%	

AQUATIC CONSERVATION STRATEGY

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

1. **The existing condition, including the important physical and biological components of the fifth-field watersheds.** *The existing conditions for local resources can be found in the EA in the Water Quality and Fish section and in the Wildlife section. The existing conditions for fifth-field watersheds can be found below in this Appendix.*

2. **The effect of the project on the existing condition.** *The effects of the alternatives on resources can be found in the EA in the Water Quality and Fish section and in the Wildlife section.*

3. **Relevant information from applicable watershed analysis used in designing and assessing the project.**

Page references	Collawash
Emphasis on thinning opportunities	4-5
Stream surveys	3-28

4. **Consistency with Riparian Reserve standards and guidelines of the NFP on pages C-31 to C-38.** (Where standards and guidelines contain direction to "meet," "not adversely affect," "not retard or prevent attainment of" or otherwise "achieve ACS objectives," the Aquatic Conservation Strategy objectives apply only at fifth-field watershed and larger scales, are achieved only over a period of decades or longer, and do not provide additional direction constraining the short-term or long-term effects of individual projects."

Applicable riparian reserve standards and guidelines:

TM-1 c. Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain ACS objectives. *Refer to the purpose and need section. The objective of thinning in riparian reserves is to accelerate the development of mature and late-successional stand conditions. The design criteria and best management practices provide protection to riparian and aquatic resources.*

RF-2. For each existing or planned road, meet Aquatic Conservation Strategy objectives by:
a. minimizing road and landing locations in Riparian Reserves.
b. completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian Reserves.

c. preparing road design criteria, elements, and standards that govern construction and reconstruction.
d. preparing operation and maintenance criteria that govern road operation, maintenance, and management.
e. minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
f. restricting sidecasting as necessary to prevent the introduction of sediment to streams.
g. avoiding wetlands entirely when constructing new roads.
The proposed temporary roads are not located within riparian reserves and they would be built on gentle landforms and obliterated upon project completion. They would be consistent with this standard and guideline.

RF-3. Determine the influence of each road on the Aquatic Conservation Strategy objectives through watershed analysis. Meet Aquatic Conservation Strategy objectives by:
a. reconstructing roads and associated drainage features that pose a substantial risk.
b. prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected.
c. closing and stabilizing, or obliterating and stabilizing roads based on the ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short-term and long-term transportation needs.
Road reconstruction needs have been identified along haul routes.

RF-5. Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.
The proposed temporary roads are not located within riparian reserves and they would be built on gentle landforms and obliterated upon project completion. They would be consistent with this standard and guideline.

Collawash Fifth-field Watershed
Summary of Existing Condition

The Collawash River drainage is a 5th field watershed within the Clackamas River Basin. The Collawash lies in the southern extreme of the Mount Hood National Forest, about 40 miles south of the Columbia River on the westslope of the Cascade Mountain Range. The entire watershed is within lands administered by the USDA Forest Service. The watershed encompasses approximately 96,476 acres and is comprised of 22 subwatersheds ranging in size from 1,129 acres to 10,524 acres. There are 630 stream miles within the Collawash River watershed. Approximately 130 miles of stream are fish bearing streams. Anadromous salmonids are present in 38 miles of stream within the watershed. The Collawash River is designated a Tier I, Key Watershed under the Northwest Forest Plan. Tier 1 watersheds have been identified as crucial refugia for at-risk fish species.

The Collawash watershed supports populations of winter steelhead, coho salmon, chinook salmon, and resident cutthroat and rainbow trout. The following ESU's occur within the watershed: Upper Willamette River chinook salmon (*Oncorhynchus tshawytscha*), Lower Columbia River steelhead (*Oncorhynchus mykiss*), and Lower Columbia River coho salmon (*Oncorhynchus kisutch*).

Management activities in the Clackamas Basin that have had an effect on aquatic resources in the Collawash River include timber harvest, road building, hatchery introductions, and hydroelectric development. The riparian reserves of the watershed have been altered by past timber harvest. The total area of riparian reserves within the watershed is 34,080 acres. Currently, 23% of the Riparian Reserve area within the watershed is in early-seral forest condition.

There are approximately 288 miles of roads in the watershed, which equates to a road density of 1.9 miles of road per square mile. Approximately 26 miles of road are within 200 feet of perennial streams. There are 623 stream crossings within the Collawash River watershed. The miles of road, number of stream crossings and dispersed campgrounds within the watershed has led to an increase in drainage network density.

Restoration projects implemented within the Collawash River watershed have focused on improving fish passage, improving instream habitat complexity, decreasing road densities, and restoring off-channel habitat and floodplain connectivity.

Using the "Matrix of Pathways and Indicators" (NOAA Fisheries, 1996), the condition of the existing environmental baseline with in the Collawsh River watershed was assessed. Baseline habitat indicators that are described "at risk" in the Collawash watershed include: substrate, large woody debris, pool frequency, and riparian reserves. Chemical contaminants/nutrients, physical barriers, pool quality, off-channel habitat, refugia, streambank condition, and floodplain connectivity are described as "properly functioning." Road density, sediment and turbidity, peak/baseflows, and drainage network increase within the watershed is described as "not properly functioning."

The above watershed summaries contain references to the Matrix of Pathways and Indicators. The description of existing conditions categorized in the Matrix of Pathways and Indicators (MPI) is relative to baseline conditions that would be expected under unmanaged conditions. The existing status (Properly Functioning, At Risk, or Not Properly Functioning) represents the condition today, and thus provides a baseline context for evaluating the effect of changes that would result under the various Alternatives.

The MPI generally categorizes Properly Functioning conditions for watershed processes as "similar" to unmanaged conditions, At Risk conditions as having "some alteration" or "minor differences" as compared to unmanaged conditions, and Not Properly Functioning conditions as "substantially different" or exhibiting "pronounced differences" relative to unmanaged conditions.

COLLAWASH THINNING PROJECT

Key Best Management Practices For The Protection Of Water Quality

This document summarizes the key Best Management Practices (BMPs) for the protection of water quality that will be used to minimize the potential for adverse effects to water quality, fish habitat, and site productivity during implementation of this project. The full text of the general BMPs, and a more detailed explanation of the BMP implementation process, is contained in the document: General Best Management Practices for the Mt. Hood National Forest (August 2004). This BMP document is designed to implement the direction in the Mt. Hood Forest Plan standards and guidelines FW-055 through FW-059, and Appendix H, Best Management Practices.

Best Management Practices are defined as methods, measures or practices selected by an agency to meet its non-point source control needs. BMPs include, but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation). Best Management Practices are the primary mechanism to enable the achievement of water quality standards (U.S. Environmental Protection Agency, 1987). Some BMPs may not be applicable to all alternatives, for example road construction BMPs would not apply to alternatives that do not build roads. BMP training is ongoing for individuals involved in project design, layout, administration, and maintenance activities.

This project will be included in the Forest-wide pool of potential projects available for BMP monitoring. Each year a selected number of sites/units are selected at random from the Forest-wide pool of available projects for BMP monitoring. Activity sites are available for monitoring after they have gone through at least one winter following completion of the project activity.

The BMPs that apply to each location where various resource management activities are proposed are shown in the table below. A unit-by-unit listing of the type of harvesting system (helicopter, skyline, ground-based) for each unit is shown in tables located in the EA.

