

TARZAN ENVIRONMENTAL ASSESSMENT

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CHAPTER I.

A. Introduction

This Environmental Assessment describes the analysis of project proposals in the Fawn, Rhododendron, Lowe and Kansas Creek subdrainages of the Upper Clackamas watershed. The analysis file includes maps, public involvement results, a biological evaluation and assessment, the cultural resource report, and other resource specialist reports.

The planning area is located approximately 70 miles south east of Portland, Oregon. The location of the proposed activities are in T.7 S., R.7 E.; T.8 S., R.7 E.; Willamette Meridian. See Map which shows the vicinity of the Tarzan planning area.

This action is proposed under the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (hereafter referred to as the Northwest Forest Plan), and the Mt. Hood National Forest Land and Resource Management Plan (hereafter referred to as the Mt. Hood Forest Plan). The Record of Decision (ROD) for the Northwest Forest Plan amended the Mt. Hood Forest Plan.

The Tarzan project is in Matrix, a land allocation identified in the Northwest Forest Plan. No projects are proposed in riparian reserves. The Matrix is further divided into Mt. Hood Forest Plan land allocations. Proposed projects occur in the following land allocations: C1 Timber Emphasis, B2 Scenic Viewsheds and B11 Deer and Elk Summer Range. See the Northwest Forest Plan and the Mt. Hood Forest Plan for specific management direction related to these land allocations.

B. Desired Future Condition

The following desired future conditions are derived from the **Mt. Hood Forest Plan**.

Health	Forests have low levels of disease, damaging insect populations and storm damage. Four-92, FW-382; and Four-292, C1-22.
Growth	Stands are healthy and vigorous, and have growth rates commensurate with the sites potential (at a rate at which the mean annual increment has not culminated). Four-5, #44; and Four-86, FW-306; and Four-91, FW-372; and Four-90, FW-361.
Scenery	The forest is visually appealing with a wide variety of natural appearing landscape features. Forest stands and openings are blended with natural landforms and existing vegetation, and have natural shapes, edges, patterns, and sizes. This applies throughout the landscape with increased emphasis for areas seen from sensitive viewing positions such as road 46. Four-218, goal; Four-113, FW-558; and Four-108.

- Deer & Elk The forest provides high quality summer rearing habitat for deer and elk. The forest contains a mix of habitats including forage, thermal cover and optimal cover. Open road density is at a level which allows animals a sense of security. Four-277, goal; Four-278, B11-9 to 16; Four-72, FW-202 to 210.
- C1 The forest consists of stands with an even distribution of age classes, up to approximately 120 years, running from seedlings to mature timber. Four-290.

The following statements describe desired future conditions from the **Northwest Forest Plan**.

- Riparian Riparian reserves provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration. They contain diverse vegetation and supply coarse woody debris sufficient to sustain physical complexity and stability. Riparian reserves provide mature forest connectivity. ROD page B-11.
- Aquatic Streams have diverse structures with coarse woody debris sufficient to sustain physical complexity and stability. Streams have spatial and temporal connectivity within and between watersheds. The streams provide unobstructed routes to areas critical to fulfilling life history requirements of aquatic and riparian-dependent species. ROD page B-11.
- Matrix Early-seral stands are diverse and contain patches of green trees and snags as well as dispersed green trees and coarse woody debris.

The following statements describe desired future conditions from the **Upper Clackamas Watershed Analysis**.

- Landscape design Forests contain a mix of habitats including early, middle and late-seral stands dispersed across the landscape.
- LSRs and riparian reserves are mature forests or are rapidly moving toward a mature, diverse condition. There are large patches of late-seral interior habitats connected via riparian reserves.
- Matrix lands provide the majority of the landscape's early-seral habitats with a variety of sizes and shapes.
- The average size of early, mid, and late-seral patches will be greater than at present. Many patches will be large, resembling historical conditions. There will be a less fragmented forest than at present except in certain key deer and elk habitats where forage openings and edge are present.

C. Purpose and Need

Many areas do not meet some of the desired conditions described above. The following lists the need for action, the purpose of the project, and a detailed description of the proposed action.

1. Regeneration

Need The project area contains stands that are growing slowly, are diseased and are exposed to repeated storm events which continually damage trees and blow them down. If no action is taken these stands will continue to decline. Several hundred acres meet this criteria.

One of the key landscape level issues identified in the Upper Clackamas Watershed Analysis is the fragmentation of late-seral forested habitats. Given that some landscapes, including those found in the Tarzan planning area, are highly fragmented, the Watershed Analysis recommended that stand manipulations should be prioritized in a way that minimizes additional fragmentation of remaining late-seral interior patches, while focusing on isolated patches which have little or no interior value. In the project area approximately 287 acres are highly fragmented and have little interior habitat.

Purpose The objective of the project is to convert these stands to young productive stands that are capable of growth commensurate with the site's potential.

Another objective is to focus on stands which are fragmented or otherwise isolated from the larger interior late-seral patches. This strategy accomplishes two things; it avoids the interior patches which are most valuable to species dependent on late-seral habitats, and it increases the average patch size. As these proposed plantations grow, they would blend in with adjacent existing plantations to form large contiguous patches which are closer to the patch size expected in unmanaged forests.

Proposed Action

The proposed action is to regenerate approximately 287 acres. Stands would be regenerated by removing most of the trees and preparing the site for planting. At least 15% of the green trees would be retained; some in patches and some as scattered trees. The shelterwood method would be used to provide protection to seedlings. Several roads would be constructed to access landings, (approximately one mile). Several miles of road reconstruction along haul roads would also occur. Land allocations include, C1 (210 acres), B2 (39 acres), and B11 (38 acres).

2. Second Growth Management

Need Within the planning area, there are some stands of second growth trees that are experiencing a slowing of growth due to overcrowding. Approximately 104 acres of 70 year old natural second growth are currently overstocked. A small patch of root rot occurs in stand 41. If left unaltered, this overstocked condition would result in continued reduction of net annual growth and result in stands with reduced vigor and increased mortality. These areas include the following land allocations: C1 (50 acres) and B11 (54 acres)

Purpose The objective is to increase health and vigor, and to enhance growth which results in larger trees.

Proposed Action The proposed action is to thin and fertilize approximately 104 acres. Approximately 1/3 mile of road would need to be constructed to access landings. Half of these acres would have trees removed by tractors and the other half would have small trees chipped or left on site or removed as firewood. Stand 41 would have all trees removed in a 75 foot wide strip (approximately 2 acres) surrounding the root rot. This strip plus the deforested center would be planted with disease tolerant species.

3. Road Restoration

Need There is a need to reduce road maintenance costs and to reduce potential sources of sedimentation. The following roads were identified for treatment (4670-029, 4672-170, and 4672-172).

Purpose The objectives are to reduce road maintenance costs and to reduce sources of erosion.

Proposed Action The proposed action is to decommission three roads: 4670-029, 4672-170, and 4672-172 for a total of approximately 0.8 mile. Rock surfacing would be removed and roads would be scarified and seeded.

4. Forage Enhancement

Need Quality forage is lacking in certain important deer and elk habitats within the B11 land allocation. If no action is taken, forage would continue to decline.

Purpose The objective is to provide quality forage.

Proposed Action The proposed action is to scarify, seed, and fertilize 5 acres. These are located in older plantations in which conifer growth is limited by freezing during the growing season. Native grass such as blue wild rye would be used.