KEY BMPs APPLICABLE TO ALL SITES WHERE ACTIVITIES OCCUR

Activity Type	**BMP Identifier**
Timber Harvesting	W-4, W-5
Ground-based harvesting	All Timber BMPs except BMP T-12.
Helicopter yarding	All Timber BMPs except BMP T-11.
Cable yarding	All Timber BMPs except BMP T-11
Landings	BMP T-3, T-4, T-5, T-6, T-7, T-8, T-10, T-13, T-14, T-15, T-19, T-21
Roads	W-4, W-5
Road maintenance	BMP R-12, R-15, R-16, R-18, R-19, R-20
Road decommissioning	BMP R-2, R-3, R-4, R-5, R-6, R-9, R-15, R-20, R-23
Road reconstruction	BMP R-2, R-3, R-4, R-5, R-6, R-7, R-9, R-12, R-15, R-16, R-20
Temporary road construction	All Road BMPs, except, BMP R-16, R-17, R-21
Timber haul	BMP R-19, R-20, R-21
Watershed Management	BMP W-1, W-4, W-5
Fuels Management	BMP F-1

BMP EFFECTIVENESS

Each BMP described below provides a qualitative assessment of expected effectiveness that the applied measure will have on preventing or reducing impacts on water quality. The effectiveness of each BMP will be evaluated with two indices, 1) ability to implement, and 2) effectiveness as indicated by administrative studies and professional judgment. For each index, the BMPs will be rated either high, moderate or low in effectiveness of preventing or reducing impacts.

- Ability to Implement

High: Greater than 90% certainty the BMP can be implemented as planned.

Moderate: Greater than 75%, but less than 90% certainty the BMP can be implemented as planned.

Low: Less than 75% certainty the BMP can be implemented as planned.

- Effectiveness

High: Practice is highly effective (> 90%) and one or more of the following types of documentation are available:
a. Administrative studies (AS) - local or within similar ecosystem.
b. Experience (EXP) - judgment of an expert by education and/or experience.
c. Fact (FCT)- obvious by reasoned (logical) response.
d. Scientific literature/research (LIT/RES) may also be available to document the effectiveness of many of the BMPs.

Moderate: Documentation (as described for high) shows that the practice is effective less than 90% of the time, but at least 75% of the time.

Or

Logic (LGC) indicates that this practice is highly effective, but there is no documentation to support the rating. Implementation and effectiveness of this practice will be monitored and the practice will be modified if necessary to achieve the objective of the BMP.

Low: Effectiveness unknown or unverified, and there is little or no documentation.

Or

Applied logic is uncertain in this case, or the practice is estimated to be less than 60% effective. This practice is speculative and needs both effectiveness and validation monitoring.

Administrative BMP Monitoring Studies, Mt. Hood National Forest: Monitoring for BMP implementation and effectiveness was performed on a wide variety of BMPs, ranging from riparian reserve protection to temporary road construction. Monitoring results are summarized in the Forest Plan Monitoring and Evaluation Reports for Fiscal Years 1997 through 2002. The reports will be cited below, where applicable, in the BMP narratives for effectiveness using the abbreviation found at the end of each citation, for example, **MTH-AS-97** is the Forest Plan Monitoring and Evaluation Report for FY 1997, while **MTH-AS-02** is the same report for Fiscal Year 2002. BMP monitoring done during this period

indicates that overall the BMPs monitored were prescribed and implemented as planned, resulting in adequate soil and water protection in most instances.

Other monitoring has occurred. One example is the Best Management Practices Evaluation Program (BMPEP), 1992-2002 Monitoring Results. USDA Forest Service, Pacific Southwest Region, Pacific Southwest Region. This report will be cited below, where applicable, as an indicator of BMP effectiveness in the narratives using the abbreviation, **BMPEP-R-5**.

ACRONYMS AND ABBREVIATIONS
EXP- Professional experience
NFP- Northwest Forest Plan
TSC- Timber Sale Contract
TSPP-Timber Sale Planning Process

TIMBER MANAGEMENT BMPs

T-1. Title: Timber Sale Planning Process (TSPP)
Objective: To incorporate water quality and hydrologic considerations into the TSPP.
Explanation: *For this project, a description of the affected environment and the potential environmental and cumulative effects to water quality is documented in the EA.*
Ability to implement: High Effectiveness: High (EXP)

T-2. Title: Timber Harvest Unit Design
Objective: To ensure that timber harvest unit design will secure favorable conditions of water quality and quantity, while maintaining desirable stream channel characteristics and watershed conditions for the various beneficial uses of water such as fish habitat.
Explanation*: Harvest units were designed by an interdisciplinary team that included individuals with fisheries, soils and hydrology expertise.*
Ability to implement: High Effectiveness: High (EXP)

T-3. Title: Determination of Surface Erosion Hazard for Timber Harvest Unit Design
Objective: To identify high erosion hazard areas in order to prevent downstream water quality degradation and loss of site productivity.
Explanation*: Surface soil erosion hazard for this project was determined for each harvest unit and used for project design and the identification of appropriate design criteria.*
Ability to implement: High Effectiveness: Moderate (EXP)

T-4. Title: Use of Sale Area/Project Maps for Designating Water Quality Protection Needs
Objective: To ensure recognition and protection of areas related to water quality protection are delineated on a Sale Area Map or Project Map.
Explanation*: A sale area map will be included in timber sale contracts that shows streams and other important features.*
Ability to implement: High Effectiveness: High (EXP)

T-5. Title: Limiting the Operating Period of Timber Sale Activities
Objective: To ensure that the Purchaser conducts their operations, including erosion control work, road maintenance, and so forth in a timely manner, within the time period specified in the Timber Sale Contract (TSC).
Explanation: *Design Criteria #2.*
Ability to implement: High Effectiveness: High (EXP)

T-6. Title: Protection of Unstable Lands

Objective: To provide for identification and appropriate management prescriptions for unstable lands.
Explanation: T*his project has been designed to meet Mt. Hood Forest Plan standards and guideline pertaining to active landslides. Watershed specialists will assist in field layout of harvest units, where necessary, to ensure these standards and guidelines are implemented on the ground. A physical scientist will assist as needed with sale layout for units on unstable/earthflow terrain.*
Ability to implement: High Effectiveness: Moderate (EXP)

T-7. Title: Riparian Reserve Designation

Objective: To designate a zone along permanently flowing streams, intermittent streams, lakes, and wetlands that will minimize potential for adverse effects to water quality and riparian values from adjacent management activities. Any management activities occurring within these zones should be designed for the purpose of either maintaining or improving riparian values.
Explanation: *Design Criteria #9 and 13.*
Ability to implement: High Effectiveness: High (EXP, MTH-AS-98 through MTH-AS-02)

T-8. Title: Stream course and Aquatic Protection

Objective: (1) To conduct management actions within these areas in a manner that maintains or improves riparian and aquatic values. (2) To provide unobstructed passage of storm flows (3) to control sediment and prevent other pollutants from entering stream courses. (4) To restore the natural course of any stream as soon as practicable, where diversion of the stream has resulted from timber management activities.
Explanation*: Design Criteria #9 and 13. Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, MTH-AS-00, MTH-AS-01)

T-9. Title: Determining Tractor Loggable Ground

Objective: To minimize erosion and sedimentation resulting from ground disturbance of tractor logging systems.
Explanation: *Design Criteria #10. Implementation and responsibility: Land suitable for tractor logging is described in the environmental assessment. Where necessary, and in consultation with resource specialists, any needed modifications are made during the sale layout phase of the TSPP. Requirements governing tractor operations are incorporated in the TSC.*
Monitoring: The Contracting Officer and Sale Administrator oversee the operation to insure compliance with the provisions of the TSC.
Ability to implement: High Effectiveness: High (EXP)

T-10. Title: Log Landing Location

Objective. To locate landings or reuse old landings in such a way as to avoid watershed impacts and associated water quality degradation.
Explanation: *Design Criteria #11.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5, MTH-AS-98 thru MTH-AS-01)

T-11. Title: Tractor Skid Trail Location and Design

Objective: By designing skidding patterns to best fit the terrain, the volume, velocity, concentration, and direction of runoff water can be controlled in a manner that will minimize erosion and sedimentation.
Explanation: *Design Criteria #10. Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5, MTH-AS-98 thru MTH-AS-02)

T-12. Title: Suspended Log Yarding In Timber Harvesting

Objective: To protect soils from excessive disturbance, to maintain the integrity of Riparian Reserves and other sensitive watershed areas and to control erosion on cable corridors.
Explanation: Design Criteria #8. *Skyline yarding would achieve one end suspension except during*

lateral yarding. All skyline corridors would be rehabilitated before winter season closure, where necessary. Rehabilitation will consist of one or more of the following: waterbarring, scattering slash, mulching, and/or seeding. Standard and Special Provisions of the Timber Sale Contract.
Ability to implement: High Effectiveness: High (EXP, MTH-AS-98 through MTH-AS-00, BMPEP-R-5)

T-13. Title: Erosion Prevention and Control Measures During Timber Sale Operations
Objective: To ensure that the Purchaser's operations shall be conducted to minimize soil erosion.
Explanation*: Design Criteria #8. Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: Moderate (Exp, BMPEP-R-5)

T-14. Title: Re-vegetation of Areas Disturbed by Harvest Activities
Objective: To establish a vegetative cover on disturbed sites to prevent erosion and sedimentation.
Explanation: *Design Criteria #8.*
Ability to implement: High Effectiveness: Moderate (EXP, BMPEP-R-5)

T-15. Title: Log Landing Erosion Prevention and Control
Objective. To reduce the impacts of erosion and subsequent sedimentation associated with log landings by use of design criteria.
Explanation*: Design Criteria #8. Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (BMPEP-R-5, MTH-AS-98 through MTH-AS-02)

T-16. Title: Erosion Control on Skid Trails
Objective: To protect water quality by minimizing erosion and sedimentation derived from skid trails.
Explanation: *The Sale Administration Handbook section on Skid Trails and Fire lines guidelines will be used to determine the appropriate spacing of water bars, with closer waterbar spacing for steeper slopes. Water bar spacing may also be adjusted based on site-specific characteristics. Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP,BMPEP-R-5, MTH-AS-98 through MTH-AS-02)

T-19. Title: Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
Objective: To assure the adequacy of required erosion control work on timber sales.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

T-21. Title: Servicing and Refueling of Equipment
Objective: To prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water and other harmful materials from being discharged into or near rivers, streams and impoundments or into natural or man-made channels.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP)

T-22. Title: Modification of the Timber Sale Contract (TSC)
Objective: To modify the TSC if new circumstances or conditions arise and indicate that the timber sale will damage soil, water or watershed values.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

T-23. Slash Treatment in Sensitive Areas
Objective: To maintain or improve water quality by protecting sensitive areas from degradation, which would likely result from using mechanized equipment for slash disposal.
Explanation: *Logging slash from thinning operations would primarily be left in the units. Any slash that*

ends up at the landing would be piled and burned. No mechanical equipment will be used to pile slash within harvest units.
Ability to implement: High Effectiveness: Moderate (EXP, BMPEP-R-5)

ROAD SYSTEM BMPs

R-1. Title: General Guidelines for the Location and Design of Roads
Objective: To locate and design roads with minimal resource damage.
Explanation: *Design Criteria #11. No new permanent system roads would be constructed.*
Ability to implement: High Effectiveness: High (EXP)

R-2. Title: Erosion Control Plan
Objective: To limit erosion and sedimentation through effective planning prior to initiation of road construction activities and through effective contract administration during construction.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

R-3. Title: Timing of Construction Activities
Objective: To minimize erosion by conducting road construction operations during minimal runoff periods.
Explanation: *Design Criteria #2.*
Ability to implement: High Effectiveness: High (EXP)

R-4. Title: Stabilization of Road Slope Surfaces and Spoil Disposal Areas
Objective: To minimize erosion from exposed cut slopes, fill slopes, and spoil disposal areas.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

R-5. Title: Road Slope Stabilization Construction Practices
Objective: To reduce sedimentation by minimizing erosion from road slopes and slope failures along roads.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

R-6. Title: Dispersion of Subsurface Drainage From Cut and Fill Slopes
Objective: To minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP)

R-7. Title: Control of Road Drainage
Objective: To minimize the erosive effects of water concentrated by road drainage features, to disperse runoff from disturbances within the road clearing limits, to lessen the sediment generated from roaded areas and to minimize erosion of the road prism by runoff from road surfaces and from uphill areas.
Explanation: *Temporary roads will be constructed with rolling dips where necessary to disperse surface runoff.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

R-9. Title: Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects
Objective: To minimize erosion and sedimentation from disturbed ground on incomplete projects.
Explanation*: No roads would be constructed across streams. Standard and Special Provisions of the Timber Sale Contract.*

Ability to implement: High Effectiveness: Moderate (EXP)

R-10. Title: Construction of Stable Embankments (Fills)
Objective: To construct embankments with materials and methods which minimize the possibility of failure and subsequent water quality degradation.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

R-12. Title: Control of Construction and Maintenance Activities Adjacent to Riparian Reserves
Objective: To protect water quality by controlling construction and maintenance actions within and adjacent to Riparian Reserves so that the following riparian reserve functions are not impaired:
a. Acting as an effective filter for sediment generated by erosion from bare surfaces, road fills, dust drift, and oil traces;
b. Maintaining shade, riparian habitat (aquatic and terrestrial), and channel stabilizing effects:
c. Keeping the floodplain surface in a resistant, undisturbed condition to slow water velocities and limit erosion by flood flows.
Explanation: *Design Criteria #11. No road construction is planned for riparian reserves.*
Ability to implement: High Effectiveness: High (EXP)

R-15. Title: Disposal of Right-of-Way and Roadside Debris
Objective: To insure that debris generated during road construction is kept out of streams and to prevent slash and debris from subsequently obstructing stream channels. To insure debris dams are not formed which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.
Explanation*: Road construction is not near streams.*
Ability to implement: High Effectiveness: High (EXP)

R-16. Title: Specifying Riprap Composition
Objective: To minimize sediment production associated with the installation and utilization of riprap material.
Explanation*: Standard and Special Provisions of the Timber Sale Contract.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

R-17. Title: Water Source Development Consistent With Water Quality Protection
Objective: To supply water for roads and fire protection while maintaining existing water quality.
Explanation: *Standard and Special Provisions of the Timber Sale Contract. Minimize sediment delivery using appropriate BMPs when using pump chances. Avoid wet road conditions. Use and develop off-channel ponds and decommission in-channel sites that are in conflict. When using pump chances, maintain riparian vegetation and stream shade. Rock access ramps where the potential for surface erosion is a concern. Do not pump from streams that do not have continuous flow. Retain at least half of the flow below the pump site. Fish bearing streams: When using pump chances, maintain riparian vegetation and Large Woody Debris (LWD) recruitment potential. When using pump chances, install, operate, and maintain pump screens in compliance with NOAA Fisheries standards.*
Ability to implement: Moderate Effectiveness: Moderate (EXP, BMPEP-R-5)

R-18. Title: Maintenance of Roads
Objective: To maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, side casting, and blockage of drainage facilities (all of which can cause sedimentation and erosion, and deteriorating watershed conditions).
Explanation: *End haul unsuitable material to a disposal area designated by a project engineer.*
Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5)

R-19. Title: Road Surface Treatment to Prevent Loss of Materials

Objective: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.