D. Scoping

A scoping process to request public input for this project was conducted. A letter describing the proposed project and requesting comments was sent out on October 7, 1997. The project also appeared in the Forest's Summer 1997 issue of Sprouts, a quarterly publication that is mailed to a wide audience. The following issues were developed as a result of this scoping.

E. Issues

The planning process is guided by issues developed during the scoping process. Analysis of these issues aided in formulating and evaluating alternatives, and defining project design criteria to meet resource management objectives.

Significant Issue

1. Water Quality and Fisheries

Both water quality and fish habitats are concerns for many people. The proposed actions are in subdrainages of the Clackamas River. Even though the proposed actions have been designed to meet current standards there is still a concern about ground disturbing activities including road construction.

The new road construction needed to access units 16 and 41 may pose a risk to water quality and fish by contributing sediment to streams. A qualitative rating will be used to describe impacts to water quality and fish.

Other Issues

2. Biogeography

The proposed action would regenerate 25 fragments of mature forest. The Northwest Forest Plan and the Watershed Analysis provided for species with large home ranges and for species which require large blocks of mature forest, but there are many species of plants and animals that use isolated patches. The Watershed Analysis recommended that harvest opportunities be focussed on parts of the landscape which have minimal value to late-successional species.

There is a concern that "islands" of forest are important as biodiversity "stepping stones," areas for wildlife and plants to use until other surrounding stands grow to maturity. A qualitative rating will be used to describe the affects.

3. Scenery

Portions of the project area can be seen from road 46 which is a primary travel route. It is also seen from other local roads. Most of the project area has been visually altered by past harvest.

There is a concern about how canopy removal would alter scenery as seen from road 46 and other open roads in the project area. A qualitative rating will be used to describe the effects.

CHAPTER II. - ALTERNATIVES AND DESIGN CRITERIA

A. Alternative A - No Action.

"Custodial" activities would occur, including but not limited to road maintenance, data gathering, fire suppression, and activities approved by other plans or documents. All of these custodial activities would also occur with any of the other alternatives.

B. Alternative B - Proposed Action

Alternative B is designed to move the area toward the desired future condition. It is designed with the intent of protecting or enhancing the resources listed in the issues section. The purpose and need section describes 4 actions.

Action 1 involves regeneration of stands using the shelterwood method. It targets "islands" or other areas where fragmentation is so extensive that no interior habitat remains. Fuels reduction and site preparation would be accomplished prior to planting. Short sections of temporary road would be built to access landings. Approximately 287 acres would be treated in this manner.

Action 2 involves thinning and fertilizing approximately 104 acres of second growth forest which is overcrowded. Short sections of temporary road would be built to access landings.

Action 3 involves the decommissioning of roads 4670-029, 4672-170 and 4672-172.

Action 4 involves the enhancement of forage.

C. Alternative C

Alternative C is designed to respond to issue #1.

The proposed action involves the construction of several roads to access landings. Many of the roads are very short and are proposed to allow landings to be placed in the location where skyline logging can be done with minimal disturbance to soils. The primary concern expressed in issue #1 is with two longer roads associated with units 16 and 41. Alternative C would eliminate these two longer roads and the units would be logged using other methods.

D. Mitigation Measures (also see Appendix A)

SEASONAL RESTRICTIONS

1. Soils: No operation of off-road ground-based equipment would be permitted between October 1 and June 30. Units 3,4,5,6,7,17,18,20,21,23,24,25,26,27,30,35,40 and 41. Also applies to the ground-based portions of units 2,8,9,16 and 22. Also applies to ground-based equipment on

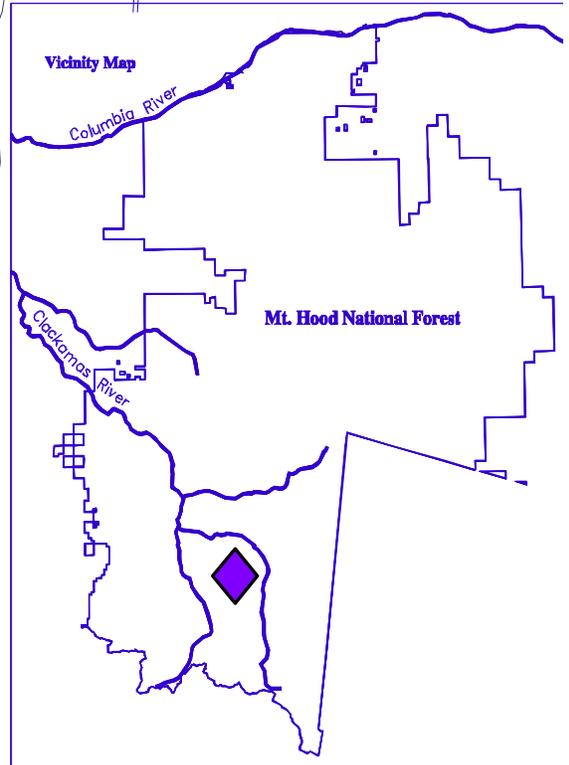
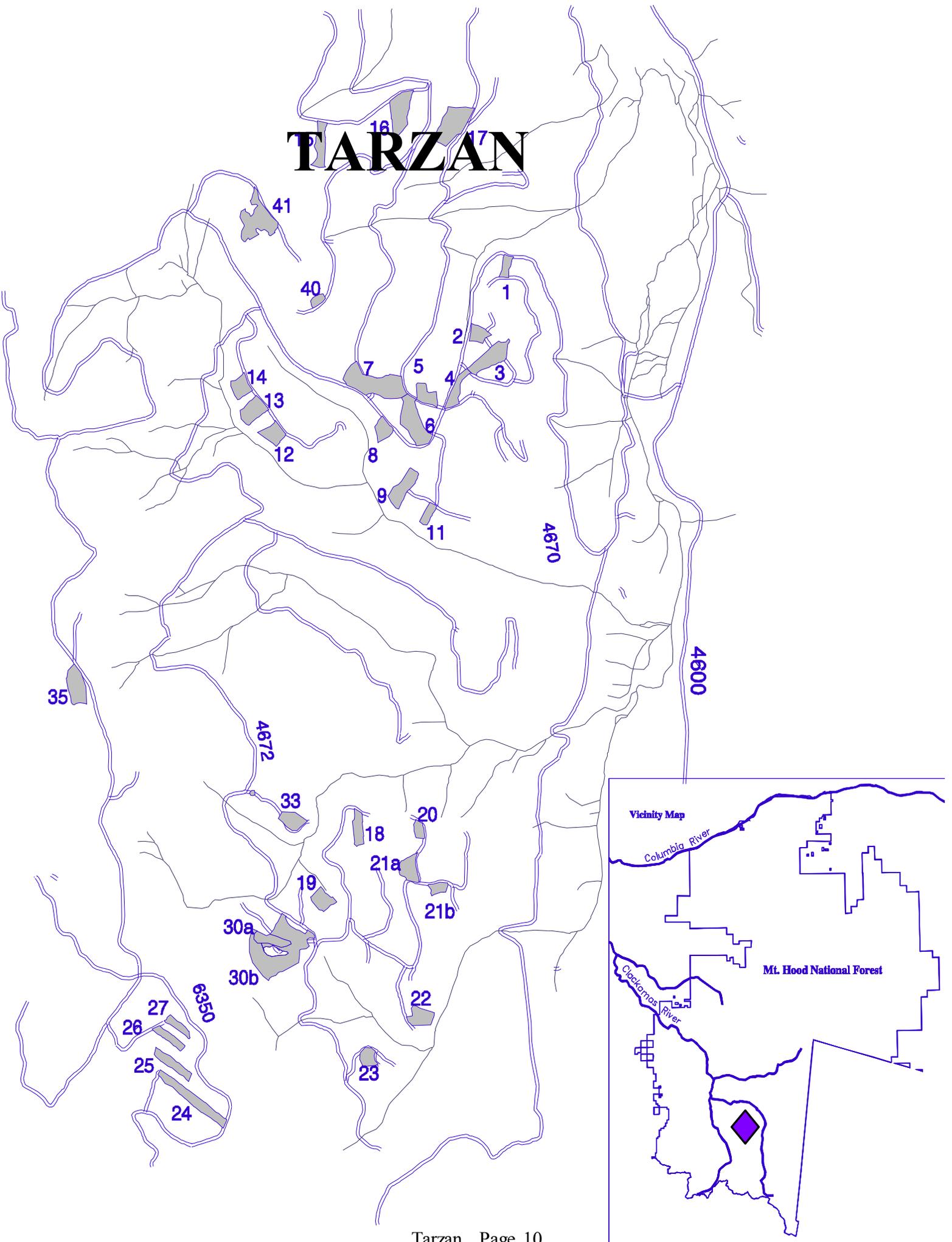
connected projects and road construction. This restriction may be waived if soils are dry or if operators switch to skyline or other systems.