Explanation: *Standard and Special Provisions of the Timber Sale Contract. For all roads used for timber haul, apply dust abatement, and erosion control as directed by a physical scientist or road engineer. For dust abatement, water or lignin sulfonate may be applied. These dust abatement treatment measures will be applied during dry weather or during a light rain according to the Manufacturer of the dust abatement materials, provided the dust palliative penetrates the road surface and does not flow to low areas or off of the road surface. Rock aggregate will be added to system roads where necessary to reduce sedimentation from native surface roads or out of Normal Operating Season haul conditions. No rock aggregate will ordinarily be added to temporary landings or roads, other than spot rocking for erosion control, helping facilitate restoration of these areas. Under certain circumstances, rock aggregate may be added to temporary helicopter landings, but the rock will be removed following the completion of operations. Clean road ditches and culverts. Rock all native-surface haul road crossings with an 8" lift of crushed rock for 100 feet on both sides of perennial and fish bearing streams.*

Ability to implement: High Effectiveness: Moderate (EXP, BMPEP-R-5)

R-20. Title: Traffic Control During Wet Periods

Objective: To reduce road surface damage and rutting of roads and to lessen sediment washing from damaged road surfaces.

Explanation: *Design Criteria #10. Temporary roads are designed to be used only during the Normal Operating Season. Road use will be suspended during wet periods to avoid road damage that cannot be repaired by typical road maintenance blading operations. Road use will also be suspended to avoid road surface runoff that will increase turbidity in streams. Also see site-specific BMP prescriptions identified for BMP R-19.*

Ability to implement: High Effectiveness: Moderate (EXP, BMPEP-R-5)

R-21. Title: Snow Removal Controls to Avoid Resource Damage

Objective: To minimize the impact of snowmelt runoff on road surfaces and embankments and to consequently reduce the probability of sediment production resulting from snow removal operations.

Explanation*: Design Criteria #4. Standard and Special Provisions of the Timber Sale Contract.*

Ability to implement: Moderate Effectiveness: Moderate (EXP, BMPEP-R-5)

R-23. Road Decommissioning

Objective: To reduce sediment generated from temporary roads or unneeded system roads by decommissioning them at the completion of their intended use.

Explanation: Design Criteria #11.

Ability to implement: High Effectiveness: High (EXP, BMPEP-R-5, MTH-AS-97, MTH-AS-99)

FUELS MANAGEMENT BMPs

F-1. Title: Fire and Fuel Management Activities

Objective: To reduce the potential public and private losses and environmental impacts which result from wildfire and/or subsequent flooding and erosion, by reducing the frequency, intensity and duration of uncharacteristic wildland fire.

Explanation: *Wherever fuel loading meets Forest Plan Standards and Guidelines, logging slash will be retained. Slash provides protection for the soil from rain splash and runoff and serves as sediment traps for surface erosion.*

Ability to implement: High Effectiveness: Moderate (EXP, BMPEP-R-5)

WATERSHED MANAGEMENT BMPs

W-1. Title: Watershed Restoration

Objective: To repair degraded watershed conditions and improve water quality and soil stability.
Explanation: *Some skid trails, landings and roads would be decompacted and revegetated.*
Ability to implement: Moderate Effectiveness: Moderate (EXP)

W-4. Title: Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control & Countermeasure (SPCC) Plan

Objective: To prevent contamination of waters from accidental spills.
Explanation: *Standard and Special Provisions of the Timber Sale Contract. Storage facilities for oil products on site shall be insured that any spill will not enter any streams or other waters. If oil storage exceeds 5,000 liters (1,320 gallons) or any single containers exceed 2,500 liters (660 gallons), an SPCC plan will be prepared.*
Ability to implement: High Effectiveness: Moderate (EXP)

W-5. Title: Cumulative Watershed Effects

Objective: To protect the beneficial uses of water and streams from the cumulative effects of multiple land management activities which individually do not create unacceptable effects, but collectively may result in adverse (degraded) water quality or stream habitat conditions.
Explanation: *Cumulative watershed effects analysis would use the Aggregate Recovery Percentage (ARP) methodology. For soil resources, cumulative effects are analyzed for each harvest unit. The percentage of the unit that has been detrimentally impacted by past practices and the expected additional impact from the current proposal such as road building, logging, site preparation and fuels treatments were calculated.*
Ability to implement: High Effectiveness: Moderate (EXP)

ANALYSIS OF NEW INFORMATION

Collawash Thinning

Assessment of the report titled "Scientific evaluation of the status of the Northern Spotted Owl."(SEI Report) (S P Courtney, J A Blakesley, R E Bigley, M L Cody, J P Dumbacher, R C Fleischer, AB Franklin, J F Franklin, R J Gutiérrez, J M Marzluff, L Sztukowski).

The National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) include provisions for consideration of new information relative to existing and proposed Federal activities. As ecosystem assessment findings and other science documents are released, significant new information provided by those documents needs to be considered in the decision making process for *proposed actions*. It will also need to be evaluated with respect to *ongoing actions* to determine if either NEPA supplementation or re-initiation of ESA consultation is necessary. The Collawash Thinning proposal is a proposed action. Although an Environmental Assessment has been completed, a decision on the proposal has not been made. The following concepts and definitions are provided as background to this assessment:

NEPA Issues - "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts" [40 CFR §1502.9(c)] - the regulation is specific to Environmental Impact Statements, but Forest Service (FS) policies extend this concept to other levels of NEPA analysis (FSH 1909.15 §18). NEPA documents for proposed actions need to be reviewed with respect to the likelihood of "significant new information" warranting supplementation or revision.

ESA Issues - The ESA test is different than that of NEPA. The ESA focuses on "new information," not "significant new information." Under the ESA, re-initiation of consultation is required if "new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered" [50 CFR §402.16(b)]. Thus, while new information may not be significant under NEPA, it may reveal effects not previously considered under ESA.

Definitions:

Ongoing actions - Existing projects, activities, agreements, or special uses where the Agencies have discretion or control.

Proposed actions - Proposals which do not have a decision or those where a decision has been made, but no contract or permit has been awarded.

New information - Information not previously known or considered or that which provides new interpretations or context not considered at the time an existing decision was made.

Significant new information - New information that (1) is relevant to environmental concerns and bearing on the actions or their impacts and (2) would substantially alter the impact analyses and

conclusions in existing NEPA documents. Findings of significance ultimately rest with the decision maker and would be based on evidence provided in the record.

Process for Considering New Information With Respect to Proposed Actions

Appropriate changes to NEPA documents for proposed actions are made in accordance with the CEQ regulations relating to significant new information [40 CFR §1502.9(c)], and FS NEPA Handbook 1909.15, Chapter 18. Similarly, appropriate changes with respect to ESA Section 7 consultation are made in accordance with the ESA regulations relating to re-initiation of formal consultation (50 CFR §402.16), and Forest Service policies with respect to proposed species and their habitats.

If the evaluation results in changes to NEPA documents for proposed actions, appropriate agency national, state or unit-level NEPA and other program-specific guidance should be consulted regarding requirements for public notification and any public comment periods. Where evaluations are applied, it is encouraged that findings be documented. Such documentation should be filed in the analysis file for the proposed action; this includes findings of no discretion, no new information, and non-significance where appropriate.