2. Big Game Summer Range: No harvest operations, road construction, use of motorized equipment or blasting would be permitted in the B11 Summer Range land allocation during fawning, calving, and rearing season, generally April 1 through July 30. Unit 24, 25, 26, 27 and 30.
3. Big Game Rearing: No harvest operations, road construction, use of motorized equipment or blasting would be permitted in key deer and elk rearing areas between May 15 and June 30. Units 19, 30 and 33.
4. Spotted Owls: No harvest operations, road construction, use of motorized equipment or blasting would be permitted within $\frac{1}{4}$ mile of northern spotted owl activity centers between March 1 and June 30. This applies to unit 21b.
5. Peregrine Falcon: No harvest operations, road construction, or use of motorized equipment would occur within 2 miles of known nest sites between January 1 and July 31 to protect nesting Peregrine Falcons. Applies to units 5,6,7,8,9,12,13,14,15,16,17,35,40 and 41. No blasting would occur within 3 miles of known nest sites between January 1 and July 31 to protect nesting Peregrine Falcons. Applies to units 1 through 18, 35, 40 and 41. This restriction may be waived if nest sites are not used.

OTHER DESIGN CRITERIA

6. Following harvest activity, the contractor would remove or chip slash created by harvest operations in units 1,2,4,6,7,8,24 and 35 within 100 feet of roads 6350, 4670, and 4650.
7. Candy stick (*Allotropa virgata*): The following is the project specific design that would meet the management requirements for this "Survey and Manage" plant. To protect at least 50% of the known population, green tree retention patches have been identified in Unit 8. Trees, woody debris and duff in these retention patches would be protected during harvest, burning and post harvest treatments. Populations would be monitored.
8. Other projects in the Tarzan area may be approved by other environmental assessments including restoring large woody debris to streams, improving fish passage at culverts, and riparian planting. These projects may be eligible to be funded by Knudsen-Vandenberg funds generated by the Tarzan project.

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Comparison of Alternatives with Purpose and Need

	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Purpose 1 Regeneration	Does not meet objectives. Growth would continue to decline. Fragmented landscape remains.	Fully meets objectives. Regenerates 27 islands, on 287 acres. Moves toward DFC for both forest health/growth and for creating contiguous early-seral patches.	Same as B
Purpose 2 Second Growth Management	Does not meet objective. Growth would continue to decline. Health problems increase.	Fully meets objective. Enhances growth of 104 acres of young forest.	Same As B
Purpose 3 Road Restoration	Does not meet objective. Erosion continues.	Meets objective of reducing maintenance costs. Closes 0.8 mile of road.	Same As B
Purpose 4 Forage	Does not meet objective. Animals lack forage.	Meets objective. Creates 5 acres of quality forage.	Same As B

Comparison of Alternatives with Issues

	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Significant Issue #1 Fish and Water	No impacts to water quality and no improvements with road oblit. or reconstruction.	No measurable impacts. 5,200 feet of road construction. Some risk of sediment reaching streams from new roads.	No measurable impacts. 900 feet of road construction. Less risk of sediment reaching streams than Alt B.

CHAPTER III. - ENVIRONMENTAL EFFECTS

This section provides a comparison of alternatives. Alternatives are compared by the varying effects which they impart on several components of the environment. References are included for each resource to indicate where it is discussed in the Northwest Forest Plan and the Mt. Hood Forest Plan and Final Environmental Impact Statement (FSEIS).

A. Water Quality and Fisheries (Issue #1)

Mt. Hood Forest Plan References

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

Northwest Forest Plan References

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

Existing Situation

The Watershed Analysis contains the following information on existing conditions for the Upper Clackamas River and tributaries.

- Water quality is excellent.
- Water temperature is well within the range for optimal rearing of salmonids.
- The watersheds are hydrologically stable in terms of geology and vegetative cover.
- There was relatively little damage to the subwatersheds of the Tarzan area during the recent floods and storm events.

Effects of Alternatives - Issue #1

There are several roads constructed to access harvest area landings. Most of them are very short extensions of existing roads. Issue #1 focuses on two long roads (4300 feet) which access units 16 and 41. These roads may pose a risk to water quality and fish by contributing sediment to streams. The potential sediment sources that have been considered (for avoidance or mitigation) include: direct input of storm runoff during construction of stream crossings, erosion of cut and fill slopes of roads near

streams prior to the growth of grasses spread for erosion control, rutting of roads used during wet conditions, the increased ditch network and faster delivery of water to streams. The two roads accessing units 16 and 41 would be constructed with alternative B but would not be built with alternatives A or C. With alternative B, there would be a short-term increase in risk of sediment inputs during the life of the project. These roads are not in riparian reserves and do not cross any streams. They would be used during dry or frozen conditions. When use is completed, they would be ripped and seeded. Given these design features and other mitigations measures, there would be no measurable difference between any of the alternatives in terms of sediment input to streams, water quality or fish habitat.

Effects of Alternatives - Other

Implementation of the Aquatic Conservation Strategy of the Northwest Forest Plan has resulted in dramatically reduced effects on riparian and aquatic dependent resources. There are no proposed actions within Riparian Reserves. Possible effects to aquatic resources would be limited to projects outside the Riparian Reserve which involve canopy removal or ground disturbance.

The proposed activities have been designed to meet the Aquatic Conservation Strategy and State Water Quality Standards, and therefore the Clean Water Act, through adherence to Best Management Practices. Project design and mitigation minimize effects to recreational fisheries. Proposed road closures are for roads which do not access fish bearing streams.

The Aggregate Recovery Percentage (ARP) index is often used to calculate cumulative effects of past and future harvest activities on hydrology. It evaluates the risk of increased peak flows from rain-on-snow events. In stands with little or no canopy, snow accumulation on the ground is subject to rapid melting during periods of rain. The ARP value for these subwatersheds would decline by 1 to 2% with the action alternatives with post treatment levels varying from 73 to 76%. The minimum Forest Plan level for these watersheds is 65%. For more information on cumulative effects of this project and others on watershed and fisheries, refer to Chapter 5 of the Upper Clackamas Watershed Analysis.

Stream shade conditions would remain unchanged and no change in water temperature is expected.

Mitigations have been designed to minimize the risk of fertilizer entering streams. Direct application is avoided by using a "no application buffer" to avoid application near streams and areas of surface water for protection of fish and other aquatic organisms. Drift is avoided by limiting aerial application to days with little to no wind. Based on past District monitoring of forest fertilization activities, the only chance for approaching or possibly exceeding standards and thresholds would be in the case of an accidental spill. If this were to happen, the District spill containment plan would be implemented immediately with proper state and federal agencies notified.

Bull Trout (proposed threatened) While it is thought that bull trout were once prolific throughout the Clackamas River and its tributaries, fisheries biologists believe that bull trout no longer exist in this area. Stream temperatures fall within the optimum range for bull trout. Several years of intensive sampling have yielded no sightings of bull trout. The effect rating for this species for this project is "May Effect, Not Likely to Adversely Affect."

Steelhead - Lower Columbia Stock (proposed threatened) Adult Clackamas winter steelhead migrate into the Forest April through June. Above North Fork Dam they use the mainstem and the larger tributaries as spawning and rearing habitat. The effect rating for this species for this project is "May Effect, Not Likely to Adversely Affect."

Cutthroat trout - Lower Columbia Stock (sensitive) Cutthroat trout exhibit diverse patterns in life history and migration behaviors. The effect rating for this species for this project is "May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal Listing."

Coho Salmon - Lower Columbia Stock (sensitive) The Clackamas River contains the last significant run of wild late-run winter coho in the Columbia Basin. Coho salmon occupy the Clackamas River and the lower reaches of streams in the Upper Clackamas watershed. Adult late-run winter coho enter the Clackamas River from November through February. Spawning occurs mid-January to the end of April with the peak in mid-February. Peak smolt migration takes place in April and May. The effect rating for this species for this project is "May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal Listing."

B. Late-Successional Forests, Connectivity and Biogeography (Issue #2)

Mt. Hood Forest Plan References

Forestwide Diversity Standards and Guidelines - FW-158 to FW-169, page Four-67
See FEIS pages IV-90 and IV-155 to IV-167

Northwest Forest Plan References

Ecological Principles for Management of Late-Successional Forests - pages B-1 to B-9
Current Plans and Draft Plan Preferred Alternatives: Exceptions - page C-3
Matrix Standards and Guidelines - pages C-39 to C-61

Existing Situation

The current mix of seral stages is primarily the result of timber harvest and fire. The Upper Clackamas is a highly fragmented watershed within a highly fragmented subbasin. The most connected late-seral habitat in the watershed is in the LSR and would remain and eventually increase through time, since they would be managed to promote the development of late-seral habitat. Roughly one third of the Upper Clackamas watershed is in LSR 207 and 100 acre LSRs. The portion of LSR 207 that lies within the Upper Clackamas Watershed contains 23 of the 52 known owl activity centers in the watershed. The LSR is one of the narrowest in the region and hence has a high edge to area ratio.

Late-seral habitats are currently more abundant in the watershed than early-seral habitats. Generalist and contrast species have abundant habitat. The planning area currently contributes a high percentage of the available habitat for TLML (Terrestrial Large home range, Mosaic, Late-seral) species.

Effects of Alternatives - Issue #2

There is a concern that "islands" of forest are important as biodiversity "stepping stones," areas for wildlife and plants to use until other surrounding stands grow to maturity. The Northwest Forest Plan and the Watershed Analysis provided for species with large home ranges and for species which require large blocks of mature forest, but there are many species of plants and animals that use isolated patches. Alternative A would not alter any stands. Alternatives B and C would regenerate 25 fragments of mature forest. This would result in the local extirpation of species which display limited dispersal capabilities. These species would be maintained in other land areas such as Late-Successional Reserves, Riparian Reserves, 100 acre owl reserves, administratively withdrawn lands and within the connectivity network. They would also be retained in mature forests in the matrix that would not be harvested in the near future due to scheduling constraints.

Effects of Alternatives - Other

The strategy developed in the Upper Clackamas Watershed Analysis and used to prioritize regeneration opportunities within the Tarzan project area, focuses on stands which were fragmented or otherwise isolated from the larger interior late-seral patches. This strategy accomplishes two things; it avoids the interior patches which are most valuable to species dependent on late-seral habitats, and it increases the average patch size. Through alternatives B and C, 287 acres would be regenerated under this strategy. These stands are highly fragmented and have little interior habitat.

Stands would be regenerated by removing most of the trees and preparing the site for planting. Of these acres, at least 10% would be retained in patches and on the rest, the reserve shelterwood method would be used to provide protection to seedlings.

A total of 149 acres of late-seral habitat would be converted on 15 units including units 1, 8, 9, 12 - 15, 17-20, and 22 - 25. Treatment of these areas would not affect interior late-seral habitat (areas of late-seral habitat greater than 500' from an opening) because these units primarily treat isolated small blocks of late-seral habitat. These units are not in the connectivity network identified in the watershed analysis.

Overall, only a slight reduction in populations of late-seral associates is expected. Available habitat for late-seral associates with medium and large home ranges (TLML and TMML) would be concentrated largely within the LSR and riparian reserves. This project would have minor effects on late-seral habitat within the matrix since the most connected late-seral stands are retained within the connectivity network.

C. Scenery (Issue #3)

Mt. Hood Forest Plan References

Forestwide Visual Resource Standards and Guidelines - FW-552 to FW-597, page Four-107

Scenic Viewsheds Standards and Guidelines - B2-12 to B2-42, page Four-221

See Mt. Hood FEIS pages IV-127, IV-131, IV-142, and IV-155 to IV-167

See Clackamas National Wild and Scenic River and State Waterway Environmental Assessment and Management Plan, Appendix F - Clackamas River Management Plan

Existing Situation

Portions of the project area can be seen as middleground from Road 46 which is a primary travel route as well as from the Clackamas River which is a Scenic River. From these viewing positions, the visual quality objective is partial retention. Views into the project area are screened by trees except in one small area of road 46. At this point, large portions of the landscape to the west of road 46 can be seen. The view can be described as rolling topography where mature forests are fragmented by interspersed plantations. Straight edges and stand shapes result in a landscape that does not meet the partial retention visual quality objective. None of the proposed harvest areas can be seen from road 46 or the Clackamas River.

Proposed harvest areas can be seen from other open roads which carry a visual quality objective of Modification. Old clearcuts adjacent to these roads open up vistas of distant mountains and ridges as well as more local scenes which can be described as rolling topography where mature forests are fragmented by interspersed plantations and roads. Straight edges are common.

Effects of Alternatives

Alternative A would result in a continuation of the current unacceptable visual condition.

Alternative B and C involve the removal of forest canopy. Units 1, 17, 18 and 20 are within the viewshed of road 46 and the Clackamas River but cannot be seen due to vegetative screening. This vegetative screening consists of mature trees which are in a Late-Successional Reserve. These trees are likely to persist for many years unless a catastrophic event such as a fire or wind storm cause openings large enough to open up a view of adjacent upland slopes. Units 30 through 41 are thinning prescriptions which would retain their current visual character which is contiguous unfragmented forest. Regeneration units that are visible from open roads in the Modification zone include 2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 21, 24, 25, 26 and 27. Project design and mitigations combine to move the landscape toward its desired visual condition. Since fragmented forest patches are targeted with this alternative, the existing straight edges would be blended. 10% of each harvest area would be retained in clumps and 15 trees/acre would be retained outside of the clumps in regeneration units. To reduce visual impacts, 100% slash disposal would be required near major roads. In the long term, the concept of focussing harvest on islands and other fragmented forest patches would result in a more natural appearing landscape with large patch sizes and fewer straight lines. The amount of time required for the visual blending of old plantations and proposed harvest units would depend on the height of the old plantations: the taller they are the longer it would take for straight edges to disappear.