The following questions are organized by the various evaluation categories. Question 1 considers whether FS has discretion to alter analyses and decisions for particular proposed activities. Questions 2 through 5 then address NEPA's "significant new information" issue. (Questions 2 through 4 help determine whether the information is actually "new" and, if so, whether it is relevant to the proposed actions and would substantially alter the impact analyses and conclusions in existing NEPA documents. Question 5 looks at the potential for the new information to "raise the level" of NEPA compliance required for the action, thereby necessitating development of a new NEPA document. The remaining questions address ESA's "new information" issue.

1. Does the FS have discretion or control over the proposed action?

Yes the agency has discretion.

2. Is the information new?

Yes, some of the information is new. Monitoring of populations of Northern Spotted Owls has been ongoing for many years. After the consultation and the issuance of a Biological Opinion by the U.S. Fish and Wildlife Service for the Collawash Thinning proposal, a report was published by Sustainable Ecosystems Institute of Portland Oregon (September 2004). The report is titled "Scientific evaluation of the status of the Northern Spotted Owl."(S P Courtney, J A Blakesley, R E Bigley, M L Cody, J P Dumbacher, R C Fleischer, AB Franklin, J F Franklin, R J Gutiérrez, J M Marzluff, L Sztukowski).

The report is a review and synthesis of information on the status of the Northern Spotted Owl. The report was prepared to aid the US Fish and Wildlife Service in their 5-year status review process, as set out in the Endangered Species Act. The report did not make recommendations on

listing status, or on management, and 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 et al.

The following excerpt is from the executive summary of the SEI report. The italicized portion below each paragraph gives project specific information on that topic.

> Central to understanding the status of the subspecies is an evaluation of its taxonomic status. The panel is unanimous in finding that the Northern Spotted Owl is a distinct subspecies, well differentiated from other subspecies of Spotted Owls. *This in not new information and does not change the assessment of effects for the Collawash project.*
>
> The panel did not identify any genetic issues that were currently significant threats to Northern Spotted Owls, with the possible exception that the small Canadian population may be at such low levels that inbreeding, hybridization, and other effects could occur. *This information does not change the assessment of effects for the Collawash project. The Collawash project would not affect Canadian owls.*
>
> The use of habitat and of prey varies through the range of the subspecies. These two factors interact with each other and also with other factors such as weather, harvest history, habitat heterogeneity etc, to affect local habitat associations. While the general conclusion still holds that Northern Spotted Owls typically need some late-successional habitat, other habitat components are also important (at least in some parts of the range). *This information does not change the assessment of effects for the Collawash project.*
>
> The available data on habitat distribution and trends are somewhat limited. Development of new habitat is predicted under some models. However our ability to evaluate habitat trends is hampered by the lack of an adequate baseline. Given these caveats, the best available data suggest that timber harvest has decreased greatly since the time of listing, and that a major cause of habitat loss on federal lands is fire. In the future, Sudden Oak Death may become a threat to habitat in parts of the subspecies' range. *This information does not change the assessment of effects for the Collawash project. There have been no large fires in the Collawash area in recent years. Sudden Oak Death has not been found in the Collawash area.*
>
> Barred Owls are an invasive species, that may have competitive effects on Northern Spotted Owls (as was recognized at the time of listing). Opinion on the panel was divided on the effects of Barred Owls. While all panelists thought this was a major threat, some panelists felt that the scientific case for the effects of Barred Owls remained inconclusive; other panelists were more certain on this issue. *This information does not change the assessment of effects for the Collawash project. Barred owls are discussed in the EA, section 4.5.1.*

The demography of the Northern Spotted Owl has been recently summarized in a meta-analysis (Anthony et al 2004), which is the most appropriate source for information on trends. Although the overall population, and some individual populations show signs of decline, we cannot determine whether these rates are lower than predicted under the Northwest Forest Plan (since there is no baseline prediction under that plan). However the decline of all four Washington state study populations was not predicted, and may indicate that conditions in that state are less suitable for Northern Spotted Owls. Several reasons for this pattern are plausible (including harvest history, Barred Owls, weather). *The Collawash project area was not part of the demographic studies summarized by Anthony et al. (2004). Of the 14 study areas, one is nearby. The nearest is the H.J. Andrews study area. The estimated spotted owl population on the H.J. Andrews study area is 70-80% of the 1987 initial population size. The data from the report suggested that populations over all of the 14 study areas were declining about 4% per year during the study. It also was suggested that owl populations on federal lands had better demographic rates than elsewhere and that populations were doing poorest in Washington. This information does not change the assessment of effects for the Collawash project.*

There is currently little information on predation on Spotted Owls, and no empirical support for the hypothesis, advanced at the time of listing, that fragmentation of forest after harvest increases predation risk. *This information does not change the assessment of effects for the Collawash project. The Collawash project is a thinning that would not fragment habitat.*

West Nile Virus is a potential threat, but of uncertain magnitude and effect. *This information does not change the assessment of effects for the Collawash project. West Nile Virus has not been identified in the Collawash project area.*

In general, conservation strategies for the Northern Spotted Owl are based on sound scientific principles and findings, which have not substantially altered since the time of listing (1990), the Final Draft Recovery Plan (1992) and adoption of the Northwest Forest Plan (1994). Nevertheless we identify several aspects of conservation and forest management that may increase both short and medium term risks to the species. These are typically due to failures of implementation.

A full evaluation of the uncertainties of the data, the conclusions that can be drawn from them, and of the perceived threats to the subspecies, are shown in the summary of individual panelist responses to a questionnaire.

Major threats to Northern Spotted Owls at this time include: the effects of past and current harvest; loss of habitat to fire; Barred Owls. Other threats are also present. Of threats identified at the time of listing, only one (predation linked to fragmentation) does not now appear well supported.

3. Is the new information relevant to environmental concerns for this action?

Yes. The Collawash thinning project could affect Northern Spotted Owls because the proposal would downgrade 88 acres of natural second growth that is marginal nesting/roosting/foraging habitat to dispersal habitat. It is marginal because there are scattered large legacy trees but other habitat characteristics are not ideal. The legacy trees would be retained and the stand would eventually become nesting/roosting/foraging habitat again. In the short term, the plantation thinning would degrade dispersal habitat, but in the long term, the thinning would result in the faster development of mature forest characteristics when compared to no action.

4. Does the new information tell you something substantially different about effects of the proposed action?

No. The reports are new but they summarize trends that were predicted at the time of the Northwest Forest Plan. It was predicted that Northern Spotted Owl populations would decline. The reports do not contain any information specific to the Collawash thinning proposal or this specific area. The reports are broad scale assessments that look at the Northern Spotted Owl throughout its range. The reports do not contain any information that would substantially change the analysis or conclusions in the Collawash EA concerning the impacts on the Northern Spotted Owl.

The Collawash thinning proposal is consistent with the land allocations and standards and guidelines of the Northwest Forest Plan. The Collawash project is a thinning designed to improve forest health and growth and result in increased biological diversity and larger trees.

The report however does make some general recommendations about thinning of forest stands as it relates to owl habitat and owl prey relationships. The report notes thinnings that promote species diversity, variable thinning densities and interruptions in the forest canopy, hold promise for accelerating the development of spotted owl habitat and dense prey populations over conventional thinning (single species with uniform density). This is not new information since it is synthesizing research conducted between 1994 and 2002. The proposed action is consistent with these objectives. The Collawash thinning proposal includes measures that will promote maintaining species diversity and variable densities. This information does not change any conclusions in the Collawash EA in any substantial way.

5. Does the magnitude of changed effects require a different level of NEPA analysis than was originally applied?

No. The new information did not substantially change the effects on the Northern Spotted Owl that were analyzed in the Collawash EA.

6. Is the new information relative to the proposed action involving potentially affected federally listed or proposed species and/or ESA designated or proposed critical habitats?