D. Economics

Mt. Hood Forest Plan References

Forest Management Goals - 19, page Four-3
See FEIS page IV-112

The objectives for this project involve the targeting of certain stands which have marginal economic value.

Alternative B: Units 1, 11, 13, 14, 18, and 27 are understocked and are not growing up to the sites potential. Units 30, 33, 35, 40 and 41 are thinning proposals. Since the larger trees would be retained in all of these units, the value of the timber removed compared with the costs of logging results in a marginal situation. However when the value of the other units is combined, the project as a whole would have a positive net value. This project would have a benefit/cost ratio of 1.31.

Alternative C would have less road construction but would have higher logging costs. It would cost \$38,000 more than B and would result in a benefit cost ratio of 1.28.

Alternative A would result in a long-term reduction in site productivity. Stands which are not growing commensurate with the sites potential would remain and would continue to decline.

E. Botany

Mt. Hood Forest Plan References

Forestwide Threatened, Endangered and Sensitive Plants and Animals Standards and Guidelines - FW-170 to FW-186, page Four-69

See FEIS pages IV-76 and IV-90

Northwest Forest Plan References

Survey and Manage Standards and Guidelines - pages C-4 to C-6

Survey and Manage Species List - pages C-49 to C-61

Surveys have been conducted for sensitive plants. Three sensitive plant species were found approximately 0.75 mile from any proposed project site: *Corydalis aquae-gelidae*, *Aster gormanii* and *Utricularia minor*. None of the proposed actions would impact these populations.

There are rare plants listed on Table C3 of the Northwest Forest Plan. At this time, the management of known sites is required for certain species. The following species are known to occur in the vicinity of the Tarzan project.

Allotropia virgata (Candy Stick) - There are 5 known sites in the project area. Management direction requires protection of 50% of the known population in any subwatershed. Mitigation measure #7 describes the identified protection measures.

Hydrotheria venosa - There is one known site in the project area for this aquatic lichen. Riparian Reserves would adequately protect this species.

Hypogymnia oceanica - There are two known sites for this lichen near the project area. The proposed activities are far enough away from known sites so that no special protection measures would be needed.

Corydalis aquae-gelidae - The proposed activities are far enough away from known sites so that no special protection measures would be needed.

F. Wildlife

Mt. Hood Forest Plan References

Forestwide Diversity Standards and Guidelines - FW-162, page Four-68

Forestwide Wildlife Standards and Guidelines - FW-187 to FW-214, page Four-71

Deer and Elk Standards and Guidelines - B10-12 to B10-28, page Four-274, B11-9 to B11-25, page Four-278, B8-11 to B8-24, page Four-263, B2-18 to B2-31, page Four-224, See FEIS page IV-90

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

Northwest Forest Plan References

Protection Buffers - pages C-19 to C-21
Matrix Standards and Guidelines - pages C-39 to C-61
Consultation - Endangered Species Act - page A-2
Critical Habitat for Northern Spotted Owl - page A-3
Standards and Guidelines Common to All Alternatives: Exceptions - page C-3
Survey and Manage Standards and Guidelines - pages C-4 to C-6
Known Spotted Owl Activity Centers - pages C-10 and C-45
Protection Buffers - pages C-19 to C-21, C-45 to C-48
Additional Protection for Bats - page C-43
Survey and Manage Species List - pages C-49 to C-61

Northwest Forest Plan FSEIS References

Chapters 3&4: Affected Environment and Environmental Consequences - pages 205-258

Northern Spotted Owl (threatened)

Alternative A would have no effect on the spotted owl or its habitat.

Alternatives B and C

Spotted owls are dependent on all attributes of a late-successional forest, including large diameter trees, a multilayered canopy, the presence of large snags and large coarse woody debris in various decay stages.

Approximately 213 acres of nesting-roosting-foraging habitat (NRF) would be removed through regeneration harvest. Approximately 244 acres of dispersal habitat would be removed and 116 acres dispersal habitat would be degraded (these acreages add up to more acres than the total for the units because some units occur in several owl home ranges, and are therefore counted twice).

Survey efforts completed since 1990 determined that 41 pairs and 5 resident singles have territories in the Upper Clackamas watershed which includes the Tarzan planning area. Twenty three of the activity centers are located inside LSR 207. Seventeen are outside LSR 207, but have 100 acre LSRs surrounding the activity center. Twelve activity centers have no designated habitat protection since they were found for the first time in the summer of 1994 after the reserves around the known spotted owl activity centers were established.

The Tarzan project area contains portions of a Critical Habitat Unit (CHU OR-11). In all likelihood the Northwest Forest Plan would be adopted as the Final Recovery Plan for the northern spotted owl; the LSRs and reserves around known owl activity centers may comprise the new CHU. Until that time, however, impacts to existing delineations of the CHUs will be displayed. There are about 48,300 acres of CHU in the Upper Clackamas watershed. Of that, about 25,000 acres is NRF habitat (52%) and about 26,900 acres is dispersal habitat (56%).

Only two units occur in Critical habitat. Units 16 and 17 would remove a total of 17 acres of dispersal habitat and 22 acres of NRF habitat within CHU OR-11. All other units occur outside of this CHU.

There is expected to be a low risk to the population as a whole as this project is consistent with all of the standards and guidelines identified in the Northwest Forest Plan. A determination of "may effect individuals but would not pose a threat to the population" was made for the northern spotted owl. Consultation with the U.S. Fish and Wildlife Service was initiated on the Tarzan project in August, 1997, through the document titled "The Willamette Province Fiscal Year 1998 Habitat Modification Biological Assessment for listed species."

With alternatives B and C, one proposed harvest unit (21B) would be within 1/4 mile of an owl activity center. The application of a limited operating season would reduce the affect of noise disturbance on nesting owls.

Bald Eagle (Threatened)

No bald eagle nests or communal winter roosts are known within the Tarzan planning area. Habitat conditions through most of the upper Clackamas River corridor are marginal to poor for bald eagle occupancy, due mainly to limited prey density and prey availability. Eagles require large trees and snags for nesting and roosting and large bodies of water such as lakes and major rivers for foraging. Eagles have been documented foraging along the Clackamas and Collawash Rivers. The Mt. Hood Forest Plan identified Bald Eagle Habitat Areas (A13) that were designed to provide potential nesting and communal roosting habitat that would contribute to recovery of the species as identified in the Pacific Bald Eagle Recovery Plan (1986). There are no A13 areas in or adjacent to the Tarzan project area.

Peregrine Falcon (endangered)

Surveys for peregrine falcons were completed in 1993. Survey results revealed two eyries (nest sites), each of which were located just outside the boundary of the Tarzan project area.

Although no eyries were located within the project area, several adjacent sites were classified as having potential for peregrine nesting. High potential sites include Mt. Lowe and Granite Peaks. These sites have been surveyed in the past. No peregrine nesting activity has been observed to date. The seasonal restriction for this species would be waived if no nesting is occurring during the project. The effect rating for all alternatives would be "No Effect."