Yes. The new information is specifically about a federally listed species, the Northern Spotted Owl. The Collawash thinning proposal would affect this species.

7. Does the new information reveal effects to federally listed or proposed species and/or designated or proposed critical habitats in a manner or to an extent not previously considered.

No. The information does not reveal effects concerning the impacts of the Collawash thinning proposal in a manner or extent not previously considered. See question 4.

Based on the assessment of this new information I have determined that the information is not significant for the Collawash Thinning proposal because it does not alter the analysis or conclusions concerning the Northern Spotted Owl in the Collawash EA. I have also determined that the information did not reveal any effects the Collawash thinning proposal would have on the Northern Spotted Owl that were not previously considered. Therefore re-initiation of ESA consultation with the USFWS is not required.

/S/ ANDREI RYKOFF

ANDREI RYKOFF
District Ranger

Soil Analysis for Collawash Thinning EA

May 2005

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

Existing Situation

Geology

The Collawash project area lies in the Western Cascade physiographic province, which consists chiefly of dark colored lava flows, light colored pyroclastic flows, and associated intrusions. These rocks dip slightly eastward, are often deeply weathered and form soils which may be rich in clay. Large-scale geologic mapping by Hammond et. al. (1982) identified six geologic formations underlying the ten Collawash timber sale units. The geologic units are briefly described in their order of occurrence, youngest to oldest, followed by a list of Collawash timber sale units located on them. Collawash units listed more than once are located on multiple geologic types.

Surface deposits:

Qls Landslide deposits: Unsorted deposits up to 30 meters thick of clay to boulder size detritus, locally incorporating glacial deposits, talus, and colluvium, but consisting generally of bedrock units. Locally, these deposits vary from stable to active, and some were probably active during the last interglacial. *Collawash units: 1, 2, part of 3, part of 4, 5, part of 6, 8.*

Qyt Younger Till: Unsorted compact deposits up to 20 meters thick of clay to boulder size detritus deposited by alpine glaciers, forming moraines mantling valley floors and slopes. *Collawash unit: upper area of 9b.*

Tertiary Intrusive Rocks:

Tipa Pyroxene Andesite/Diorite. *Collawash unit: lower slopes of 4.*

Upper Western Cascade Bedrock Units:

Tr Rhododendron Formation: Gray pyroxene andesite porphyry lava flows and light-colored laharic deposits with individual thicknesses up to 45 meters, and pyroclastic deposits up to 180 meters thick. Total formation thickness is about 915 meters. *Collawash units: 9a, 9b, upper slopes of 10.*

Middle Western Cascade Bedrock Units:

Tn Andesites of Nohorn Creek: Consists chiefly of andesitic lava flows and minor fluvial volcaniclastic and tuff interbeds. The formation is interbedded complexly with the beds of Bull Creek. Where the formation is underlain by weak strata of the Breitenbush Formation and the beds of Bull Creek, the unit tends to slide, otherwise the lava flows are competent and uphold steep slopes and cliffs. *Collawash units: 3, lower slopes of 10.*

Tbc Beds of Bull Creek: Consist of dark brown to gray interstratified laharic deposits, thinner fluvial volcaniclastic conglomerates and sandstones, and minor andesitic and basaltic lava flows. Maximum exposed thickness is about 375 meters. *Collawash units: upper slope of 6, 7.*

Earthflows

Units 1, 2, 3, 4, 5, 6, and 8 are located on earthflow topography.

Analysis Methodology: The Forest plan measures potential impacts to earthflow stability by calculating 'recovery levels'; the percent of acreage in each earthflow with timber stands having at least 40% of the crop trees at least 8 inches diameter breast height and at least 70% crown closure. Stands with trees having these characteristics are thought to allow for adequate snow interception and evapotranspiration rates which do not result in greater earthflow movement due to increased groundwater piezometric levels. An incremental recovery is calculated for thinned stands and for stands less than 30 years in age. The Forest Plan has assigned each earthflow with a risk rating based on geomorphology and downslope consequences of failure, and has set the minimum recovery level for High risk earthflows at 90% recovered (B8-031), and Moderate risk earthflows at 75% recovered (B8-032).

See Table 3 for information on risk categories and existing 2005 recovery levels for the three earthflows that occur in the area of the Collawash timber sale units. Cracks in the ground were observed in Unit 8, indicating that some movement is occurring in that earthflow.

Landslides

Slide features were observed in Collawash units 4, 7, 9b and 10. See attached map. In all units the slides occurred on steep slopes with shallow soil over bedrock. Depositional material from a slide occurring upslope of unit 8 was observed within upper central unit 8.

Unit 4: Landslides were not observed on the 1959 aerial photos. The unit was clearcut logged in 1962. 1967 aerial photos show two slides, probably occurring after residual roots of cut trees had decayed and no longer provided root strength to hold the soil in place. A third slide is seen in the 1972 photos, and is larger on the 1989 photos.

Unit 7: Clearcut logged in 1958. Three slides observed on the 1972 aerial photos in the southern portion of the unit.

Unit 9b, 10: Three slide headwall features in unit 9b seen on the 1967 photos. Slides continue downslope into unit 10. Some slides appear to be older than the fire that created the current stand, as trees within the slide areas appear to be the same age as stand trees. Other slides have younger trees within them. Two additional slide features are located at the lower unit 9b SW boundary, but outside the unit.

Soils

Soils in the project area have been derived from weathering of the geologic units mentioned above. Within the project area the Western Cascade bedrock units and landslide deposits form soils mapped as MU 100, 101, 102, 108, and 109. The glacial till deposits form soils mapped as MU 327, 328, and 329. (*Mt. Hood National Forest Soil Resource Inventory* (SRI) Howes, 1979). The lower slopes of Unit 4 should be mapped as MU 109. Within any soil-mapping unit, there is a possibility of finding up to 25% inclusions of other associated soils and/or bedrock outcrops. Soil characteristics for soil mapping units within the proposed thinning units are listed in Table 1.

Table 1. Soil Mapping Unit Attributes

Soil Mapping Unit (thinning *unit #)*	Landform	Natural Soil Mantle Stability	Surface Erosion Potential	Compaction Hazard	Susceptibility to Soil Displacement	Sedimentation Yield Potential
MU 15 *(7)*	Steep to very steep unstable drainageways	Very Unstable	Very Severe	Low	High	High
MU 100 *(1, 3, 4, 5, 8)*	Earthflow- nearly level to gently sloping, slightly uneven benches	Stable – Moderately Stable	Moderate - Severe	High	Moderate	High
MU 101 *(2, 3, 4, 5)*	Earthflow- steep, slightly uneven to dissected north and east slopes	Moderately Stable - Unstable	Severe	High	Moderate - High	High
MU 102 *(3, 6)*	steep, slightly uneven to dissected south and west slopes	Moderately Stable - Unstable	Severe	High	Moderate - High	High
MU 108 *(6, 9a, 9b, 10)*	very steep south and west slopes	Unstable	Severe	Moderate	High	High
MU 109 *(3, 4, 6, 7)*	very steep north and east slopes	Unstable	Severe	Moderate	High	High
MU 327 *(9a, 9b)*	Nearly level to sloping, smooth glaciated uplands	Stable	Slight - Moderate	Moderate	Low	Low - Moderate
MU 328 *(9b)*	Sloping to steep, smooth to slightly dissected glaciated uplands, N&E aspects	Moderately Stable	Slight - Moderate	Low	High	Moderate
MU 329 *(9b)*	Sloping to steep, smooth to slightly dissected glaciated uplands, S&W aspects	Moderately Stable	Moderate	Moderate	High	Moderate

Detrimental Soil Condition.
Analysis Methodology: Potential impacts caused by harvest and fuels treatment are measured by percent of harvest area in detrimental soil condition. This is a cumulative measurement that includes soil compaction, puddling, displacement, and severe burning, and their relationship to erosion and long-term site productivity. To provide for long-term site productivity, the Forest Plan has set the maximum for detrimental soils at 8% for earthflow soils (B8-040, 041) and 15% for all other soils (FW-022). Current level of detrimental soil condition was determined from field observations by the district soil scientist, interpretation of 1946, 1959, and 1967 aerial photos, and calculations of disturbed ground from scanned aerial photos using ERDAS IMAGINE software (Golden, Vanderzanden).

See Table 4, column 3 for existing condition by unit. The percentage of area in a detrimental soil condition varies from stand to stand due to the occurrence, manner, and extent of past timber harvest and fuel treatment activities. Units 9a, 9b, and 10 are natural second growth stands resulting from a wildfire, and have had no previous harvest entries. Units 1 through 8 were clear cut harvested from 1955 to 1962 and subsequently broadcast burned or machine piled. Management practices at the time did not restrict machine movement within units, or follow more restrictive practices on earthflow topography as is done today, therefore existing detrimental impacts to soil are generally higher than that allowed under the current Forest Plan standards implemented in the early 1990's. Six units do not meet the Mt. Hood Forest Plan Standard and Guideline B8-040 for detrimental soil condition on earthflows (units 1, 2, 3, 5, 6 and 8), and one unit does not meet standard FW-022 for detrimental soil condition on non-earthflow soils (unit 4).

Organic Matter/Soil Fertility. Duff layers are relatively thin in the plantation units due to past management practices during clearcutting and slash burning or piling treatments. Duff layers range from ¼ to 1 ½ inches with an average of ½ inch. Large down logs are also lacking in these units due to past logging and fuel treatment practices. In the natural second growth stands, down logs created after the wildfire became a source for rotting debris accumulation and have resulted in duff layers generally greater than 2-3 inches. Down logs in various stages of decay are currently present. Ground vegetation is minimal where duff layers are thick or where the soil is covered with rotted logs.

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

Environmental Effects

Detrimental condition analysis: An estimate of detrimental soil condition resulting from proposed road and landing construction, reopening of decommissioned and closed roads, and felling and thinning activities was determined for each alternative (Table 4). Calculations include anticipated road rehabilitation projects listed below. It was assumed landings created during previous entries would be re-used, and where previous entries created higher percent detrimental conditions, a progressively greater number of existing skidtrails would be available to be re-used. See Table 2 for percent of additional impact anticipated with each logging method, based on current condition.

Table 2.

Current % Detrimental Soil Condition	Anticipated additional impact with:				
	Mechanical	Ground based harvest		Skyline harvest	
	felling	skidtrails	landings	corridors	landings
0% (no previous entry)	0.5%	7%	1%	3.5%	0.5%
0% to < 5%	0.5%	7%	1%	2%	0%
5% to < 10%	0.5%	3%	0%	2%	0%
10% to < 15%	0.5%	2%	0%	2%	0%
15% to < 20%	0.5%	1%	0%	2%	0%
> = 20%	0.5%	0%	0%	2%	0%

Soil rehabilitation analysis: Units with greater than 15% (8% on earthflows) of the activity area would be considered for rehabilitation, as directed in FW-028 and B8-041a (MH Forest Plan Interpretation #6). All temporary roads constructed for this sale, and currently decommissioned roads reopened for this sale, would be obliterated and

revegetated with native species. All landings and temporary roads used this entry would be subsoiled and revegetated by the timber sale purchaser when detrimental soil conditions are greater than 15% (8% on earthflows). Existing temporary roads located within the thinning units but not used during the Collawash sale would remain in a compacted condition, unless funding became available for rehabilitation. Skidtrails, both used or unused this entry, would not be rehabilitated after thinning is completed, as deep soil tillage can cause adverse impacts to the root systems of established trees adjacent to the treated skidtrails. Rehabilitation of skidtrails would be considered following completion of the regeneration harvest entry.

Alternative A

Short-Term Effects

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

Long-Term and Cumulative Effects

There would be no impacts to soil resources at this time. Soils would continue to develop through natural processes. The percent of existing detrimental soil condition would slowly decline as compacted areas recover due to physical and biological processes. Forest organic litter input, organic decomposition rates, duff layer development and soil fauna and microbe activity would remain at natural levels. Organic materials would be subject to natural disturbances such as windthrow, fire, and natural climatic change. As unthinned stands age, trees will eventually fall over in a natural thinning process. Withholding natural disasters such as insect, disease, or fire devastation, these stands should eventually produce large trees which will be a source of future large decaying logs on the ground.

Alternative B

Thinning: Approximately 237 acres of plantations and 55 acres of natural stands would be thinned using a combination of ground based, skyline, and helicopter logging systems. Mechanical felling would occur in all or portions of units 1, 2, 4, 5, 6, 8, 9a, and 9b, depending on slope. Use of existing skidtrails and landings would occur where appropriate.

Roads: Approximately 0.8 miles of temporary road would be constructed to access landings. After yarding is complete, the roads would be obliterated and revegetated with native species. Approximately 0.7 miles of decommissioned or closed roads would be opened to access landings. All units where roads are to be re-opened have detrimental soil conditions in excess of the Forest Plan standards, therefore, after yarding is completed all opened roads will be obliterated and revegetated with native species.

Thinning in Riparian Reserves: Approximately 88 acres of upland Riparian Reserve area would be thinned. The planned wider spacing of leave trees in the Riparian Reserve areas would allow for just one logging entry to achieve an accelerated development of desired stand conditions, compared to multiple entries on matrix lands where the planned spacing is less wide.

Earthflows*:* Thinning is planned for 156 acres located on two moderate risk earthflows and 18 acres located on a low risk earthflow. Table 3 identifies earthflow information, acres planned for thinning by alternative, and levels of recovery for each alternative. All units are located on earthflows which meet Forest Plan standards for recovery under all alternatives. The Mt. Hood Forest Plan does not assign a recovery level for low risk earthflows.

Table 3. Earthflow current information, planned acres of thinning, and percent recovery by alternative.

Earthflow	*Risk*	*Goal*	*Alt. A*	*Alt. B*	*Alt. C*	*Alt. D*	*Collawash units*
Jack Davis	Low		0 ac.	18 ac.	16 ac.	16 ac.	Portions of units 3 and 4
Fan	Moderate	>=75%	0 ac. 90.7 %	138 ac. 89.6 %	80 ac. 90.1 %	80 ac. 90.1 %	Units 1, 2, 5, 6, and part of 3
Pink	Moderate	>=75%	0 ac. 80.3 %	18 ac. 80.2 %	7 ac. 80.2 %	7 ac. 80.2 %	Unit 8

Landslides: Active landslide areas with slopes greater than 30 percent are to be excluded from the Collawash sale area. (FW-003, FW-004, FW-005) The Forest Geologist will identify and ribbon on the ground areas to be excluded from the thinning units.

Soils

Soils and long-term productivity are addressed by Forest Plan Standards and Guidelines for detrimental soil condition, and 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. Use of Best Management Practices and project design for harvest units and temporary road construction would result in meeting applicable standards for soil protection and long-term site productivity involving woody debris, ground cover, and live tree retention. The existing detrimental soil condition is greater than Forest Plan standards in most units.