Black-backed woodpecker (Protection Buffer Species)

This species occurs at higher elevations on the Forest in stands with lodgepole pine, western larch, true firs, or Engelmann spruce. The species is snag dependent for nesting and foraging. Black-backed woodpeckers also require beetle infested trees for foraging. Surveys are not required for this species. Managing for high levels of large snags is the primary mitigation measure for this species.

Great Gray Owl (Protection Buffer Species)

Great gray owls have not been documented to occur anywhere on the Mt. Hood National Forest. Surveys have been conducted to protocol standards on many of the Forests meadows including Rhododendron meadow, which is in the planning area. To date, no great gray owls have been discovered. The project would have no effect on the great gray owl.

Bats (Protection Buffer Species)

Four species of bats that may occur in the Assessment Area have been identified as protection buffer species: long-eared myotis, long-legged myotis, fringed myotis, and silver-haired bat. Snags and old, decadent trees provide important roosting habitat for these bats. They were identified as Protection Buffer Species because caves, mines, abandoned wooden bridges and buildings are extremely important roost and hibernation sites, and require additional protection to ensure that their value as habitat is maintained. Caves, mines, abandoned wooden bridges and buildings are not present in the project area.

Red Tree Vole (survey & manage)

The red tree vole is a canopy dwelling vole. It appears to be more abundant in late-successional forests than young forests. These voles are limited to lower elevations (less than 3,300 feet) forests with a strong Douglas-fir component. They probably have limited dispersal capability because they live and travel primarily in the canopy of conifer forests. Primary reproductive habitat is late-successional stands greater than 100 acres, primarily habitat is late-successional stands of any size, and potential habitat identified as closed-canopy-small-conifer stands. Surveys for red tree voles are not required in the Tarzan area based on draft survey protocols.

Deer and Elk (indicator species)

Deer and elk utilize the Tarzan area primarily as summer range with a portion of the area allocated as B11 Deer and Elk Summer Range in the Mt. Hood Forest Plan. Available thermal cover, especially optimal cover (thermal cover with forage interspersed in small openings) and open road density have been analyzed for Tarzan using fixed analysis areas.

Existing situation (pre) and Post Harvest habitat conditions (post).

	Minimum	Hunter Cr. *		Rhodode ndron		Lowe Cr.		June Cr.		B11 **	
		pre	post	pre	post	pre	post	pre	post	pre	post
Optimal Cover %	20	45	44	37	36	43	43	33	32	22	22
Optimal and Thermal Combined %	30	55	53	50	49	57	55	50	48	56	56
	Maximum										
Open Road Density miles / square mile	2.5	2.8	2.3	1.5	1.4	2.5	2.5	2.3	2.3	1.5	1.45

* The post harvest number for Hunter includes acres and miles closed from the planned Bear Cub project, (54 acres of harvest and 2.3 miles of road closure) which overlaps.

**The target maximum open road density for B11 is 1.5 miles per square mile.

Quality forage is lacking in certain important deer and elk habitats. The proposed action is to scarify, seed, and fertilize 5 acres. These are located in older plantations in which conifer growth is limited by freezing during growing season. Native grass such as blue wild rye would be used.

Alternative A would have no reduction of optimal or thermal cover but would also not enhance forage or close any roads.

Alternatives B and C

Through implementation of Alternatives B and C, approximately 258 acres of forage would be created in regeneration harvest units (reduced 10% for leave patches). This would provide forage for deer and elk for approximately 15 years. Seventy eight acres of thermal cover and 138 acres of optimal thermal cover would be converted. The resulting levels of thermal and optimal thermal cover would continue to be well within the range needed to meet Mt. Hood Forest Plan standards. In addition, five acres of quality permanent forage would be created by scarifying, seeding, and fertilizing frost pockets with native blue wild rye.

Alternatives B & C would also decommission three segments of road totaling 0.8 mile, which would benefit big game by reducing open road densities and potential for harassment. Newly constructed roads would be closed upon completion of project.

Alternatives B & C would benefit deer and elk habitat by creating forage and quality permanent forage, while reducing harassment through road closures. Relatively high levels of thermal and optimal thermal cover would be maintained.

Pine Marten and Pileated Woodpecker (indicator species)

Most of the proposed harvest units contain habitat for Pine Marten and Pileated Woodpecker. Alternative B and C would remove this habitat and Alternatives A would retain it. The Northwest Forest Plan provided for the needs of these species by the delineation of late-successional reserves and other land allocations. The Upper Clackamas Watershed Analysis recommended that the habitat management areas for these species in the Mt. Hood Forest Plan (B5) were not needed and they were deleted as recommended in the Northwest Forest Plan.

Caddisfly (sensitive)

Four species of caddisfly (Mt. Hood Primitive Caddisfly, Mt. Hood Farulan Caddisfly, One-spot Caddisfly, and Cascades Apatanian Caddisfly) are thought to reside in high elevation small streams. They have never been found in the Clackamas basin.

Larch Mt. Salamander (survey & manage)

No potential habitat (talus) has been identified near the project area.

Mollusks (survey & manage)

Many listed species are associated with riparian areas which would not be affected by this proposal. There are no known sites and surveys are not required for mollusks at this time.

Other Wildlife Habitats

Project design and mitigation measures combine to ensure adequate levels of habitat for species which depend on snags and down wood. An analysis done during Watershed Analysis indicates that snag densities across the landscape averages greater than 4 snags per acre. This existing level combined with the levels left in proposed harvest units would ensure that the landscape level situation for snag dependent species would exceed 40% biological potential. (Upper Clackamas Watershed Analysis page 17). See Appendix A for other wildlife design features.

Several wet meadows occur in the project area. There are a number of species tied to these meadow habitats. The meadow habitat is expected to continue to occur in the planning area in about the same amount as currently exists.

G. Soils

Mt. Hood Forest Plan References

Forestwide Soil Productivity Standards and Guidelines - FW-22 to FW-38, page Four-49

Forestwide Geology Standards and Guidelines - FW-1 to FW-21, page Four-46

Earthflow Standards and Guidelines - B8-28 to B8-41, page Four-264

See Mt. Hood FEIS pages IV-11, and IV-155 to IV-167

Northwest Forest Plan References

Coarse Woody Debris Standards and Guidelines - page C-40

Soil Disturbance Standards and Guidelines - page C-44

Modify Fire and Pesticide Use, Minimize Soil Disturbance Standards and Guidelines - page C44

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

Existing Situation

Soils in the Tarzan sale area are classified in the Mt. Hood Soil Resource Inventory (SRI) as primarily mapping units 304 and 309, with minor amounts of mapping units 305, 310, 336, and 337. Slopes in the project area vary from 0 to about 60 percent. Soil mapping unit 304, 305, and 337 has formed in deep glacial till deposits and mapping unit 309 and 310 in deep compacted glacial till deposits. Soils in mapping unit 336 have formed in unconsolidated silt to boulder sized materials deposited by alpine glaciers. Soil profiles for the predominant soils (304 and 309) in the project area range in depth from about 30 to 60 inches, and vary from gravelly silt loams, gravelly sandy loams, and in some instances cobbly loams.

The SRI interpretation for surface erosion for the predominant soil mapping units is slight, and low to moderate for subsoils. Soil compaction hazard for the predominant soil mapping units is low to moderate, and the soil mantle stability rating is very stable.

The landform mapping in the Upper Clackamas watershed analysis shows that the landforms within the Tarzan project area consist of resistant rock on gentle to steep slopes as well as some areas of weak rock on steep slopes (WRSS). The WRSS is unstable as a result of pyroclastic rock. Proposed timber harvest units were located to avoid landforms with weak rock on steep slopes.