Short-Term Effects

Soil Detrimental Condition. Table 4 shows percent of each unit in a detrimental soil condition by alternative. Potential soil disturbances that have been considered are road and landing construction, reopening of closed roads, and felling and harvest operations. Calculations include obliteration of newly constructed temporary roads, obliteration of the reopened previously decommissioned road in Unit 1, and obliteration of temporary roads and landings used this entry on units where percent detrimental soil condition is greater than the Forest Plan standards.

A net increase in detrimental soil condition is predicted where more skidtrails, yarding corridors, landings and roads would be constructed than already exist. Detrimental soil condition would remain below 15 percent in the natural second growth stands regardless of logging system, and in Unit 7, a unit that was previously skyline logged. Units that would have greater than 8% or 15% detrimental conditions are those whose existing condition is currently greater than those levels. Restoration of temporary roads and landings by subsoiling and revegetation would initiate recovery of productivity, but is unlikely to return the soil to its original condition and productivity.

Table 4. Existing and projected percent detrimental soil condition by unit and alternative.

Unit #	B8 earthflow B8-040 goal	Other soils FW-022 goal	Logging system at previous entry	Existing Condition	Alt. A	Alt. B	Alt. C *	Alt. D
1	<= 8%		T, S	12.1%	11.6 %	13.6 %	14.5 %	14.5 %
2	<= 8%		S	8.1%	8.1 %	11.9 %	11.9 %	11.9 %
3	<= 8%		T, S	23.1%	23.1 %	24.6 %	24.9 %	24.9 %
4		<= 15%	S	16.2%	16.2 %	15.9 %	16.1 %	16.1 %
5	<= 8%		S	11%	11 %	13 %	11.4 %	11.4 %
6	<= 8%		T, S	25.4%	25.4%	26.0 %	23.9 %	23.9 %
7		<= 15%	S	3.6%	3.6%	5.6 %	5.6 %	5.6 %
8	<= 8%		T, S	8.3%	8.3%	10.3 %	9.6 %	9.6 %
9a		<= 15%		0	0	8.6 %	1 %	
9b		<= 15%		0	0	8.4 %	2.1 %	
10		<= 15%		0	0	7.5 %	1 %	

* In some cases percent detrimental condition of the unit increases even though total area of unit decreases, because although the acreage of remaining ground based logging system or road area stays the same, it becomes a greater percent of the remaining smaller unit.

Soil Erosion.

Bare soil would be exposed as logs are dragged on and machines travel over the ground surface. Approximately 4 acres of roads, skidtrails and landings would be constructed or reconstructed. Approximately 3 acres of bare skyline yarding corridors would occur. A total of 7 acres would have potential increased erosion as a result of thinning activities. Disturbed areas, particularly where slopes are greater than 25%, would be potential chronic sources of sediment until they are revegetated successfully.

Erosion would not occur where duff and other effective ground cover is retained. Therefore, practices which limit the amount of soil exposure, or which re-establish ground cover after soil is exposed, will result in less erosion occurring. Of the proposed yarding systems, ground based systems result in a greater amount of ground exposure than skyline and helicopter systems. Units that are prescribed for ground based systems generally have flat to gentle terrain, so even if the potential for erosion may be high, eroding materials will not move far before redeposition occurs. If Best Management Practices are followed there is a low potential for sediment to be delivered to streams. Unit 2 is the only ground based harvest unit located on severely erosive soil, but the low slopes, use of designated skidtrails, and establishing effective ground cover by applying seed, fertilizer, and straw mulch on the disturbed soils (FW-025, FW-

026) will aid in minimizing erosion. All other units on severely erosive soils will be logged by skyline or helicopter, resulting in a minor increase in erosion if Best Management Practices are followed.

The wider spacing planned for leave trees in the Riparian Reserves may increase windthrow occurrence in areas of high watertables and/or steep slopes. Soils exposed on the windthrow mounds could potentially become a source of sediment that could reach adjacent streams, especially where slopes are steep and ground cover has been disturbed by yarding equipment. If windthrow does not become a problem, entering the riparian reserve just one time, because of the wider spacing of leave trees, rather that multiple times, in the long term could reduce detrimental impacts to soils.

Organic Matter/Soil Fertility. Full suspension yarding would minimize duff disturbance in skyline operations. Designated skidtrails and the re-use of existing skidtrails in ground-based yarding operations would minimize duff layer disturbance by limiting tractors to skidtrails, and minimize the amount of area over which logs are dragged across the soil surface. Soil microbial populations will likely be reduced initially in areas of exposed soils until soil organic matter and litter layers build back up. Leaving slash and needles where trees are felled should help maintain carbon and nutrient levels. Leaving large woody debris would benefit soil fauna and microbes, and decomposer organisms. The mitigation measure for coarse woody debris and snags, leaving 18.6 trees with wood decay per acre in natural second growth stands and riparian areas and 5 trees with wood decay per acre elsewhere, will increase amounts of moderate-sized woody debris in the short term until larger diameter trees develop and return naturally or artificially onto the forest floor system.

Long-Term and Cumulative Effects
Detrimental Soil Condition. The detrimental soil condition would slowly decline as compacted areas recover due to physical and biological processes.

Soil Erosion. Surface erosion rates would decline as exposed soils become revegetated.

Organic Matter/Soil Fertility. Soil microbial populations would slowly increase as soil organic matter and the litter layer continue to build up.

Alternative C

Thinning: Approximately 150 acres of plantations and 55 acres of natural second growth stands would be thinned.
Thinning in riparian reserves: would not occur.
Roads: New roads would not be constructed. Approximately 0.7 miles of existing temporary roads would be reopened and after yarding is complete, obliterated and revegetated (units 1, 4, 6, 8). Approximately 87 acres of helicopter yarding rather than skyline yarding would occur where road access would not be available (units 3, 4, 5, 9a, 9b, 10).

Earthflows: Thinning is planned for 87 acres located on two moderate risk earthflows and 16 acres located on a low risk earthflow. See Table 3, column 6 for earthflow recovery levels for Alternative C.

Landslides: The Forest Geologist will identify active landslide areas for exclusion from the thinning units.

Short-Term Effects
The effects of this alternative outside of riparian reserves are expected to be similar to those of alternative B, except for a reduced area in road, skidtrail, and skyline corridor disturbance. Approximately 2 acres of roads, skidtrails and landings would be constructed or reconstructed. Approximately 1 acre of bare skyline yarding corridors would occur. A total of 3 acres would have potential increased erosion as a result of thinning activities. No detrimental soil effects would occur within riparian reserves adjacent to harvest units.

Long-Term and Cumulative Effects
Cumulative effects on disturbed areas are expected to be the same as alternative B.

Alternative D
This alternative is similar to C but would eliminate the thinning of the natural second growth stands (approximately 55 acres).

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

Long-Term and Cumulative Effects
Cumulative effects on disturbed areas are expected to be the same as alternative B.

References

Golden, M. and D. Vanderzanden. 2004. ERDAS IMAGINE Primer / Calculating Bare Ground from Scanned Photos.

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

Howes, Steve. 1979. Soil Resource Inventory. Mt. Hood National Forest. USDA Forest Service, Pacific Northwest Region, Sandy, Oregon.

Mt. Hood National Forest, December 1991. Forest Plan Management Direction – Interpretation #6 (B8 Earthflow Stability Recovery Criteria).

Mt. Hood National Forest, November 2002. Forest Plan Management Direction – Interpretation #10: Watershed Hydrologic Recovery Methodology – Earthflows.

USDA Forest Service, 1990. Land Resource Management Plan. Mt. Hood National Forest, Sandy, Oregon.

Wallowa-Whitman National Forest, USDA Forest Service, September 2001. Interim Protocol for Assessment and Management of Soil Quality Conditions. Version 3.3.