Effects of Alternatives

Harvest units were examined and determined to be suitable for timber management in terms of soil productivity. Potential soil disturbances that have been considered (for avoidance or mitigation) include compaction from heavy equipment, and the displacement of soil and organic matter by harvesting or site preparation equipment and erosion. Other factors considered were the potential effects caused by fire, the effects to mycorrhizae, and effects to long-term site productivity. Mitigation measures and project design for harvest units and road construction would result in meeting applicable standards for soil protection. With Alternative B, most of the units would be either logged via a skyline system or a loader logging system both of which result in very low soil impacts. Tractors would only be used where loader logging is not feasible. With alternative C, two roads would not be built and this ground would continue to grow trees. Alternative C would therefore have slightly less effect on soils than B. With alternative A, the proposed road decommissioning would not occur and erosion would continue.

H. Management of Competing and Unwanted Vegetation

1. Management Objectives

Site specific vegetation management objectives have been developed. They are based on the objectives stated in the FEIS for Managing Competing and Unwanted Vegetation, FEIS for the Standards and Guidelines in the Pacific Northwest Regional Guide (1984), Mt. Hood National Forest Plan, and the Northwest Forest Plan. Vegetation management projects would be designed to minimize potential adverse impacts to the environment, project workers, and the public. The following list of objectives were used to identify the "damage thresholds" for vegetation management, vegetation management strategies and the feasible treatment methods.

Site Specific Objectives:

- Meet the recommended stocking levels within 5 years after harvesting.
- Maintain conifer stocking at levels that would produce an economical thinning at the earliest possible time.
- Meet the Mt. Hood Forest Plan standards for minimizing soil erosion and compaction.
- Maintain adequate levels of downed woody debris and snags that provide for habitat diversity and the maintenance of long-term productivity.

2. Site Conditions

Stands proposed for regeneration harvesting have a low to moderate level of existing understory vegetation. This vegetation could become a physical barrier during tree planting. Currently, the overall fuel loading in the proposed harvest units in the 0-3 inch size class averages well below 12 tons/acre. Slash created during harvesting could become a physical barrier during tree planting and can create an

unacceptable fuel hazard level. Removal of this live vegetation and slash prior to planting may be necessary in order to meet management objectives for conifer seedling establishment. Past experience in this area shows that if shelter trees are retained to ameliorate the effects of an otherwise harsh site, and if trees are established immediately after site preparation, no release treatments are required to meet the stand growth objectives.

3. Damage thresholds:

1. Greater than 20% cover of live vegetation.
2. Less than 350 "well" distributed planting spots per acre.
3. Greater than 12 tons/acre of slash in the 0-3" size class.

A post harvest/pretreatment survey would be conducted on all harvest units to identify those that exceed these thresholds. If this survey determines that any of the harvested units are below these thresholds, then the no treatment alternative would be chosen, and tree planting would take place as soon as possible.

4. Strategy Selection

Several strategies were considered. Alternatives B and C would use a combination of the prevention, no action and correction strategies depending on site specific conditions.

No Action includes natural decomposition of slash. If a post-harvest review determines that the damage thresholds would not be exceeded, this treatment option could be chosen.

Prevention would be applicable to intermediate harvest prescriptions which would not create much slash and where planting is not needed. Shelterwood retention is also a technique which can be used to enhance early reforestation success which in turn minimizes the risk of brush competition.

Correction involves the treatment of brush and slash where damage thresholds are exceeded.

- a. Grapple piling would involve a track-mounted vehicle with a grapple type device to pile a large portion of the slash. It would also be used to pull the larger live vegetation and place it in the pile with the slash. These piles would then be burned under a very specific set of weather and fuel moisture conditions.
- b. Machine crushing and cutting would use a track-mounted masticating machine to chip or grind up smaller dead limbs, create planting spots, and cut live vegetation.
- c. Hand piling would involve a combination of use of chain saws and manual labor to pile the slash and remove the live vegetation. These piles would then be burned under a very specific set of weather and fuel moisture conditions.
- d. Broadcast burning is the intentional application of fire, usually on larger more continuous fuels where the use of other treatments is not appropriate. Jackpot burning is similar but is used to describe a situation where fuels are not continuous. It would be applied under a very specific set of weather and

fuel moisture conditions. Measures that would be used to minimize the loss of green trees during burning. Burning would be executed in compliance with Oregon Smoke Management Regulations.

e. Lop and Scatter involves the use of chain saws to get slash closer to the ground to reduce ladder fuels and speed up decay.

5. Noxious Weeds

The strategy of prevention would be used to minimize the risk of introducing new noxious weeds. Appendix A describes standard practices for the use of noxious weed free seed mixes and mulch products.

The noxious weeds of concern found near proposed projects are *Hypericum perforatum* (St. Johnswort) and *Senecio jacobea* (Tansy Ragwort). Neither is judged to be a serious threat to reforestation objectives, however the conditions created by Alternatives 2 and 3 may cause temporary growth in populations. As tree growth in harvest units occurs over time, these weed populations are likely to decline within project areas but persist in roadside areas. Cooperative efforts would continue with Oregon Department of Agriculture which includes the use of biological controls (spreading insects which feed upon these weeds).

I. Air Quality

Mt. Hood Forest Plan References

Forestwide Air Quality Standards and Guidelines - FW-39 to FW-53, page Four-51

See Mt. Hood FEIS pages IV-19, and IV-155 to IV-167

Effects of Alternatives

The fuel treatment methods considered in the project area may temporarily affect local air quality. Prescribed burning has the potential to degrade air quality for short periods of time. The principal impact to air quality from prescribed burning is the temporary visibility impairment caused by smoke to the recreational Forest users. Past experience has shown that significant air quality declines are limited in scope to the general burn area and are of short duration. The effects on air quality should be minimal due to the burning being scheduled in the spring (March - June) or fall (October - December) or during periods of inclement weather.

Areas of highest concern for possible impacts to air quality are:

Portland-Vancouver Metropolitan Area

Mt. Hood Wilderness

Bull of the Woods Wilderness

Salmon-Huckleberry Wilderness

Mt. Jefferson Wilderness

To protect visibility in Class I areas, prescribed burning would be restricted from July 4 weekend to September 15. All prescribed burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan to minimize the adverse effects on air quality.

Burning would be conducted when smoke dispersion conditions are favorable to minimize the potential for adverse effects.

Human Health Effects From Smoke

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

Members of the public are generally not at risk. Few health effects from smoke should occur to Forest users due to their limited exposure. Warning signs and public notices should serve to notify Forest users of areas with activity so they may avoid those areas. Due to the distance involved and the season of the burn, strong inversions are unlikely to develop and hold a dense smoke plume to adversely affect residents.

J. Heritage Resources

Mt. Hood Forest Plan References

Forestwide Timber Management Standards and Guidelines - FW-598 to FW-626, page Four-118
See FEIS page IV-149 and IV-155 to IV-167

Surveys conducted for this project located five new sites all of which were lithic isolates. This project is discussed in heritage resource report number 98-03-01. There are no anticipated effects on heritage resources. Project design criteria have been incorporated to protect heritage resources and are described in Chapter II. The project contracts would contains provisions for the protection of sites found during project activities.

K. Other

1. Effects upon minority groups, women, and civil rights (Secretary Memorandum 1662, Supplement 8 and OMB Circular A-19, see also FSM 1730): Minority groups and women would benefit to the extent that they would be able to participate in additional employment generated by the projects.
2. Environmental justice - Executive Order 12898. Projects would not disproportionately adversely affect minority or low-income populations.
3. There would be no effect upon prime farm land or prime range land.
4. No flood plains or wetlands are affected by the alternatives.
5. There are no conflicts between the proposed action and the objectives of Federal, Regional,

State, laws and local land use plans, or policies.

6. The relationship between short-term uses and the maintenance of long-term productivity; no significant reductions in long-term productivity are expected. See soils section.
7. Irreversible and Irretrievable Commitments. The use of rock for road surfacing is an irreversible resource commitment.

CHAPTER IV. - CONSULTATION WITH OTHERS

List of Other Agencies Consulted

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

The publication "Sprouts" is a quarterly newsletter sent out by the Mt. Hood National Forest to notify interested people, organizations, and other agencies of proposed projects and solicit comments on them. This project appeared in the winter, summer and fall 1996 issues. A letter describing the project and requesting comments was sent out to a district mailing list of 217 agencies, organizations and individuals.

From these public involvement efforts, six different letters were received. They are in the analysis file. Several of the comments expressed concern about fisheries, water quality, scenery, and regeneration success. These comments were considered during the development of the issues, alternatives and mitigations. A complete synopsis of the comments and responses will be included in an appendix to this EA after the completion of the 30 day comment period.

CHAPTER V. - LIST OF PREPARERS

Jim Roden	Writer Editor
Craig Edberg	Silviculture
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Carol Horvath	Botany
Terry Brown	Fuels
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Pat Greene	Scenery
Tom Horning	Fisheries
Steve Rheinberger	Logging Systems / Economics
Ivars Steinblums	Hydrology / Soils
Larry Bryant	Hydrology

Appendix A

Clackamas River Ranger District Standard Management Requirements and Design Criteria

See Alternative Section for mitigation specific to each alternative.

1. To reduce erosion, bare soils would be revegetated. Grass seed, fertilizer and mulch would be evenly distributed at appropriate rates to ensure successful establishment. Biodegradable erosion control mats would be used at stream crossing reconstruction sites and steep, unstable slopes. Effective ground cover would be installed prior to October 1 of each year.

Native plant species would be used to meet erosion control needs and other management objectives. Appropriate plant and seed transfer guidelines would be observed. Nonnative species may be used if native species are unavailable and the nonnatives are either 1) Early European introduced species which are naturalized and are judged not to invade undisturbed native plant communities, or 2) short-lived annuals or perennials that are both nonpersistent and noninvasive.

Grass seed would preferably be certified by the states of Oregon or Washington or grown under government-supervised contracts to assure noxious weed free status. In certain cases noncertified seed may be used if it is deemed to be free of State of Oregon listed noxious weeds.

When straw or hay is utilized it would preferably be certified by the state of Oregon, if the certification program is in effect at the time of straw/hay purchase. If the certification program is not in effect, these products would originate from State of Oregon or State of Washington certified grass seed fields or from Forest contracts to assure noxious weed free status. If no straw or hay is available from any of the preceding sources, obtain these products from fields judged to be free of State of Oregon listed noxious weeds.

2. Avoid fertilizer use in close proximity to live streams and wetlands. Generally a 10 foot buffer would be used for manual applications and a 100 foot buffer would be used for aerial applications. This would be adjusted based on site specific conditions.
3. To minimize surface erosion and sediment delivery; road construction, road reconstruction, landing construction, would not occur during periods of prolonged wetness.
4. No new landing construction would occur within riparian reserves if it involves road cut or fill-slope preparation. Avoid log landing within riparian reserve if at all possible. If not, existing landings may be used within a riparian reserve if it is located at least 125 feet from streams.
5. Avoid road construction within Riparian Reserves. If not possible, roads would be located in a manner which minimizes impacts to aquatic resources.
6. Where thinning is planned for riparian reserves, no-cut areas adjacent to streams and wet areas would be "custom designed" on-the-ground with assistance and review by a fisheries biologist. The location of the no-cut boundary and the degree of thinning in the riparian reserve would be designed

to achieve aquatic conservation strategy objectives by maximizing tree size, and minimizing the potential for sediment delivery to aquatic systems and to adequately protect the zone of shade influence along perennial streams.

7. Trees would be directional felled away from the interior of the riparian reserve to minimize yarding disturbances.
8. Avoid cutting of hardwoods in Riparian Reserves.
9. To reduce erosion, temporary roads, landings, skid trails, and skyline corridors would have water bars installed where needed, prior to the end of the normal operating season.
10. Avoid ground disturbance within riparian reserve by using techniques such as full log suspension in skyline units. (If not feasible, one-end log suspension may occur within the dry portions of the Riparian Reserves.) For tractor units, skid trails would generally be located outside of the riparian reserve and trees would be directionally felled and winched.
11. Avoid yarding corridors through riparian reserves where possible. When harvest occurs within riparian reserves, yard away from streams. Logging systems for each unit would be designed in a manner to minimize the total number of yarding corridors and landings within riparian reserves. Parallel settings with spacing approximately 150 feet between corridors and corridor width less than 15 feet are preferred over radial settings. The types of settings need to be weighed in relation to the number of landings needed to log the unit while affording the most protection to riparian reserve values.
12. Locate green tree retention clumps to minimize risk of wind throw. Where possible, leave clumps around known locations of sensitive/rare species, around concentrations of hard snags, on rocky soils, around wetlands less than 1 acre, or around patches of Pacific yew trees.
13. Snags would be retained at the level of 2.7 per acre. If a post contract review of snag levels indicates that units do not meet this level, blasting or girdling of live trees would create sufficient snags.
14. In regeneration harvest units, leave a minimum of 240 linear feet of decay class 1 or 2 logs per acre greater than or equal to 20 inches in diameter and more than 20 feet in length. In partial cutting harvest units, retain a minimum of 100 linear feet per acre.
15. Avoid the use of ground based operations (tractors, skidders, etc.) on slopes greater than 20%, because of the risk of damage to soil and water resources. Skid trails for ground-based equipment would be designated to meet Mt. Hood Forest Plan standards for soils. Existing skid trails would be used where possible. Restrict ground-disturbing activities to nonsaturated soil areas.
16. Retain effective ground cover on approximately 60% of each unit for soil erosion protection.
17. Maintain a minimum of 25 tons per acre of dead and down woody material evenly distributed throughout the harvest unit.

18. Projects would be designed to achieve combined detrimental soil impacts of 15% or less for the activity area. If impacts exceed this level based on a post project review, soils would be restored to a level of less than 15% by deep soil tillage using an approved forest cultivator.
19. Following harvest activity, the contractor would remove or chip slash created by harvest operations in units within 100 feet of mainline or secondary roads as shown in the Access and Travel Management Plan.
20. All prescribed burning would be done in accordance with state and local air quality regulations. To protect visibility in Class I areas, burning would not occur from July 4 to Labor Day.
21. When slash is piled in harvest units, one pile per acre would be retained unburned for use by wildlife.
22. When manual slash treatments, manual competing vegetation treatments, or other manual labor projects are considered, projects would be designed to reduce the exposure of workers to hazardous conditions.
23. Firewood would be made available to the public at landings where feasible.
24. Activities would be designed to meet State Water Quality Standards, and therefore the Clean Water Act, through adherence to Best Management Practices (BMPs).

Appendix B

Response to Comments for Tarzan Environmental Assessment